

Title: Simpler Recycling in England IA No: RPC Reference No: RPC-DEFRA-4341 (2) Lead department or agency: Department for Environment, Food and Rural Affairs (Defra) Other departments or agencies:	Impact Assessment (IA)
	Date: 21/05/2024
	Stage: Final
	Source of intervention: Domestic
	Type of measure: Secondary legislation
Contact for enquiries: recycling@defra.gov.uk	

Summary: Intervention and Options	RPC Opinion: GREEN
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Cost of Preferred (or more likely) Option 4 (in 2019 prices, 2020 present value)

Total Net Present Social Value	Business Net Present Value	Net cost to business per year	Business Impact Target Status Qualifying provision
£4,860.0m	£1,271.9m	£288.7m	

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

Waste generation produces negative environmental externalities. It emits greenhouse gases when sent to treatment such as incineration or landfill. When waste cannot be prevented, recycling reduces the environmental costs of products/materials being disposed of. This is because recycling is a less carbon intensive process. It also generates value by providing raw materials for manufacturing. However, current measures for household collection of recyclable materials, such as landfill tax or dry recycling separation, are proving insufficient to increase recycling beyond the current level of 44%-45% and reduce the amount of residual waste produced. Loose requirements on local authority (LA) waste collections have led to a variety of different collection systems and materials collected, leading to different recycling performance and experience for householders across England. This limits potential recycling and the environmental and economic benefits that could be achieved. For non-household municipal waste (NHM), businesses usually pay for waste collections on a per lift or bin basis. This means that introducing additional recycling may require additional bins and this may in return increase waste management costs. Government intervention is required to enable a consistent range of recyclable waste materials to be collected from households and businesses to overcome these barriers to achieve high recycling.

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

The policy objective is to reduce the negative environmental impacts by increasing both (i) the quantity of materials collected for recycling, and (ii) the quality of recyclate produced due to improved material segregation. The proposed changes will expand the range of materials collected and help both sectors (i.e., household and NHM) make the right decisions on what can be recycled, reducing contamination. Decreased contamination will boost reproprocessors' confidence in the quality of recyclate being collected, increasing demand for secondary materials. These changes will ensure that minimal waste goes to landfill, and more food waste and garden waste is composted or sent for anaerobic digestion. The policy will also help to achieve the ambitions to reach 65% municipal recycling rate by 2035 that Government stated in our 2018 Resources and Waste Strategy; and to support the Government's levelling up agenda (via Simpler Recycling) and commitment to achieve net zero emissions by 2050.

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

Within the constraints of existing legal requirements local authorities can decide on a local basis what and how materials should be collected from households for recycling. This has led to a large variety of service collection profiles and current legislative or fiscal drivers are unlikely to change this (i.e., they proved to be insufficient to increase current levels of recycling, which have plateaued at 44-45% since 2015). Further non-regulatory options were considered, e.g., voluntary frameworks and guidance, educational/communication schemes, businesses support via specific grants and tools. They were disregarded on the basis that these options are already operating but have not achieved the intended policy objectives. Waste & Resources Action Programme ("WRAP", a climate action non-governmental organisation) and other organisations continue to work with local authorities and businesses to improve recycling. WRAP, for example, worked with the waste sector to develop a voluntary Consistency Framework, but this has not been taken up by the majority of local authorities because of other funding pressures and an absence of additional legal drivers. For businesses, a range of voluntary initiatives have operated but there have been no drivers for the sector to actively recycle waste and the costs of the change to businesses, without rationalisation of waste services, can inhibit the transition. In response to this, Government has concluded that we should implement measures to improve consistency in recycling for households and businesses.

The Environment Act 2021 amends the Environmental Protection Act 1990 to require that six recyclable waste streams are collected from households for recycling or composting: plastics; metal; glass; paper and card; food waste; garden waste. The Environment Act 2021 also requires that the same recyclable waste streams (except garden waste) are collected from relevant non-domestic premises (e.g. schools and hospitals) and other premises producing relevant waste (industrial and commercial waste, which is similar in nature and composition to household waste – i.e. businesses).

The primary legislation requires that these recyclable waste streams are collected separately from residual waste in all circumstances and collected separately from each other unless certain exceptions apply (if it is not technically or economically practicable to collect separately or it does not offer the best environmental outcomes). In these circumstances, LAs and other waste collectors may co-collect recyclable waste streams on production of a written assessment to justify use of an exception. In all circumstances, the dry recyclable waste streams (plastic, metal, glass and paper and card) must be collected separately from food and garden waste. Food waste must always be collected weekly from households.

Additionally, the Secretary of State has the power to set exemptions in regulations from the requirement to separately collect the recyclable waste streams, if satisfied that doing so will not significantly reduce the potential for recyclable waste streams to be recycled or composted. The Secretary of State intends to provide exemptions to allow for the co-collection of any/all dry recyclable waste streams, and the co-collection of food and garden waste, in all circumstances without the need to produce a written assessment. Therefore, waste collectors will choose how to collect recycling. Please note the recyclable waste streams must still be collected separately from residual waste in all circumstances, and dry recycling must still be collected separately from food/garden waste. If food and garden waste are co-collected from households, this must be weekly to satisfy the requirement that food waste is collected weekly from households.

Secondary legislation will set out further detail on the materials in scope, any exemptions from the requirement to collect recyclable streams separately, dates by which the requirements must be introduced (including transitional arrangements to allow longer for food waste implementation for certain waste collection authorities), and additional relevant non-domestic premises in scope of the requirements. As such, the final policy options presented and analysed in this impact assessment are based on the anticipated final secondary legislation proposals and reflect the most likely collection arrangements to operate across households and non-household premises.

We expect local authorities to implement these reforms in a variety of ways to suit their specific circumstances, which has been considered in the supporting modelling. The impacts of different requirements for household and non-household waste and recycling collections were considered and then combined for the whole municipal (M) sector:

Baseline (i.e., do-nothing): do not implement Simpler Recycling in England. Introduce an “all-in, no glass” Deposit Return Scheme (DRS) for drinks containers in England and Northern Ireland (as set out in the forthcoming DRS IA).

Option 1M: (i) Household sector – this option assumes consistent collection of dry recyclable waste streams through systems with further separation. This option also assumes separate weekly food waste, and provision of free garden waste. (ii) NHM sector – this option assumes businesses and non-domestic premises (producing household waste) separate recyclable waste into mixed dry recyclable waste streams but with a separate glass waste collection. They also have separate food waste collections. Micro firms are exempt.

Option 2M: (i) Household sector – as Option 1M. (ii) NHM sector – as in 1M except micro firms are phased into the policy from 31st March 2027.

Option 3M: (i) Household sector – as Option 1M, except for garden waste. It is assumed that all local authorities charge participating households for collecting garden waste. (ii) NHM sector – as in 1M.

Option 4M: (i): Household sector – as Option 1M, except for garden waste. It is assumed that all local authorities charge participating households for collecting garden waste. (ii) NHM sector – as in 1M except micro firms are phased into the policy from 31st March 2027)

Option 4M is our preferred option. There was a strong support from consultation responses for micro firms to be included in the new requirements, given their overall impact on our recycling rate and associated carbon benefits. Concerning garden waste, additional environmental benefits (e.g., carbon savings) did not provide a strong enough economic case to fund these services using public expenditure.

Will the policy be reviewed? It will be reviewed. If applicable, set review date: 5 years post implementation				
Is this measure likely to impact on international trade and investment?		No		
Are any of these organisations in scope?	Micro Yes	Small Yes	Medium Yes	Large Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)		Traded: -18.5Mt		Non-traded: -28.2Mt

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 Minister: Robbie Moore Date: 20th May 2024

Summary: Analysis & Evidence

Policy Option 1

Description: 1M

FULL ECONOMIC ASSESSMENT

Price Base	PV Base	Time Period	Net Benefit (Present Value (PV)) (£m)		
2020	2024	12	Low: £3,739.1	High: £9,632.6	Best Estimate: £5,789.0

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)		Total Cost (Present Value)
Low	£1,099.5	7	£205.9	£2,940.0
High	£1,407.1		£321.4	£4,312.9
Best Estimate	£1,226.3		£216.4	£3,147.3

Description and scale of key monetised costs by 'main affected groups' Local authorities see their net waste management costs increase by £3,513m. Out of these costs, £997m are transition costs. They include buying new vehicles, containers, and wider transition costs. £1,322m is a loss of income from removed garden waste charging. This is a transfer to households as they generate savings from removed garden waste charges. The remaining balance is changes in on-going costs (£1,697m) and DRS net effect (£486m saving). DRS net effect is the difference in DRS-specific costs between the baseline and a relevant policy option. We estimate the following transition costs to the NHM sector: £132m familiarisation costs. The NHM waste management costs decrease by £561m (including DRS net effect). The policy support costs (including compliance and enforcement) are estimated to be £63m (of which £1.8m are transition costs). All values presented are discounted.

Other key non-monetised costs by 'main affected groups'

Familiarisation and inconvenience costs to households are not accounted for. Based on available evidence we do not expect these costs to be significant. We were not able to monetise costs to business associated with sorting waste. However, we do not expect these costs to be significant. These and wider impacts on the recycling and waste industry are presented qualitatively in this impact assessment, using the best available evidence.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)		Total Benefit (Present Value)
Low	£0	0	£845.6	£8,051.9
High	£0		£1,320.1	£12,572.6
Best Estimate	£0		£939.0	£8,936.3

Description and scale of key monetised benefits by 'main affected groups'

Household savings from removed garden waste charging are estimated at £1,322m over the appraisal period. This is a transfer from local authorities to households. Government has a lost benefit of £4,175m in reduced landfill tax receipts. This is a transfer impact from Government to local authorities (£180m) and to businesses (£3,995m) as their costs of disposing of waste to landfill are reduced. There is a saving to the NHM sector of £3,995m from reduced landfill tax payments (NB landfill tax payments concerning local authorities are included in their waste management costs). Carbon savings (traded and non-traded) are estimated at £7,795m. These savings are net of emissions associated with an increase in recycling activity. All values are discounted

Other key non-monetised benefits by 'main affected groups'

The recycling industry benefits from an increased supply of higher quality and quantity of materials. We were not able to monetise the additional Greenhouse Gas (GHG) savings associated with higher quality recycle that is more likely to be produced under systems with further separation. Impacts on jobs, innovation and trade are presented qualitatively.

Key assumptions/sensitivities/risks	3.5
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For the household sector, the uptake in recycling is estimated based on WRAP's modelling. The modelling reflects different collection schemes, rurality, deprivation levels and Office for National Statistics (ONS) data across different local authority areas. The high and low sensitivities do not assume any change in recycling yields from best estimates. They account for different material prices and gate fees and reflect uncertainty associated with key capital (such as vehicles and containers) and operating costs (such as labour). The NHM 'presented' baseline recycling rate is estimated to be 43.3%. It is likely that this is an overestimate which means that we might overestimate costs to businesses and underestimate carbon savings. However, this aligns with our cautious approach to estimating costs to businesses. For Option 1M, we assume that 80% of the total tonnage that could be recycled is presented by business. This is our central estimate. We also modelled 70% and 90% capture rates for low and high estimates, respectively. The high and low sensitivities also include familiarisation costs, lift prices and DRS effect. For the cross-cutting impacts (carbon savings), we used low, central and high carbon prices.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m: -£175.9
Costs: -£42.9	Benefits: £0.0	Net: -£42.9	

Summary: Analysis & Evidence

Policy Option 2

Description: 2M

FULL ECONOMIC ASSESSMENT

Price Base	PV Base	Time Period	Net Benefit (Present Value (PV)) (£m)		
2020	2024	12	Low: -£81.4	High: £11,054.9	Best Estimate: £4,991.7

COSTS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£1,221.7	7	£542.4	£6,235.3
High	£1,870.2		£828.9	£9,537.2
Best Estimate	£1,464.3		£610.6	£7,093.6

Description and scale of key monetised costs by 'main affected groups' Local authorities see their net waste management costs increase by £3,513m. Out of these costs, £998m are transition costs. They include buying new vehicles, containers and wider transition costs. £1,322m is a loss of income from removed garden waste charging. This is a transfer to households as they generate savings from removed garden waste charges. The remaining balance is changes in on-going costs (£1,697m) and DRS net effect (£486m saving). We estimate the following transition costs to the NHM sector: £354m familiarisation cost. The NHM waste management costs increase by £3,164m (including DRS net effect); this consists of a £3,594m cost increase to micro firms and a £430m saving to the remaining businesses. Although micro firms are phased into the policy from 31st March 2027, they are one of the most affected groups given their large number. The policy support costs (including compliance and enforcement) are estimated to be £63m (of which £1.8m are transition costs). All values presented are discounted.

Other key non-monetised costs by 'main affected groups'

Familiarisation and inconvenience costs to households are not accounted for. Based on available evidence we do not expect these costs to be significant. We were not able to monetise costs to business associated with sorting waste. However, we do not expect these costs to be significant. These and wider impacts on the recycling and waste industry are presented qualitatively in this impact assessment, using the best available evidence.

BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	£0	0	£996.9	£9,455.9
High	£0		£1,827.7	£17,290.1
Best Estimate	£0		£1,278.5	£12,085.2

Description and scale of key monetised benefits by 'main affected groups'

Household savings from removed garden waste charging are estimated at £1,322m over the appraisal period. This is a transfer from local authorities to households. Government has a lost benefit of £5,756m in reduced landfill tax receipts. This is a transfer impact from Government to local authorities (£180m) and to businesses (£5,576m) as their costs of disposing of waste to landfill are reduced. There is a saving to the NHM sector of £5,576m from reduced landfill tax payments (NB landfill tax payments concerning local authorities are included in their waste management costs). Carbon savings (traded and non-traded) are estimated at £10,943m. These savings are net of emissions associated with an increase in recycling activity. All values are discounted.

Other key non-monetised benefits by 'main affected groups'

The recycling industry benefits from an increased supply of higher quality and quantity of materials. We were not able to monetise the additional GHG savings associated with higher quality recycle that is more likely to be produced under systems with further separation. Impacts on jobs, innovation and trade are presented qualitatively.

Key assumptions/sensitivities/risks	Discount
	3.5

For the household sector, the uptake in recycling is estimated based on WRAP's modelling. The modelling reflects different collection schemes, rurality, deprivation levels and ONS data across different local authority areas. The high and low sensitivities do not assume any change in recycling yields from best estimates. They account for different material prices and gate fees and reflect uncertainty associated with key capital (such as vehicles and containers) and operating costs (such as labour).

The NHM 'presented' baseline recycling rate is estimated to be 43.3%. It is likely that this is an overestimate which means that we might overestimate costs to businesses and underestimate carbon savings. However, this aligns with our cautious approach to estimating costs to businesses. For Option 2M, we assume that 80% of the total tonnage that could be recycled is presented by business. This is our central estimate. We also modelled 70% and 90% capture rates for low and high estimates, respectively. The high and low sensitivities also include familiarisation costs, lift prices and DRS effect.

For the cross-cutting impacts (carbon savings), we used low, central and high carbon prices.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m: £1,443.5
Costs: £351.7	Benefits: £0.0	Net: £351.7	

Summary: Analysis & Evidence

Policy Option 3

Description: 3M

FULL ECONOMIC ASSESSMENT

Price Base	PV Base	Time Period	Net Benefit (Present Value (PV)) (£m)		
2020	2024	12	Low: £5,003.8	High: £10,257.8	Best Estimate: £6,669.9

COSTS (£m)	Total Transition (Constant Price)		Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£831.2	7	-£149.3	-£717.5
High	£1,064.9		-£45.5	£476.3
Best Estimate	£928.5		-£140.6	-£554.0

Description and scale of key monetised costs by 'main affected groups'

Local authorities see their net waste management costs decrease by £188m. Out of these costs, £722m are transition costs. They include buying new vehicles, containers and wider transition costs. £1,003m is additional income from garden waste charging. This is a transfer from participating households that are charged for their garden waste to be collected. The remaining balance is changes in on-going costs (£588m) and DRS net effect (£486m saving). We estimate the following transition costs to the NHM sector: £132m familiarisation costs. The NHM waste management costs decrease by £429m (including DRS net effect). The policy support costs (including compliance and enforcement) are estimated to be £63m (of which £1.8m are transition costs). All values presented are discounted.

Other key non-monetised costs by 'main affected groups'

Familiarisation and inconvenience costs to households are not accounted for. Based on available evidence we do not expect these costs to be significant. We were not able to monetise costs to business associated with sorting waste. However, we do not expect these costs to be significant. These and wider impacts on the recycling and waste industry are presented qualitatively in this impact assessment, using the best available evidence.

BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	£0	0	£577.4	£5,480.1
High	£0		£1,002.1	£9,540.2
Best Estimate	£0		£644.0	£6,115.9

Description and scale of key monetised benefits by 'main affected groups'

Participating households (with gardens) are charged for their garden waste collections by local authorities. This is a disbenefit to them of £1,003m over the appraisal period. Government has a lost benefit of £3,636m in reduced landfill tax receipts. This is a transfer impact from Government to local authorities (£150m) and to businesses (£3,486m) as their costs of disposing of waste to landfill are reduced. There is a saving to the NHM sector of £3,486m from reduced landfill tax payments (NB landfill tax payments concerning local authorities are included in their waste management costs). Carbon savings (traded and non-traded) are estimated at £7,269m. These savings are net of emissions associated with an increase in recycling activity. All values are discounted.

Other key non-monetised benefits by 'main affected groups'

The recycling industry benefits from an increased supply of higher quality and quantity of materials. We were not able to monetise the additional GHG savings associated with higher quality recyclate that is more likely to be produced under systems with further separation. Impacts on jobs, innovation and trade are presented qualitatively.

Key assumptions/sensitivities/risks	Discount
	3.5

For the household sector, the uptake in recycling is estimated based on WRAP's modelling. The modelling reflects different collection schemes, rurality, deprivation levels and ONS data across different local authority areas. The high and low sensitivities do not assume any change in recycling yields from best estimates. They account for different material prices and gate fees and reflect uncertainty associated with key capital (such as vehicles and containers) and operating costs (such as labour). Concerning garden waste collections, we assume that the households (that are charged) have requested to have a separate collection.

The NHM 'presented' baseline recycling rate is estimated to be 43.3%. It is likely that this is an overestimate which means that we might overestimate costs to businesses and underestimate carbon savings. However, this aligns with our cautious approach to estimating costs to businesses. For Option 3M, we assume that 80% of the total tonnage that could be further recycled is presented by business. This is our central estimate. We also modelled 70% and 90% capture rates for low and high estimates, respectively. The high and low sensitivities also include familiarisation costs, lift prices and DRS effect.

For the cross-cutting impacts (carbon savings), we used low, central and high carbon prices.

BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m: -£175.9
Costs: -£42.9	Benefits: £0.0	Net: -£42.9	

Summary: Analysis & Evidence

Policy Option 4

Description: 4M

FULL ECONOMIC ASSESSMENT

Price Base	PV Base	Time Period	Net Benefit (Present Value (PV)) (£m)		
2020	2024	12	Low: £1,499.7	High: £12,192.8	Best Estimate: £5,920.6

COSTS (£m)	Total Transition (Constant Price)		Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£953.5	7	£187.3	£2,577.7
High	£1,528.0		£462.0	£5,700.7
Best Estimate	£1,166.5		£253.7	£3,392.3

Description and scale of key monetised costs by 'main affected groups' Local authorities see their net waste management costs decrease by £188m. Out of these costs, £722m are transition costs. They include buying new vehicles, containers and wider transition costs. £1,003m is additional income from garden waste charging. This is a transfer from participating households that are charged for their garden waste to be collected. The remaining balance is changes in on-going costs (£588m) and DRS net effect (£486m saving). We estimate the following transition costs to the NHM sector: £354m familiarisation costs. The NHM waste management costs (excluding landfill tax) increase by £3,164m relative to the baseline (including DRS net effect); this consists of a £3,594m cost increase to micro firms and a £430m saving to the remaining businesses. Although micro firms are phased into the policy from 31st March 2027, they are one of the most affected groups given their large number. The policy support costs (including compliance and enforcement) are estimated to be £63m (of which £1.8m are transition costs). All values presented are discounted.

Other key non-monetised costs by 'main affected groups'

Familiarisation and inconvenience costs to households are not accounted for. Based on available evidence we do not expect these costs to be significant. We were not able to monetise costs to business associated with sorting waste. However, we do not expect these costs to be significant. These and wider impacts on the recycling and waste industry are presented qualitatively in this impact assessment, using the best available evidence.

BENEFITS (£m)	Total Transition (Constant Price) Years		Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	£0	0	£761.7	£7,200.4
High	£0		£1,565.9	£14,770.6
Best Estimate	£0		£988.6	£9,313.0

Description and scale of key monetised benefits by 'main affected groups'

Participating households (with gardens) are charged for their garden waste collections by local authorities. This is a disbenefit to them of £969m over the appraisal period. Government has a lost benefit of £5,216m in reduced landfill tax receipts. This is a transfer impact from Government to local authorities (£149m) and to businesses (£5,067m) as their costs of disposing of waste to landfill are reduced. There is a saving to the NHM sector of £5,067m from reduced landfill tax payments (NB landfill tax payments concerning local authorities are included in their waste management costs). Carbon savings (traded and non-traded) are estimated at £10,466m. These savings are net of emissions associated with an increase in recycling activity. All values are discounted.

Other key non-monetised benefits by 'main affected groups'

The recycling industry benefits from an increased supply of higher quality and quantity of materials. We were also not able to monetise the additional GHG savings associated with higher quality recycle that is more likely to be produced under systems with further separation. Impacts on jobs, innovation and trade are presented qualitatively.

Key assumptions/sensitivities/risks	Discount	3.5
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For the household sector, the uptake in recycling is estimated based on WRAP's modelling. The modelling reflects different collection schemes, rurality, deprivation levels and ONS data across different local authority areas. The high and low sensitivities do not assume any change in recycling yields from best estimates. They account for different material prices and gate fees and reflect uncertainty associated with key capital (such as vehicles and containers) and operating costs (such as labour). Concerning garden waste collections, we assume that the households (that are charged) have requested to have a separate collection.

The NHM 'presented' baseline recycling rate is estimated to be 43.3%. It is likely that this is an overestimate which means that we might overestimate costs to businesses and underestimate carbon savings. However, this aligns with our cautious approach to estimating costs to businesses. For Option 4M, we assume that 80% of the total tonnage that could be recycled is presented by business. This is our central estimate. We also modelled 70% and 90% capture rates for low and high estimates, respectively. The high and low sensitivities also include familiarisation costs, lift prices and DRS effect. For the cross-cutting impacts (carbon savings), we used low, central and high carbon prices.

BUSINESS ASSESSMENT (Option 4)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m: £1,443.5
Costs: £351.7	Benefits: £0.0	Net: £351.7	

Glossary

Extended producer responsibility (EPR): the UK Government together with the Devolved Administrations are reforming the UK packaging producer responsibility system and introducing EPR for household packaging. 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. 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. The new regulations should increase the recyclability and reusability of packaging by rewarding/penalising producers according to specified criteria. Consumers will find it easier to recycle packaging due to clear labelling. Measures related to the presentation of evidence relating to the export of packaging waste for recycling will be tightened.

Deposit return scheme (DRS): drinks containers are often made of easily recyclable materials (PET plastic, aluminium, steel), yet are frequently disposed of inappropriately or littered, rather than recycled, generating negative externalities including increased CO₂ emissions. The Deposit Return Scheme for England, Wales and Northern Ireland aims to increase recycling rates of in-scope drinks containers, collect higher quality recycling and reduce litter by placing a refundable deposit paid by consumers at the point of purchase to be redeemed when the container is returned to a return point.

Municipal waste: household waste and household-like waste produced on non-household premises.

Municipal sector: includes households and non-household municipal sector (NHM).

Non-household municipal sector (NHM): premises that produce relevant waste (such as businesses) and relevant non-domestic premises (such as residential homes, schools, and hospitals) that produce household waste. In this impact assessment, we use “municipal businesses” or “the NHM sector” interchangeably to refer to both premises that produce relevant waste and non-domestic premises that produce household waste.

Relevant waste: commercial and industrial waste, which is similar in nature and composition to household waste.

Waste collection authority (WCA): a local authority in England providing a waste collection service for households and, in some cases, non-household municipal premises¹.

Waste disposal authority (WDA): a local authority in England providing a waste disposal service for households and/or non-household municipal premises. WDAs usually have the function of managing collections from Household Waste Recycling Centres.

Waste collection system definitions:

- Dry recycling/recyclables: paper and card, plastic, glass, metal.
- Multi-stream collection: dry recyclable waste streams are presented for collection by the household in three or four separate containers, for example: (i) plastics and metal, (ii) glass and (iii) paper and card.
- Twin-stream collection (also known as two-stream): dry recyclable waste streams are presented for collection in two separate containers, for example fibres (paper and cardboard) in one and other dry recyclable waste streams (metal; glass; plastic) in another.
- Mixed dry recyclables collection: dry recyclable waste streams (metal; plastic; glass; paper and card) are presented together in one bin. This also called co-mingling.

¹ For more detail, please see section 30 of the EPA 1990.

- Separate food waste collections: food waste is collected separately from the other recyclable waste streams and residual waste.
- Separate garden waste collections: for households, garden waste is collected separately from the other recyclable waste streams and residual waste.
- Capture rate: the quantity of target material 'captured' divided by the total quantity of the material available for waste collection. Capture rate is a non-specific waste stream term.
- Recycling rate:
 - *Presented recycling rate*: the amount of recyclate presented for recycling at kerbside level, i.e., the amount of waste physically put in the bin by the householder or firm as a proportion of the total amount of waste available for collection.
 - *Actual recycling rate*: the proportion of recyclate that arrives for treatment, sorted and split from any contamination that may make the recyclable material untreatable, as a proportion of total amount of waste available for collection.
 - *Household recycling rate*: based on an actual recycling rate calculated for the household sector. This rate does not include indirect recycling (i.e., recyclate recovered from residual waste infrastructure such as energy from waste (EfW) and Mechanical Biological Treatment (MBT)).
 - *NHM recycling rate*: based on an actual recycling rate calculated for the NHM sector (unless otherwise stated). This rate does not include indirect recycling (i.e., recyclate recovered from residual waste infrastructure such as EfW and MBT).
 - *Municipal sector recycling rate*: based on actual recycling rate for the municipal sector. This rate includes indirect recycling (from residual waste infrastructure such as EfW and MBT).
- Low-rise and flatted properties: for households, low-rise refers to properties that are usually three stories or less whose waste is collected at kerbside. Flatted properties are those usually higher than three stories. Their waste may be collected at kerbside but also there may be recycling facilities with shared bins within the building complex. The reason for the distinction is that it is usually easier to collect waste from low-rise properties and residents tend to use their own recycling bins more than in flatted properties. This is because the recycling facilities in the flatted properties are more complex, there may be inadequate space at the point of collection to separate recyclables, etc.
- HMG: His Majesty's Government, the government of the United Kingdom made up of all ministerial departments.

Executive Summary

This is a final impact assessment to assess the final policy proposals on Simpler Recycling in England. (previously known as “Consistency in Recycling”) There were four consultations on this policy. We first consulted on the policy in February – May 2019². Our second consultation was in May – July 2021³. We held two further consultations in October – November 2023: a targeted consultation on exemptions and statutory guidance⁴, and a public consultation on additional policies⁵. There were two accompanying impact assessments to assess the economic case of the proposed policy options, published in 2019 and 2021. This final impact assessment builds on the earlier assessments. It reflects the final policy proposals and incorporates the latest evidence available.

The final impact assessment covers municipal waste, which is comprised of household waste and businesses and public sector organisations that generate household-like waste. In this document non-household premises affected are referred to as municipal businesses or the non-household municipal sector (NHM). Despite being grouped together as the municipal sector, waste collections for households and municipal businesses are very different and will be addressed separately throughout the impact assessment. For example, the NHM sector is overall more complex than the household sector given its diversity and no ‘middleman’ to manage waste collections between the businesses and the waste collectors (as a local authority does for households).

In 2019, we consulted on proposals to require all local authorities in England to collect the same core set of dry recyclable materials from households and have separate weekly food waste collections from households, and other policies related to recycling. The intention of this proposal was to increase the overall quantity and quality of recycling collected in order to reduce the negative environmental impacts. Previous recycling requirements have proven insufficient to increase recycling beyond the current level of 44-45% for households (this rate has not changed for the past 5 years) and 43.3%⁶ for businesses. Additionally, previous policy has led to a lack of consistency in waste collection services (including different materials collected for recycling) and recycling performance across England.

Following support for the proposals in our 2019 consultation, the Environment Act 2021 amended the Environmental Protection Act 1990 (“the Act”) to require the following recyclable waste streams to be collected for recycling or composting from all households in England: glass, metal, plastic, paper and card, food waste and garden waste. Food waste must be collected at least weekly from households. The Act also requires businesses and relevant non-domestic premises (such as schools and hospitals) in England to make arrangements for the same recyclable waste streams, except garden waste, to be collected for recycling or composting. Together, waste collected from these premises is referred to in this impact assessment as ‘municipal waste’.

The Act requires that the recyclable waste streams are collected separately from residual waste in all circumstances and collected separately from each other unless certain exceptions apply (if it is not technically or economically practicable to collect separately or it does not offer the best environmental outcomes). In these circumstances, LAs and other waste collectors may co-collect recyclable waste streams on production of a written assessment to justify use of an exception. In all circumstances, the dry recyclable waste streams (plastic, metal, glass and paper and card) must still be collected separately from food and garden waste.

Additionally, the Secretary of State has the power to set exemptions in regulations from the requirement to separately collect the recyclable waste streams, if satisfied that doing so will not significantly reduce the potential for recyclable waste streams to be recycled or composted. The

² [Consistency in recycling collections in England: executive summary and government response 2019](#)

³ [Consultation on consistency in household and business recycling in England government response 2021](#)

⁴ [Exemptions and statutory guidance for simpler recycling in England government response 2023](#)

⁵ [Simpler recycling in England: additional policies government response 2023](#)

⁶ Presentational recycling rates from WRAP analysis.

Secretary of State intends to provide exemptions to allow for the co-collection of any/all dry recyclable waste streams, and the co-collection of food and garden waste, in all circumstances without the need to produce a written assessment. Therefore, waste collectors will choose how to collect recycling (i.e. as a comingled service or through systems with further separation) according to local circumstances. Please note the recyclable waste streams must still be collected separately from residual waste in all circumstances, and dry recycling must still be collected separately from food/garden waste. If food and garden waste are co-collected from households, this must be weekly to satisfy the requirement that food waste is collected weekly from households.

Regulations will confirm these exemptions, as well as a) dates by which the requirements must be introduced, b) materials to be included in each of the recyclable waste streams, c) an exemption for micro firms from the new requirements for an initial two years, and d) additional relevant non-domestic premises to be included in scope of the requirements. As such, the final policy options – presented and analysed in this impact assessment - are based on the final secondary legislation proposals and the modelling reflects the most likely collection arrangements to operate across households and non-household premises (considering applicable exemptions from separate collection). Please see Section 6 for more information.

Overall, introducing consistent municipal collection requirements can unlock significant environmental and financial benefits and increase the quantity and quality of materials collected for recycling and reprocessing into secondary raw materials. There are currently, significant barriers limiting further uptake such as insufficient pricing of environmental externalities, behavioural barriers at the point of materials' collection or fragile secondary materials markets⁷ preventing these benefits being realised. Through mandating increased standardisation of materials collected for recycling across England, we expect to improve waste collection services and performance (i.e., this is because the current approach to recycling is fragmented and inconsistent across England). We also expect communications and clearer labelling to improve business and residential understanding of what can be recycled, leading to high recycling rates by both sectors as well as lower contamination⁸ and greater compliance with the requirements.

Table 1 informs our options appraisal and summarises our high-level theory of change for Simpler Recycling. Throughout our appraisal, we refer to local authorities when representing Waste Collection Authorities (WCAs) and/or Waste Disposal Authorities (WDAs), unless otherwise stated. This is because the proposed policy affects both waste collection as well as waste treatment and/or disposal. Similarly, affected businesses and non-domestic premises are referred to as 'municipal businesses' or the 'NHM sector'.

⁷ There are a number of proposals – set out in our Resource and Waste Strategy - to help stimulate supply and demand for secondary materials. This is because it is often cheaper to use virgin raw materials than recycled, despite their higher environmental impact.

⁸ Recycling contamination occurs when materials are sorted into the wrong recycling bin, or when materials are not properly cleaned (such as food residue remains on a plastic container). Such contamination can reduce the quality and value of recyclate and can lead to rejection at reprocessing or sorting centres.

Table 1: High level theory of change for consistent recycling collections

Issue	Activity	Expected behaviour changes	Outcome	Environmental, economic or social benefit
<p>The household (HH) sector: currently local authorities (LAs) make their own decisions about which materials they collect for recycling, depending on local factors and the ability to sell these materials on to recycling companies. Some materials are currently widely collected (e.g., paper & card collected by c.100% of LAs in England), however others are less widely collected (e.g., 35% of LAs have a separate food waste collection; 83% collect plastic pots tubs and trays for recycling). This creates fragmented and inconsistent approach to recycling across England; and households have very different experiences of recycling depending on where they live.</p>	<p>A core set of recyclable waste streams to be collected from households by all LAs.</p> <p>We will continue to work with WRAP to develop good practice on communications for householders alongside the implementation of Simpler Recycling reforms.</p>	<p>Households recycle materials that they were not able to recycle before. This means that all households are able to recycle the same set of materials and experience the same level of service.</p>	<p>Improved participation and standardisation of materials in recycling means increased amounts of waste are recycled.</p>	<p>Reduced landfill and incineration and their associated carbon emissions.</p> <p>Reduced carbon emissions as a result of reduced production from virgin materials.</p> <p>Increased revenue for the recycling industry (non-monetised in this IA).</p>
	<p>Working with Extended Producer Responsibility (EPR)⁹ reforms on a universal recycling label for packaging will reduce confusion for householders on what can and can't be recycled.</p>	<p>Clearer labelling reduces householder confusion around which materials to recycle. This encourages more recyclable material to be put into the recycling collection rather than the residual waste bin.</p>	<p>Increased amounts of waste are recycled.</p> <p>Less contamination of recycling streams so recyclate is more valuable (higher quality) and less time and money is spent removing contaminants.</p>	
	<p>Mandate the separate collection of food waste for households.</p>	<p>Households currently without separate collections can recycle food waste.</p>	<p>Increased amounts of food waste are recycled.</p>	
	<p>Mandate the free collection of garden waste for households.</p>	<p>Households that currently do not pay for their garden waste collection are now able to recycle their garden waste instead of putting it into the residual bin or disposing of it elsewhere.</p>	<p>Increased amounts of garden waste are recycled.</p>	
<p>The NHM sector: there are no drivers for businesses to actively recycle waste and costs of the change, without rationalisation of waste services, can inhibit the transition.</p>	<p>Requirement for businesses to arrange for the collection of, and present, recyclable waste streams and food waste separately from residual waste for collection.</p>	<p>Business owners and managers recycle materials that would otherwise been landfilled or incinerated.</p>	<p>Increased amounts of material from non-household municipal sources are recycled.</p>	

⁹ Further detail can be found in the Glossary.

<p>This is because businesses usually pay for waste collections on a per-lift or bin basis. Consequently, introducing additional recycling bins may not lead to reduced waste costs.</p>	<p>We will continue to work with WRAP on developing communications messages for businesses and other organisations.</p> <p>Working with EPR reforms on a universal recycling label for packaging will reduce confusion on what can and can't be recycled in the NHM sector.</p>			
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Source: Defra and WRAP methodologies

The options considered in this final impact assessment are informed by the consultations and associated impact assessments^{10, 11}. They have been designed in line with the requirements of the Environment Act 2021 to separately collect recyclable waste streams, taking into account that it will be possible to use an exemption to collect certain waste streams together:

- We have assessed the four municipal sector policy options, which are combinations of different options for the household and NHM sectors (see Table 2).
- For the household sector, we have modelled two options (i.e., Option 1hh and 2hh) based on our preferred option from the second consultation impact assessment. **Option 1hh** assumes consistent weekly collection of dry recyclable waste streams (paper and card, plastic, metal and glass) through systems with further separation. It assumes fortnightly residual collections, separate weekly food waste and free fortnightly garden waste collections. It also assumes high-rise properties transition at the same time as low-rise properties. All high-rise properties have separate food waste collections. **Option 2hh** is the same as 1hh option except it is assumed that all local authorities have charged garden waste collections for low rise properties with gardens. A charged garden waste scenario had been disregarded in our consultation impact assessment due to a relatively low net present value (NPV) compared to options which had free garden waste associated with them. However, we have gathered some new evidence and reviewed our modelling around garden waste. Therefore, this is now included in the main option analysis.
- For the household options, we have used a model of alternate residual waste collections with weekly food waste collections. In reality, some local authorities are likely to continue to provide weekly residual collections. Concerning charged garden waste, some local authorities may choose to continue to provide free garden waste collections to their households.
- The NHM sector has also two options. **Option 1nhm** assumes that businesses (including non-domestic premises) separate waste into residual, mixed dry recyclables, separate glass waste and separate food waste. Micro firms (those who employ less than 10¹²) are exempt in this policy option to mitigate against cost pressure. **Option 2nhm** is the same as Option 1nhm, except micro firms are included in the policy from 31st March 2027, two years after implementation, to allow time for businesses to account for new provisions.

¹⁰ <https://www.gov.uk/government/consultations/waste-and-recycling-making-recycling-collections-consistent-in-england/outcome/consistency-in-recycling-collections-in-england-executive-summary-and-government-response#government-response-to-consultation-on-consistency-in-household-and-business-recycling>

¹¹ <https://consult.defra.gov.uk/waste-and-recycling/consistency-in-household-and-business-recycling/>

¹² This is how we defined “micro-sized” firms for the purposes of this impact assessment.

- For modelling purposes, we have assumed that all businesses will separate waste to mixed dry recyclables and have separate glass and food waste collections under the proposed policy option. We use this option as the most likely scenario on the assumption that the majority of businesses are likely to rely on an exemption from the requirement to collect the recyclable waste streams separately from each other, to collect paper and card, metal and plastic together in one bin, so as to reduce number of bins required. This is based on the national surveys of waste collections from businesses and waste collector offerings¹³. They show that the majority of recyclable waste collections provided to the NHM sector are currently for mixed dry recyclables. This is because most sites have limited space; and, also, not every business generates all the material streams in scope of reforms. As such, we have modelled partially mixed dry collections (with glass as a separate stream). Please see Section 6 for more information.
- The appraisal period covers the period from 2024 to 2035, i.e., 12 years. This is to help measure our progress against meeting a 65% ambition of municipal waste by weight to be recycled by 2035¹⁴ (given that Simpler Recycling is the largest contributor towards this ambition)¹⁵.

Table 2: Combinations of municipal (M) sector options considered for household and non-household municipal waste.

<i>Sectors</i>	<i>Non-Household Municipal (NHM) Sector</i>		
	<i>1 nhm</i>	<i>2nhm</i>	
<i>Household Sector</i>	<i>1 hh</i>	1M	2M
	<i>2hh</i>	3M	4M

Given the options analysis presented in this impact assessment and the outcome from the review of stakeholder responses to the second consultation, the recommended option is 4M:

- For households: Option 2hh which assumes local authorities can continue to charge for garden waste collections.
- For municipal businesses: Option 2nhm which includes micro firms from 31st March 2027.
- The NPV (2024-2035) of these two options combined (i.e., Option 4M) is £5,921m. Although this combination of options does not yield the highest NPV (i.e., net benefit to society), there was strong support from consultation responses for micro firms to be included in the new requirements¹⁶. Including micro firms will help increase our recycling rate. Our estimate is that this option could achieve between 9.9 to 17.3 percentage point increase in municipal recycling rate by 2035. Our central estimate is a 13.6 percentage point increase, meaning an increase in recycling rate from 42.3% to 55.9% by 2035.
- As part of this impact assessment, we have considered two mitigation options for micro-firms that exempt micro firms or allow them additional implementation time to make required changes. Given that the inclusion of micro firms increases our NHM recycling rates by 9.3 percentage points as well as increases our carbon savings by £3.1-3.2bn¹⁷, our preferred

¹³ Source: WRAP

¹⁴ As set out in our Resource and Waste Strategy for England:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf

¹⁵ Annex G provides the main analysis outputs based on a 10-year appraisal. This is to allow a comparison of outcomes against the other major waste reforms (i.e., EPR and DRS).

¹⁶ <https://www.gov.uk/government/consultations/consistency-in-household-and-business-recycling-in-england/outcome/government-response>

¹⁷ The additional carbon savings of including micro firms are dependent on the HH option. There are discounted carbon savings of £3.149bn under Option 1hh and £3.197bn Option 2hh.

option is 2nhm. Since micro-firms produce nearly 30% of the total non-household municipal waste, including them in the new requirements, also helps divert increased amounts of biodegradable materials (e.g., food waste, paper and cardboard) away from landfill. This is in line with our overall Net Zero strategy commitment to explore policies to work towards the near elimination of biodegradable municipal waste to landfill by 2028.

- Concerning garden waste collections, we have considered value for money of using public expenditure. Additional environmental benefits (e.g., carbon saving) did not provide a strong enough economic case to fund a free service and so instead local authorities can continue to charge for garden waste collections.

Summary of key changes made to this IA following the 2021 consultation

We have made the following changes in this impact assessment:

- We have updated our approach to estimating the municipal recycling rate. To reflect uncertainty around this estimate, we also present a low and high estimate for each option in addition to a central estimate. The central estimate(s) is lower compared to the previous consultation impact assessment. This is mainly driven by changes concerning assumptions on garden waste and process losses from the recyclable materials collected from the NHM sector.
- We have updated our analysis with the latest DRS¹⁸ preferred option, which is an ‘All-in no glass’ scheme. This is because we include the DRS effect as part of our baseline as it removes materials that would otherwise have been collected at kerbside.
- We continue to adjust both household options to include the DRS impact on local authorities. We have modelled the changes in waste management costs due to the DRS in both the baseline and policy-related options. The net change in costs (i.e., DRS net effect) is the difference in DRS-specific costs between the baseline and policy related options and has been included in the overall NPV calculations.
- The DRS net effect for the NHM sector has also been included in the overall NPV calculations. There is uncertainty around the DRS’ impact on the business collection costs. As such, we include some sensitivity analysis on this too.
- There has been consideration of how our policy on Simpler Recycling will interact with His Majesty’s Government’s (HMG) Green Gas Support Scheme (GGSS)¹⁹ initiative. This relates to the supply of separately collected food waste as a feedstock for anaerobic digestion (AD). There is some uncertainty on the relative contribution of both policies from diverting food waste from landfill and/or other destinations to AD plants. For modelling purposes, we ensured that there is no double counting concerning the costs and benefits of both policies.
- Due to the interactions between policies, the social net present value (SNPV) and carbon savings reported in this impact assessment should be considered jointly with the SNPV and carbon savings reported in the final stage impact assessment for HMG’s GGSS²⁰.
- The analysis has been updated to use the latest carbon prices which were updated to reflect the latest changes in international and domestic targets, and a better understanding of new technology costs and associated availability to help meet the targets.
- Given that compliance will be assessed by the Environment Agency, we have included both compliance and regulator costs to the regulator.

¹⁸ Further detail can be found in the Glossary.

¹⁹The GGSS follows on from the biomethane element of the non-domestic renewable heat incentive by providing tariff support for biomethane produced via AD and injected into the gas grid.

²⁰ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1018133/green-gas-impact-assessment.pdf

- Household (HH) specific changes:
 - As per the previous impact assessment, we have used WRAP's Routemap collection model to present different household recycling scenarios. The model has been updated to include the latest local authorities' collection scheme data. We are now using 2018/19-year data compared to 2017/18.
 - The HH analysis is based on ICP3 (indicative cost and performance assessments). The previous analysis was based on ICP2. This also means that we use the 9-part rurality classification for this impact assessment. Previously, we used the six-part rurality classification.
 - Based on engagement with stakeholders, we revised our evidence concerning garden waste collections and revised our modelling accordingly.
 - Overall, the costs to local authorities are greater compared to the previous analysis. This is mainly driven by changes in the assumptions related to the transition period, costs (i.e., ICP2 to ICP3), garden waste and additional materials (added in scope of the policy).
- NHM specific changes:
 - We engaged with stakeholders to estimate familiarisation costs to businesses (previously non-monetised).
 - We updated our central baseline cost in line with the 43.3% presented recycling rate assumed in the do-nothing scenario. This was based on engagement with WRAP and Defra internal teams, as well as speaking to one of the waste management companies (who did undertake some analysis to estimate the recycling rate for the NHM sector).
 - As part of our sensitivity analysis, we modelled three different capture rates. This is to reflect greater uncertainty associated with the NHM recycling rates to be achieved after policy implementation.

Finally, this impact assessment includes an extensive sensitivity analysis to test the impact of the key risks and uncertainties. This includes variables such as driver costs, vehicle costs, gate fees and material revenue, lift prices and different capture rates for the NHM sector.

Defra has completed a Justice Impact Test (JIT) for this policy to manage the impact on the justice system.

The structure of the IA

The IA has the following structure:

Section 1: Problem under consideration

Section 2: Rationale for intervention

Section 3: Policy objective

Section 4: Summary of options considered

Section 5: Detailed description of household and non-household municipal options considered (including do-nothing)

Section 6: Key assumptions

Section 7: Costs and benefits of collections system options for the municipal, household and non-household sectors

Section 8: Small and Micro sized Business Assessment

Section 9: Monitoring & Evaluation

Annexes

Annex A: Non-monetised costs and benefits

Annex B: Sensitivity analysis

Annex C: Greenhouse gas emissions impact

Annex D: Covid-19 considerations

Annex E: Sources of evidence and data

Annex F: Quality assurance

Annex G: Costs and benefit summary tables, presented with a different base year and appraisal period for comparison with other policies

Section 1: Problem under consideration

Household waste collections

Household recycling rates in England have plateaued at around 44-45% since 2015²¹ with only a small number of local authorities expanding services to add new materials to be collected such as plastic film and food waste²². Some have also introduced charges for previously-free services such as garden waste collection. Local authorities' budget provisions have reduced and, together with the slowing impact of current incentives²³, this has led to a lack of investment in new recycling services. Landfill tax has been one of the drivers for local authorities to divert household waste from landfill and towards energy recovery or recycling²⁴. The Waste (England and Wales) Regulations 2011 also require waste collectors to separately collect wastepaper, metal, plastic and glass unless one of a list of conditions is met (set out on page 24 below). Together with the improvements in recycling and energy recovery plants, local authorities have seen a 72% reduction by weight of collected waste sent to landfill since 2010/11²⁵. This has incentivised local authorities to provide recycling services for most dry materials. However, these regulatory drivers are not sufficient for expanding certain collections (for example, providing separate food waste collections) and the benefits of expanding recycling services to include certain types of plastics are limited because the value of those materials on secondary markets does not outweigh the costs of collection.

Current targets for recycling are weight-based but we are looking at alternatives to weight-based metrics such as carbon emissions²⁶. These options are not considered as part of this impact assessment, but we will engage local authorities on developing non-binding performance indicators and alternatives to weight-based targets in future.

Dry recycling collections

Government supports comprehensive and frequent waste collections. Currently, there is limited consistency around materials that local authorities collect for recycling. Not all local authorities in England collect glass and plastic pots, tubs and trays (PTT), for example, at 86% and 83% respectively²⁷. Concerning plastic film, only 17% of local authorities collect it for recycling²⁸. Greater consistency, for example, means that local authorities that do not already collect plastic film will be required to collect it for recycling. Requiring all local authorities to collect the same materials from kerbside will help increase the quantity and quality of materials collected for recycling. It could also help reduce consumer confusion (by ensuring that the same materials are collected for recycling across England, e.g., 40% of the public think recycling rules should be simplified²⁹).

WRAP surveys show that 85% of UK households add one or more items to their recycling collection that is not accepted locally. Furthermore, just over half of UK households (55%) put at

²¹ <https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management>

²² Based on data using WRAP's Toolbox based on local authorities' portal self-reported inputs.

²³ E.g., landfill tax.

²⁴ UK Parliament website (2014) <https://publications.parliament.uk/pa/cm201415/cmselect/cmenvfru/241/24105.htm>

²⁵ Our Waste, Our Resources: A Strategy for England, 2018:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf

²⁶ As per footnote 14.

²⁷ Based on 2020/21 data using WRAP's Toolbox based on local authorities' portal self-reported inputs.

²⁸ Based on 2020/21 data using WRAP's Toolbox based on local authorities' portal self-reported inputs.

²⁹ <https://www.confused.com/recycling-confusion>

least one item in the general rubbish that could be collected in the kerbside recycling³⁰. As a result, householders either recycle fewer items than they are able to or contaminate recycling with items that are not collected locally for recycling or are non-recyclable. Such contamination can reduce the quality and value of recyclate and can lead to rejection at reprocessing or sorting centres. This in turn reduces our overall recycling rate and reduces the amount of material made available to producers to be recycled into new products, or for packaging producers to achieve targets and obligations to recycle a set proportion of the packaging they place on the UK market. Also, any recycling materials destined for other countries must meet strict criteria in accordance with waste import and export legislation^{31,32}. This reinforces the need for us to ensure the quality of recyclate is high.

High profile media coverage of waste, such as in the programme “The Blue Planet,” mean that there is increased public demand to tackle the problem of waste in more effective ways and to recycle more materials, especially plastics. Similarly, the latest YouGov survey results show that the British public want more to be done to encourage recycling in the UK³³. The survey identifies that the biggest issues keeping British people from recycling more are a lack of local facilities, Councils not collecting certain types of items from the kerbside, and confusing rules.

The quality of dry recycling has also failed to improve in recent years, with Material Recovery Facilities (MRFs) reporting a target material³⁴ percentage of 84.4% towards the last quarter of 2019, a fall from 90.6% since the last quarter of 2014, with a notable rise in non-recyclable material received³⁵. This is influenced by both collection services run by local authorities as well as products being placed on the market by producers. More composite or difficult to recycle products placed on the market cannot be controlled by local authorities or waste management companies running the MRFs.

Food waste collections

Using WRAP’s analysis for households, hospitality and food service, food manufacture, retail and wholesale sectors in 2018, we estimate around 9.5 million tonnes of food waste (i.e., post farm gate³⁶) is produced every year. This has an estimated sale value of over £19 billion a year and is associated with more than 25 million tonnes of GHG emissions³⁷. The detrimental impacts of food waste on the environment are significant. Food waste that is sent to landfill generates methane (i.e., a powerful greenhouse gas 25 times more powerful than CO₂³⁸). The Government has made a commitment in its Clean Growth Strategy³⁹ to work towards no food waste entering landfill by 2030.

Currently 51%⁴⁰ of local authorities collect food waste separately from residual waste (either, food mixed with garden waste, or separate collection of food waste), with 35% of all local authorities

³⁰ <https://wrap.org.uk/sites/default/files/2021-09/WRAP-Recycling-Tracker-2021-report.pdf> pg. 5

³¹ <https://governmentbusiness.co.uk/news/22102018/china-recycling-restrictions-hitting-uk-councils>

³² <https://wrap.org.uk/resources/report/gate-fees-reports>

³³ <https://yougov.co.uk/topics/science/articles-reports/2019/11/04/britons-say-more-needs-be-done-encourage-recycling>

³⁴ Target materials are materials which are accepted for recycling.

³⁵ <https://wrap.org.uk/resources/guide/dry-recyclables-improving-quality-cutting-contamination>

³⁶ Post – farm gate includes all food waste from processors, manufacturers, retailers and from households. This figure is taken from the UK progress against Courtauld 2025 targets and Sustainable Development Goal 12.3, WRAP, 2020.

³⁷ Based on lifecycle emissions (e.g., including production, packaging, transport, waste management). Further detail can be found here: <https://wrap.org.uk/resources/report/uk-progress-against-courtauld-2025-targets-and-un-sustainable-development-goal-123>

³⁸ Over 100 years, IPCC AR5 Synthesis Report.

³⁹ The Clean Growth Strategy, Leading the way to a low carbon future.

<https://assets.publishing.service.gov.uk/government/clean-growth-strategy-correction-april-2018.pdf>

⁴⁰ Based on 2020/21 data using WRAP’s Toolbox based on local authorities’ portal self-reported inputs.

collecting this waste separately from other biodegradable waste, and the remaining authorities collecting food waste mixed with garden waste (Table 3). Only 13%⁴¹ of local authorities currently collect food waste from all households on a weekly basis in line with the requirements of new section 45 of the Environmental Protection Act 1990 (as amended by the Environment Act 2021). Separate collection of food waste for treatment by anaerobic digestion has higher environmental outcomes than co-mingling food and garden waste by in vessel composting (IVC)⁴². Both anaerobic digestion and IVC recycle food waste by turning it into a form of organic fertiliser, but only anaerobic digestion reclaims energy through the production of biogas. If all local authorities provided at least kerbside properties with a household food waste collection this would increase the amount of food waste collected per year by an estimated 1.33 million tonnes by 2035.

Table 3: Percentage of English local authorities collecting selected materials for recycling

% of English LA's collecting	Beverage cartons	Cardboard	Foil	Glass	Metal (cans and tins)	Mixed plastic film	Paper	Plastic bottles	Plastic pots, tubs and trays	Separate food waste ⁴³
2018/19 ⁴⁴	65%	100%	76%	89%	100%	19%	100%	100%	78%	35% (40%)
2019/20	64%	100%	78%	89%	100%	19%	100%	100%	82%	37% (40%)
2020/21	64%	100%	78%	86%	96%	17%	100%	100%	83%	35% (38%)
2021/22	64%	100%	80%	90%	100%	19%	100%	100%	84%	43% (52%)

Source: WRAP's toolbox based on local authorities' portal

Garden waste collections

In this impact assessment, we assess environmental benefits and value for money associated with introducing a free minimum garden waste collection (relative to a charged service). Around 65% of local authorities charged for garden waste collections in 2018/19⁴⁵. Evidence suggests that this results in a lower household participation than a free service (Section 6).

Providing all kerbside properties (that have gardens) with a free garden waste collection could help increase recycling rates and could also ensure this material is sent to industrial composting rather than sometimes discarded in residual waste bins. Charging for garden waste is likely to reduce the number of households using the service, therefore, it potentially increases levels of garden waste in residual waste. Where this is sent to landfill, this generates greenhouse gas emissions as well as leachate, an acidic liquid which needs to be extracted and treated.

Waste collections from Non-Household Municipal sector

The Waste (England and Wales) Regulations 2011 as amended by the Waste (Circular Economy) (Amendment) Regulations 2020 defines municipal waste as "waste collected from households" and "waste collected from other sources, where such waste is similar in nature and composition to waste from households"⁴⁶.

⁴¹ This estimate also includes local authorities which collect garden waste and food waste together on a weekly basis.

⁴² Based off WRAP analysis, we have modelled that the traded carbon savings from collecting food waste separately and having it treated via AD (-0.0867T CO₂e/T) are greater than the non-traded carbon savings of having food waste collected in a comingled collection and treated at an IVC facility (-0.0393T CO₂e/T).

⁴³ Figure in brackets include local authorities who offer both a separate food waste collection, and a comingled food collection.

⁴⁴ This is the initial (baseline) year in our modelling.

⁴⁵ Based on 2018/19 data using WRAP's Toolbox based on local authorities' portal self-reported inputs.

⁴⁶ The Waste (Circular Economy) (Amendment) Regulations 2020, available at <https://www.legislation.gov.uk/uksi/2020/904/contents/made>

Given the size of the NHM sector (for our impact assessment we estimated around 2.15 million business and public administration units⁴⁷), it makes a significant contribution to our municipal waste recycling ambitions. Most business sectors have not historically had direct policy measures to drive their recycling performance apart from the price they pay for the collection of waste. Business expenditure on waste and recycling services tends to be a very small proportion of the overall business turnover⁴⁸ and so efficiency gains made by diverting more waste to recycling may yield comparatively few cost savings at a site level and provide limited financial incentive to separate waste.

At present, the Waste (England and Wales) Regulations 2011 require waste collectors to collect paper, metal, plastic or glass separately unless one of these conditions is met:

- collecting the wastepaper, metal, plastic, or glass together results in output from those operations which is of comparable quality to that achieved through separate collection;
- separate collection of the waste does not deliver the best environmental outcome when considering the overall environmental impacts of the management of the relevant waste streams;
- separate collection of the waste is not technically feasible taking into consideration good practices in waste collection; or
- separate collection of the waste would entail disproportionate economic costs taking into account the costs of adverse environmental and health impacts of mixed waste collection and treatment, the potential for efficiency improvements in waste collection and treatment, revenues from sales of secondary raw materials as well as the application of the polluter-pays principle and extended producer responsibility.

However, without the amendments to the Environmental Protection Act 1990, there is no requirement on the non-household municipal sector to arrange for their waste to be recycled. Given that waste collection services are offered on a per bin or per lift basis, businesses would pay a higher cost for having additional bins for recycling, unless they produced enough waste to be able to reduce their number of residual waste bins. This is because a typical residual waste collection service usually costs more than recyclable waste collection service.

Currently, there is a substantial variation in the non-household municipal sector's performance in recycling, both across sectors and business sizes, and data quality is significantly poorer compared to the household sector. We estimate levels of recycling from the non-household municipal sector— that produce municipal waste – to be at around 43.3%⁴⁹. However, there is significant potential to increase these rates through introducing requirements for greater separation, especially of dry materials and food waste (from residual waste).

Our analysis indicates that the requirement for separate food waste and separate dry recycling collection could increase municipal recycling rates to as much as 61.3%⁵⁰ (under a high capture rate scenario and accounting for a process loss).

⁴⁷ <https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/ukbusinessactivitysizeandlocation/2019>

⁴⁸ <https://www.cips.org/knowledge/categories-and-commodities/facilities/waste-management/how-to-develop-a-waste-management-and-disposal-strategy/>

⁴⁹ Estimated 'presented' recycling rate, i.e., based on WRAP's analysis.

⁵⁰ Assuming that all municipal businesses are within the scope of policy requirements (including micro firms). In assessing options in this impact assessment, we have assumed that businesses achieve a lower capture rate of 80% and material is lost at a sorting stage. The estimated recycle rate at this capture is 57.7%.

Section 2: Rationale for Intervention

Waste generation is a source of negative environmental externalities as it can emit greenhouse gases when sent for incineration or to landfill. Another problem for municipal solid waste (MSW) in landfills is leachate generation⁵¹, which could cause a significant threat to surface water and groundwater. When waste cannot be prevented, recycling can minimise these environmental costs of products/materials being disposed of and create value by providing valuable materials for manufacturing.

Current measures and requirements for household collection of recyclable materials, such as landfill tax or the current legislative requirements, are proving insufficient to increase household recycling beyond the current level of 44%-45% and reduce the amount of residual waste produced. Flexible requirements on local authority waste collections have led to a variety of different collection systems and materials collected, leading to different performance across the country as evidenced in the recent DEFRA statistics release on local authority collected waste management⁵², as well as in WasteDataFlow (WDF)⁵³ and WRAP's LA Portal⁵⁴. The LA Portal provides specific scheme variations and WDF covers the tonnages for each council area. This limits the potential for recycling and environmental and economic benefits that otherwise could be achieved. This also means households have different experiences of recycling depending on where in England they live.

The NHM sector also has low levels of recycling (i.e., our current estimate is 36.5%⁵⁵). Businesses usually pay for waste collections on a per-lift or per-bin basis. Recycling collection charges per 'bin-empty' are lower than for residual bins due to the higher value of the material and their lower disposal costs compared to refuse. However, diverting some recyclable waste from the refuse bin still, almost certainly, means that a refuse container is required despite it becoming less full. The need for a range of recyclable containers to collect the extra material streams will increase cost to businesses unless all of the waste from the refuse bin can be removed and that service suspended or reduced in frequency e.g., three-weekly collections instead of two-weekly. Consequently, introducing additional recycling bins may not lead to reduced waste costs.

Government intervention is therefore needed to require a consistent range of waste materials to be collected from households and businesses. This will enable current measures such as landfill tax to be most effective at driving waste up the waste hierarchy⁵⁶ (i.e., towards reuse or recycling) and deliver the associated environmental benefits.

Behavioural barriers

Overall, the case for change in the municipal sector is undermined if the overall business case from higher recycling is poor from a private perspective. This is due to high upfront costs and uncertain future savings (because they depend on assumptions of higher recycling rates (e.g., economies of scale) and secondary material prices (which depend on the quality of recyclates)). In addition, waste and recycling services have not typically been a priority area for businesses or

⁵¹ Environment Agency.

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/321602/LFTGN02.pdf pg. 8
Environment Agency & DEFRA, <https://www.gov.uk/guidance/landfill-developments-groundwater-risk-assessment-for-leachate>

⁵² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf pgs. 23-25

⁵³ <https://www.wastedataflow.org/>

⁵⁴ <https://laportal.wrap.org.uk/>

⁵⁵ Based on WRAP's analysis. WRAP estimated the presented business recycling rate of 43.3%. We adjusted this estimate to reflect that there are some process losses (when materials go through MRFs), based on discussions with the industry.

⁵⁶ The "waste hierarchy" ranks waste management options according to what is best for the environment.

local authorities in recent years. Business waste services represent a small proportional cost to overall turnover for most operators⁵⁷ which means there are few incentives to improve, even though changes could lead to savings over time. Further, current waste service arrangements in the commercial sector do not drive economies of scale or incentivise recycling over residual waste.

Household sector

The Environmental Protection Act 1990 (until the amendments in the Environment Act 2021 have been commenced) requires WCAs to make arrangements for the collection of at least two types of recyclable waste together or individually separated from the rest of the household waste. There are also further requirements on local authorities set out in the Waste (England and Wales) Regulations 2011. The current legislation means that WCAs do not all collect the same range of materials and there are circumstances under which local authorities do not have to collect the recyclable waste streams separately from residual waste. Whilst this helps to account for local circumstances, this creates a fragmented and inconsistent approach to recycling across England. As a result, householders are having very different experiences of recycling depending on where they live. There is also some uncertainty about what can and cannot be recycled (this was identified as one of the most frequently cited barriers). Evidence shows that this can create confusion to householders over the type of materials collected and the way they should be presented for the collection^{58,59}. “The council doesn’t collect enough things for recycling” is another key barrier that households identify⁶⁰. The latest results of an annual survey of UK households⁶¹ show that fewer items are disposed of incorrectly by households who have services with the following scheme characteristics: a restricted residual waste capacity, higher numbers of materials collected for recycling and multi-stream recycling schemes. By contrast, more items are disposed of incorrectly by households in areas where fewer items are collected for recycling and there is less restriction of residual waste capacity.

Requiring the same set of materials (including separate food waste and additional materials⁶²) to be collected consistently and separately from residual waste (alongside specific communications) will improve waste collection services, leading to better recycling performance and experience for all households across England (this is important for ‘Levelling up’, i.e., to ensure consistent recycling collections across households). Further, the proposed introduction of mandatory labelling through the EPR scheme, where government requires producers to include appropriate labelling on their packaging, was supported strongly by stakeholders at the first consultation stage⁶³. This is because this would improve household participation and recycling. Impacts associated with labelling are assessed as part of the EPR IA⁶⁴.

Our analysis suggests that certain collection systems might result in cost savings for local authorities in the medium to long-term (e.g., savings associated with residual waste). However, some authorities may see the change as a risk, increasing their cost burden in the short-term

⁵⁷ <https://www.cips.org/knowledge/categories-and-commodities/facilities/waste-management/how-to-develop-a-waste-management-and-disposal-strategy/>

⁵⁸ <https://www.bbc.co.uk/news/science-environment-45496884>

⁵⁹ <https://wrap.org.uk/sites/default/files/2021-09/WRAP-Recycling-Tracker-2021-report.pdfht>

⁶⁰ WRAP, 2020, Banbury, Recycling behaviours and attitudes 2020, Prepared by WRAP, available at <https://wrap.org.uk/sites/default/files/2021-03/WRAP-Recycling-Tracker-Report-2020-March-2020.pdf>

⁶¹ WRAP, 2020, Banbury, Recycling behaviours and attitudes 2020, Prepared by WRAP pg. 22 available at <https://wrap.org.uk/sites/default/files/2021-03/WRAP-Recycling-Tracker-Report-2020-March-2020.pdf>

⁶² These materials include metal packaging, food and drink cartons and plastic film.

⁶³ Q40,41 and 42 in consultation responses

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/819467/epr-consult-sum-resp.pdf

⁶⁴ [Impact Assessment \(publishing.service.gov.uk\)](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/819467/epr-consult-sum-resp.pdf)

(e.g., to cover the costs of transitioning to a new collection system)⁶⁵. Also, future savings depend on an uncertain income from selling collected materials and a reduction in gate fees' payments, compared with what local authorities are used to paying at the moment. As such, local authorities are likely to avoid changing collection systems under current circumstances, i.e., due to clear upfront costs but uncertain long-term savings.

Consistent recycling collections across England⁶⁶ will help achieve wider system efficiencies and reduce risks associated with investments in new collection systems. In the second consultation, Government confirmed its commitment to funding the net additional costs to local authorities arising from the new statutory duties placed on them through the introduction of Simpler Recycling. Concerning packaging materials, payments from packaging producers will fund local authorities for the collection of these materials (i.e., as a result of changes being brought by the EPR scheme). We expect that funding and payments to local authorities will take account of equity and regional consideration by looking at rurality and level of deprivation and performance expectations.

Non-household municipal sector

With respect to businesses that produce relevant waste and non-domestic premises that produce household waste, the main behavioural and cost barriers are particularly pertinent to small- and micro-sized businesses. These are understood as the following:

- waste and recycling sit low on business agendas⁶⁷;
- there is a lack of clarity of responsibilities between businesses and waste management companies and possible split of incentives⁶⁸;
- businesses may not be aware that through re-configuring their collection provisions, their overall waste management costs can be reduced. This is a particular issue concerning small and micro businesses;
- possible space issues especially for micro firms;
- high turnover of staff⁶⁹.

Businesses typically pay for the collection and subsequent processing of material in their waste and recycling collection containers on a regular schedule under a contract with a waste management company, or for a minority of businesses, through a local authority waste provider. Recycling collection charges per 'bin-empty' are lower than for residual bins due to the higher value of the material and their lower disposal costs compared to refuse. However, diverting some recyclable waste from the refuse bin still, almost certainly, means that a refuse container is required despite it becoming less full. Businesses who do not collect all the recyclable waste streams required may need an additional recycling container(s) to collect the extra material. This could increase cost to businesses unless all of the waste from the refuse bin can be removed and that service suspended or reduced in frequency e.g., three-weekly collections instead two-weekly.

For larger businesses, reducing the number of refuse containers and using savings to pay for more recycling is possible. A key issue for very small businesses is that re-configuring the container mix is more difficult when there are limited containers to start with and adding in extra recycling bins at current market prices may increase overall costs. Also, the majority of the

⁶⁵ Based on discussions with LAs during the first and second consultation.

⁶⁶ Simpler Recycling will ensure that every home in England gets separate weekly food waste collections, and where requested, separate garden waste collections, and all households are able to recycle plastic, paper and card, glass and metal.

⁶⁷ Based on WRAP's research and engagement with the sector.

⁶⁸ For example, charging on a per lift basis regardless of whether the bins are full or not can possibly make the use of recycling services more expensive, if simply added next to the refuse waste collections.

⁶⁹ https://archive.wrap.org.uk/sites/files/wrap/SME_Recycling_-_Summary_Report.pdf

charges for commercial collections relate to the operational delivery cost (e.g., labour) and not the treatment of the material.

The waste composition profiles for the diverse NHM sectors all show much larger proportions of recyclable waste compared to household waste⁷⁰. This is primarily due to businesses purchasing packaged goods from their supply chain, food waste generated in preparation and post-consumer waste. As such, the recycling potential from NHM sectors is significantly greater than from household sector which produces greater proportions of non-recyclable waste.

Without the intervention of legislation, there appears to be limited options to incentivise businesses to collect and separate key recyclables which are important to meet future national ambitions and targets.

It is important to note that whilst the change in waste management costs for the NHM sector could appear large, the costs/savings are relatively small at individual site level given there are 2.15 million businesses included in the NHM sector. Waste management and recycling costs remain a very small proportion of overall turnover⁷¹. The importance of legislation is to provide a driver for change that would otherwise be unlikely to happen without large scale participation across the numerous and diverse NHM sectors.

High participation in recycling services could improve the economies of scale in waste collection. For waste-generating businesses to see cost savings, there needs to be several businesses adopting a preferred collection regime. This is because of the cost overhead involved for a collection vehicle to get to a business' site. Similarly, waste management companies would need to see changes in their waste management costs in order to pass some of these savings on to affected businesses through higher revenues for separated material or savings in landfill tax. It is thus possible that a co-ordination issue has prevented the realisation of these benefits.

In this analysis, we use current market prices for the charges for container collections. These reflect current low levels of participation and separation of recyclable material. A key benefit of intervention through legislation could be that the higher presentation rates of recyclable materials reduce the charges to businesses. Charges could reduce from improvements in the efficiency of collection, making better use of collection assets and increased revenue from the capture of more recyclable materials. However, given the complexity in charging and the range of NHM businesses, a future reduction in container charges has not been assumed in this assessment.

Environmental externalities

The municipal sector is not fully accounting for the environmental impacts of the resources it uses and waste it generates when making decisions on recycling and waste disposal. Despite incentives being aligned to the waste hierarchy, with landfill being subject to the landfill tax as it represents the worst option environmentally for most materials, there is still a significant amount of waste that ends up in landfill and incineration. In fact, the total amount of residual waste (sent to landfill or incineration) generated by local authorities has remained stable over recent years⁷².

The environmental impacts range from natural resource depletion, greenhouse gas emissions and wider ecosystem impacts associated with the production of raw materials, when compared to the use of secondary, recycled materials. This should also reflect the environmental impacts of waste management activities when comparing recycling to refuse waste treatment options

⁷⁰ <https://wrap.org.uk/content/quantifying-composition-municipal-waste>

⁷¹ <https://www.cips.org/knowledge/categories-and-commodities/facilities/waste-management/how-to-develop-a-waste-management-and-disposal-strategy/>

⁷² <https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables>

(energy from waste (EfW) incineration or landfilling). Generally, recycling activities are less carbon intensive compared to the refuse waste treatment options, especially given that they help avoid suboptimal extraction of virgin materials and associated carbon emissions⁷³. Further, there are known long-term environmental issues and high management costs associated with landfill aftercare treatments.

System-wide failures

Suboptimal levels of recycling have system-wide implications. First, recycling activities are generally less capital and infrastructure intensive when compared to residual waste treatment. As recognised by the National Infrastructure Commission, higher recycling performance generally leads to lower pressures on residual waste infrastructure⁷⁴.

A fragmented approach to recycling currently undermines the development of viable and resilient secondary markets for materials and goods in the UK. The contamination of materials for recycling was identified as one of the key barriers in relation to plastics, paper and cardboard, metals and glass, in recent WRAP research⁷⁵. The misalignment between waste collections for recycling (local authorities have a variety of collection systems and materials are often collected co-mingled leading to cross contamination; and the NHM sector which has low recycling levels and low material separation) and supply chain preferences (which calls for separating glass from paper and other fibres) shows that there are split incentives between those presenting and collecting materials and preferences down the supply chain.

Finally, the UK secondary material markets have been under pressure due to closures in foreign markets receiving UK exported waste. This is because of increasing contamination of waste leading to poor quality of presented recyclates, which in turn leads to a high dependency on export markets⁷⁶. There is a need to strengthen domestic reprocessing capabilities and to develop a sustainable end market for recycled goods.

⁷³ As demonstrated in our calculations on carbon savings presented as part of this IA.

⁷⁴ National Infrastructure Commission, 2018, National Infrastructure Assessment.

⁷⁵ <https://wrap.org.uk/resources/consistent-household-recycling-framework>

⁷⁶ WRAP's Plastic Market Situation Report, 2019, <https://www.wrap.org.uk/plastics-market-situation-report-2019>

Section 3: Policy objective

Following the 2019 consultation on “Consistency in Household and Business Recycling Collections in England”, measures were introduced in the Environment Act 2021 (“the Environment Act”) which require waste collection authorities to collect a consistent set of recyclable waste streams from households and for businesses, and non-domestic premises that produce household waste, such as hospitals and schools, to arrange for the separate collection of a consistent set of recyclable waste streams and to present the waste in accordance with these arrangements. These waste streams are glass, metal, plastic, paper and card, food waste, and, for households only, garden waste⁷⁷.

Following stakeholder feedback and further engagement with the sector, we published our second consultation on consistency in recycling in 2021, which built on the proposals outlined in the 2019 consultation. This consultation gathered views on these proposals, including how the measures introduced by the Environment Act should be implemented. This includes detailed lists of materials to be included in each recyclable waste stream and implementation dates.

Our research and analysis of consultation responses has been guided by our policy ambition to increase resource efficiency and create a more circular economy. Central to this is the policy objective to drive up recycling rates. In the year 2000 recycling rates were at 11% based on the household waste recycling rate⁷⁸. In the years since, this recycling rate has increased to around 45%, but it has now stalled⁷⁹. Similarly, our current estimate of business presented recycling rate is 43.3%. That is why the Government has brought forward legislative changes to accelerate recycling rates. This is to achieve a 65% recycling rate for municipal waste by 2035 as set out in the 2018 Resources and Waste Strategy. The Government is undertaking the decisions outlined below because it believes that they will serve as a basis for increasing recycling by making recycling more consistent and more straightforward for households, businesses, and non-domestic premises in England.

These measures will ensure that every home in England gets separate weekly food waste collections, and where requested, separate garden waste collections, and all households are able to recycle plastic, paper and card, glass, and metal. We will increase the recycling of these waste streams (excluding garden waste) beyond the household sector, by requiring businesses and non-domestic premises to arrange for the separate collection of these waste streams as well.

These measures will divert greater volumes of recyclable waste from landfill and Energy from Waste (EFW) towards the secondary material market. This will help the recycling industry in the UK to develop suitable and innovative infrastructure which can play a key part in the development of a circular economy (i.e., this is further discussed in Annex A). By diverting greater volumes of recyclable waste, in particular biodegradable waste, away from landfill, and plastic waste away from incineration, and Energy from Waste (EfW) plants, we are also contributing to the government’s ambition to reach Net Zero emissions of greenhouse gases by 2050.

Furthermore, requiring separate food waste collections will ensure that food waste can be sent to anaerobic digestion sites where it generates biofuel and digestate, a nutrient-rich fertiliser, rather than landfill, where it releases methane and contributes to the generation of leachates. The UK

⁷⁷ The management of waste items such as nappies and paint are not considered as part of consistent kerbside collection. In line with our Resources and Waste Strategy for England, we are considering the best approach to minimising the environmental impact of a range of products, including nappies/AHP taking on board the environmental and social impacts of the options available. We believe the right approach for each product requires careful consideration taking account of various factors, for example, waste benefits versus energy usage. Work is underway on an environmental assessment of washable and disposable absorbent hygiene products with the primary focus on nappies.

⁷⁸ Source: UK Statistics on Waste

⁷⁹ Source: UK Statistics on Waste

committed to working towards sending no food waste to landfill by 2030 through its 2017 Clean Growth Strategy and the Resource and Waste Strategy, published in 2018.

Final policy proposals are summarised below and described in detail within the [government response to the 2021 consultation on Consistency in household and business recycling in England](#). The evidence that follows considers consultation feedback and evidence provided by WRAP, the Waste Infrastructure Delivery Programme and Local Partnerships. We also conducted stakeholder engagement exercises, including targeted engagement on potential delivery issues (e.g., long-term waste disposal contracts)⁸⁰.

Dry recycling

The dry recyclable waste streams (excluding plastic films) must be collected from households by 31 March 2026. The legislation date for households aligns with the end of the financial year in which EPR for packaging is due to commence. The majority of the materials listed are packaging, and as payments from producers will fund local authorities for the collection of the packaging materials, we want to ensure that local authorities will receive funding in time to transition to the new requirements.

Non-household municipal premises, except micro-firms (businesses with fewer than 10 full-time equivalent – FTE – employees), will be required to arrange for the collection of the dry recyclable waste streams (excluding plastic films) by 31 March 2025.

This earlier date for non-household municipal premises reflects the greater flexibility in commercial collection contracts, as well as the fact that commercial collections are not dependent on the delivery of EPR for packaging funding.

With regards to plastic films, all local authorities and waste collectors will be required to collect these materials as part of the plastic recyclable waste stream from households, non-domestic premises, and businesses, including micro firms, by 31st March 2027.

Food waste

Waste collection authorities will be required to collect food waste on a weekly basis from all households by end of March 2026, except where specific transitional arrangements may be required.

We will require non-household municipal premises, except micro firms, to comply with the requirement to arrange for the separate collection of food waste and to present the waste in accordance with the arrangements by 31st March 2025, except where specific transitional arrangements may be required⁸¹.

Garden waste

There was mixed support for our proposals to introduce a free minimum collection service for garden waste. The updated modelling (presented in this impact assessment via options appraisal) shows that the cost for this proposal is disproportionate when weighted against carbon benefits

⁸⁰ The final policy proposals are explained in detail in the final government response on the 2021 consultation. This can be found here: <https://www.gov.uk/government/consultations/consistency-in-household-and-business-recycling-in-england/outcome/government-response>

⁸¹ The terms for transitional arrangements were outlined in the government response on the 2021 consultation. This can be found here: <https://www.gov.uk/government/consultations/consistency-in-household-and-business-recycling-in-england/outcome/government-response>

Actual transitional arrangements will be listed in the regulations, which will be published alongside this impact assessment.

of the policy. Therefore, we will no longer be proceeding with the proposal to require local authorities to introduce a free minimal garden waste collection service at this time.

All local authorities will be required to arrange for the separate collection of garden waste for recycling and composting where it is requested by households by end of March 2026, but they can continue to charge for this service.

Given that a free service of garden waste was our preferred option in the second consultation impact assessment, we decided to present this option for transparency reasons.

Micro firms

In acknowledgement of the challenges micro firms face to adjust to new requirements, micro firms will be given an additional two years from the date by which all other non-household municipal premises must comply with the requirements (with the exception of film collections where the date aligns). This means that micro firms must arrange for the collection of all waste streams by 31st March 2027.

Statutory and non-statutory guidance

We will issue statutory guidance to provide further information to support the design and delivery of these new collections in order to achieve high levels of performance.

Finally, this policy dovetails with reforms to packaging EPR and the introduction of a DRS for drinks containers:

- Reforms to the UK-wide packaging producer responsibility system will see producers bearing greater costs for collection and disposal of packaging placed on the market than at present. This additional financial obligation will be used to support local authorities to reduce their costs of collecting packaging. In turn, the increased quantity and quality of recycling collected will help producers to meet packaging obligations to demonstrate that packaging placed on the market is properly recycled.
- In addition to placing the cost of managing packaging waste on producers, proposals for EPR include a mandatory UK-wide labelling scheme for packaging in which producers would label their packaging as 'Recyclable' or 'Not Recyclable', based on an approved recyclability assessment system. Clear and consistent labelling will make it easier for consumers to know what packaging items can be recycled and to dispose of their packaging waste correctly. This in turn will mean more packaging waste is recycled and will reduce contamination in recyclable waste streams.
- The proposed materials to be included in scope of a DRS in England and Northern Ireland are PET bottles⁸², steel and aluminium cans. This is based on a preferred option, i.e., 'All-in no glass' DRS.

⁸² PET bottles are the bottles made of polyethylene terephthalate (PET).

Section 4: Summary of options considered

The options considered in this analysis are informed by our two consultations and associated impact assessments^{83, 84}. They have been designed in line with the requirements introduced in the Environment Act to separately collect recyclable waste streams and take into account that certain waste streams can be collected together in particular circumstances.

They include well established collection scheme design principles and peer reviewed industry assumptions. Each option is underpinned by best practice for both household and NHM sectors and this impact assessment focuses on the combined effects. Based on the analysis of costs and benefits, the following four municipal options are presented in the overall NPV calculations (Table 4).

Household Sector Options

1hh: This option assumes the following:

- Local authorities are required to collect a set list of dry recyclables.
- Fortnightly residual collections.
- Separate weekly food waste collections.
- Free fortnightly garden waste collection.
- High-rise properties transition at the same time as low-rise properties.
- All dry recyclable materials from high-rise properties are collected under existing collection systems.

2hh: This option is the same as 1hh option except it is assumed that all local authorities have charged garden waste collections (rather than providing a free service) for low rise properties with gardens.

Household 1hh and 2hh options are based on our preferred option from the second consultation IA, which has been updated to align with the requirements introduced by the Environment Act. In addition, the Secretary of State intends to make exemptions in the regulations that allow for the co-collection of any/all dry recyclable waste streams, and the co-collection of food and garden waste, in all circumstances without the need to produce a written assessment. Therefore, LAs and other waste collectors can choose how to collect recycling. For modelling purposes, we have assumed that local authorities choose to move towards collection systems with further separation in some cases (see Section 6 for more information). Please note the recyclable waste streams must still be collected separately from residual waste in all circumstances, and dry recycling must still be collected separately from food/garden waste. If food and garden waste are co-collected from households, this must be weekly to satisfy the requirement that food waste is collected weekly from households.

Non-Household Municipal Options

1nhm: This option assumes the following:

- Businesses and non-domestic premises are required to collect a set list of dry materials and food waste.

⁸³ <https://www.gov.uk/government/consultations/waste-and-recycling-making-recycling-collections-consistent-in-england/outcome/consistency-in-recycling-collections-in-england-executive-summary-and-government-response#government-response-to-consultation-on-consistency-in-household-and-business-recycling>

⁸⁴ <https://consult.defra.gov.uk/waste-and-recycling/consistency-in-household-and-business-recycling/>

- Businesses and non-domestic premises have separate collections for residual, mixed dry recyclables, glass⁸⁵, and food waste.
- Micro firms (those who employ less than 10⁸⁶) are exempt in this policy option to mitigate against cost pressure.

2nhm: This option is the same as 1nhm except micro firms are included and phased into the policy from 31st March 2027, two years after implementation to allow time for these businesses to account for new provisions.

For modelling purposes, we have assumed that all businesses separate waste to mixed dry recyclables (except glass). For glass and food waste they have separate collections. We use this option as the most likely scenario on the assumption that the majority of businesses are likely to rely on an exemption from the requirement to collect the recyclable waste streams separately from each other, to collect paper and card, metal and plastic together in one bin, so as to reduce number of bins required. This is based on the national surveys of waste collections from businesses and waste collector offerings⁸⁷. They show that the majority of recyclable waste collections provided to the NHM sector are currently for mixed dry recyclables. This is because most sites have limited space; and, also, not every business generates all the material streams in scope of reforms. As such, we have modelled partially mixed dry collections (with glass as a separate stream). Please see Section 6 for more information.

Table 4: Combinations of municipal (M) sector options considered for household and non-household municipal waste.

Sectors	Non-Household Municipal (NHM) Sector		
	1nhm	2nhm	
Household Sector	1hh	1M	2M
	2hh	3M	4M

Reinstated options

We have reinstated the following option for the household sector:

- **Charged garden waste scenario.** This option had been disregarded in our consultation impact assessment. Given that we have gathered some new evidence around garden waste, this is now included in the main option analysis⁸⁸.

Disregarded options from the main analysis

We have disregarded the following options for the household sector:

- Consistent weekly collection of dry recyclables under **twin-stream only systems for low-rise properties**⁸⁹. This option was disregarded in the previous impact assessment as 50 local authorities currently operate multi-stream collections⁹⁰ and we do not expect they will move to twin-stream as a result of this policy⁹¹.

⁸⁵ Please see Section 6 for more information.

⁸⁶ This is how we defined “micro-sized” firms for the purposes of this impact assessment.

⁸⁷ Source: WRAP

⁸⁸ Based on engagement with stakeholders and consultation responses to the second consultation.

⁸⁹ Including collection of key dry recyclables at flatted properties; fortnightly residual collections; separate weekly food waste and free fortnightly garden waste collections.

⁹⁰ <https://larac.org.uk/blog/getting-value-out-recycling>

⁹¹ Please refer to Section 6 for more information.

- Consistent weekly collection of dry-mixed recyclables under **current collection systems for low-rise properties (i.e., no change from the baseline collection system)**⁹². We have disregarded this option because although there will be an exemption allowing for mixed collections, in the modelling we assume that local authorities choose to move towards systems with further separation in some cases. This is because the trajectory has been towards more separation of materials from entirely mixed schemes on the basis of rising processing costs at MRFs and increased income from the sale of separately collected materials⁹³.

We have disregarded the following options for the non-household municipal sector:

- No exemptions, phasing or de minimis (i.e., all businesses are within scope). This means that all businesses separate waste to residual, mixed dry recyclables, separate glass waste⁹⁴ collections and separate food waste collections. This option has been disregarded because it disproportionately affects micro firms compared to other size businesses.
- We explored a de minimis threshold for businesses to be exempt from food waste separation if they produce less than 5kg of food waste per week. This was part of the consultation impact assessment. WRAP's analysis has found that most businesses produce this amount of food waste and therefore they would not be exempt from this requirement. Most responses to the first consultation agreed that businesses that produce sufficient quantities of food waste should separate it from residual waste for collection and recycling. Furthermore, this option would present difficulties to enforce weight-based compliance. As such, we have not presented this as an option in the previous and current impact assessments.

Non-regulatory options:

Non-regulatory options were considered as part of a long list of possible approaches in the second consultation IA. They were disregarded due to the following reasons:

- There are various non-regulatory approaches. They include voluntary educational schemes and campaigns, frameworks and guidance, businesses support via specific grants and tools. These approaches have already been used in the sector. Although they have encouraged some individual organisation or individual LA action, they have not led to a systematic change to deliver against the policy objectives set out in this IA. For this reason, we have disregarded these approaches from the short-list of options for quantitative appraisal.
- **Educational schemes and campaigns:** Recycle Now⁹⁵ is the national recycling campaign for England and Northern Ireland, which aims to motivate more people, to recycle more things, more often. WRAP work with and alongside brands, retailers, waste management companies, local authorities, and Government to bring about real sustainable change. Recycle Now works at the forefront of consumer insights on recycling behaviours. Through the delivery of key campaign moments, ongoing citizen interaction, partnerships and Recycle Week, the annual recycling awareness week, Recycle Now works to educate and inspire citizens to modify their behaviour in recycling. The campaign is about 20 years old, e.g., the first Recycle Week was back in 2003. It is a successful campaign, but in isolation it does not deliver against the policy objectives proposed in this final IA. This is

⁹² As per above – Including collection of key dry recyclables at flatted properties; fortnightly residual collections; separate weekly food waste and free fortnightly garden waste collections.

⁹³ Engagement with WRAP.

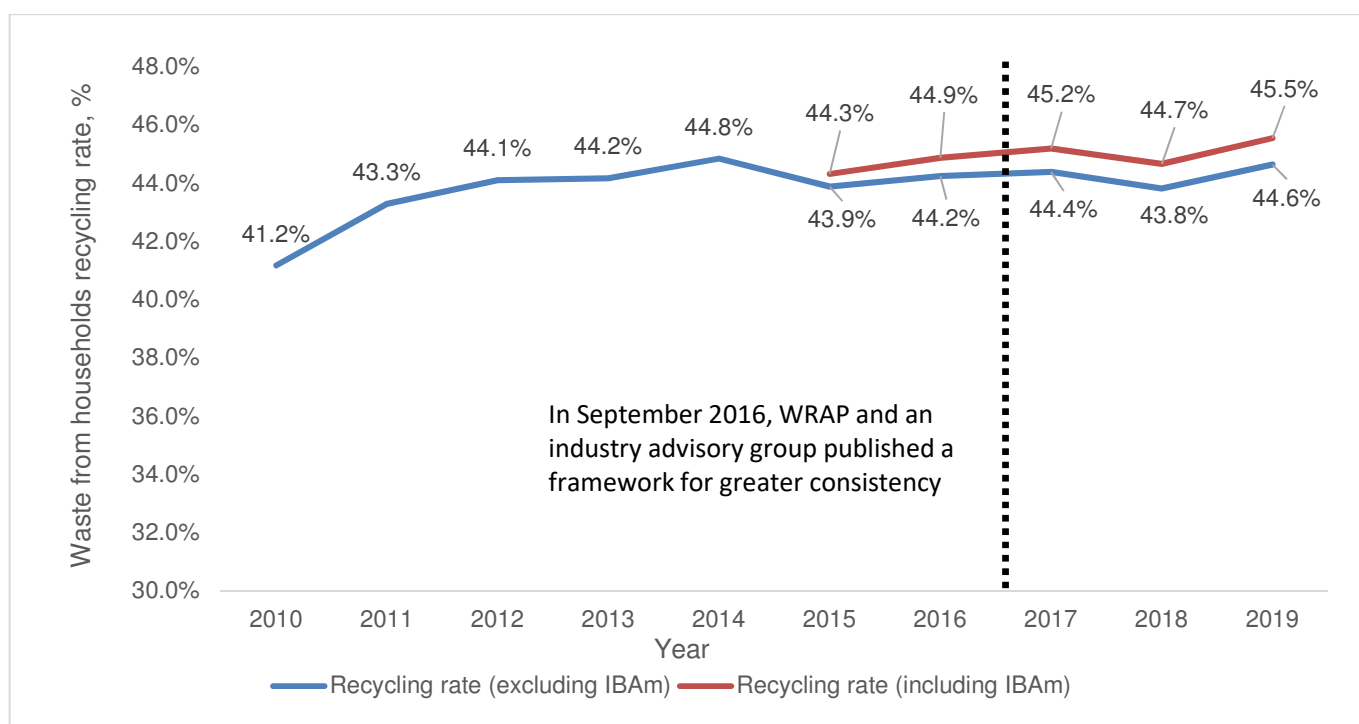
⁹⁴ Please see Section 6 for more information.

⁹⁵ <https://wrap.org.uk/taking-action/citizen-behaviour-change/recycle-now>

because this campaign needs to be accompanied with consistent waste collections which would then enable people to recycle the same materials across the country.

- National framework and guidance:** Local authorities are currently able to decide on a local basis what and how materials should be collected from households for recycling. This has led to a large variety of service collection profiles and current legislative or fiscal drivers are unlikely to change this (i.e., they proved to be insufficient to increase current levels of recycling which plateaued over the last 10 years or so)⁹⁶. As such, WRAP and other bodies have been working very closely with local authorities to improve recycling⁹⁷. WRAP, for example, worked with the waste sector to develop a voluntary 'Consistency Framework'⁹⁸. The framework sets out a 5-point action plan, including specific actions on local authorities to improve their services with the support from WRAP. However, this has not been taken up by the majority of local authorities because of other funding pressures and an absence of legal drivers. Evidence of limited impact is shown in Figure 1, of very little change in overall household recycling rates, especially between 2015 and 2020. The Framework has been in place since 2016. It was therefore clear that further legislation was required in order to increase recycling rates and it was not sufficient to rely on local authorities to keep improving recycling rates on a voluntary basis.

Figure 1: Household recycling rates in England since 2011 with a timestamp of when the Consistency Framework was introduced⁹⁹



Source: UK Statistics on waste¹⁰⁰, released annually

- Business support, including tool and grants:** For businesses, a range of voluntary initiatives operate (e.g. the business recycling and waste services commitment and recycle at work campaigns)^{101,102}. This also includes publicly funded capital grants to help improve

⁹⁶ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/918853/201819_Stats_Note_FINAL_accessible.pdf

⁹⁷ <https://wrap.org.uk/sectors/local-authorities>

⁹⁸ <https://www.wrap.org.uk/collections-and-reprocessing/consistency>

⁹⁹ IBAM stands for Incineration bottom ash metal.

¹⁰⁰ <https://www.gov.uk/government/statistical-data-sets/env23-uk-waste-data-and-management>

¹⁰¹ <https://www.recyclenow.com/recycle/recycle-work-1>

¹⁰² <https://wrap.org.uk/resources/guide/business-recycling-and-waste-services-commitment#download-file>

recycling¹⁰³ and a small number of Business Improvement Districts that have brought individual businesses together to agree more comprehensive waste collection services at lower prices, for example by agreeing a contract with a single waste management company¹⁰⁴. Despite this, it remains the exception and requires collective action to identify financial savings as well as increased recycling. In addition, there have been no drivers (e.g., business residual waste and recycling services tend to be a very small proportion of overall business turnover¹⁰⁵, see Table 5. below) and so efficiency gains in diverting more waste to recycling may yield comparatively low savings at site level and provide limited financial incentive to separate waste without the presence of regulatory requirements.

- There are no requirements at all on those producing the waste to segregate recyclable waste or make arrangements for recycling collections. Simply relying on businesses to do the right thing has not worked and, as such, business recycling rates are much lower than household recycling rates. This is reinforced by the current estimated recycling rate of 36.5% in the NHM sector.

Table 5: Baseline costs of waste service provision as a proportion of average turnover, given per sector and firm size

	Micro	Small	Medium	Large
Hospitality	1.15%	0.43%	0.21%	0.03%
Retail & Wholesale	0.25%	0.07%	0.03%	0.01%
Health	0.72%	0.30%	0.17%	0.07%
Education	0.29%	0.45%	0.19%	0.12%
Transport & Storage	0.41%	0.16%	0.09%	>0.00%
Offices & other Services	0.15%	0.07%	0.02%	0.01%

Source: WRAP's costing of baseline waste provision and turnover taken from ONS¹⁰⁶

- In our 2019 initial consultation, we asked whether businesses, public bodies and other organisations that produce municipal waste should be required to separate dry recyclable material from residual waste so that it can be collected and recycled. The majority of responses (95%) agreed with this proposal¹⁰⁷. We have also asked whether there are alternatives to legislative measures that would be effective in increasing business recycling. There were a number of comments, however, most of them were about additional incentives and/or businesses to support the proposed legislative measures. Several comments also suggested that commercial collections should meet the same consistency aims as household waste and recycling services, as this would enable common messaging to reflect recycling options at home and work. Concerning segregation of food waste for businesses, a large majority of respondents agreed that businesses that produce sufficient quantities of food waste should be required to separate for recycling.

Other:

- Landfill tax has been one of the drivers for local authorities to divert household waste from landfill and towards energy recovery or recycling¹⁰⁸. It helped move standard rated waste to landfill from being a cheap form of waste disposal to the most expensive, which reflects its position at the bottom of the waste hierarchy.

¹⁰³ <https://wrap.org.uk/media-centre/press-releases/wrap-launches-new-ps1-million-grant-increase-business-waste-recycling>

¹⁰⁴ <https://www.teamlondonbridge.co.uk/recycling>; <https://betterbankside.co.uk/what-we-do/recycling/>

¹⁰⁵ <https://www.cips.org/knowledge/categories-and-commodities/facilities/waste-management/how-to-develop-a-waste-management-and-disposal-strategy/>

¹⁰⁶ Turnover taken from ONS IDBR Business Data, organised by employment size band.

¹⁰⁷ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/819780/consistent-recycling-consult-part2.pdf

¹⁰⁸ UK Parliament website (2014) <https://publications.parliament.uk/pa/cm201415/cmselect/cmenvfru/241/24105.htm>

- HM Treasury are responsible for tax policy. HM Treasury regularly reviews Landfill Tax as part of normal budget procedure and works with Defra to assess policy impacts alongside other interventions, including those proposed in this impact assessment.

Section 5: Detailed description of household and non-household municipal options considered (including do-nothing)

The options presented in this IA have been designed in line with the requirements introduced by the Act to separately collect recyclable waste streams and take into account that certain waste streams can be collected together where one of the exceptions or exemptions applies.

These options have been assessed based on a combined output from three technical models:

- WRAP's Routemap collection model to estimate impacts concerning the household sector;
- WRAP's NHM model to estimate impacts concerning the NHM sector; and
- Defra's in-house model, called FoWST (i.e., Fates of Waste Simulation Tool) to estimate impacts across the municipal sector. The model estimates the mass flow balance across the municipal sector in order to estimate the tonnages treated by different methods and associated GHG emissions. It also helps estimate impacts on overall landfill tax payments.

All these models rely on a large set of assumptions and data which are summarised in Section 6. Quality assurance of these models is explained in Annex F.

Household sector and baseline scenario

The baseline scenario assumes that local authorities make no changes with respect to the offered dry recycling collection systems, separate food waste collections, garden waste collections or any changes in the frequency of refuse waste collections. This scenario assumes that local authorities provide waste management services as observed in 2018/19 WasteDataFlow data and local authority Recycling Scheme Updater (LARSU)¹⁰⁹ and make no change in the period of 2018-2035. The baseline is used as the starting point for each scenario.

The 2018/19 data¹¹⁰ on local authorities show:

- 89% collect glass, 100% metal cans and tins, 100% paper, 100% plastic bottles, 100% collect cardboard packaging. Overall, 71% of local authorities collect all five widely recycled materials and PTTs (plastic pots, tubs and trays).
- 35% of local authorities provide separate food waste collections.
- 65% of local authorities charge for the collection of garden waste.
- 2% of households have their refuse collected more than weekly, 25% on weekly, 70% on fortnightly and 3% on three-weekly basis.

Based on 2018/19 local authority Recycling Scheme Updater (LARSU) data¹¹¹, we assume that local authorities use the following dry kerbside collection schemes in the baseline for low rise properties: 50 with multi-stream collections, 159 with co-mingled collection, 104 with twin-stream collections.

The current coverage of recycling and service profiles from high-rise flats varies considerably across local authorities¹¹². The known coverage varies from flats having only a residual waste

¹⁰⁹ <https://laportal.wrap.org.uk>

¹¹⁰ Based on data from WRAP's local authority portal: <https://laportal.wrap.org.uk/>

¹¹¹ <https://larac.org.uk/blog/getting-value-out-recycling>

¹¹² Based on data from WRAP's local authority portal: <https://laportal.wrap.org.uk/>; and WRAP's collated case studies of recycling performance associated with high-rise properties

collection to full segregation of dry materials and food waste. Baseline assumes no change from the current service provisions.

The household sector recycling rate stood at 45% in 2018/19 and is expected to remain unchanged by 2035/36. Waste arisings grow in-line with household projections with an assumed fixed recycling yield¹¹³ per household each year. Given that there was very little change in overall household recycling rates, especially between 2015 and 2020, we assume that collection systems do not change over time. Although households identify “the council doesn’t collect enough things for recycling” as one of the barriers to recycling¹¹⁴, it does require local authorities to invest in these services which is difficult due to several other funding pressures and an absence of additional legal drivers to strengthen associated business cases (as explained in Section 2). This is unlikely to change under the baseline.

For the baseline scenario we use the results from WRAP’s Routemap collection model to provide the net service costs¹¹⁵ of waste management for both low-rise and high-rise properties. These costs are estimated to be around £2.13 billion in 2018/19, rising to around £2.31bn by 2035 as a result of projected growth in the number of households from 24 million to 26 million by 2035¹¹⁶. The largest proportion (41%) of the overall costs are annual operating and communications costs (including staff costs), followed by annual bulking costs of dry recycling and treatment costs of food waste and residual waste (42%, covering the cost of sending waste to relevant facilities for waste treatment and paying associated gate fees), and annualised capital costs for vehicle and containers replacement (bins). This ‘net’ estimate also accounts for any revenues received through selling collected dry recyclates directly to reprocessors (e.g., paper to paper mills).

We also adjust these baseline estimates to include the DRS effect. Based on WRAP’s modelling, we estimate an average increase of £93m to annual net service costs for local authorities from 2027 onwards. This is based on the materials removed by the DRS from kerbside collections. Although the tonnage associated with DRS materials do not affect the overall collection costs, they do affect bulking, treatment and disposal costs. There are some savings associated with residual waste disposal and dry material bulking. They are offset by increased costs incurred from the remaining material going to MRFs and lost revenue from DRS materials being removed. The former is driven by an estimated increase in MRF gate fees. WRAP has modelled a cost increase from c. £35 per tonne¹¹⁷ to £60 per tonne¹¹⁸ once DRS materials are removed from kerbside. The latter effect has been estimated based on the tonnes of DRS materials removed and associated lost revenue for each material.

Further detail on assumptions for WRAP’s Routemap collection model can be found in Section 6.

Option 1hh: This option assumes consistent weekly collection of dry recyclables under systems with further separation for low-rise properties, unless Local Authorities have collection contracts that extend beyond the date by which they need to comply with the new requirements. They then move to a twin-stream collection when their contracts end. It also assumes fortnightly residual collections, separate weekly food waste and free fortnightly garden waste collections. It assumes

¹¹³ Yields represent material collected from the kerbside and therefore include contamination. The contamination rates are then applied per each collection system to derive the recycling tonnage net of contamination. See the ‘Key household scenario assumptions’ section in Annex A for more details.

¹¹⁴ WRAP, 2020, Banbury, Recycling behaviours and attitudes 2020, Prepared by WRAP, available at <https://wrap.org.uk/sites/default/files/2021-03/WRAP-Recycling-Tracker-Report-2020-March-2020.pdf>

¹¹⁵ Overall cost for all English local authorities of running their waste collection systems, net of revenue they generate such as the sale of separately collected dry recyclable material.

¹¹⁶ Population growth projections – <https://www.gov.uk/government/statistical-data-sets/live-tables-on-household-projections>

¹¹⁷ Based on an average gate fee across the country. Source: WRAP.

¹¹⁸ Based on the survey of operators that was undertaken by WRAP.

high-rise properties transition at the same time as low-rise properties - who also have separate food waste collection.¹¹⁹

This household collection scenario assumes the following:

- Local authorities change their dry collection system at the same time as they introduce separate food waste collections (i.e., by the end of March 2026).
- Local authorities (that have collection contracts that extend beyond the date by which they need to comply with the new requirements) introduce separate food waste collections by the end of March 2026 and change their dry collection to a twin stream collection when their contracts end. This assumes that these local authorities rely on the exemption in England¹²⁰. All new dry materials (except plastic films) that are required to be collected by the end of March 2026 are added to existing collections. This means that local authorities collect the following dry materials by the end of March 2026: glass bottles and containers, paper and card, metal packaging, plastic bottles, plastic pots, tubs and trays. The new dry materials, that also need to be collected by end March 2026, are aluminium foil, aluminium food trays, steel and aluminium aerosols, aluminium tubes, metal jar lids, food and drink cartons.
- Local authorities (not already collecting plastic film) have plastic film collections by the end of March 2027.
- At low-rise household properties, all local authorities provide weekly collections of separate food waste by the end of March 2026.
- At low-rise household properties, all local authorities provide collections of garden waste on the currently operated frequencies. Assuming that all local authorities are required to have these collections by the end of March 2026, this is the year when all local authorities would start to provide a free service.
- At low-rise household properties, all local authorities provide fortnightly collections of refuse waste. This has been modelled to minimise costs of transitioning to new collection systems and increase recycling yields. In reality, some local authorities are likely to continue to provide weekly collections of refuse waste.

Option 2hh: this option is the same as 1hh option except it is assumed that all local authorities have charged garden waste collections in line with the new requirements for low rise properties with gardens.

It is assumed that all local authorities have a charged garden waste service by the end of March 2026. There is an increasing number of local authorities each year that charge for this service¹²¹. The incentive to charge is likely to increase given the new requirement is to have separate food waste collections.

In the modelling of both household options, we have assumed that dry recycling system capacity for low-rise properties is equivalent to at least 140 litres per week; food recycling capacity is 23 litres per week; and residual waste capacity is around 120 litres per week¹²². The analysis assumes the industry follows best practice in selecting their waste containers, vehicles and crew profiles.

¹¹⁹ Please see Section 6 for more information.

¹²⁰ Please see Section 6 for more information.

¹²¹ In 2012/13, there were c. 35% of all local authorities that provided a charged garden waste service. In 2018/19, there were c. 65%; and in 2020/21 67% of all local authorities that charged for the service.

¹²² The scheme profiles and associated container capacities come from data reported in LARSU (<https://larsu.wrap.org.uk/>) and are built into the core model. LARSU is the data input tool used by local authorities.

Both household options are adjusted to include the DRS impact on local authorities. We have modelled the changes in waste management costs due to the DRS in both the baseline and policy-related options. The net change in costs due to the DRS has been included in the overall NPV calculations. This is because this change in local authority waste management costs will be absorbed by the EPR scheme; and the EPR impact assessment builds on the preferred option of this IA.

Non-household municipal (NHM) sector options

Non-household municipal (NHM) sector and baseline scenario

WRAP created industry waste estimates for approximately 2.15 million businesses and public sector entities. This was based on 2018 data from ONS for the Inter-Departmental Businesses Register (IDBR), using local unit counts. The sector scope of NHM businesses included is defined by a close examination of European Waste chapter codes and their mapping onto data sources such as Environmental Agency's Waste Data Interrogator (WDI) and Incineration data¹²³, Defra Refuse Derived Fuel (RDF), Defra Household data, Defra C&I study, Eurostat¹²⁴, related-waste compositions and previous similar studies. This mapping allows us to determine which firms are producing household-similar waste per the Circular Economy Package (CEP) definition¹²⁵. From the data on business counts, 83.4% are micro firms, 13.4% are small, 2.8% are medium and 0.4% are large businesses (Table 6 below). Following the CEP definition of Municipal Waste, the NHM sector includes six core sectors: Hospitality, Retail and Wholesale, Health, Education, Transport and Storage, Office and other Services¹²⁶. The non-domestic premises are included within these sectors (e.g., schools are included in the education sector). There are other sectors that produce municipal waste. However, these sectors were excluded from the main modelling given that the amounts of municipal waste that they produce are likely to be very small¹²⁷.

Table 6 shows the number of businesses and non-domestic premises, based on the number of local units. The local business unit definition¹²⁸ is used in this impact assessment to group businesses and to estimate the impacts to the NHM sector. The rationale for using local business units, over enterprise data, is to reflect the actual collection (i.e., logistics) of waste from businesses premises and associated costs; and not the business' ability to provide a level of recycling provision most aligned with its business size (i.e., based on the enterprise business definition¹²⁹). However, given that this could affect the distribution of impacts per business size, we also assessed the impact of using different business definitions. This is presented as part of the Small and Micro sized Business Assessment (see Section 8).

¹²³ <https://data.gov.uk/dataset/312ace0a-ff0a-4f6f-a7ea-f757164cc488/waste-data-interrogator-2018>

¹²⁴ <https://ec.europa.eu/eurostat/web/environment/overview>

¹²⁵ <https://ec.europa.eu/eurostat/documents/342366/351806/Municipal-waste-statistics-guidance.pdf>

¹²⁶ It is important to note that only a small proportion of food manufacturers are included within the NHM definition. This is because (especially with medium and large Food Manufacturers), they may have a significant proportion of their waste collected by a non-standard business kerbside collection service, more so than other Sectors. Examples of alternative disposal routes may be animal feed or food re-distribution.

¹²⁷ This impact assessment excluded Food Manufacturing from the NHM sector, given its small amounts of municipal waste. NB Food Manufacturing was included in the previous impact assessments.

¹²⁸ Local unit definition: A local unit is an individual site within an enterprise, <https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/ukbusinessactivitysizeandlocation/2021>

¹²⁹ Enterprise definition: Can be defined as the smallest combination of legal units (generally based on VAT and/or PAYE records) that is an organisational unit producing goods or services, which benefits from a certain degree of autonomy in decision-making, especially for the allocation of its resources, <https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/bulletins/ukbusinessactivitysizeandlocation/2021>

Table 6: Number of businesses/non-domestic premise units, counts by employment band size, England, 2018

Sector	Micro	Small	Medium	Large	Total
Hospitality	113,395	47,970	4,805	250	166,420
Retail & Wholesale	352,050	71,925	9,490	1,475	434,940
Health	90,365	42,785	8,900	935	142,985
Education	31,820	18,410	11,850	770	62,850
Transport & Storage	96,220	10,805	3,695	750	111,470
Offices & other Services	1,114,140	96,615	21,060	4,775	1,236,590
Total	1,802,845	290,290	60,530	9,285	2,155,255

Source: WRAP's Business count based on the IDBR register from the Office for National Statistics (ONS)

Defra commissioned WRAP to map the national NHM data returns onto the individual business profiles. This research estimates the NHM sector produced 25.4 million tonnes of waste¹³⁰ in 2018. All NHM data, including this total waste arisings figure is a median-averaged figure comprised of four estimated sensitivities that WRAP have developed. Although granular data and assumptions have been applied to calculate high-level sector break-down, it will not show the exact data for individual businesses, and this *cannot* be calculated with the data available. The methodology on these four sensitivities can be found in more detail in the 'Key NHM Scenario Assumptions' section (see Section 6).

The highest contribution of waste arisings comes from the Retail and Wholesale sector, accounting for 37.0% of total NHM waste arisings, with Office and other Services second (20.0%) and Hospitality third (14.5%)¹³¹. Table 7, below, shows how the generation of waste is split by employment size band and sector type.

Table 7: NHM waste arisings in tonnes, baseline year, by sector and business size

	Micro	Small	Medium	Large	Total
Hospitality	1,805,383	1,284,601	531,087	63,636	3,684,707
Retail & Wholesale	3,443,730	3,301,851	1,724,790	924,562	9,394,932
Health	479,012	1,055,793	552,304	710,217	2,797,325
Education	29,558	943,359	1,219,425	350,117	2,542,459
Transport & Storage	429,530	591,206	813,015	72,902	1,906,654
Office and other services	1,393,698	1,395,211	1,212,402	1,084,775	5,086,085
Total	7,580,912	8,572,020	6,053,023	3,206,208	25,412,163

Source: WRAP's analysis

Table 7 shows that small businesses generate the largest share of waste arisings, followed by micro, then medium and finally large businesses. The table also shows that the sector type also affects how much waste is produced alongside businesses size.

The NHM sector is overall more complex than the household sector given its diversity and no 'middleman' to manage waste collections between the businesses and the waste collectors (as a local authority does for households). In 2017 and 2018 WRAP have undertaken large scale surveys of waste container profiles from the NHM sector to help understand the baseline profiles for the businesses in scope and found that:

- Businesses and public sector units are predominantly charged by pick up and pay per volume¹³² of an ordered container.

¹³⁰ Indicative estimate.

¹³¹ In the previous Impact Assessment, Office and other Services produced the lowest contribution of all the sectors. The second contributor was Education and the third was Hotels and Catering.

¹³² A flat rate is charged per pick up of a container, irrespective of its weight or how full it is.

- The costs are not officially reported because they are **commercially sensitive**. They vary according to contract terms which are often very short-term and influenced by the take up of a range of other services, as well as national or regional contract terms.
- The type of collection for the NHM sector can vary from sack pick-ups, 120 litre wheeled bins, up to 1,280 litre wheeled bins and can provide collections of general refuse, mixed dry recycling with and without glass, separate paper and cardboard packaging, mixed plastics, mixed glass, and food waste¹³³. Waste management companies collecting waste from businesses tend to favour the customer (business) in using 1,100 litre waste bins for general waste. This is largely because the collection vehicles are suited to lifting this type of bin, convenient for the customers' use and it is cost efficient for the waste management company in terms of operations.
- There are instances of larger containers being used and further specialist collections for key materials from NHM businesses, but these tend to be in the minority.

In addition, in 2019 WRAP also commissioned surveys of national pricing for NHM collections for a range of materials and considered variations across the country. Using the surveys mentioned above provides a useful indication of what services are being used and the relative costs of provision.

Whilst charges for recycling services are lower than for residual waste, ordering more containers and services often results in more costs to the NHM sector businesses. Reducing or avoiding cost increase is possible where businesses and public sector units decide to cost-optimize their collections through measures such as reduced size for refuse containers, decreased frequency of collections or shared waste service provisions. All these measures are considered in increased recycling scenarios and are described in more detail in 'Key NHM sector assumptions' in Section 6. From WRAP's survey of NHM businesses, it appears that part of the NHM sector is already implementing these measures, although to varying degrees. However, there are still businesses that do not have a recycling collection at all. They only have a residual collection or a very small recycling collection and there is lack of rationalisation. Coordination failure among businesses due to lack of information on support options available to them to minimise costs, may be a considerable contributing factor. For example, businesses (i.e., operating in the same work-space area) may have little to no knowledge of the amount of cost savings they could make if they made use of the shared service provision or collectively reduced the size of their refuse containers etc. Another factor limiting the optimisation approach has been the relatively low savings that might be achieved relative to the overall turnover and the perceived challenge in realising small savings.

Baseline scenario for the NHM sector

There is currently no robust data reporting requirement, of similar quality to the WasteDataFlow used on the household side, which could be used for the NHM sector analysis. We have asked WRAP to develop the evidence for the baseline of the NHM sector on which this impact assessment could build.

Like in the household sector, the NHM baseline scenario assumes that the sector makes no change to their current use of waste collection systems or collection frequency. We assume that the presented recycling rate for the NHM baseline is 43.3%, or 11 million tonnes of waste currently recycled (this does not account for process losses once material has been through MRFs¹³⁴). We assume that, out of this recycled tonnage, overall, around 80% are dry mixed recyclates (DMR)

¹³³ Container and material types are known to vary even further for broader commercial and industrial waste streams, but these are not in scope since they would not follow the standard municipal waste definition.

¹³⁴ These losses are included when estimating the amount of waste that is sent to landfill or EfW and associated carbon impacts.

and 20% represent separate food waste collections sent for recycling¹³⁵. The 43.3% baseline is representative of all waste provision profiles used by business size per sector level.

Our central estimate in the 2021 consultation was 49%. We have lowered this estimate given advice from WRAP as well as further discussions with the industry. Technical experts from one large waste management company presented their internal analysis which demonstrated business recycling rate is significantly lower than our estimate¹³⁶. If this is the case, this means that we are very likely underestimating carbon savings as well as potential opportunities for further business savings concerning waste management costs under the proposed policy options¹³⁷.

In the baseline scenario, we assume the recycling rate remains unchanged from year to year over the period covered and across all business sizes. Despite sustained consumer pressure on businesses to lessen their environmental impact, our evidence shows that the NHM recycling rate remains low, with some businesses not undertaking any recycling (see Section 8 for further detail). This consumer pressure has seen improvements in business practices regarding a reduction in the amount of plastic packaging used, a movement away from single use plastics, and the growth of the UK plastics pact¹³⁸. Given that these are consumer facing initiatives, this could help explain why on-site business recycling rates have not improved. Additionally, whilst there has been an increase in consumer pressure for businesses to be more environmentally aware, this pressure from consumers is not unilateral. According to a YouGov survey, only 50% of consumers are willing to pay more for environmental or ethical brands¹³⁹.

It should be noted that it is very likely that we are overestimating the NHM recycling rate in our analysis (as per above). We have checked this assumption with a waste management company which has investigated the NHM recycling rate. As the NHM recycling rate has stagnated, and we do not believe it will improve as a result of consumer pressure, interventions are needed to increase the current rate of business recycling.

WRAP has estimated the NHM waste management costs to be around £4 billion per year for the 43.3%. WRAP has also estimated these costs to include the DRS scheme. The scheme increases the 43.3% baseline costs by £136m per year.

Finally, the 43.3%¹⁴⁰ represents the amount that gets initially recycled by business and are used to estimate NHM waste management costs in the baseline (as explained above). An actual recycling rate for the NHM baseline is slightly lower than the presented rate above. This is because the actual rate is adjusted to account for process losses (e.g., associated with contamination that makes recyclable material untreatable). We estimate this actual rate to be approximately 36.5%¹⁴¹ (based on our engagement with the sector). This rate is used to estimate GHGs emissions in the baseline.

¹³⁵ Source: WRAP's analysis

¹³⁶ The presentation was in December 2021.

¹³⁷ This is based on the first impact assessment which assumed the NHM business recycling rate to be between 30% and 40%.

¹³⁸ <https://wrap.org.uk/taking-action/plastic-packaging/the-uk-plastics-pact/whos-signed-up>

¹³⁹ <https://www2.deloitte.com/uk/en/pages/consumer-business/articles/sustainable-consumer.html>

¹⁴⁰ A proportion of this is assumed to be dry recyclables and separate food waste recycling.

¹⁴¹ Based on our engagement with one large waste management company, we assumed that c.15% of recycled material is lost due once going through a sorting process.

The following options have been considered against the baseline:

Option 1nhm: This option assumes businesses separate waste to residual, mixed dry recyclables, separate glass waste collections¹⁴² and separate food waste collections. Micro firms, those who employ less than 10, are exempt in this policy option to mitigate against cost pressure.

The waste composition profiles of the NHM sub-sectors all show that businesses have much higher proportions of potentially recyclable waste than is prevalent in the household waste stream. With legislative measures to compel businesses to separate their waste, the potential of increased recycling rate is significant compared to the baseline. This scenario depicts the whole NHM sector (except micro firms) collecting dry mixed recyclables: plastics, metal, paper and card (glass is assumed to be collected separately¹⁴³). It also requires having separate food waste collections. It assumes businesses are required to collect these materials (excluding plastic film) by the end of March 2025. Plastic film needs to be collected by the end of March 2027.

We estimate this policy option to produce an actual recycling rate of 48.4% for the NHM sector by 2035. We modelled three different capture rates to reflect uncertainty around this estimate.

Option 2nhm: As in 1nhm, this option assumes businesses separate waste to residual, mixed dry recyclables, separate glass waste collections and separate food waste collections. In this option, micro firms are included and phased into the policy from 31st March 2027, two years after implementation for other businesses to allow time for businesses to account for new provisions.

This option assumes the same collection of the recyclable materials, all dry mixed recyclables, separate glass¹⁴⁴ and separate food waste as in Option 1nhm, but rather than micro firms being permanently exempt, they are phased in later to allow additional time to change their arrangements for waste collection. This option allows micro firms to contribute to the increased recycling rate and improves the overall performance against policy objectives.

Under this option, we expect to see the NHM sector to have an actual recycling rate of 57.8% by 2035 (this is our central estimate; we also modelled a high and low estimate to reflect uncertainty concerning future recycling rates). This option provides a better recycling rate than Option 1nhm, owing to the capture of waste from micro firms. As such, this is our preferred option.

Municipal scenario descriptions

Combining the household and non-household recycling scenarios we have developed four municipal sector options:

Household 1hh: This option assumes consistent weekly collection of dry recyclables under multi-stream systems for low-rise properties unless local authorities have collection contracts that extend beyond the date by which they need to comply with the new requirements¹⁴⁵. It assumes fortnightly residual collections, separate weekly food waste and free fortnightly garden waste collections. High-rise properties transition at the same time as low-rise properties. They have separate glass and food waste collections, and all other recyclable materials are collected under existing collection schemes.

¹⁴² Please see Section 6 for more information.

¹⁴³ Please see Section 6 for more information.

¹⁴⁴ Please see Section 6 for more information.

¹⁴⁵ Please see Section 6 for more information.

Household 2hh: this option is the same as 1hh option except it is assumed that all local authorities have charged garden waste collections in line with the requirements for low rise properties with gardens.

Non-household municipal 1nhm: This option assumes businesses and non-domestic premises separate waste to residual, mixed dry recyclables, separate glass waste collections¹⁴⁶ and separate food waste collections. Micro firms, those who employ less than 10, are exempt in this option to mitigate against cost pressure.

Non-household municipal 2nhm: As in option 1nhm, this option assumes businesses and non-domestic premises separate waste to residual, mixed dry recyclables, separate glass waste collections¹⁴⁷ and separate food waste collections. In this option, micro firms, those who employ less than 10, are included and phased into the policy from 31st March 2027, two years after implementation to other businesses to allow time for businesses to account for new provisions.

Option 1M – Option 1hh and Option 1nhm

Option 2M – Option 1hh and Option 2nhm

Option 3M – Option 2hh and Option 1nhm

Option 4M – Option 2hh and Option 2nhm

¹⁴⁶ Please see Section 6 for more information.

¹⁴⁷ Please see Section 6 for more information.

Section 6: Key assumptions and data used

This final impact assessment is based on a combined output from three technical models:

- WRAP's Routemap collection model to estimate impacts concerning the household sector;
- WRAP's NHM model to estimate impacts concerning the NHM sector; and
- Defra's in-house model, called FoWST (i.e., Fates of Waste Simulation Tool) to estimate impacts across the municipal sector. The model estimates the mass flow balance across the municipal sector in order to estimate the tonnages treated by different methods and associated GHG emissions. It also helps estimate impacts on overall landfill tax payments.

In this section, we present the key assumptions and data used in these three models. We start with households, then discuss businesses, before considering the overall municipal sector. This section also explains our approach to estimating familiarisation costs to businesses as well as policy costs.

Household-related modelling and assumptions

Here we describe the key assumptions driving the performance, costs and savings in household recycling scenarios (i.e., both low- and high-rise properties are included in the options analysis). There are a lot of assumptions underpinning the household-related modelling (some of which are **commercially sensitive**). The large number of assumptions relate to the complexity in delivering extensive collection services to 24 million households situated in local authority areas with wide ranges of deprivation and housing stock and with inter-relations between service profiles all being serviced by a mix of in-house and private sector delivery organisations. The complexity is compounded by limited national data reporting frameworks to help identify the key performance and cost differences between schemes, particularly where local authorities operate several schemes within specific council boundaries. As such, we provide a summary of our approach to household-related modelling. There are a number of self-contained studies underpinning the HH analysis and the summaries are referenced throughout this section.

The household sector comprises of the waste collected at kerbside (door to door collections) for low-rise household properties, waste collected from flatted properties (i.e., high-rise properties), bring sites for waste, bulky waste and waste presented at Household Waste Recycling Centres (HWRCs). The analysis on this sector has focussed on the first two categories with the biggest impact. WRAP assume that there are 20.5 million low-rise properties and 3.3 million flatted properties in 2018/19¹⁴⁸. Bring sites¹⁴⁹, areas where local authorities or third parties provide containers for the public to deposit recyclable material, and Household Waste Recycling Centres are not included for reasons of poor data quality, particularly around cost, and therefore their performance is assumed to continue at current levels.

The household sector analysis is undertaken from a bottom-up approach, which considers the known baseline service profiles of each collection authority in England. The data used to build the individual baselines is derived from WRAP's local authority data on the LA Portal¹⁵⁰ which is derived from the national scheme audit undertaken and with performance data benchmarks created and processed from WasteDataFlow¹⁵¹.

The overall service costs of waste and recycling can be split into a number of key elements including the collection costs, material revenue from recyclates (e.g., for collection of dry material

¹⁴⁸ WRAP analysis.

¹⁴⁹ WRAP research on LA Bring Sites 2018.

¹⁵⁰ <https://laportal.wrap.org.uk/>

¹⁵¹ <http://www.wastedataflow.org/>

streams), required sorting costs (e.g., gate fees paid by local authorities to process comingled dry recycling through material recycling facility operations) and treatment and disposal costs (from food waste to garden waste or refuse waste).

However, when scaling and comparing costs across local authorities, the comparison is extremely difficult due to different local circumstances¹⁵², different services included within local authority expenditure and no formal method for local authorities to report their specific costs for kerbside or flats collections services. Thus, WRAP developed a national cost modelling approach (Indicative Cost and Performance study) to establish standardised costs to enable fairer comparison between collection systems which reside in settings of varying characteristics. The modelling approach was endorsed and assured by an industry representative group when used in the national Consistency Framework.¹⁵³

Given the number of local authorities, it would be too complex to calculate the national cost based on the local costs for each local authority. As such, the WRAP indicative cost and performance assessments (ICP) uses average baselines for different areas that have common characteristics such as deprivation and geography. This impact assessment is based on the latest version of ICP using 2020 data sets (ICP3)¹⁵⁴. For further technical details and full assessment of the methodology please refer to WRAP ICP3¹⁵⁵ – Online Tool Modelling Assumptions Technical Annex¹⁵⁶.

The ICP3 modelling approach comprises a collection calculator using the Kerbside Analysis Tool (KAT) and incorporates sorting costs from handling of materials at depots and sorting facilities. The elements combine to generate a series of baseline models from which the new standardised costs can be generated. KAT uses actual scheme logistics timings collected from over 130 hours of filming a wide range of collection services. The tool shows how different waste flows are linked in a way that enables the achievement of significant collection savings in refuse collection and disposal activity via high recycling scenarios. KAT is typically used for individual local authority support projects and is the lead cost calculator tool used by local authorities and consultants for the last 15 years in over 400 separate analyses. It is used to produce bespoke and transparent kerbside analyses to account for aspects such as service profile, local operational efficiency and recycling performance that could be achieved in the council area. The KAT model looks at services holistically where increases in recycling performance affect the yields of remaining refuse waste needing to be collected and the resources needed to provide the services in desired policy scenarios.

Previous WRAP research looking at variables affecting recycling rates showed that the level of economic deprivation and rural nature of the area are two important contextual factors that have a significant impact on kerbside recycling performance and collection service efficiency¹⁵⁷. This also affects workload for crews and, consequently, collection infrastructure and associated costs to local authorities. The consultation impact assessments were modelled using the six-part rurality classification in line with ICP2. Following a peer review of the rurality classifications it was decided that the existing approach to segmenting local authorities was fit for purpose but there was a case to divide the existing groups further. ICP3 modelling, including this impact assessment, has been updated with nine rurality groups by including a third category for deprivation (i.e., middle deprivation).

¹⁵² Such as different property types and travel distances through conurbations and onto treatment end-destinations.

¹⁵³ <https://www.wrap.org.uk/collections-and-reprocessing/consistency>

¹⁵⁴ The previous impact assessment was based on ICP2.

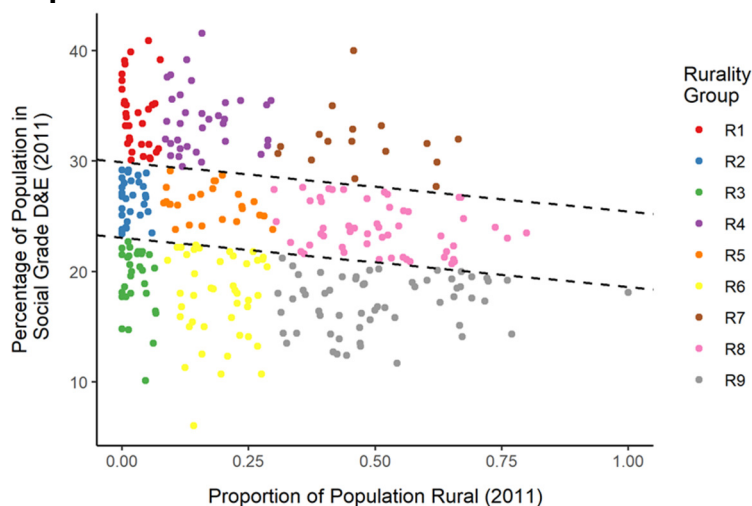
¹⁵⁵ The consultation impact assessment was based on ICP2 which was about five years old.

¹⁵⁶ This will be published in spring 2022 on WRAP's LA portal.

¹⁵⁷ Factors influencing recycling performance | WRAP: <https://wrap.org.uk/resources/report/factors-influencing-recycling-performance#:~:text=The%20factors%20found%20to%20be%20influential%20in%20affecting,dry%20recycling%20achieving%20higher%20kerbside%20dry%20recycling%20yields%3B>

These nine groups consist of a three-part geographical classification and three levels of deprivation thresholds. The geographical classification takes into account a number of rural inhabitants at a local authority level¹⁵⁸. This is based on the total population of LSOAs (Census 2011) which are defined as: predominantly urban (less than 8% of population is defined as 'rural'); mixed urban and rural (more than 8% but less than 30% of population is defined as 'rural'); and predominantly rural (more than 30% of population defined as rural). The deprivation thresholds were calculated using a line of best fit between the proportion of population that is rural, and the percentage of population in social grades D and E. This split the local authorities into two groups of higher and lower deprivation. A middle deprivation group was formed by applying an offset of 50% of one standard deviation either side of the line of best fit to span one standard deviation. Figure 2 below summarises the nine rurality groups.

Figure 2: Rurality groups¹⁵⁹



Source: WRAP

The KAT baselines are set up for nine different rurality groups from operational data that was sourced from surveys and directly from WRAP's 1:1 support covering the majority of local authorities in England that fit into each category. The baselines account for typical operational conditions with respect to average staff time or average pick rates achieved when servicing properties in a range of areas¹⁶⁰. The results of the ICP3 scenario analysed generate cost-codes that are specific to holistic service profiles. The cost codes for each rurality group then feed into WRAP's Routemap model where they are mapped on to each local authority's area profile relative to the housing stock and property numbers. The cost codes are used for the baseline scenarios and can be changed to alternative cost codes depending on the preferred policy scenarios for the impact assessment.

The presented household recycling scenarios in the impact assessment were prepared using WRAP's Routemap model. The model was originally built for the cost and performance analysis of 2020 household recycling target and subsequently refined for the national Consistency Framework in 2015. The Routemap versions used in the impact assessment were updated further particularly around annual scheme and performance changes.

The aim of the Routemap model is to aggregate the individual local authority data for cost and performance and run new scenarios over a future time series to show the annual costs via a range of cost categories. The scenarios are applied to each local authority according to when each can

¹⁵⁸ 2011 Census, available at:

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/2011censuspopulationandhouseholdestimatesforsmallareasinenglandandwales/2012-11-23>

¹⁵⁹ Dashed lines represent the line of best fit offset on either side by 50% of one standard deviation to identify middle deprivation local authorities.

¹⁶⁰ KAT project report and user guide

change and are phased in according to contract status, the service in place already and the size of the authority. The application of scenarios over time is important given the large-scale procurement and implementation challenges each local authority would face in adopting the new Government scenarios by the target dates set in legislation.

The Routemap model applies a number of assumptions on waste and recycling collection scenarios on top of the ICP results, including:

- Waste arisings: latest tonnages information from WasteDataFlow, waste from household recycling rate calculations or local authority Recycling Scheme Updater.
- Effect of changes to waste arisings: the initial recycling 'yield' projections account for anticipated increases in the number of households in each local authority, but an uplift is applied based on the ratio of projected arisings to projected households.
- General assumptions: levels of contamination, food waste and garden waste arisings assumptions.
- Assumptions by local authorities: with respect to household numbers, material yields (e.g., kg/hh collected under separate food waste services), gate fees, contextual information on the level of rurality and deprivation, transition costs and local authorities waste management contract end dates. WRAP's local authority analysis is based on data from 2018/19 since this is the last full year that scheme performance data from WasteDataFlow was available when the modelling was built. The baseline collection regimes for each authority are assumed to be those in place in 2018/19, and thus do not reflect changes made since 2018/19.
- Cost assumptions: with respect to dry recycling collection costs, residual waste collection costs, separate food waste collection costs or garden waste collection costs, container delivery cost etc.
- Contract assumptions: takes into account when local authorities might be able to adopt a new service profile. It depends on their contract end and renewal dates. Authorities are assumed to change collection system no sooner than 2026. In particular, where an authority's waste management contract is due for renewal sooner than 2026/27, the analysis assumes that contracts can be continued on a rolling basis until 2026, i.e., when the change is made. Any extra costs incurred from this are not reflected in the analysis.
- Vehicle renewal schedules: for services operating in-house managed collections, the timing of service change is influenced by how local authorities might renew their relevant fleet. The assumptions for vehicle renewal were determined by an extensive national survey in 2019 with findings showing a range of batch or whole fleet procurement depending on LA's size and local preferences.
- Transition rate assumptions: the rate at which local authorities can implement new services profiles and roll them across their areas. This depends on area size and complexity of the new profile. The transition costs include a wide range of diverse requirements in mobilising services such as re-routing, project management, container delivery and call-centre management. The analysis does not account for any effects resulting from large-scale adoption of certain collection methods, e.g., the spike in demand for certain types of truck. Defra and WRAP have been developing Implementation Plans to help address procurement and capacity issues.
- In general, the projections from Routemap are based upon observed data in authorities where a particular collection regime has been introduced. It may be that certain local factors, not accounted for in the modelling such as service quality of delivery, will affect the yields and prices in ways not reflected in these cases. Moreover, although there will be an exemption allowing for mixed collections, in the modelling we assume that local authorities choose to move towards systems with further separation in some cases. This is because the trajectory

has been towards more separation of materials from entirely mixed schemes on the basis of rising processing costs at MRFs and increased income from the sale of separately collected materials¹⁶¹. As such the impact assessment modelling objectives are to understand the average differences in scheme types and their associated performance delivery to help refine a way forward with national policy proposals. It is not the objective that the IA costs would be directly used to inform funding payments. It is recognised that further refinement and local data improvements would be needed to devise actual funding arrangements.

- Government confirmed its commitment to funding the net additional costs to local authorities arising from the new statutory duties placed on them through the introduction of Simpler Recycling. Concerning packaging materials, payments from packaging producers will fund local authorities for the collection of these materials (i.e., as a result of changes being brought by the EPR scheme). We expect that funding and payments to local authorities will take account of equity and regional consideration by looking at rurality and level of deprivation and performance expectations. This means that the costs to local authorities will be mitigated to cover additional costs associated with deprived and rural areas. As such, we do not assume that local authorities would pass their costs to their households.

The spreadsheets producing WRAP's analysis has been peer reviewed both internally and externally. The assumptions on costs and performance of collection systems are updated annually¹⁶² and undertake peer review¹⁶³ to ensure they are fit for application in the models. The outputs from the model runs were also subject to an analytical review (i.e., sense checking) by Defra staff. The main sources of uncertainty are the complexity of the interlinked models and reliance on indicative costs specifically for high density housing such as flats and Household Waste Recycling Centres.

Transition costs

Routemap includes transition costs associated with a service change. The cost of transition from one scheme to another depends on the type of scheme change. The table below shows the costs that are applied to each change. They are all one-off costs applied in the first year of change.

¹⁶¹ Engagement with WRAP.

¹⁶² Through the published statistics at laportal.wrap.org.uk

¹⁶³ There are several peer reviews of the assumptions and modelling used using experts with skills in diverse areas of analysis and industry knowledge. This also includes using external expert contractors to gather assumptions and/or to sense check that data are appropriate to use in the modelling.

Table 8: Transition costs

	Dry scheme change (including addition of new dry material)	Refuse change	Food recycling addition	Garden waste charge change	Dry container swap ¹⁶⁴
Project manager to manage the service change per local authority	£40k	£40k	£40k	n/a	n/a
Re-routing of current vehicle collection routes based on staff time to work out new routes	£20k	n/a	£20k	n/a	n/a
Roll-out communications includes developing an introduction and instruction leaflet	£2.75 per hh	£2 per hh	£0.75 per hh	£0.75 per hh	£0.75 per hh
Engagement staff costs to distribute leaflets and to promote new services at roadshows	£1 per hh	£1 per hh	£1 per hh	n/a	£1 per hh
Depot hire for initial container storage	£0.4 per hh	n/a	£0.2 per hh	£0.2 per hh	£0.2 per hh
Call centre based on temporary additional staff (1-2 per LA) for hh and business queries	£0.5 per hh	n/a	£0.5 per hh	£0.5 per hh	£0.5 per hh
Liner start-up costs	n/a	n/a	£0.5 per hh	n/a	n/a
Container delivery – cost depends on container type	yes	n/a	yes	n/a	yes

Source: WRAP

These costs are taken from the technical specification of Routemap¹⁶⁵ and are based on: (1) actual prices from leading manufacturers; (2) WRAP surveys of regional procurement hubs from which local authorities buy their products; and (3) one-to-one local authority support work from the past 10 years. The costs are inflated for the year of analysis.

Price and cost assumptions

As for price assumptions, all modelling is done based on constant prices that do not change over the years. Material incomes are accounted for in sorting costs (i.e., these are net of income received for sold material) as well as in direct payments in scenarios where materials are collected separately (i.e., for fibres in twin-stream scenarios and separately collected materials in multi-stream scenarios). The material income is based on the average prices as reported in WRAP's Material Pricing Reports (2019/20 values).

Regarding the treatment and disposal costs, Routemap uses localised gate fee costs, where these are known. They are based on both Gate Fees surveys (from between 2018/19 and 2019/20) and individual local authority studies across various waste and recycling facilities in England. Where data cannot be sourced the regional average is used. This processing cost data is collected from local authorities and their contractors under arrangements that the data will be treated as **commercially sensitive**. To try to make the standardised costs closer to actual expenditure the values are incorporated into the Routemap model and aligned to the local authority area. The data is handled sensitively with limited staff access to protect the integrity of the local authorities supplying the information on this and other WRAP programmes. In addition, bulking and haulage costs are added relative to the scheme profile where required¹⁶⁶. Haulage costs to transport the materials across the country to the reprocessors are also considered in the

¹⁶⁴ This applies to collection systems that change their dry material scheme type (i.e., to systems with further separation).

¹⁶⁵ Source: WRAP.

¹⁶⁶ For example, for LAs who might need to haul food waste to an anaerobic digestion facility cross country, or to manage the transfer of segregated dry recyclables into bulk containers at a local depot.

materials pricing where appropriate¹⁶⁷. Some materials that are bulked and hauled such as paper do not require an additional haulage cost applied since the price paid by the reprocessor already includes them in the value offered.

There is a lot of uncertainty around the collection of plastic film (given that only 19% of local authorities in England collect plastic film) and its impact on MRF gate fees. We have assumed that the collection of plastic film will increase MRF gate fees by 6%. This is based on WRAP's discussions with local authorities and MRF operators. We have included some sensitivity modelling on this estimate – see Annex B for further detail.

The key cost assumptions are related to the following items:

- **Containers:** WRAP estimated the capital costs and replacement rates of different containers from an in-depth cost review originally undertaken in 2016¹⁶⁸ and adjusted with data from local authorities between 2019-20 to reflect any price changes. The range of these capital costs range from c.£1 for a kitchen caddy to c.£20 for a wheeled 240l bin; and the range of replacement rate is between 2% to 5% depending on a container type.
- **Vehicle:** the vehicle costs are based on an in-depth cost review¹⁶⁹ and adjusted where appropriate according to the information provided directly by leading manufactures supplying fleet to local authorities. Annual standing cost includes insurance, tax and licensing for the vehicles and is calculated as 5% of the capital plus road tax¹⁷⁰. The running costs cover maintenance, tyres and oil and is calculated as 10% of the capital for all vehicles (except for the 7.5 tonne food waste vehicle where running costs are 7.5% of the capital)¹⁷¹. The fuel is assumed to be £1.10. This is based on the average price for diesel that local authorities pay^{172, 173}.
- **Crew salaries:** WRAP gathered salary information from job adverts and directly from local authorities in 2019-20. All the base annual salaries are adjusted to include national insurance, pension and sick/holiday pay costs.
- **Service overheads:** WRAP assumed 10% of total costs account for overheads. This was originally based on the 2016 cost review and was still found to be relevant in WRAP one-to-one studies with local authorities in 2019/20¹⁷⁴.

We have estimated high and low sensitivities for costs concerning containers, vehicles and crew salaries. Further detail can be found in Annex B.

Dry recycling at low-rise properties

WRAP uses data from Government's WasteDataFlow (WDF) tonnage reporting system to calculate the collected tonnages of dry recyclables for each LA. The values supplied by Councils

¹⁶⁷ The Materials Pricing Report (wrap.org.uk/resources/report/materials-pricing-report) summarises the costs of transfer and which material streams have the haulage already included (known as Ex-works costs).

¹⁶⁸ Eunomia, 2016, Update of Kerbside Analysis Toolkit Default Data.

¹⁶⁹ WRAP: Implementation Plan survey of vehicle manufacturers (2019, unpublished).

¹⁷⁰ WRAP: Implementation Plan survey of vehicle manufacturers (2019, unpublished).

¹⁷¹ WRAP: Implementation Plan survey of vehicle manufacturers (2019, unpublished).

¹⁷² Source: WRAP (based on their engagement with local authorities. NB local authorities do not pay VAT and they tend to buy fuel at better rates).

¹⁷³ The fuel costs are around 5-10% of the total gross collection costs. The rising fuel prices are likely to affect these costs, however the effect should be similar under both the baseline and assessed policy options. The baseline scenario is based on less efficient vehicles (e.g., vehicles used for comingled collections are less efficient than the ones used for multi-stream collections), and therefore we would expect to see the number of comingled systems fall in pursuit of systems with higher separation for lower costs.

¹⁷⁴ Eunomia, 2016, Update of Kerbside Analysis Toolkit Default Data

in WDF are aggregated totals for the local authority area and need cleansing and further analysis to calculate dry recycling yields per household for each target material. These yield benchmarks are created from analysis looking at collection system type, collection frequency, rurality and levels of deprivation. When an authority is assumed to move from one collection system to another the waste yield per household will change based on the above factors. Although there will be an exemption allowing for mixed collections, in the modelling we assume that local authorities choose to move towards systems with further separation in some cases. This is because the trajectory has been towards more separation of materials from entirely mixed schemes on the basis of rising processing costs at MRFs and increased income from the sale of separately collected materials¹⁷⁵.

The yields referred to above represent material collected from the kerbsides and thus include a certain amount of non-target materials, or certain level of contamination. Reporting of inputs and rejects from Material Recovery Facilities shows reasonable variation and inconsistency between data sets such as WasteDataFlow and the MF Portal and so standardised contamination rates are applied. A contamination rate is then applied to the tonnage collected and varies by collection approach with the following assumptions applied in the household model:

- Co-mingled mixed dry recyclables collections: 13.5%
- Twin-stream dry recyclables: 9.5%.
- Multi-stream dry recycling collections: 4%¹⁷⁶.

Compared to the consultation impact assessment¹⁷⁷, this analysis includes the new proposed materials grouped into three broad categories for modelling purposes: cartons, foil, and plastic film. WasteDataFlow provided limited information on these new materials which meant yields per household for these materials needed to be estimated using other sources of evidence and information.

For cartons, based on discussion with ACE¹⁷⁸, WRAP estimated a consumer 'placed on the market' (POM) value of 55,000 tonnes¹⁷⁹ with c. 64% capture rate. This was then divided by 29 million households in the UK to estimate a yield of 1.2 kg per household per year.

For foil, there was a discussion with Alupro¹⁸⁰ which provided a POM estimate of 32,596 tonnes. This estimate includes foil containers, plain foil, and imported premium pet food trays. There was no data for tubes, but Alupro advised that the associated tonnages would be negligible. The POM estimate covers both consumer and non-consumer foil. To calculate the consumer POM only, the proportion of consumer to non-consumer aluminium packaging reported in the Pack-flow Covid-19 metal report¹⁸¹ was applied to the above tonnages. Assuming 29 million households in the UK and a recycling rate of 56%¹⁸², an estimated yield of 0.4 KG/HH/YR has been calculated.

¹⁷⁵ Engagement with WRAP.

¹⁷⁶ WRAP's analysis (unpublished).

¹⁷⁷ https://consult.defra.gov.uk/waste-and-recycling/consistency-in-household-and-business-recycling/supporting_documents/Consistency%20in%20recycling%20impact%20assessment.pdf

¹⁷⁸ <http://www.ace-uk.co.uk/recycling/>

¹⁷⁹ This is an estimate for the UK.

¹⁸⁰ Alupro is an industry funded, not-for-profit organisation, representing the UK's aluminium packaging industry: <https://alupro.org.uk/>

¹⁸¹ Valpak, 2020, PackFlow Covid-19 Phase I: Metal

¹⁸² 56% capture rate was applied as a best guess option as foil shares a similar property to film. A high proportion of both materials will be contaminated with food which tends to reduce the capture rate as householders may be reluctant to wash and recycle the packaging.

Concerning plastic film, we assume that all local authorities collect it from 2027 onwards. WRAP estimated that there could be 6kg of plastic film per household per year collected for recycling. This estimate is based on 311 tonnes of plastic film¹⁸³ attributed to the household sector of which 56%¹⁸⁴ is captured for recycling. This is then divided by 29 million households (including flats)¹⁸⁵.

We assume that plastic film is collected within the same dry materials vehicle (e.g., in a compartment within a multi-stream truck or mixed with other materials within a twin-stream or comingled truck). This assumption is based on the most common collection approaches used by local authorities that already collect plastic film¹⁸⁶.

Separate food waste collections at low-rise properties

All household scenarios assume local authorities adopt separate food waste weekly collections at kerbside. While there are other options for collecting food waste, such as mixed food and garden waste collections, WRAP evidence shows that separate weekly collections of food waste can capture nearly three times as much material per year compared to mixed food and garden waste collections. However, given the exemption, some local authorities may choose to conduct mixed collections due to local circumstances, availability of AD and IVC facilities and existing contracts. More food waste tends to be captured through weekly collections when residual collections are on a fortnightly basis (as assumed in all household scenarios). Summarised in the Consistency Framework supporting evidence¹⁸⁷, the estimated food waste yields are calculated on an established formula for each local authority area (including local deprivation and residual service profile).

All household scenarios assume caddy liners would be offered to householders and are accounted for as part of the transition and ongoing costs to local authorities. Engagement with the sector suggests that local authorities and food waste recycling plant operators benefit from a flexible approach to caddy liner use, which is appropriate to varied local circumstances and treatment facility requirements. Local authorities are able to provide caddy liners if preferred. We continually review the evidence base and policy around caddy liner use.

The liners are only supplied to participating households on an on-going basis to minimise wastage and are costed on the basis of compostable polymers so there might be savings made if cheaper polyethylene versions are suitable at food waste treatment facilities. The start-up liner packs to all households equate to £0.5 per household. Based on c.23.4m households in England, this equates to c.£12m start-up liner costs. The ongoing costs are around £1.5 per household (but could be £0.5 per household if PE bags are used instead) which means c.34m pa.

WRAP food waste trials¹⁸⁸ and other research on trying to maximise participation in food waste collection services show that free caddy liners can result in significantly higher household participation. This is primarily due to liners addressing householders' key concerns of cleanliness of the system and that the liners should be free. Without their provision to householders, WRAP estimate around 20% lower yield per household in Year 1, dropping to 50% of expected yield achieved under caddy liner provision by Year 3.

Dry recycling and separate food waste collections at high-rise properties (flats)

¹⁸³ Estimated using UK POM 2019 data.

¹⁸⁴ Based on information that WRAP obtained from Suez and CEFLEX based on their work on international studies.

¹⁸⁵ Based on the number of households in the UK.

¹⁸⁶ Based on WRAP's review.

¹⁸⁷ Ibid.

¹⁸⁸ WRAP (2016), [Household food waste collections guide](#); WRAP (2009), [Evaluation of the WRAP separate food waste collection trials](#).

The performance at flats is calculated in the same way as for kerbside properties. Based on WRAP reviews of urban schemes, flats are assumed to achieve collected dry yields equivalent to 50% of that achievable at kerbside properties. The frequency of the collection for both recycling and residual waste is unchanged. For food waste the typical capture rate is 0.5kg/hh served per week. The service profile assumed for flats are bring style collections. Given the huge diversity in the design of housing stock for flatted properties it is only possible to present service costs and performance values from observed and monitored services.

The 2011 Census offers a percentage of high-rise households defined as “Flat, maisonette or apartment: Purpose-built block of flats or tenement”¹⁸⁹. However, the classification of high-rise may not match the local authority’s approach to service provision. Therefore, a methodology was derived to estimate the proportion of high-rise properties in the authority based on WRAP’s LARSU scheme data, using the Census figures where the scheme data was inconclusive.

Free and charged garden waste collections at low-rise properties with gardens

Following consultation responses from industry stakeholders, we have agreed with WRAP to revise the garden waste assumptions and associated modelling based on engagement with stakeholders. This was in part due to stakeholders (including local authorities) providing additional information on the amount of garden waste which would be diverted from the residual stream by moving from a charged garden waste service to a free garden waste service¹⁹⁰. Some local authorities gave examples on the percentage of garden waste found in the residual stream, and how their own experiences differed from the levels previously suggested in the second impact assessment¹⁹¹.

We have modelled the baseline and the two household policy options. The baseline reflects the current situation where circa 65% of local authorities charge for the service in 2018/19¹⁹². The household options are the same, except one option assumes a free garden waste collection (1hh) and another option assumes a charged garden waste collection.

The key factors that affect the costs and benefits between free and charged garden collections include: the quantity of garden waste that is remaining within residual stream, the level of take up in the charged collection and the level of collection efficiency that is achieved in the charged and/or free system. Furthermore, it is assumed that only low-rise households produce garden waste and that they are provided with a 240-litre bin and a fortnightly collection.

Garden waste related assumptions in Routemap builds on local authority data, including WasteDataFlow (WDF) and LARSU. The former consists of a number of questions that local authorities need to answer to provide data on their waste arisings. Garden waste specific questions in WDF include Q10¹⁹³, Q14¹⁹⁴, Q16¹⁹⁵ and Q23¹⁹⁶. LARSU provides information about the service provision provided by each local authority.

¹⁸⁹ <http://www.ons.gov.uk/ons/rel/census/2011-census/key-statistics-and-quick-statistics-for-local-authorities-in-the-united-kingdom---part-3/rft-qs402uk.xls>

¹⁹⁰ “Consistency in Household and Business Recycling in England”, Traverse, Pg. 88

¹⁹¹ “Consistency in Household and Business Recycling in England”, Traverse, Pg. 88

¹⁹² Based on 2018/19 data using WRAP’s Toolbox based on local authorities’ portal self-reported inputs.

¹⁹³ Q10 contains data for the collection of household organic waste from kerbside.

¹⁹⁴ Q14 contains data for the collection of household organic waste via Civic Amenity (CA) sites at a Waste Disposal Authority (WDA) level.

¹⁹⁵ Q16 contains data for the collection of household organic waste via CA sites, at a Unitary Authority (UA) or Waste Collection Authority (WCA) level.

¹⁹⁶ Q23 contains data for the collection of material for treatment by WDA from which recyclates are back allocated to WCAs.

Using 2018/2019 WDF, WRAP have estimated garden waste arisings per household for each local authority¹⁹⁷. They then mapped these estimates against the type of service provision offered by different local authorities (e.g., a free garden waste service). LARSU, for example, provides information whether local authorities provide free or charged garden waste service. Based on this analysis, WRAP then calculated the average garden waste yields for local authorities which provide a free garden waste service (i.e., 151.53kg/hh/yr), and for local authorities which provide a charged garden waste service (110.98kg/hh/yr).

To estimate the impact on residual waste collections, WRAP assume residual waste contain c. 3.4% of garden waste based on a combination of free and charged collections in the baseline¹⁹⁸ (with charged garden waste services containing c.4.5% garden waste, and free garden waste collections containing c.2.4%). This assumption is guided by compositional studies of the residual waste stream by WRAP¹⁹⁹. Applying these percentages to the baseline residual yields, WRAP estimated that, on average, residual collections alongside a charged garden collection contain 8.32kg/hh/yr more garden waste compared to residual collections alongside a free collection.

Concerning household waste recycling centres (HWRCs), WRAP estimated that there is an 18.02kg/hh/yr difference in HWRC residual waste collected between a free and charged service. This was based on Q14/16 in WDF. The same analysis of Q23 in WDF, "Civic amenity sites: household" showed a 13.23kg/hh/yr difference in HWRC garden waste collected between free and charged services.

Given the above assumptions, WRAP calculated that there is a +/-0.99 kg/hh/yr arisings change moving from a free garden waste collection to a charged garden waste collection. This equates to a reduction of c.7,624 tonnes for all going to charged and to an increase of c.11,702 tonnes for all going to free. For modelling purposes, we assumed this is a direct transfer from the residual stream. All the tonnage related assumptions have been summarised below in Table 9.

¹⁹⁷ WDF reports the quantities of garden waste generated by local authorities. WRAP looked at the amounts generated at kerbside in WDF and then mapped this onto the available properties (i.e., not flats).

¹⁹⁸ Based on 2018/19 data using WRAP's Toolbox based on local authorities' portal self-reported inputs, 65% of local authorities charged for a garden waste collection in 2018/19.

¹⁹⁹ <https://wrap.org.uk/resources/report/quantifying-composition-municipal-waste>

Table 9: Comparing the impacts of moving to different garden waste collection services

Stream	From free to charged	From charged to free	From no service to free	From no service to charged
Kerbside GW	-40.55	40.55	151.53	110.98
Reference	kg/hh/yr WDF 2018/19 Q10 "Garden only" compared to LARSU LA scheme data 2018/19		kg/hh/yr WDF 2018/19 Q10 Garden only compared to LARSU LA scheme data 2018/19 – avg. collected tonnes for free and charged collections	
Kerbside Residual	8.32	-8.32	-151.53	-110.98
Reference	kg/hh/yr WDF 2018/19 Q23 "Collected household waste: Regular Collection" - Analysed with residual waste composition data related to the https://wrap.org.uk/resources/report/quantifying-composition-municipal-waste-report and comparing to the LARSU LA scheme data 2018/19.		kg/hh/yr Assumed direct diversion from residual due to lack of data. There are a minimal number of LA's offering no GW collection at all from which to obtain data.	
HWRC GW	13.23	-13.23	-	-
Reference	kg/hh/yr WDF Q14/16 data of "green garden waste only" reported in 2018/19 under collection and unitary authorities		Assumed no change due a small number of local authorities affected ²⁰⁰ and lack of data.	
HWRC Residual	18.02	-18.02	-	-
Reference	kg/hh/yr Q23 "Civic amenity sites: household" 2018/19 UAs & WDAs		Assumed no change due to a small number of local authorities affected and lack of data.	
Overall arisings	-0.99	-0.99	-	-
Reference	kg/hh/yr A product of the above assumptions			

Source: WRAP

The analysis on local authority income from garden waste subscriptions considers what each local authority currently charges households for the service. WRAP uses surveys to understand the actual local charge which has been included in the baseline modelling. Some local authorities currently charge over £154m per year through the garden waste charging subscription service. There is a large variation in charging across England (£22-£97 per household per year for a bin type service, or an average charge of £43 per household per year²⁰¹). There appears no strong relationship between the level of charge and take up rate or the corresponding tonnage collected.

Finally, to estimate the total local authority income in a fully charged scenario, we assumed that there will be a 30% participation rate. This is derived from the current participation rates in existing charged garden waste services²⁰².

Key non-household municipal (NHM) sector assumptions

Non-household municipal familiarisation costs

We have used the consultation to seek stakeholder views on the familiarisation costs to businesses. This is because they were unmonetised and only qualitatively discussed in the previous analysis.

²⁰⁰ For the scenarios affected there are around 5 local authorities affected (i.e., 1.5% of the total). WDF does not segment HWRC tonnes by the individual sites to help develop average estimates of change. There are many sites in each waste disposal area all located within the boundaries of several waste collection authorities.

²⁰¹ Based on WRAP's analysis.

²⁰² Based on a study by Resource Futures (unpublished).

In our analysis, the familiarisation costs include: (1) reading and understanding new regulatory requirements and guidance; and (2) dissemination through staff training.

There are several assumptions made to estimate these costs and they have been made from the responses to the consultation questions as well as a specific familiarisation survey sent out following a policy consultation session with stakeholders. Our stakeholders included business improvement districts (BIDs), business representatives and waste management companies.

We assume that reading and understanding new regulatory requirements and guidance will require approximately 4 hours of one manager per small and micro business, two managers for medium and three managers for large²⁰³. This considers that there is some level of recycling/disposal knowledge, especially within larger businesses²⁰⁴. The costs associated with staff training are based on the average number of staff per businesses size²⁰⁵. We expect that staff training should take around 15 minutes of each of the staff member's time²⁰⁶. This training would cover how staff need to separate the recyclable waste into the new streams. Wages used to estimate familiarisations costs are presented in Table 10. They are all adjusted with a wage uplift, measured at 22%²⁰⁷, that reflects the non-wage related overheads such as national insurance contributions and pensions. These wage rates are from Defra estimates for survey control on how different occupations are assumed to cost for time when completing a survey.

²⁰³ Based on the businesses survey that we undertook in June 2021. We then tested these results with WRAP to agree a central estimate based on their experience concerning business recycling and associated behaviour. Furthermore, we included this estimate as part of our sensitivity analysis (i.e., our low and high-cost estimates are 2 and 4 hours of reading per manager, respectively).

²⁰⁴ This is based on the estimated recycling rates per businesses size in the baseline.

²⁰⁵ Average staff numbers by enterprise size were taken from the ONS IDBR dataset found here:

<https://www.ons.gov.uk/file?uri=/businessindustryandtrade/business/activitysizeandlocation/adhocs/13506enterprisesbydivisionandsizeinengland/ah866.xls>

²⁰⁶ The businesses survey – that we undertook in June 2021- produced a mixed response on the amount of time required for staff training. We then tested these results with WRAP to agree a central estimate based on their experience concerning business recycling and associated behaviour. Furthermore, we included this estimate as part of our sensitivity analysis (i.e., our low and high-cost estimates assume 10- and 20-minutes training time per staff, respectively).

²⁰⁷ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/827926/RPC_short_guidance_note_-_Implementation_costs_August_2019.pdf

Table 10: Familiarisation costs to businesses (£, undiscounted)

Type of staff cost	Category type	Business size by employment size-band				Total
		Micro (<10)	Small (10-49)	Medium (50-249)	Large (250+)	
Managers costs	Staff number	1	1	2	3	
	Wage rate w/ uplift	£25.5	£25.5	£25.5	£25.5	
	Time taken, hours per person	4	4	4	4	
	Total manager cost	£102	£102	£204	£306	
All staff training	Staff number	2	19	99	1574	
	Wage rate w/ uplift	£14.1	£14.1	£14.1	£14.1	
	Training time taken, hours per person	0.25	0.25	0.25	0.25	
	Total all staff cost	£7	£67	£349	£5,548	
1st year fam costs per business size		£109	£169	£553	£5,854	£6,685
Number of enterprises per business size²⁰⁸		2,144,175	200,445	36,885	9,460	2,390,965
Total sector 1st year familiarisation costs, £m		£234	£34	£20	£55	£343

Source: Defra's modelling

Furthermore, we include some on-going training costs to businesses. This covers new staff members in the two years following the initial year having to familiarise themselves with the new practice of firms they move to. After year three of the policy, we assume full knowledge across all workers and no need for further familiarisation. As similar requirements will be placed on households, it was suggested in the consultation responses that this should mitigate familiarisation costs to businesses²⁰⁹. We assume a 15% turnover of staff²¹⁰ from year to year, and the associated costs are given in Table 11 below.

²⁰⁸ Waste management companies are already required to offer recycling services to their customers. As such, we do not think that there will be any significant familiarisation costs to these companies. These costs were monetised in this impact assessment.

²⁰⁹ <https://www.gov.uk/government/consultations/consistency-in-household-and-business-recycling-in-england/outcome/government-response>

²¹⁰ <https://www.monster.co.uk/advertise-a-job/hr-resources/workforce-management-and-planning/staff-retention/what-is-the-ideal-employee-turnover-rate/>

Table 11: On-going familiarisation costs to businesses after the first year of the policy implementation (£, undiscounted)

Type of costs	Category type	Business size by employment size-band				Total
		Micro (<10)	Small (10-49)	Medium (50-249)	Large (250+)	
On-going costs	Avg. staff turnover number	0.3	3	15	236	
	Wage rate w/ uplift	£14.10	£14.10	£14.10	£14.10	
	Time taken, hours per person	0.25	0.25	0.25	0.25	
	Total on going costs	£1	£10	£52	£832	£896
Number of enterprises per business size		2,144,175	200,445	36,885	9,460	2.39m
Total sector on-going familiarisation		£2m	£2m	£2m	£8m	£14m

Source: Defra's modelling

For micro firms, we assume that all familiarisation costs start two years from go-live date.

NHM model: total waste arisings

The business classification used in the analysis follows the Standard Industrial Classification of economic activities at the 2-digit level and as such a wide range of businesses are included. For example, the office category in which a significant proportion are small and micro businesses includes estate agents, libraries, financial services, telecommunications centres as well as standard office complexes.

Given the uncertainty in data, WRAP have developed four key sensitivities on the total amount of waste in the NHM sector. This methodology used data, among others, provided by the Environment Agency (EA) and resulted in the four main estimates because the EA data is not conclusive in the sense of:

- In 2018 only 69% of permitted sites included site data in their returns. This could be for multiple reasons: they might have not processed any waste, they might have closed down, they have just opened, or simply did not include any site data.
- There is no flow of data within the EA WDI, and so it is difficult to know the true path of waste from one facility to another and to an end destination. For instance, some waste is shown to go to a facility (e.g., transfer, or end destination incineration), other waste is shown to go to a process (Recovery), and so it is difficult to depict if the Recovery tonnes are counted in a Recovery site or if they are going to a recycling destination.

This means that four sensitivities were required when making assumptions on the EA WDI, so every eventuality is covered. These sensitivities include tonnes shown as gone to a Recovery process (and not), and a proxy extrapolating site data submission up to 84.5% to reflect different levels of the non-returns of data.

The four sensitivities are listed as:

- Without Recovery tonnes and 69% Returns
- With Recovery tonnes and 69% Returns
- Without Recovery tonnes and 84.5% Returns
- With Recovery tonnes and 84.5% Returns

These sensitivities were then each modelled by sector/sub-sector into waste collection scenarios and extrapolated to a national level to provide the NHM scenario results. For the purpose of this impact assessment, a median across the four sensitivities (i.e., 25.4Mt of waste) has been taken as our central estimate. We have included some sensitivity analyses to explore the impact of using different values of the total NHM waste tonnages. This is presented in Annex B.

For NHM collections, the concentration of glass and paper in many of the subsectors in scope of the regulations, such as hospitality and offices, means that there will continue to be a good economic case for separate collections to be offered to businesses²¹¹. Although there will be an exemption allowing for mixed collections, in the modelling we have assumed that all businesses choose to separate waste into mixed dry recyclables (except glass), with separate collections for glass and food waste. We use this option as the most likely scenario on the assumption that the majority of businesses are likely to rely on an exemption from the requirement to collect the recyclable waste streams separately from each other, to collect paper and card, metal and plastic together in one bin, so as to reduce number of bins required. This is based on the national surveys of waste collections from businesses and waste collector offerings²¹². They show that the majority of recyclable waste collections provided to the NHM sector are currently for mixed dry recyclables. This is because most sites have limited space; and, also, not every business generates all the material streams in scope of reforms.

NHM model: waste management costs

Similar to the standardised costing approach for HH collections, WRAP's NHM model uses industry charge per container lift data for each service offered to a business. A 2019 industry survey was used to update collection charges from a wider range of suppliers across the country²¹³. This data is then applied to the baseline and the container provision needed for future scenarios. The charges are derived from large scale surveys of commercial and local authority collectors and as such remain **commercially sensitive**. Industry reviews of SMEs and national retailers highlight contract prices that reflect minimal levels of discounting according to a range of factors such as duration, material ranges included, numbers of lifts per site, national or regional contracts.

Given the range of contract differences and scale of businesses affected in the NHM analysis it is not possible to build in discount factors into the individual site analysis. As such, the overall costs generated in the analysis are likely to be slightly overstated, particularly in the new scenarios when fully rolled out.

Given limited evidence around lift prices and how they will be affected by new materials (such as plastic film), WRAP modelled a 6% increase in the cost of DRM collections²¹⁴. This is further investigated via a sensitivity analysis presented in Annex B.

Shared waste provision

WRAP's NHM model calculates for each of the four sensitivities the tonnes of waste generated per year per business sub-sector and size. It then applies estimated waste compositions to convert tonnes of waste into volume²¹⁵ and calculates the lowest collection costs from a range of different bin sizes per business. This means that:

- If it is cheaper for the business to have a larger bin but collected every other week, as each week the bin is less than half full, then this is selected.
- If two businesses were to share a larger bin (next size up as such) but have a weekly collection (because of double the amount of waste), then the price per business would remain the same as a fortnightly collection.

²¹¹ Engagement with WRAP

²¹² Source: WRAP

²¹³ This has been inflated to 2020 prices to ensure consistency across all the analyses presented in this impact assessment.

²¹⁴ Based on WRAP's survey of MRF operators to inform HH analysis.

²¹⁵ Given sector's use of the charge per pick-up rate for a service provided, tonnages of waste need to be converted to volume to account for the amount of space left per applied container.

Alternatively, if the business was to have a smaller, less expensive bin, but collected weekly, the price would only be marginally more than the fortnightly collection alternative with two businesses sharing the service.

The WRAP fieldwork carried out so far shows micro and, to a lesser extent, smaller businesses using a shared provision more often than medium and larger sized businesses. The surveys observed some businesses already operating shared services and employing other options to maintain low charges such as backhauling of their waste. Therefore, the baseline and future scenarios for micro –firms are likely to be overstated and offer opportunities to reduce on-going charges.

Thus, WRAP's modelled scenarios do account for some waste provision sharing with the smaller businesses, but only up to a shared provision between two businesses. This means that there could be more cost savings if more than two smaller businesses shared a waste provision. Due to lack of available data on size and numbers of premises in shared office or retail facilities, it is difficult to quantify take up and cost of a shared waste provision provided by landlords or site managers.

Optimisation

When expanding a waste provision from a residual only collection to a provision that includes additional bins for a recycling collection, two options are available to businesses:

- Non-optimisation of collection services: businesses keep the residual bin currently used and add extra bins to place the recyclates in. This means that the cost of a waste collection with additional recycling bins would increase significantly, because one, or some bins, are not efficiently sized to the volume of waste generated.
- Optimisation of collection services: businesses reduce the residual bin size in line with the amount of recyclable material diverted to the additional recycling bins.

When including recycling bins on top of residual waste collections, optimisation is key to keeping the costs down for the business. The additional recycling bins are not necessarily a separate bin for each recycling material. They can and are often bins that hold multiple recyclable materials (i.e., dry mixed recyclables which contain paper, card, plastics and metal).

Optimisation can be applied on two levels. The first is to reduce the residual bin size sufficient to the volume of residual waste that is left after the recyclable waste has been extracted and placed into recycling bins. The second is, on top of reducing the residual bin size sufficiently, to also have the most suitable recycling bin size appropriate to the volume of recycle generated by the business.

This means that the cost of a waste provision with additional recycling bins would be less and, in some cases, cheaper than a residual only collection. This also may mean the waste management companies would need to adapt their collection vehicles to lift the various bin sizes. However, it is suggested some collection vehicles already have this capability.

NHM DRS analysis

WRAP has interviewed seven different waste management companies (WMCs) asking for their view on potential cost impacts in relation to the DRS scheme²¹⁶. Their view was that the scheme is very likely to increase the costs of collection of materials outside of the DRS scope. This is because the remaining material will be a less desirable product because of its lower value.

²¹⁶ Interviews were conducted in March 2020.

The views from WMCs did vary widely in the suggested cost increase to business charges. It was felt that the variation in charge increase was down to the individual business models operated, the proportion of DRS in the remaining container and its relative net processing cost. It is suggested that an overall cost increase up to 25% for NHM DMR kerbside collections may happen because of the reduction in desirability of these streams. Given the uncertainty around DRS impact, we modelled a 10%, 15% and 25% increase in the costs of DMR collections (based on views from WMCs). 15% is our central estimate.

The NHM Forecast has been calculated with reduced tonnes in the hospitality sector only²¹⁷. This sector is assumed to be the most likely affected by the DRS scheme and to have 1Mt of DRS materials²¹⁸. To show the effect the DRS scheme will have on the NHM kerbside collections, we modelled an increased cost to DMR for all business sectors.

Key municipal-wide assumptions

Our analysis concerning municipal-wide impacts depends on the amount and composition of MSW arisings²¹⁹ in the future. For waste from households, these are based on a projected change in households numbers multiplied by associated waste arisings. NHM arisings projections are projected as a flat line for the period in question.

Defra's model estimates the mass flow balance across the municipal sector in order to estimate the number of tonnes treated by different methods and associated GHGs emissions under different scenarios. This is a complex model with a number of key inputs influencing the modelling results. It is out of scope to present a detailed assessment of the model here. As such we present the key assumptions on which our municipal-wide results (i.e., GHGs and landfill tax calculations) depend:

- To split landfill costs between local authorities and the NHM sector, we assume that local authorities send c. 18% ratio of their collected residual waste to landfill. The rest is assumed to be sent to energy from waste (EfW) plants²²⁰. We used this assumption for the landfill tax payment calculations to align with the modelling of the costs to local authorities. It is likely that this assumption overestimates savings to local authorities and underestimates them to the NHM sector.
- Given that WRAP has modelled the tonnages that local authorities send to EfW, the remaining capacity is then allocated to the NHM sector. This assumption affects how much waste from businesses is sent to landfill.
- We assume that EfW capacity increases from 11,625Kt in 2019 to 14,760Kt in 2029, at which point we assume that EfW capacity becomes fixed. This assumption has been guided by the published capacity of current EfW facilities by WIDP²²¹.

²¹⁷ DRS tonnage has been estimated using Placed on the Market (POM) data. The data mainly relates to the plastic and metal beverage containers used in the hospitality sector. Although the POM data contains container data, the NHM waste compositions do not go down to the level of granularity. This means the reduction of waste has been taken out of all plastic, metal and glass materials and not just packaging materials.

²¹⁸ Based on DRS analysis

²¹⁹ We are only modelling waste from households and municipal businesses. This excludes litter and street sweepings that have some impact on capacity constraints.

²²⁰ This is based on 2019/20 WasteDataFlow data.

²²¹ Waste Infrastructure Delivery Programme (WIDP): Infrastructure Facilities List (IFL), available at: <https://data.gov.uk/dataset/b99f22a0-e716-44bf-bff2-a12da2562e4f/waste-infrastructure-delivery-programme-widp-infrastructure-facilities-list-ifl>

- All scenarios assume that 2.5% of municipal solid waste is untreatable at the moment and in the future²²². This means that it needs to be sent to landfill and cannot be processed through EfW and MBT plants or recycling facilities in any of the scenarios.
- We assume that additional AD capacity will become available. This is in part due to HMG's GGSS which aims to increase the proportion of biomethane in the gas grid by subsidising the production of biomethane via AD and injecting it into the gas grid.
- We assume a fixed capacity of MBT of 4.7Mt²²³. It is very unlikely that new MBT plants will be built. This is because they are not economically viable within the current market conditions²²⁴.
- All infrastructure whether currently operational or expected in the future is assumed to continue operating indefinitely.
- Waste composition for both HH and NHM sectors is assumed to be constant over time once adjusted for DRS tonnages. The exact changes are hard to predict, but there will almost certainly be some shifts in the composition of waste arisings over time. These changes will, in particular, affect the greenhouse gas emissions and savings under different scenarios.
- Landfill GHG emissions are counted in the years that material biodegrades, not when it is deposited.
- Carbon factors for recycling/disposal of materials are unchanged from the previous impact assessment and are held constant over time²²⁵. Until better auditing and completions are made, it is very difficult to identify the treatment process used for recycling (i.e., closed-loop vs open-loop) and in-turn the GHG benefit. For purposes of our modelling, we assumed closed-loop recycling²²⁶.
- For our main analysis, we are using the warming potential of methane to be 25 times greater than CO₂ (AR4 values). For our additional sensitivity analysis, we are using the warming potential of methane to be 28 times greater than CO₂ (AR5 without feedback), and 34 times greater than CO₂ (AR5 with feedback). This is being done in line with IPCC recommendations.
- The carbon intensity of grid electricity and heat are assumed to decline over time, but the profiles have not been updated since the 2019 IA.
- Refuse Derived Fuel (RDF) exports are assumed to decline to 0 by 2029 due to new taxes in other countries²²⁷. RDF that is sent to landfill is treated as inert and not included in calculations for landfill emissions.
- The landfill tax value is assumed to be flat and at the 2020/21 level of £94.15 per tonne of waste sent to landfill. Whilst the landfill tax has previously risen in line with the growth in the Retail Price Index I, a constant rate has been assumed for the modelling purposes as all other prices have been kept constant:
 - We use both the EA data and WasteDataFlow (WDF) to estimate the total waste arisings for the municipal sector. We then use Defra's model (i.e., FoWST) to estimate impacts across the municipal sector (including impacts associated with the landfill tax). We acknowledge that there are some potential issues with some waste

²²² Based on internal advice from the Waste Infrastructure Delivery Programme (WIDP).

²²³ Waste Infrastructure Delivery Programme (WIDP): Infrastructure Facilities List (IFL), available at: <https://data.gov.uk/dataset/b99f22a0-e716-44bf-bff2-a12da2562e4f/waste-infrastructure-delivery-programme-widp-infrastructure-facilities-list-ifl>

²²⁴ Based on internal advice from the Waste Infrastructure Delivery Programme (WIDP).

²²⁵ This is based on WRAP's 2017 analysis on carbon metric (unpublished).

²²⁶ Closed-loop recycling means that materials are made from recycled content where the previous product was the same as the new product (the process recycles the same product). Open-loop recycling produces a new product which is different to the previous product.

²²⁷ Based on internal advice from the Waste Infrastructure Delivery Programme (WIDP).

codes, which means that estimates of landfill tax impacts presented here represent a maximum potential level and outcomes may be lower. For example, in our UK statistics on waste, waste coded 19.12.12 is defined as municipal waste (based on an agreed methodology with Devolved Administrations). However, our discussions with experts suggest that this code is not 100% municipal waste²²⁸. They also suggest that the code is not always subject to the higher rate of landfill tax.

- The analysis of the composition of municipal solid waste landfilled in the UK²²⁹ put together information on the amount of biodegradable material landfilled under a range of European Waste Catalogue codes, including 19.12.12. For this code, they estimated a mean level of biodegradability of 46.3%. Given that this study showed the presence of biodegradable materials concerning municipal solid waste, we have assumed the higher landfill tax rate for the waste estimated to be diverted from landfill. In reality, some waste coded 19.12.12 could be subject to the lower rate. Hence, our estimated landfill tax impacts cannot be directly compared with the data provided in the 'Landfill tax bulletin'.
- Defra is planning to undertake some work to review its definition of municipal waste as well as commission a new study on mixed waste composition, which will inform any revisions to expectations of landfill tax impacts. This is to inform future work related to this and other policies (including associated evaluation studies).

The greenhouse gas emissions analysis of recycling scenarios builds on the assumptions specified above. We estimate the net increase or decrease in carbon emissions across the following activities: recycling and composting, energy recovery and landfill.

Our GHG savings arise from diverting waste away from the residual waste stream (black bag waste) where it will be sent to landfill or energy from waste (EfW), having in many cases a negative environmental impact. In the case of landfill, biodegradable waste (food, garden, paper, etc.) can decompose anaerobically, generating methane, a potent GHG. For EfW, burning of fossil-based waste (plastic, for example) releases CO₂ into the atmosphere. Despite the fact that both of these waste treatment methods usually recover energy, they remain for many materials a net GHG contributor.

In the case of waste, emissions from waste sent to landfill and incineration²³⁰ are non-traded. FoWST also assumes that emissions from in-vessel composting (IVC) and windrow composting are non-traded; and that emissions from AD are traded. Recycling is a mixture of traded and non-traded (avoided) emissions, depending on materials. Non-traded sector emissions are those outside the UK Emissions Trading System (UK ETS). Traded emissions are covered by the UK ETS.

On January 1st, 2021, the UK's standalone Emissions Trading System (ETS) came into force replacing the EU ETS²³¹. It is important to note that as a result of the change, there is no difference between 'traded' carbon prices and 'non-traded' prices following a government review on carbon prices²³². However, we continue to report GHGs emissions changes and split them in terms of

²²⁸ Experts from the EA and Local Partnerships.

²²⁹

<http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=17447&FromSearch=Y&Publisher=1&SearchText=WR1003&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

²³⁰ Although incineration emissions are non-traded, the energy recovery component from incinerating municipal waste generates energy which offsets the need to produce that energy through existing UK power plants. That offset is counted as traded emissions savings.

²³¹ Valuation of greenhouse gas emissions: for policy appraisal and evaluation - GOV.UK (www.gov.uk)

²³² Valuation of greenhouse gas emissions: for policy appraisal and evaluation - GOV.UK (www.gov.uk)

whether they occur in sectors covered under the UK ETS ('traded emissions') or outside the UK ETS ('non-traded emissions'). Following a cross-government review during 2020 and 2021, new carbon prices were released. The rationale for updating carbon prices include changes in international and domestic targets, and a better understanding of new technology costs and availability to help meet the targets. Published guidance is that 'traded' and 'non-traded' emissions should have the same price so that there is equal weight for emissions from the two sectors²³³.

Since the second consultation stage impact assessment, there has been consideration of how our policy on consistency in recycling will interact with HMG's GGSS²³⁴. This relates to the supply of separately collected food waste as a feedstock for AD. There is some uncertainty on the relative contribution of both policies from diverting food waste from landfill and/or other destinations to AD plants. To avoid double counting between these two policies, we have assumed that all carbon savings related from diverting waste from landfill are attributed to this impact assessment; and adjusted carbon savings related to AD plants (e.g., energy production) from 2024 onwards by the amount included in the GGSS impact assessment²³⁵. We estimated this amount based on the supply of food waste assumed in the GGSS analysis.

For each of the options' GHG emissions savings, we applied the carbon prices as presented in Table 12 over the appraised period.

Table 12: Applied carbon prices, 2020, £/t CO₂e (rounded)

Year	Traded carbon prices			Non-traded carbon prices		
	Low	Central	High	Low	Central	High
2023	126	252	378	126	252	378
2024	128	256	384	128	256	384
2025	130	260	390	130	260	390
2026	132	264	396	132	264	396
2027	134	268	402	134	268	402
2028	136	272	408	136	272	408
2029	138	276	414	138	276	414
2030	140	280	420	140	280	420
2031	142	285	427	142	285	427
2032	144	289	433	144	289	433
2033	147	293	440	147	293	440
2034	149	298	447	149	298	447
2035	151	302	453	151	302	453

Source: UK traded and non-traded carbon values for policy appraisal 2020; Table 3 from Data tables 1 to 19: supporting the toolkit and the guidance²³⁶.

Compliance and enforcement cost to the Environment Agency

The Environment Agency have provided their compliance and enforcement costs for this policy. These costs are indicative and include the following:

- **Set-up costs:** The Environment Agency estimated that they will need c.£1.8m in 2024i. This includes intelligence gathering, risk profiling, compliance planning, developing internal guidance and training, and employing the workforce.

²³³ Valuation of greenhouse gas emissions: for policy appraisal and evaluation - GOV.UK (www.gov.uk)

²³⁴ The GGSS follows on from the biomethane element of the non-domestic renewable heat incentive by providing tariff support for biomethane produced via AD and injected into the gas grid.

²³⁵ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1018133/green-gas-impact-assessment.pdf

²³⁶ <https://www.gov.uk/government/publications/valuation-of-energy-use-and-greenhouse-gas-emissions-for-appraisal>

- **Enforcement costs:** These costs depend on the number of compliance notices that the Environment Agency needs to serve. For the purposes of this impact assessment, the Environment Agency assumed this cost to be c.£540k per year from 2025 onwards. In this impact assessment, we have assumed that there are no regulatory costs (i.e., compliance and enforcement costs) passed onto businesses and local authorities. The Environment Agency has powers to recover costs only for compliance activities via their charging scheme. The Environment Agency would need to develop their charging proposals for Simpler Recycling, including an assessment of impacts on charge payers. They would also have to consult on their charging proposals and gain approval from the Secretary of State and HM Treasury.

Other policy support costs:

The policy support costs (presented in this section) are based on WRAP's advice. WRAP considered available evidence from the Devolved Administrations to estimate these costs. Given that Northern Ireland and Scotland already require businesses to segregate and present food waste separately, their evidence was used to inform the NHM policy support costs.

WRAP has estimated the following costs to support local authorities:

- **National communications:** these costs include activities such as raising awareness about the policy changes and benefits of recycling; and supporting various partners to deliver messages to citizens. The cost estimate for this item is based on WRAP's experience related to similar activities. It is assumed that c. £4.1m will be required for the period between 2024 and 2027.
- **Development and monitoring of non-binding performance indicators (NBPIs)** are important to help monitor recycling and performance levels of local authorities. These costs are estimated to be c.£350k from 2024 to 2026. From 2026, it is reduced to c.£150k for the remaining period²³⁷. Again, these estimates are based on WRAP's current experience undertaking similar activities.
- **Local authority support:** Defra has been funding activities to support local authorities. It is expected that these costs will increase as a result of these new proposals. WRAP has estimated that these costs will increase by c.£100k per year over the appraisal period (i.e., based on their existing work to support local authorities).
- The above costs are the same for both Option 1hh and Option 2hh.

Concerning the NHM sector, the policy costs that we included in this assessment cover national communications, regional outreach and roadshows to raise business awareness, and tools for businesses to use directly. It is assumed that the majority of guidance and tools for businesses to use are generated in advance of 2030, but further reporting and maintenance will be required to ensure high participation.

WRAP estimated the national communications to cost c.£55k pa²³⁸. They estimated the outreach activities and tools to cost £2.2m pa. The costs decrease to £1.3m from 2030 onwards. These costs are the same for both NHM policy options.

The previous impact assessment included costs associated with direct one-to-one businesses support. This support was based on a range of core activities to help businesses with scheme set up and optimising container and system provision, procurement, communications and set up of internal separation systems. Although some responses to our consultation agreed for the need of one-to-one business support, the evidence on the direct relationship between business support

²³⁷ This is to reflect that most of local authorities would have changed most of their collection schemes by that time.

²³⁸ WRAP estimated national communications to cost c. 271k pa. These costs also include activities to support individual business via one-to-one support.

and increased recycling rates is limited. As such, Defra is still exploring one-to-one business support options.

Section 7: Costs and benefits of collections system options for the municipal, household and non-household sectors

The four municipal sector options deliver similar costs and benefits. The key difference is the scale of effect (as summarised in Table 13).

We identify the following **benefits** associated with the presented options (i.e., based on best estimates):

- **Municipal recycling rate:** the combination of ambitious household and NHM scenarios achieves an increase in the recycling rate from 42.3% to 52.9% (1M), 57.6% (2M), 51.2% (3M), 55.9% (4M) by 2035. This includes indirect recycling recovered from residual waste treatment facilities.
- **Savings to households from removed garden waste charging:** municipal options 1M and 2M assume local authorities provide free garden waste collections. This is to incentivise households to recycle and take out garden waste from their residual bins. Local authorities incur costs related to this service and across all households, they can save on average £165m per year from not being directly charged. For Option 1M and 2M the total saving to households over the appraisal period is £1,322m (discounted). It is estimated based on outputs from WRAP's Routemap collections module analyses.
- **GHG emissions savings:** all municipal scenarios achieve a substantial reduction in greenhouse gas emissions. Across the appraisal period, these savings are £7.8bn for Option 1M, £10.9bn for Option 2M, £7.3bn for Option 3M and £10.5bn for Option 4M (all discounted). This is estimated using Defra's in-house model.
- **NHM landfill tax saving²³⁹:** we estimate £3,486m-3,995m reduction for Option 1nhm (micro exemption) and £5,067-5,576m for Option 2nhm (micro phased). Using our internal model, we estimate the tonnages treated by different methods, including landfill, EfW, MBT and AD processes. We then provide a breakdown of landfill tonnage diverted from households and businesses (i.e., HH landfill tax is included in LA waste management costs). For EANDCB calculations, the tax benefit to businesses is treated as an indirect impact²⁴⁰.
- We assume these savings are realised by waste management companies, and that they do not pass any of that saving back to the affected municipal businesses. This is because businesses tend to pay for waste collection on a per lift or bin basis (i.e., not by quantity of waste); and most of these charges for commercial collections relate to the operational delivery costs (e.g., labour) rather than the treatment of material, which varies per collection event. As such, WRAP has assumed that lift prices stay constant.
- **Landfill tax impact on government:** there is a considerable reduction in government revenue from landfill tax payments (i.e., a lost benefit to government). We estimate that only 11-22% of municipal solid waste is sent to landfill by 2035 across the four municipal sector options. This is significantly lower compared to the baseline estimate (i.e., 34%). Reduced landfill tax receipts are as follows: £4,175m for 1M Option, £5,756m for 2M Option, £3,636m for 3M and £5,216m for 4M Option. This is based on our in-house FoWST model:

²³⁹ The landfill tax value is assumed to be flat and at the 2020 level of £94.15 per tonne of waste sent to landfill. Whilst the landfill tax has previously risen in line with the growth in the Retail Price Index, a constant rate has been assumed for the modelling purposes as all other prices have been kept constant.

²⁴⁰ This is because tax impacts are out of scope of the BIT calculator (i.e., based on guidance from the Better Regulation Executive).

- We use both the EA data and WasteDataFlow (WDF) to estimate the total waste arisings for the municipal sector. We then use Defra's model (i.e., FoWST) to estimate impacts across the municipal sector (including impacts associated with the landfill tax). We acknowledge that there are some potential issues with some waste codes, which means that estimates of landfill tax impacts presented here represent a maximum potential level and outcomes may be lower. For example, in our UK statistics on waste, waste coded 19.12.12 is defined as municipal waste (based on an agreed methodology with Devolved Administrations). However, our discussions with experts suggest that this code is not 100% municipal waste²⁴¹. They also suggest that the code is not always subject to the higher rate of landfill tax.
- The analysis of the composition of municipal solid waste landfilled in the UK²⁴² put together information on the amount of biodegradable material landfilled under a range of European Waste Catalogue codes, including 19.12.12. For this code, they estimated a mean level of biodegradability of 46.3%. Given that this study showed the presence of biodegradable materials concerning municipal solid waste, we have assumed the higher landfill tax rate for the waste estimated to be diverted from landfill. In reality, some waste coded 19.12.12 could be subject to the lower rate. Hence, our estimated landfill tax impacts cannot be directly compared with the data provided in the 'Landfill tax bulletin'.
- Defra is planning to undertake some work to review its definition of municipal waste as well as commission a new study on mixed waste composition, which will inform any revisions to expectations of landfill tax impacts. This is to inform future work related to this and other policies (including associated evaluation studies).

We identify the following **costs** associated with the presented options (i.e., based on best estimates):

- **LA waste management costs (including landfill tax saving and DRS net effect):** for household Option 1hh, there is a net increase in costs. This is mainly driven by introducing free garden waste collections across all local authorities, resulting in lost revenue from charging and increase in costs, for example, related to container provision. Option 1hh means that local authorities net costs increase by £3,513m (discounted) over the appraisal period. Under Option 2hh local authorities' net costs decrease by £188m (discounted over the appraisal period). This is because our assumption is that all local authorities charge households for their garden waste collection. This increases their revenue which in turn reduces their costs associated with waste management. The presented costs above account for lower landfill tax payments that local authorities must make under both options; and are estimated by WRAP's Routemap collections module analyses.
- **Familiarisation costs to businesses:** businesses will have to read and understand the new requirements. They will also need to train their staff. We have estimated these costs to be £132m (over three years) for Option 1nhm and £354m (over five years) for Option 2nhm (discounted). These estimates are based on our engagement with the sector²⁴³. The familiarisation costs are considered to be a direct impact on businesses and are, therefore, included in the EANDCB calculations.

²⁴¹ Experts from the EA and Local Partnerships.

²⁴² <http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=17447&FromSearch=Y&Publisher=1&SearchText=WR1003&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description>

²⁴³ For further detail see Section 6.

- **NHM waste management costs (including DRS net effect):** the two NHM options deliver different outcomes. Option 1nhm (micro exemption) lowers waste management costs for the NHM by £561m (discounted over the appraisal period); and Option 2nhm has a net increase in costs of £3,164m (discounted over the appraisal period).
- Small, medium and large firms are all expected to reduce their waste management costs over the appraisal period. The cost savings are greatest for large firms, decreasing in order from medium to small (see “Small and Micro Business Assessment” in Section 8 for further detail). Concerning micro firms, their waste management costs increase under Option 2nhm. This has a significant impact on the total net NHM waste management costs given the large number of these firms compared to other sizes (e.g., small). It is common for micro firms to only have residual bins which means that they need to increase their number of bins in order to align with the new requirements; and this increases their costs. All NHM waste management costs are estimated based on WRAP’s NHM Model.
- The net change in waste management costs, including the DRS effect, is included as a direct cost to businesses, and is therefore included in the EANDCB calculations.
- **Municipal sector policy support costs to government:** these costs include national communications and guidance; tools and support for both local authorities and businesses. They also include costs to the Environment Agency to provide compliance and enforcement activities. These costs are estimated at £63m, discounted over appraisal period. Further detail can be found in Section 7.

Net present value: all municipal sector options deliver net societal savings when compared to the baseline performance.

- Option 1M has a positive NPV of £5,789.0m. Based on NPV calculations, it is the third-best option (i.e., after Option 3M and 4M respectively).
- Option 2M is estimated to have the lowest NPV of £4,991.7m across all the four municipal sector options. This is driven by both Option 1hh (free garden waste) and Option 2nhm (micro phased). These two options are the most expensive options for local authorities and businesses respectively.
- Option 3M has the highest NPV of £6,669.9m. This option demonstrates that allowing local authorities to charge for garden waste collections delivers a better economic value compared to a free collection (i.e., Option 1hh). This option also has a better economic option concerning the NHM sector by exempting micro firms from the new requirements (i.e., Option 1nhm).
- Option 4M has a NPV of £5,920.6m and is our preferred option. Although this option does not deliver the best NPV outcome, there was a strong support from consultation responses for micro firms to be included in the new requirements. Including micro firm increases our recycling rate by 4.7 percentage points (compared to Option 3M). Concerning garden waste collections, we have considered value for money of using public expenditure. Additional environmental benefits (e.g., carbon savings) do not provide a strong enough economic case to fund these services.

Non-monetised costs and benefits:

- Annex A presents our non-monetised costs and benefits for the four municipal sector options. We explain familiarisation and inconvenience costs to households; sorting costs to the NHM sector; impacts on recycling and waste infrastructure; impacts on material

quality and associated prices; impacts on jobs and innovation; and impacts on international greenhouse gas emissions.

- We were not able to estimate the additional GHG savings associated with higher quality recycle that is more likely to be produced under systems with further separation. We are unable to do this as the data quality of WasteDataFlow (WDF) limits details of the end destinations of materials (limited descriptions, missing/incomplete responses, limited auditing). Until better auditing and completions are made, it is very difficult to identify the treatment process used for recycling (i.e., closed-loop vs open-loop) and in-turn the GHG benefit. For purposes of our modelling, we assumed closed-loop recycling²⁴⁴.
- Annex A provides further detail on why it wasn't proportionate to monetise these impacts.

Table 13 below summarises the net costs and savings for each municipal sector option. It shows the profile of costs and savings to the municipal sector over the period of 2024-2035. All results are shown with constant prices and discounted. They have been estimated applying an annual discount rate of 3.5% per year²⁴⁵. The analysis follows the Green Book principles throughout²⁴⁶.

²⁴⁴ Closed-loop recycling means that materials are made from recycled content where the previous product was the same as the new product (the process recycles the same product). Open-loop recycling produces a new product which is different to the previous product.

²⁴⁵ HM Treasury, 2020, The Green Book – central government guidance on appraisal and evaluation.

²⁴⁶ HM Treasury, 2015, The Aqua Book: guidance on producing quality analysis for government.

Table 13: Summary of net impacts of considered policy options, £ millions, discounted (i.e., based on best estimates)

	Option 1M	Option 2M	Option 3M	Option 4M	
Municipal recycling rate achieved (baseline rate 42.3%)	52.9%	57.6%	51.2%	55.9%	
Savings to households from removed garden waste charging	£1,322	£1,322	-£1,003	-£1,003	
GHG emissions savings (traded and non-traded)	£7,795	£10,943	£7,269	£10,466	
NHM landfill tax saving	£3,995	£5,576	£3,486	£5,067	
Reduction in government landfill tax receipts (benefits to municipal sector included in LA and NHM rows)	-£4,175	-£5,756	-£3,636	-£5,216	
Social benefits (total)	£8,936	£12,085	£6,116	£9,313	
Additional local authorities net service costs (+)/savings (-) from changes in dry recycling, food waste and free garden waste collections for all HHs	£3,513	£3,513	-£188	-£188	
	Transition costs	£998	£998	£722	£722
	Savings and on-going costs	£1,667	£1,667	£567	£567
	DRS net effects	-£474	-£474	-£474	-£474
	Lost income from garden waste charging	£1,322	£1,322	-£1,003	-£1,003
Net cost to NHM businesses under increased recycling collections ²⁴⁷	-£429	£3,518	-£429	£3,518	
	Waste management cost	-£857	£2,209	-£857	£2,209
	DRS net effects	£295	£955	£295	£955
	Familiarisation	£132	£354	£132	£354
Policy costs to apply best practices in recycling collections	£63	£63	£63	£63	
Social costs (total)	£3,147	£7,094	-£554	£3,392	
Net present value, costs (-) / savings (+)	£5,789.0	£4,991.7	£6,669.9	£5,920.6	

Source: Defra's analysis

Municipal sector options 1M-4M: detailed summary of costs and benefits

This section provides a more detailed description of all the monetised costs and benefits for each municipal sector option. It has a number of tables to demonstrate annual impacts (relative to the baseline) for both the household and non-household municipal sectors. **The figures presented in these tables are all undiscounted unless otherwise stated. These figures may not add up to totals due to rounding.**

Under each option, we also present the municipal-wide impacts. The municipal-wide impacts include environmental benefits (such as carbon savings), reduced landfill tax payments to the Exchequer and wider policy costs (including costs associated with compliance and enforcement).

We use the following structure to present the monetised costs and benefits for each option:

- The costs and benefits associated with the household sector
- The costs and benefits associated with the NHM sector

²⁴⁷ All sub-costs under the net cost to NHM sector below are considered to have a direct impact on business and therefore included in the EANDCB calculation in the BIT calculator.

- The costs and benefits related to municipal-wide impacts
- The summary of all the monetised costs and benefits

All the monetised costs and benefits are based on our central estimates. Our sensitivity analyses are presented separately in Annex B.

Option 1M: Household option with free garden waste and NHM option with micro firms exempt.

Option 1M: Option 1hh (free garden waste)

For the household sector, we have estimated the following costs and benefits:

- Transition costs to local authorities
- Waste management costs to local authorities (including DRS net effect and landfill tax savings)
- Savings to households from free garden waste collection

For Option 1hh (i.e., the household sector only), we have estimated the recycling rate to be 53.2% by 2035 (i.e., from 45.1% in 2019)²⁴⁸. This recycling rate underpins the costs estimates presented below.

Table 14 shows the breakdown of transition costs for dry recycling, food waste and garden waste collection changes, avoided capital and vehicles costs associated with mixed garden waste collections and residual waste collections, as well as wider transition costs. Transition costs are only modelled until 2030/31. This is because these are, by definition, temporary. It is expected that all local authorities fully transition to the new requirements in this period. They consist of additional vehicles, containers, and wider transition costs to enable local authorities to change to a new collection system (or to a new waste contract) or to add new materials to existing collection systems.

The total net transition costs are estimated to be £1,091m (undiscounted), with the highest additional expenditure in 2026 and in 2027. This is when we expect most local authorities to transition and implement separate food waste collections. Note the transition costs for separate food waste (presented in Table 14) are relatively low in 2026 (and other years). This is because some of the costs associated with separate food waste are included in dry recycling due to expected movement of local authorities towards systems with further separation²⁴⁹. The vehicles associated with further separation are used to collect both dry recyclables and food waste (i.e., this is different to a twin-stream collection where a separate vehicle is required to collect food waste). Concerning the transition costs of separate food waste, they also include the provision of caddy liners for food waste containers. The costs of caddy liners provision are categorised as transition costs for the period up to 2030. After that they are treated as an ongoing operating cost to local authorities²⁵⁰.

Table 14 suggests some local authorities are changing in 2025. This would be the latter part of the year given that most local authorities make decisions based on financial years²⁵¹. These are

²⁴⁸ This is based on WRAP's household analysis.

²⁴⁹ Please see Section 6 for more information.

²⁵⁰ Engagement with WRAP and the sector suggests that local authorities and food waste recycling plant operators benefit from a flexible approach to caddy liner use, which is appropriate to varied local circumstances and treatment facility requirements. Local authorities are able to provide caddy liners if preferred, however, there are currently no plans to fund local authorities to provide caddy liners to households. We continually review the evidence base and policy around caddy liner use.

²⁵¹ Our analysis is presented using calendar years. However, the actual expenditure is more likely towards the end of 2024/25 (i.e., the second part of the financial year).

local authorities that have moved towards systems with further separation of dry materials but with alternative collection frequencies and/or separate food waste collection (collected on a separate vehicle) in the baseline. These local authorities may be the first ones to start changing their services to align with the requirements (i.e., weekly separate food waste collections) under this option²⁵². In doing so, they start to co-collect separate food waste on a stillage with the dry recycling vehicle. This affects how the costs are allocated between 'dry recycling collection' and 'separate food waste', as explained above.

Table 14: Modelled net transition costs (+) and savings (-) of household Option 1hh, £ millions, undiscounted

	Dry recycling collection	Separate food waste	Mixed food and garden waste	Garden only collection	Residual waste collection	Wider transition costs	Total transition costs
2024	£0	£0	£0	£0	£0	£0	£0
2025	£10	-£5	£0	£0	-£6	£24	£24
2026	£390	£59	-£47	£283	-£53	£105	£737
2027	£34	£64	-£3	£9	-£5	£10	£110
2028	£47	£45	-£4	£13	-£7	£8	£103
2029	£30	£42	-£2	£9	-£4	£6	£80
2030	£0	£37	£0	£2	-£1	£0	£38
Total	£511	£242	-£56	£315	-£75	£154	£1,091

Source: WRAP's modelling, Defra's assumptions on the length of transition period

Table 15 gives the total net cost to local authorities across the whole appraisal period (2024-2035). It provides a breakdown of costs associated with vehicles and containers. These costs are £675m and £453m respectively across the appraisal period. They include both initial capital as well as future replacement costs. Concerning operational costs, there are some changes in year 2025. Local authorities are required to collect all dry recyclable materials from 31st March 2026. We have assumed in the modelling that they need to add these materials to their existing collections if they don't already collect them. In turn, this increases their recycling rates and lowers net operational costs in 2025. The model, for example, estimates bulking and waste treatment costs (net of revenue for separately collected materials) to fall by £11m in 2025. These costs decrease further as more waste is recycled over the following years (i.e., £207m by 2035, or average savings of £166m per year).

Table 15 shows that local authorities have higher operating and communications costs, increasing from £252m in 2026 to £377m by 2035 (or an average increase of £302m per year over the period of 2025-2035 when compared to the baseline). These costs cover labour, fuel costs etc.

The policy proposals mitigate the DRS baseline impact on local authorities by £624m. In our analysis, we estimate that the DRS scheme reduce local authority income from material revenue and increase MRF gate fees (see Section 6 for further information). The DRS impact also have a small impact on bulking and residual waste costs. The combined effect is greater under the do-nothing compared to Option 1hh. As such, there is a saving to local authorities. Option 1M assumes that local authorities introduce a free garden waste collection. This has two main implications on the local authority costs. It contributes to the increase of the capital and operating costs to local authorities (as mentioned above). Another impact on local authorities is the lost income from charging households for their garden waste collection. WRAP estimates the net lost income to be £1,647m over the period of 2026-2035. The lost income to local authorities is a

²⁵² Most local authorities will be making decisions based on financial years.

benefit to householders. They save the same amount (i.e., £1,647m) over the same period because of removed charging.

Taking into account the loss of garden waste charging income, and the increased separation and collection of dry recyclables, food waste and garden waste, this scenario estimates an increase in local authority waste management costs of £4,263m over the period of 2024-2035. Table 15 shows the modelled costs for the period of 2024-2035²⁵³.

Table 15: Modelled net costs (+) and savings (-), of household Option 1hh, £ millions, undiscounted

	Vehicle Capital costs	Container Capital costs	Annual Operating and Comms	Annual Bulk and Treatment ²⁵⁴	Wider transition costs ²⁵⁵	DRS effect	LA income from charged garden	Total service cost (+) / saving (-)
2024	£ 0	£ 0	£ 0	£ 0	£ 0	£ 0	£ 0	£ -
2025	-£1	£ 0	-£ 7	-£ 11	£24	£ 0	£ 0	£6
2026	£ 262	£ 351	£ 252	-£ 131	£123	-£ 0	-£ 161	£1,019
2027	£ 15	£ 48	£ 356	-£ 178	£47	-£ 18	-£ 162	£431
2028	£ 27	£ 31	£ 357	-£ 190	£ 45	-£ 74	-£ 163	£358
2029	£ 14	£ 24	£ 364	-£ 200	£42	-£ 76	-£ 164	£332
2030	£ 1	£ 0	£ 368	-£ 204	£37	-£ 77	-£ 164	£289
2031	£ 1	£ 0	£ 369	-£ 206	£37	-£ 76	-£ 165	£290
2032	£ 10	£ 0	£ 371	-£ 206	£37	-£ 76	-£ 166	£301
2033	£ 303	£ 0	£ 372	-£ 207	£38	-£ 76	-£ 167	£597
2034	£ 16	£ 0	£ 374	-£ 207	£38	-£ 76	-£ 168	£312
2035	£ 28	£ 0	£ 376	-£ 207	£38	-£ 75	-£ 168	£327
	£ 675	£ 453	£ 3,551	-£ 1,946	£507	-£ 624	-£ 1,647	£4,263

Source: Defra's analysis based on WRAP's modelling

Option 1M: Option 1nhm (micro firms exempt):

We have been able to estimate the following costs and benefits to the NHM sector:

- Familiarisation costs to businesses,
- Costs to waste management companies,
- Waste management costs to businesses,
- DRS net effect; and
- Savings to waste management companies associated with landfill tax payments.

We have estimated that businesses will incur familiarisation costs in the first 3 years of the policy. These familiarisation costs include understanding new requirements, making changes to waste management contracts and training. Familiarisations costs to businesses start in 2024 (as recycling behaviour changes are seen from 2025 onwards) and are estimated to be £133m for all small, medium, and large businesses. These costs cover understanding the new requirements, making practical changes, and training staff. For the following two years (2025 and 2026) these costs reduce to £13m and are associated with training new staff only. Our assumption is that from 2027 these costs are no longer needed. This is because new staff members would be very likely trained to the same standard in their previous jobs and/or would have had a similar experience with their household recycling collection. For further detail on the monetised familiarisation costs, see Section 6.

²⁵³ These cost results also reflect the change at high-rise properties.

²⁵⁴ Including all material types, residual disposal and household waste recycling centre waste minus secondary market material revenue.

²⁵⁵ As per transition, as well as including liner costs.

Concerning waste management costs (not including DRS effect), we assume that businesses change their waste collections from 2025 onwards. This means the following:

- Large businesses: the baseline waste management costs for these businesses are £350m per year. These costs are estimated to decrease by £37.6m per year in 2025 and 2026. However, the cost decrease from 2027 onwards is lower, i.e., £28.6m. This is because there is a requirement to start recycling plastic film which in turn increases lift prices.
- Medium businesses: the baseline waste management costs are £663m per year. They are expected to decrease by £24.8m per year (Year 2025 and 2026) and by £7.1m per year from 2027 onwards.
- Small businesses: their baseline waste management costs are £1,123m per year. These costs are expected to decrease by £76.9m in 2025 and 2026 (i.e., years without plastic film collection) and by £47.6m per year from 2027.
- Micro firms: there are no changes to their baseline waste management costs, estimated to be £1.86bn per year. This is because micro firms are exempt under Option 1M.

Overall, this policy option decreases the total waste management costs for the sector from £4.00bn to £3.92bn per year (from 2027 onwards). The total impact is a saving of £1,029m in terms of waste management costs (undiscounted and over the total appraisal period).

We estimate that the DRS scheme will increase the costs to waste management companies by £379m (relative to the baseline and over the appraisal period). This is based on 15% increase in the costs of dry material recycling collections under both the do-nothing and Option 1nhm.

Under this option, the business recycling rate increases from 36.5% to 48.4%. This means that there is less business waste sent to landfill and EfW. Based on a Defra in-house model FoWST, we estimate landfill tax payments to reduce by £419m per year (i.e., average estimate across years of change). The total saving is £5,029m over the total appraisal period. Some of this saving will be as a result of diverting residual waste from landfill to EfW due to spare EfW capacity (as local authorities divert their waste to recycling). Table 16 provides a summary of the annual costs to the NHM sector (including savings associated with the landfill tax payments).

Table 16: Modelled net costs (+) and savings (-) of Option 1nhm (micro firms exempt), £ millions, undiscounted

	NHM Familiarisation	Waste management costs	DRS effect	NHM Landfill tax saving	Total service cost (+) / saving (-)
2024	£110	£0	£0	-£0	£110
2025	£12	-£139	£0	-£301	-£428
2026	£12	-£139	£0	-£447	-£574
2027	£0	-£83	£11	-£457	-£529
2028	£0	-£83	£46	-£460	-£498
2029	£0	-£83	£46	-£463	-£500
2030	£0	-£83	£46	-£464	-£502
2031	£0	-£83	£46	-£464	-£502
2032	£0	-£83	£46	-£465	-£502
2033	£0	-£83	£46	-£465	-£502
2034	£0	-£83	£46	-£465	-£502
2035	£0	-£83	£46	-£465	-£502
	£133	-£1,028	£379	-£4,915	-£5,431

Source: Defra's analysis based on WRAP's modelling

Option 1M: municipal-wide impacts

Municipal-wide impacts include:

- Impacts on the municipal recycling rate
- Environmental benefits
- Policy support costs including compliance and enforcement.

The combination of changes in the household and NHM sector outcomes leads to an increase of 10.6 percentage points in the municipal recycling rate (i.e., from 42.3% to 52.9%).

We estimate that the changes in the recycling rate deliver carbon savings of £9,845m over the total appraisal (undiscounted). This is based on 34.7Mt CO_{2e} saved over the total appraisal. For further detail see Annex C.

The total policy support costs paid by government are estimated to be £76m over the total appraisal period. These costs include set up, compliance and enforcement costs to the Environment Agency. They also include household policy support activity (non-binding performance indicators, direct council support and national communications campaigns) and NHM policy support activity (outreach and tools activities, and national guidance). For further detail see Section 6.

Table 17: Modelled net municipal impacts of implementing Option 1M, £ millions, 2024 to 2035

	Government policy support costs	GHG emissions savings	Net impact on municipal recycling rate
2024	£5	£0	0.0%
2025	£4	£350	9.2%
2026	£8	£552	10.2%
2027	£8	£674	10.3%
2028	£7	£777	10.4%
2029	£7	£864	10.4%
2030	£7	£943	10.4%
2031	£6	£1,014	10.4%
2032	£6	£1,079	10.4%
2033	£6	£1,140	10.5%
2034	£6	£1,198	10.5%
2035	£6	£1,253	10.5%
	£76	£9,845	

Source: Defra's analysis

Table 18 shows the summary of all the monetised costs and benefits associated with Option 1M. This option is a combination of Option *1hh* and Option *1nhm*.

Table 18: Modelled net costs and benefits of municipal Option 1M, £ millions, 2024 to 2035

	Benefits (-ve, cost, +ve, saving)			Costs (+ve, costs, -ve, saving)			Total net costs (-) / savings (+)	Net present value costs (-) / savings (+)
	HH's: savings from free garden waste	Greenhouse gas emission savings	Landfill tax revenue losses	NHM: Waste management cost ²⁵⁶	LA's: Waste management cost ²⁵⁷	Policy costs to government		
2024	£0	£0	£0	£110	£0	£5	-£115	-£115
2025	£0	£350	-£301	-£429	£6	£4	£467	£451
2026	£161	£552	-£468	-£575	£1,019	£8	-£208	-£194
2027	£162	£674	-£479	-£529	£431	£8	£447	£403
2028	£163	£777	-£483	-£498	£358	£7	£589	£514
2029	£164	£864	-£485	-£500	£332	£7	£705	£593
2030	£164	£943	-£487	-£502	£289	£7	£827	£672
2031	£165	£1,014	-£487	-£502	£290	£6	£898	£705
2032	£166	£1,079	-£487	-£502	£301	£6	£953	£724
2033	£167	£1,140	-£487	-£502	£597	£6	£719	£528
2034	£168	£1,198	-£487	-£502	£312	£6	£1,062	£753
2035	£168	£1,253	-£487	-£502	£327	£6	£1,103	£755
	£1,647	£9,845	-£5,140	-£5,432	£4,263	£76	£7,446	£5,789

Source: Defra's analysis

Option 2M: Household option with free garden waste and NHM option micro firms phased

Option 2M: Option 1hh (free garden waste)

Municipal Option 2M has the same household option as Option 1M (i.e., Option 1hh). This means that the following costs and benefits are also the same:

- Transition costs to local authorities
- Waste management costs to local authorities (including DRS effect)
- Savings to households from free garden waste collection

For further detail regarding these costs and benefits please refer to Option 1M description.

Option 2M: Option 2nhm (micro firms phased)

The only difference between municipal Option 2M and Option 1M is that Option 2M has a different NHM option (2nhm). Under Option 2M micro firms are no longer exempt. However, they have an additional period of two years to adjust to the new requirements from the date by which all other businesses must comply.

We have been able to estimate the following costs and benefits to the NHM sector:

- Familiarisation costs to businesses;
- Costs to waste management companies,
- Waste management costs to businesses;
- DRS net effect; and
- Savings to waste management companies associated with landfill tax payments.

²⁵⁶ Including DRS effect, Familiarisation costs, and landfill tax savings.

²⁵⁷ Including DRS effect.

Large, medium, and small businesses experience the same familiarisation costs as Option 1nhm. Familiarisation costs to micro firms start in 2026 only, a year before they have to change their recycling behaviour to comply with the new requirements. This adds an additional £249m to familiarisation costs in 2026, and £2m per year for the following two years. £249m is spent by micro firms on understanding the new requirements, making practical changes, and training staff. £2m is spent in 2027 and 2028 for training new staff only.

Under Option 2nhm, large, medium, and small businesses experience the same changes to their waste management costs as per Option 1nhm. For large businesses, the baseline costs of £350m decrease by £37.7m per year, or by £28.6m per year once plastic film has been included in the recyclable waste streams. For medium businesses, we estimate their waste management costs to decrease by £24.8m per year (Year 2025 and 2026) and by £7.1m per year from 2027 onwards. With respect to small businesses, their costs are estimated to decrease by £76.9m in 2025 and 2026 (i.e., years without plastic film collection) and by £47.6m per year from 2027.

Micro firms are no longer exempt under Option 2nhm. We estimate that their costs increase from £1,862m to £2,294m per year. This is £431m increase in their costs per annum from 2027 onwards (i.e., there is no change in years 2025 and 2026 because micro firms have two additional years to adjust, but this means that they are required to recycle plastic film after these two initial years too). Including micro firms into the policy requirements increases the total waste management costs by £2,856m compared to a saving of £1,029m under Option 1nhm. This is mainly driven by a large number of micro firms. For further detail please see Section 8 called “Small and Micro sized Business Assessment”.

We estimate that the DRS scheme will increase the costs to waste management companies by £1,226m (relative to the baseline and over the appraisal period). This is based on 15% increase in the collection costs of dry recycling materials under both the do-nothing and Option 1nhm (see Section 6 for further detail). The DRS net effect is greater under Option 2nhm, given that there are more collections of dry recycling materials (as a result of micro firms). The NHM landfill tax savings are estimated at £6,918m (undiscounted) across the total appraisal period. Including micro firms helps to achieve a higher recycling activity (compared to Option 1nhm), by diverting waste from residual waste facilities such as landfill and EfW. The outcome of implementing Option 2nhm improves the NHM sector recycling rate from 36.5% to 57.8%.

Table 19: Modelled net costs (+) and savings (-) of Option 2nhm (micro firms phased), £ millions, undiscounted

	NHM Familiarisation	Waste management costs	DRS effect	NHM Landfill tax saving	Total service cost (+) / saving (-)
2024	£110	£0	£0	£0	£110
2025	£12	-£139	£0	-£301	-£429
2026	£245	-£139	£0	-£447	-£341
2027	£2	£348	£37	-£679	-£292
2028	£2	£348	£149	-£683	-£184
2029	£0	£348	£149	-£685	-£189
2030	£0	£348	£149	-£687	-£190
2031	£0	£348	£149	-£687	-£190
2032	£0	£348	£149	-£687	-£190
2033	£0	£348	£149	-£687	-£190
2034	£0	£348	£149	-£687	-£190
2035	£0	£348	£149	-£687	-£190
	£371	£2,856	£1,226	-£6,918	-£2,465

Source: Defra’s analysis based on WRAP’s modelling

Option 2M: municipal-wide impacts

Municipal-wide impacts include:

- Impacts on the municipal recycling rate
- Environmental benefits
- Policy support costs including compliance and enforcement

The combination of changes in the household and NHM sectors leads to an increase in the municipal recycling rate to 57.6%, up by 15.2 percentage points from the baseline. This is a significantly greater change in the recycling rate compared to Option 1M which is only estimated to achieve a rate of 52.9% by 2035. These numbers show the importance of micro firms in helping to achieve the policy objectives.

Based on the recycling rate estimated for Option 2M, we estimate 48.9Mt CO_{2e} saved over the appraisal period. This is equal to £13,919m (undiscounted). For further detail see Annex C.

The policy support costs (paid by government) are estimated to be £76m. They are the same as Option 1M. Further detail in policy support costs can be found in Section 6.

Table 20: Modelled net municipal impacts of implementing Option 2M, £ millions, 2024 to 2035

	Government policy support costs	GHG emissions savings	Net impact on municipal recycling rate
2024	£5	£0	0.3%
2025	£4	£350	9.2%
2026	£8	£552	10.3%
2027	£8	£944	15.3%
2028	£7	£1,108	15.3%
2029	£7	£1,246	15.3%
2030	£7	£1,369	15.3%
2031	£6	£1,479	15.3%
2032	£6	£1,581	15.3%
2033	£6	£1,676	15.3%
2034	£6	£1,765	15.3%
2035	£6	£1,849	15.3%
	£76	£13,919	

Source: Defra's analysis

Table 21 shows the net municipal outcomes for Option 2M, which is the combination of household Option 1hh and NHM Option 2nhm. This option produces the worst net present value outcome of all four municipal options. This is because it has the most expensive household and non-household sector options; and the environmental benefits (via higher recycling rates) do not offer the best return.

Table 21: Modelled net costs and benefits of municipal Option 2M, £ millions, 2024 to 2035

	Benefits (-ve, cost, +ve, saving)			Costs (+ve, costs, -ve, saving)			Total net costs (-) /savings (+)	Net present value costs (-) / savings (+)
	HH's: savings from free garden waste	Greenho use gas emission savings	Landfill tax revenue losses	NHM: Waste management cost ²⁵⁸	LA's: Waste management cost ²⁵⁹	Policy costs to government		
2024	£0	£0	£0	£110	£0	£5	-£115	-£115
2025	£0	£350	-£301	-£429	£6	£4	£467	£451
2026	£161	£552	-£468	-£341	£1,019	£8	-£442	-£412
2027	£162	£944	-£701	-£292	£431	£8	£257	£232
2028	£163	£1,108	-£705	-£184	£358	£7	£384	£335
2029	£164	£1,246	-£708	-£189	£332	£7	£552	£465
2030	£164	£1,369	-£709	-£190	£289	£7	£718	£584
2031	£165	£1,479	-£710	-£190	£290	£6	£829	£651
2032	£166	£1,581	-£710	-£190	£301	£6	£920	£699
2033	£167	£1,676	-£710	-£190	£597	£6	£720	£528
2034	£168	£1,765	-£710	-£190	£312	£6	£1,095	£776
2035	£168	£1,849	-£710	-£190	£327	£6	£1,165	£798
	£1,647	£13,919	-£7,143	-£2,465	£4,263	£76	£6,550	£4,992

Source: Defra's analysis based on WRAP's modelling

Option 3M: Household option with charged garden waste and NHM option with micro firms exempt

Option 3M: Option 2hh (charged garden waste)

Option 3M has Option 2hh which assumes all local authorities charge participating households for separate garden waste collections. In reality, some local authorities may continue to provide free garden collections to their households. Under the new proposals, there is a requirement for all local authorities to have separate weekly food waste collections and they therefore might provide a free service if they wanted to co-collect food and garden waste.

For the household sector under this option, we have estimated the following costs and benefits:

- Transition costs to local authorities
- Waste management costs to local authorities (including DRS effect)
- Savings to households from free garden waste collection

For Option 2hh, we have estimated the recycling rate to increase by 4.7% percentage points to 49.8% by 2035 in the household sector. This achieved recycling rate underpins the cost estimates provided below.

Table 22 shows the breakdown of transition costs for dry recycling, food waste and garden waste collection changes, avoided capital and vehicles costs associated with mixed garden waste collections and residual waste collections, as well as wider transition costs. Transition costs are only modelled until 2030 because these are, by definition, temporary. It is expected that all local authorities fully transition to the new requirements in this period. They consist of additional vehicles, containers, and wider transition costs to enable local authorities to change to a new

²⁵⁸ Including DRS effect, Familiarisation costs, and landfill tax savings.

²⁵⁹ Including DRS effect.

collection system (or a new waste contract) or to add additional materials to an already suitable existing collection system.

The total net transition costs are estimated to be £793 (undiscounted), with the highest additional expenditure in 2026 (as in Option 1hh). We assume that most local authorities are able to transition in 2026. The net transition costs for dry, separate food and mixed food and garden collections are the same as Option 1hh. They are different for 'garden only collection' and 'wider transition costs. Concerning the transition costs of separate food waste, they also include the provision of caddy liners for food waste containers. They are categorised as transition costs for the period up to 2030. After that they are treated as an ongoing operating cost to local authorities²⁶⁰.

Due to a lower household participation under a charged garden waste scheme, local authorities have a lower capital expenditure. For garden only collection, their transition costs are estimated to be £20m (compared to £315m under Option 1hh with free garden waste). In turn, this household option offers the lowest net transition costs of both household options, at £793m across the transition period.

Table 22: Modelled net transition costs (+) and savings (-) of household Option 2hh (charged garden service), £ millions, undiscounted

	Dry recycling collection	Separate Food waste	Mixed food and garden waste	Garden only collection	Residual waste collection	Wider transition costs	Total transition costs
2024	£0	£0	£0	£0	£0	£0	£0
2025	£10	-£5	£0	£0	-£6	£24	£24
2026	£390	£59	-£47	£17	-£53	£103	£469
2027	£34	£64	-£3	-£1	-£5	£10	£100
2028	£47	£45	-£4	£1	-£7	£8	£91
2029	£30	£42	-£2	£3	-£4	£6	£74
2030	£0	£37	£0	£0	-£1	£0	£36
Total	£ 511	£ 242	-£ 56	£ 20	-£ 75	£ 152	£ 793

Source: WRAP's modelling, Defra's assumptions on the length of transition period

Table 23 below gives the total net cost to local authorities across the appraisal period. Under this option, the net costs associated with vehicles and containers are significantly lower, estimated at £437m and £262m respectively (when compared to Option 1hh with free garden). These costs include both initial capital as well as future replacement costs.

As per Option 1hh, there are some changes to operational and bulking and treatment costs in 2025. Local authorities are required to collect all dry recyclable materials by the end of 2025/26. We have assumed in the modelling that they need to add these materials to their exiting collections if they don't already collect them. In turn, this increases their recycling rates and lowers some operational costs in 2025. The model, for example, estimates bulking and waste treatment costs (net of revenue for separately collected materials) to fall by £11m in 2025.

The total net operating costs (over the appraisal period) are significantly lower (compared to Option 1hh). Again, this is due to lower household participation in garden waste collections (arising due to charges). Local authorities need to spend less on labour and other operating costs

²⁶⁰ Engagement with WRAP and the sector suggests that local authorities and food waste recycling plant operators benefit from a flexible approach to caddy liner use, which is appropriate to varied local circumstances and treatment facility requirements. Local authorities are able to provide caddy liners if preferred, however, there are currently no plans to fund local authorities to provide caddy liners to households. We continually review the evidence base and policy around caddy liner use.

such as fuel. Under Option 2hh, the net operating costs are expected to increase by £2,375m over the appraisal, or on average by £216m per year. Under Option 2hh, local authorities are expected to spend less on bulking and treatment. The net bulking and treatment costs (net of material revenue and landfill tax payments) are estimated to reduce on average by £168m per year.

The policy proposals mitigate the DRS baseline impact on local authorities by £624m. In our analysis, we estimate that the DRS scheme reduces local authority income from material revenue and increase MRF gate fees (see Section 6 for further information). The DRS impact also have a small impact on bulking and residual waste costs. The combined effect is greater under the do-nothing compared to Option 1hh. As such, there is a saving to local authorities. The estimated saving is the same as per Option 1hh. This is because there is no interaction between dry DRS materials and garden waste.

Opposite to Option 1hh, this option means that local authorities receive additional income from charging for garden waste if they have previously provided this service for free but choose no longer to do so. Based on the household modelling, we estimate a net increase in income to all local authorities of £1,250m between 2026 and 2035. This is an average yearly increase of £125m. In turn, the household costs are increased by the same amount received by local authorities.

Overall, Option 2hh means a net saving of £318m to local authorities (undiscounted and when compared to the baseline costs).

Table 23: Modelled net costs (+) and savings (-), of household Option 2hh (charged garden service), £ millions, undiscounted

	Vehicle Capital costs	Container Capital costs	Annual Operating and Comms	Annual Bulk and Treatment ²⁶¹	Wider transition costs ²⁶²	DRS effect	LA income from charged garden	Total service cost (+) / saving (-)
2024	£ -	£ -	£ -	£ -	£ -	£ -	£ -	£-
2025	-£ 1	£ 0	-£ 7	-£ 11	£ 24	£ 0	£ -	£ 6
2026	£ 175	£ 172	£ 163	-£ 153	£ 121	£ 0	£ 122	£ 356
2027	£ 6	£ 47	£ 239	-£ 184	£ 47	-£ 18	£ 123	£ 14
2028	£ 17	£ 29	£ 240	-£ 196	£ 45	-£ 74	£ 124	-£ 62
2029	£ 9	£ 22	£ 245	-£ 206	£ 42	-£ 76	£ 124	-£ 88
2030	£ 0	-£ 2	£ 246	-£ 210	£ 37	-£ 77	£ 125	-£ 129
2031	£ 0	-£ 1	£ 247	-£ 211	£ 37	-£ 76	£ 125	-£ 130
2032	-£ 2	-£ 1	£ 248	-£ 212	£ 37	-£ 76	£ 126	-£ 132
2033	£ 207	-£ 2	£ 250	-£ 213	£ 38	-£ 76	£ 126	£ 78
2034	£ 7	-£ 1	£ 251	-£ 213	£ 38	-£ 76	£ 127	-£ 122
2035	£ 18	-£ 1	£ 252	-£ 213	£ 38	-£ 75	£ 128	-£ 110
	£ 437	£ 262	£ 2,375	-£2,022	£ 504	-£624	£1,250	-£ 318

Source: Defra's analysis based on WRAP's modelling

Option 3M: Option 1nhm (micro firms exempt)

Option 3M has the same non-household option as Option 1M (i.e., Option 1nhm), with the following monetised costs and benefits to the NHM sector:

- Familiarisation costs to businesses;
- Costs to waste management companies,

²⁶¹ Including all material types, residual disposal, and household waste recycling centre waste minus secondary market material revenue.

²⁶² As per transition, as well as including liner costs.

- Waste management costs to businesses;
- DRS net effect; and
- Savings to waste management companies associated with landfill tax payments.

The familiarisation, waste management costs and DRS net effect to businesses are the same as per Option 1M (i.e., Option 1nhm). For further detail regarding these costs please refer to Option 1M description.

The only difference is related to the savings to waste management companies concerning landfill tax payments. This is because changes in one sector have implications to shared infrastructure. Under Option 1M, the household sector has a higher recycling rate compared to Option 3M. This means there is more capacity, for example, to treat residual waste in a EfW plant rather than sending to landfill. As such, the NHM landfill tax savings are estimated to be £4,915m and £4,281m for Option 1M and Option 3M, respectively.

Table 24: Modelled net costs (+) and savings (-) of Option 1nhm (micro firms exempt), £ millions, undiscounted

	NHM Familiarisation	Waste management costs	DRS effect	NHM Landfill tax saving	Total service cost (+) / saving (-)
2024	£110	£0	£0	£0	£110
2025	£12	-£139	£0	£301	-£428
2026	£12	-£139	£0	£386	-£513
2027	£0	-£83	£11	£395	-£466
2028	£0	-£83	£46	£398	-£435
2029	£0	-£83	£46	£400	-£437
2030	£0	-£83	£46	£400	-£438
2031	£0	-£83	£46	£400	-£438
2032	£0	-£83	£46	£401	-£438
2033	£0	-£83	£46	£401	-£438
2034	£0	-£83	£46	£400	-£438
2035	£0	-£83	£46	£400	-£438
	£133	-£1,028	£379	£4,281	-£4,797

Source: Defra’s analysis based on WRAP’s modelling

Option 3M: municipal-wide impacts

Option 3M has the following municipal-wide impacts include:

- Impacts on the municipal recycling rate
- Environmental benefits
- Policy support costs including compliance and enforcement

Given the combination of household and non-household options underpinning Option 3M, we estimate it can achieve an increase in the municipal recycling rate of 8.9 percentage points (i.e., the total rate of 51.2% by 2035).

For Option 3M, the carbon savings are estimated to be £9,165m (i.e., 32.3Mt CO_{2e}) over the appraisal period.

Option 3M has the same policy support costs as Option 1M and 2M. They are estimated at £76m over the appraisal period.

Table 25: Modelled net municipal impacts of implementing Option 3M, £millions, 2024 to 2035

	Government policy support costs	GHG emissions savings	Net impact on municipal recycling rate
2024	£5	£0	0.0%
2025	£4	£350	8.1%
2026	£8	£533	8.6%
2027	£8	£640	8.8%
2028	£7	£729	8.8%
2029	£7	£806	8.8%
2030	£7	£876	8.8%
2031	£6	£938	8.8%
2032	£6	£995	8.8%
2033	£6	£1,049	8.8%
2034	£6	£1,100	8.8%
2035	£6	£1,148	8.8%
	£76	£9,165	-

Source: Defra's analysis

Table 26 shows the net municipal costs and benefits associated with implementing Option 3M. This option has the highest NPV of £6.7bn (out of all options presented in this impact assessment). Option 3M demonstrates that allowing local authorities to charge for garden waste collections delivers a better economic value compared to a free collection (i.e., Option 1hh). Furthermore, it avoids additional net costs to the NHM sector by exempting micro firms from the new requirements (i.e., Option 1nhm).

Table 26: Modelled net costs and benefits of municipal Option 3M, £ millions, 2024 to 2035

	Benefits (-ve, cost, +ve, saving)			Costs (+ve, costs, -ve, saving)			Total net costs (-) / savings (+)	Net present value costs (-) / savings (+)
	HH's: savings from free garden waste	Greenhouse gas emission savings	Landfill tax revenue losses	NHM: Waste management cost ²⁶³	LA's: Waste management cost ²⁶⁴	Policy costs to government		
2024	£0	£0	£0	£110	£0	£5	-£115	-£115
2025	£0	£350	-£301	-£429	£6	£4	£467	£451
2026	-£122	£533	-£404	-£514	£356	£8	£156	£146
2027	-£123	£640	-£413	-£466	£14	£8	£549	£495
2028	-£124	£729	-£416	-£435	-£62	£7	£679	£591
2029	-£124	£806	-£418	-£437	-£88	£7	£782	£658
2030	-£125	£876	-£419	-£438	-£129	£7	£892	£726
2031	-£125	£938	-£419	-£438	-£130	£6	£955	£751
2032	-£126	£995	-£419	-£438	-£132	£6	£1,014	£770
2033	-£126	£1,049	-£419	-£438	£78	£6	£858	£629
2034	-£127	£1,100	-£419	-£438	-£122	£6	£1,107	£785
2035	-£128	£1,148	-£419	-£438	-£110	£6	£1,144	£783
	-£1,250	£9,165	-£4,467	-£4,798	-£318	£76	£8,487	£6,670

Source: Defra's analysis based on WRAP's modelling

Option 4M: household option with charged garden waste and NHM option with micro firms phased

Option 4M: Option 2hh (charged garden waste)

²⁶³ Including DRS effect, Familiarisation costs, and landfill tax savings.

²⁶⁴ Including DRS effect.

Option 4M has the same household option as Option 3M (i.e., Option 2hh). This means that the following costs and benefits are the same:

- Transition costs to local authorities
- Waste management costs to local authorities (including DRS effect)
- Savings to households from free garden waste collection

For further details regarding these costs and benefits please refer to Option 3M description.

Option 4M: Option 2nhm (micro firms phased)

Option 4M has the same non-household option as Option 2M (i.e., Option 2nhm), with the following monetised costs and benefits to the NHM sector:

- Familiarisation costs to businesses;
- Costs to waste management companies,
- Waste management costs to businesses;
- DRS net effect; and
- Savings to waste management companies associated with landfill tax payments.

The familiarisation, waste management costs and DRS net effect to businesses are the same as per Option 2M (i.e., Option 2nhm). For further detail regarding these costs please refer to Option 2M description.

The only difference is related to the savings to waste management companies concerning landfill tax payments. This is because changes in one sector have implications to shared infrastructure. Under Option 2M, the household sector has a higher recycling rate compared to Option 4M. This means there is more capacity, for example, to treat NHM residual waste in a EfW plant rather than sending to landfill. As such, the NHM landfill tax savings are estimated to be £6,918m and £6,284m for Option 2M and Option 4M, respectively.

Table 27: Modelled net costs (+) and savings of Option 2nhm (micro firms phased), £ millions, undiscounted

	NHM Familiarisation	Waste management costs	DRS effect	NHM Landfill tax saving	Total service cost (+) / saving (-)
2024	£110	£0	£0	£0	£110
2025	£12	-£139	£0	£301	-£429
2026	£245	-£139	£0	£386	-£280
2027	£2	£348	£37	£617	-£229
2028	£2	£348	£149	£620	-£121
2029	£0	£348	£149	£622	-£125
2030	£0	£348	£149	£623	-£126
2031	£0	£348	£149	£623	-£126
2032	£0	£348	£149	£623	-£126
2033	£0	£348	£149	£623	-£126
2034	£0	£348	£149	£623	-£126
2035	£0	£348	£149	£623	-£126
	£371	£2,856	£1,226	£6,284	-£1,831

Source: Defra's analysis based on WRAP's modelling

Option 4M: municipal-wide impacts

Municipal-wide impacts include:

- Impacts on the municipal recycling rate
- Environmental benefits
- Policy support costs including compliance and enforcement

The combination of changes in the household and NHM sector outcomes leads to an increase of 13.6 percentage points in the municipal recycling rate (i.e., from 42.3% to 55.9%).

We estimate that the changes in the recycling rate deliver carbon savings of £13,300m over the total appraisal (undiscounted). This is based on 46.7Mt CO₂e saved over the total appraisal. For further detail see Annex C.

The total policy support costs paid by government are estimated to be £76m over the total appraisal period. These costs include set up, compliance and enforcement costs to the Environment Agency. They also include household policy support activity (non-binding performance indicators, direct council support and national communications campaigns) and NHM policy support activity (outreach and tools activities, and national guidance).

Table 28: Modelled net municipal impacts of implementing Option 4M, £ millions, 2024 to 2035

	Government policy support costs	GHG emissions savings	Net impact on municipal recycling rate
2024	£5	£0	0.0%
2025	£4	£350	8.2%
2026	£8	£533	8.6%
2027	£8	£914	13.6%
2028	£7	£1,066	13.6%
2029	£7	£1,194	13.6%
2030	£7	£1,308	13.5%
2031	£6	£1,410	13.5%
2032	£6	£1,504	13.5%
2033	£6	£1,592	13.5%
2034	£6	£1,674	13.5%
2035	£6	£1,753	13.5%
	£76	£13,300	-

Source: Defra's analysis

Municipal Option 4M is based on the combination of Option 2hh (charged garden waste) and Option 2nhm (micro firms phased). It is our preferred option. Table 29 shows the summary of all the costs and benefits associated with this option.

The modelled NPV for Option 4M is £5.92bn over appraisal period 2024-35. It has the second-best NPV out of all assessed options. Although this option does not deliver the best NPV outcome, there was a strong support from consultation responses for micro firms to be included in the new requirements. Including micro firms increases our recycling rate by 4.7 percentage points (compared to Option 3M). Concerning garden waste collections, we have considered value for money of using public expenditure. Additional environmental benefits and savings to households do not provide a strong enough economic case to fund these services. This is given that the Government is committed to providing the new burdens required for local authorities to deliver consistent collections.

Table 29: Modelled net costs and benefits of municipal Option 4M, £ millions, 2024 to 2035

	Benefits (-ve, cost, +ve, saving)			Costs (+ve, costs, -ve, saving)			Total net costs (-) / savings (+)	Net present value costs (-) / savings (+)
	HH's: savings from free garden waste	Greenhouse gas emission savings	Landfill tax revenue losses	NHM: Waste management cost ²⁶⁵	LA's: Waste management cost ²⁶⁶	Policy costs to government		
2024	£0	£0	£0	£110	£0	£5	-£115	-£115
2025	£0	£350	-£301	-£429	£6	£4	£467	£451
2026	-£122	£533	-£404	-£280	£356	£8	-£77	-£72
2027	-£123	£914	-£635	-£229	£14	£8	£363	£328
2028	-£124	£1,066	-£639	-£121	-£62	£7	£479	£418
2029	-£124	£1,194	-£641	-£125	-£88	£7	£635	£535
2030	-£125	£1,308	-£642	-£126	-£129	£7	£790	£643
2031	-£125	£1,410	-£642	-£126	-£130	£6	£893	£702
2032	-£126	£1,504	-£642	-£126	-£132	£6	£989	£751
2033	-£126	£1,592	-£642	-£126	£78	£6	£866	£635
2034	-£127	£1,674	-£642	-£126	-£122	£6	£1,147	£813
2035	-£128	£1,753	-£642	-£126	-£110	£6	£1,214	£831
	-£1,250	£13,300	-£6,471	-£1,831	-£318	£76	£7,652	£5,921

Source: Defra's analysis based on WRAP's modelling

²⁶⁵ Including DRS effect, familiarisation costs, and landfill tax savings.

²⁶⁶ Including DRS effect.

Section 8: Small and Micro sized Business Assessment

Our small and micro sized business assessment (SaMBA) includes the following sub-sections:

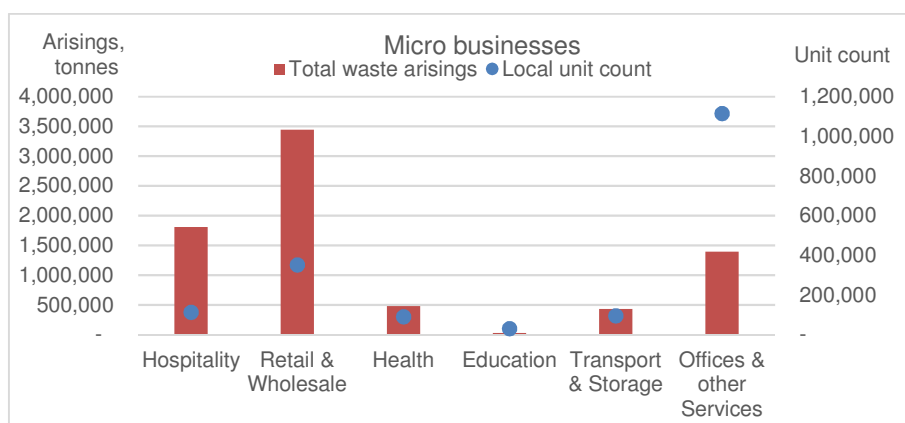
- Demographic of small and micro businesses in England
- Small and micro business impacts
- Cost mitigation measures for businesses
- The impact of using different business definitions: enterprise versus local business units

Demographic of micro firms and small businesses in England

In terms of the demographic of businesses in England, micro firms and small businesses make up most of the business count, representing 96.8% of total firms according to the 2018 Business Count by Standard Industry Classification (SIC) class by employment size-band²⁶⁷. The 2018 business data suggests of the 2.15 million firms, 2.09 million of them are categorized in the micro or small definition because they employ fewer than 50 people per business. Relative to the total waste arisings for the 2018 NHM sector, small businesses contribute 33.7% (8.6 million tonnes) and micro firms contribute 29.8% (7.6 million tonnes) of all NHM waste²⁶⁸. Amongst micro and small businesses, the Retail and Wholesale sub-sector produces the highest tonnages of waste arisings. Micro firms and small businesses from this sub-sector are estimated to produce 3.30 million and 3.44 million tonnes per year respectively²⁶⁹. Amongst medium sized businesses (those who employ between 50 and 249 employees), the Retail and Wholesale sub-sector also produces the highest tonnages of waste arisings, whereas amongst large sized businesses (those who employ over 250 employees), it is the Offices and other services sub-sector.

Figure 3, below, presents the micro firm population against estimated waste arisings for each of the main NHM sub-sectors.

Figure 3: Micro firm counts, and total waste arisings, England 2018



Source: Based on WRAP's analysis of the NHM sector²⁷⁰

²⁶⁷ <https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/datasets/ukbusinessactivitysizeandlocation> Using Table 4 from the 2018 data.

²⁶⁸ The total estimated NHM waste arisings are 26,916,889 tonnes based on 2018 WRAP NHM Baseline data.

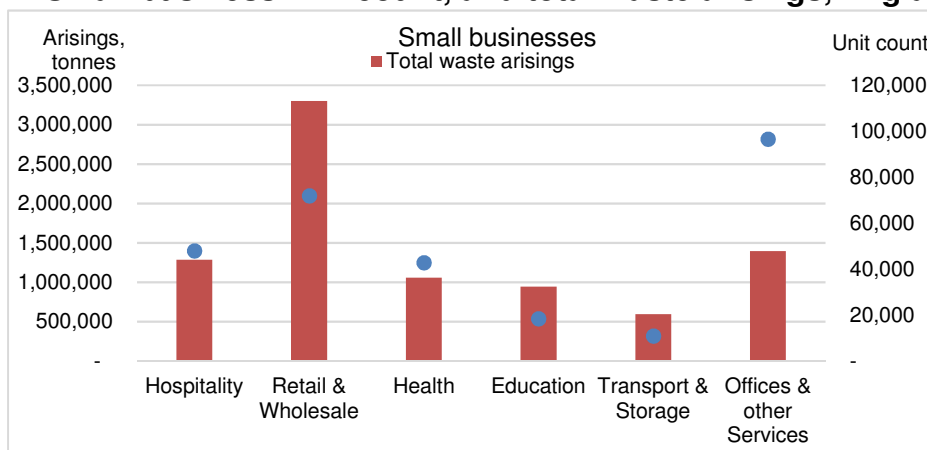
²⁶⁹ WRAP modelling.

²⁷⁰ Waste arisings are based on WRAP estimates. Business counts are based on 2018 data from the interdepartmental business register published by the ONS.

Figure 3 shows that although the highest tonnages of waste arisings are produced by the Retail and Wholesale sub-sector, the largest business count belongs to the Office and other services sub-sector who produced the third highest total waste arisings²⁷¹.

Figure 4 below shows that, amongst small businesses, the sub-sector that accounts for the largest business count is also Offices and other services. The sub-sector that produces the highest total tonnage of waste arisings is also Retail and Wholesale²⁷². Amongst small and micro businesses, the tonnage of waste distribution between sub-sectors is shown to be comparable. Therefore, efforts to drive recycling rates in sub-sectors can be targeted similarly between small and micro businesses.

Figure 4: Small business firm count, and total waste arisings, England 2018



Source: Based on WRAP's analysis of the NHM sector²⁷³

From WRAP's own 2017/18 NHM Business Survey, the most frequently employed waste collection service for micro firms is a residual collection of all waste arisings, with little focus on recyclables. For small businesses, the most frequently employed waste collection service is a residual collection alongside a dry-mixed recyclables (DMR) collection or specialised collections on waste types.

In contrast, medium and large sized businesses are shown to employ a range of collection systems that include residual, dry mixed recyclables, food waste and separate glass. Therefore, small and micro businesses are more likely to have to make significant changes to the waste collection services that they employ. Medium and large businesses already employ a variety of ways to recycle so the largest gains can be found in the small and micro business recycling service provisions. This is to achieve the desired policy outcome in the municipal recycling rate.

Table 30: Recycling rates of NHM defined waste per local unit size

Micro	Small	Medium	Large	Recycled Total
26%	50%	51%	52%	43%

Source: WRAP's NHM Bottom-up survey

²⁷¹ Office services sit in third highest arisings behind Hospitality, with Retail and Wholesale first, the same trend is seen in recycling tonnes.

²⁷² Furthermore, compared to the last IA evidence base, there has too been a reduction in the number of Transport and Storage firms, but their waste arisings total has stayed reasonably similar.

²⁷³ As per the Micro business count and arisings, scaling issues put Food and Manufacturing close to zero in business count. These are estimated at 1,780.

Small and micro business impacts

The two NHM policy options modelled are:

1nhm: Businesses separate waste to residual, mixed dry recyclables, separate glass waste²⁷⁴ collections and separate food waste collections. Micro firms, those who employ less than 10 full time equivalent employees, are exempt in this policy option to mitigate against cost pressure.

2nhm: Businesses separate waste to residual, mixed dry recyclables, separate glass waste collections²⁷⁵ and separate food waste collections. Micro firms are included and phased into the policy from 31st March 2027, two years after implementation to allow time for businesses to account for new provisions.

These options are the same as in the consultation impact assessment²⁷⁶. However, the dry mixed recyclable collection stream now includes additional materials, including plastic film.

For micro firms, Option *1nhm* will result in no change to their waste collection costs as they would be exempt from meeting the requirements outlined in the policy. This exemption would mitigate the cost increase to micro firms that would otherwise be seen if they were required to change their waste collection system to comply with the new requirements.

Option *2nhm* shows micro firms changing to new collection services to be compliant with the requirements from 31st March 2027. This would provide micro firms two years more than other businesses. This phasing period would allow more preparation time for micro firms to comply with the requirements. These preparations may include procuring new service providers, setting up the in-house systems such as new bins, communicating the changes and training the staff, and optimising the waste areas such as removing extra residual bins that will no longer be required with the introduction of recycling bins. Direct engagement with businesses has shown that larger firms have the ability to change their collection services more quickly due to the characteristics they already have in place, such as single point procurement and more space. As such, allowing micro firms more time will support them to overcome some of the barriers that they face to meeting the new requirements. This will have an overall positive impact on the outcomes of the policy.

Familiarisation costs to micro and small businesses

Table 31 demonstrates costs that are expected to be paid by businesses to account for the time spent reading and understanding the new regulatory requirements and providing staff training. Further detail on our approach to estimating familiarisation costs can be found in Section 6.

Table 31: Familiarisation costs for micro and small businesses to align themselves with the new waste provision requirements, £m (undiscounted)

	No. of enterprises	2024	2025	2026	2027	2028	Total cost, £m	Cost per firm, £
Micro sector	2,144,175	£0.0	£0.0	£233.5	£2.2	£2.2	£238	£111
Small sector	200,445	£33.9	£2.0	£2.0	£0.0	£0.0	£38	£189

Source: Based on Defra's analysis of the NHM sector using business surveys at consultation events

²⁷⁴ Please see Section 6 for more information.

²⁷⁵ Please see Section 6 for more information.

²⁷⁶ https://consult.defra.gov.uk/waste-and-recycling/consistency-in-household-and-business-recycling/supporting_documents/Consistency%20in%20recycling%20impact%20assessment.pdf

Waste management costs to micro and small businesses

Option 1nhm would lead to no cost changes concerning waste management as seen below in Table 32. Under policy Option 2nhm, there are two sectors that see projected cost savings, Retail and Wholesale and Health, whereas all other sectors see expected cost increases. Most notably, Offices and other services experience the largest net increase in costs, explained through their relatively large business count number but relatively small waste arisings. Offices and other services represent 62% of all micro firms and almost 20% of all micro firm waste. Therefore, the associated cost increase is relatively more expensive than other sectors.

The indicative net costs per firm column shows that when accounting for local unit count, Offices and other service net cost increase is still the largest across all other sectors of micro firms. With the phasing period described above, the actual cost changes are not expected to start until businesses start separating their wastes from 31st March 2027. These costs would be higher if micro firms were to be required to transition at the same time as all other businesses, i.e., from 31st March 2025.

Table 32: Scenario net appraisal (2027-35) cost (+) or saving (-) relative to baseline, without DRS effect, micro firms only, in 2020 prices, pounds undiscounted²⁷⁷

Micro Firms, £				
	Option 1nhm: Net appraisal cost per sector, £m	Option 1nhm: Indicative net cost per year, per firm ²⁷⁸	Option 2nhm: Net appraisal cost per sector, £m	Option 2nhm: Indicative net cost per year, per firm
Hospitality	£ -	£ -	£85	£84
Retail & Wholesale	£ -	£ -	-£1,015	-£320
Health	£ -	£ -	-£32	-£39
Education	£ -	£ -	£126	£439
Transport & Storage	£ -	£ -	£230	£265
Offices & other Services	£ -	£ -	£4,490	£448
All	£ -	£ -	£3,885	£239

Source: Defra's estimates based on WRAP's NHM Modelling

Table 33 below shows the effects of Options 1nhm and 2nhm on small businesses. These cost effects are equal across the options as there is no exemption or phasing considered when it comes to business sizes of this type. This is due to the cost impact being relatively smaller than for micro firms. Significant benefits would also be forgone with an exemption or phasing-in of the policy. As such, they align to the new requirements and will see their waste provision change in 2025, along with medium and large firms. Table 33 shows that there is no specific theme in cost or saving across the sectors for small businesses, and impact of the policy is dependent on the existing recycling profile seen in the sectors. The table shows the three largest net cost increases are in Education, Hospitality and Transport & storage sectors. Savings are seen in the Retail & Wholesale sector with similar indicative per firm yearly savings.

²⁷⁷ The costs given below are calculated using high level sector averages, across the 9 years of aligning to waste regulations from 2027-35.

²⁷⁸ Calculated by taking the yearly average total cost per all businesses of a size and dividing by the number of local units in that sector – should be taken as indicative and not assumed to be the actual waste management cost experienced by firms of this size.

Table 33: Scenario net appraisal (2025-35) cost (+) or saving (-) relative to baseline, without DRS effect, small businesses only, in 2020 prices, pounds undiscounted²⁷⁹

Small Businesses, £				
	Option 1nhm: Net appraisal cost per sector, £m	Option 1nhm: Indicative net cost per year, per firm	Option 2nhm: Net appraisal cost per sector, £m	Option 2nhm: Indicative net cost per year, per firm
Hospitality	£140	£265	£140	£265
Retail & Wholesale	-£830	-£1,049	-£830	-£1,049
Health	-£99	-£211	-£99	-£211
Education	£204	£1,007	£204	£1,007
Transport & Storage	£17	£142	£17	£142
Offices & other Services	-£14	-£13	-£14	-£13
All	-£583	-£182	-£583	-£182

Source: Defra's estimates based on WRAP's NHM Modelling

Tables 32 and 33 above show the costs to small and micro businesses without considering the effect of Deposit Return Scheme (DRS). Below, Tables 34 and 35, show the same tables as above but including the net DRS effect.

For businesses, we expect the DRS impact to be largely driven by the hospitality sector (e.g., bars, restaurants, hotels) which has the largest amount of drink containers. We have removed these DRS tonnages from the hospitality sector only; however, the cost effect is seen across all sectors and business sizes as seen in the below tables (see Section 6 for further detail about DRS-related assumptions). Based on WRAP's survey of WMCs, we modelled a 15% increase in lift cost prices for dry mixed recyclables. This is because the remaining material is likely to be less desirable across all sectors. The 15% increase is our central estimate. See Annex B for further detail on low and high sensitivity estimates related to the size of the modelled DRS effect.

Including DRS effect in our analysis increases costs to small and micro businesses, using the high-level averages across performance years. The increase is £58 per business per year for micro firms, and £90 per business per year for small businesses. Despite this increase, small businesses are still expected to make a net cost saving to align to the new requirements.

Table 34: Scenario net appraisal (2027-35) cost (+) or saving (-) with DRS effect, relative to baseline, micro firms only, in 2020 prices, pounds undiscounted

Micro Firms, £				
	Option 1nhm: Net appraisal cost per sector, £m	Option 1nhm: Indicative net cost per year, per firm, £	Option 2nhm: Net appraisal cost per sector, £m	Option 2nhm: Indicative net cost per year, per firm, £
Hospitality	£ -	£ -	£149	£146
Retail & Wholesale	£ -	£ -	-£616	-£195
Health	£ -	£ -	£20	£25
Education	£ -	£ -	£125	£438
Transport & Storage	£ -	£ -	£253	£292
Offices & other Services	£ -	£ -	£4,568	£456
All	£ -	£ -	£4,500	£278

Source: Defra's estimates based on WRAP's NHM Modelling

²⁷⁹ The costs given below are calculated using high level sector averages, across the 11 years of aligning to waste regulations from 2025-35.

Table 35: Scenario net appraisal (2025-35) cost (+) or saving (-) with DRS effect, relative to baseline, small businesses only, in 2020 prices, pounds undiscounted

Small Businesses, £				
	Option 1nhm: Net appraisal cost per sector, £m	Option 1nhm: Indicative net cost per year, per firm, £	Option 2nhm: Net appraisal cost per sector, £m	Option 2nhm: Indicative net cost per year, per firm, £
Hospitality	£175	£332	£175	£332
Retail & Wholesale	-£660	-£834	-£660	-£834
Health	-£62	-£132	-£62	-£132
Education	£202	£995	£202	£995
Transport & Storage	£29	£243	£29	£243
Offices & other Services	£36	£33	£36	£33
All	-£281	-£89	-£281	-£89

Source: Defra's estimates based on WRAP's NHM Modelling

For small and micro businesses, there are varying outcomes in costs and savings per sub-sector from the change in service provision (as demonstrated in this section). These differences in savings/costs are mainly driven by the existing recycling activity (i.e., the baseline performance), the amount of waste generated and waste composition per sub-sector and per firm size. WRAP's research on existing container profiles used by businesses suggests a varying degree of recycling activity per business types and sizes. However, the general rule is that the lower recycling the greater the potential savings in moving to a high recycling scenario (although subject to the amount of residual waste generated and diminishing returns).

Across all the business sizes, the proposed policy has the biggest impact on micro firms. For completeness, Table 36 shows the impact on medium and large NHM businesses. For small (and medium and large) businesses there is some opportunity to lower their costs associated with waste management whilst helping to increase the overall NHM recycling rate. Amongst small and micro business, the most notable change in costs would be to the Office and other Services sub-sector. This is because this sub-sector accounts for 57.8% of all small and micro units.

Table 36: Scenario net appraisal (2025-35) cost (+) or saving (-) with DRS effect, relative to baseline, medium and large businesses only, in 2020 prices, pounds undiscounted.

	Medium businesses		Large Businesses	
	Net appraisal cost per sector, £m	Indicative net cost per year, per firm, £	Net appraisal cost per sector, £m	Indicative net cost per year, per firm, £
Hospitality	£26	£499	£1	£379
Retail & Wholesale	-£70	-£671	-£7	-£447
Health	-£83	-£849	-£43	-£4,136
Education	£322	£2,469	£40	£4,743
Transport & Storage	£56	£1,392	£1	£123
Offices & other Services	-£223	-£964	-£228	-£4,350
All	£28	£43	-£236	-£2,393

Source: Defra's estimates based on WRAP's NHM Modelling

Our SaMBA assessment explains why we have considered policy options that exempt micro firms or allow them additional implementation time to make required changes. Given that the inclusion of micro firms increases our NHM recycling rates by 9.3 percentage points as well as increase our carbon savings by £4.1bn²⁸⁰ our preferred option is 2nhm. This option was also supported by the consultation responses which showed that respondents believed that small and micro

²⁸⁰ The additional carbon savings of including micro firms are dependent on the HH option. There are undiscounted carbon savings of £4.07bn under Option 1hh and £4.13bn Option 2hh.

businesses should comply with the new requirements. Only 10% of respondents expressed a preference for a complete exemption. 90% of respondents supported the inclusion of micro firms, whether with a two-year phasing period (32%) or without any phasing period (58%)²⁸¹. General comments expressed that there should be a drive for all businesses to ‘do the right thing’ for the societal benefits and that micro firms are instrumental to increasing the current level of recycling seen at business premises, which in some business sizes and sectors is well below the household recycling rate.

Mitigation measures for businesses

Two-year exemption for micro-firms

Option 2nhm, the preferred option to phase in micro-firms over two years, provides businesses with a longer period of time to prepare for the changes they will need to make to be compliant with new requirements by the 31st March 2027. Although this only delays increased costs to micro-firms, it does provide additional time for Defra to develop additional cost mitigation measures together with the sector.

Business support tools

Defra has already commissioned the development and improvement of online tools that will help businesses to optimise and rationalise their waste collection services. This was based on engagement with the sector via several workshops that we held together with WRAP. These workshops helped to identify clear gaps in the provisions of these tools and guidance. This work is intended to provide support mechanisms for businesses to ensure that they transition to compliant waste management systems in the most cost-effective way.

Cost reduction options for businesses

At consultation, we tested cost mitigation options. The measures proposed were collaborative procurement, co-collection, zoning and commercial bring sites – the below table gives a short description of each of the options.

Table 37: the cost mitigation measures tested at consultation with a short description

Collaborative procurement	Encouraging two neighbouring businesses to share the same containers under contract
	Encouraging businesses to use shared facilities on a site/estate
	Business Improvement Districts/partnerships tendering to offer a preferential rate (opt-in)
Co-collection	Co-collection – the contractor for household services also delivers the non-household municipal services
Zoning	Exclusive service zoning – one contractor delivers the core recycling and waste services for the zone
	Framework zoning – shortlist of suppliers licensed to offer services in the zone
	Material specific zoning – one contractor delivers food, one for packaging, one for refuse collection services
Commercial bring sites	Encouraging SMEs to use commercial bring sites or encourage LAs to permit SMEs to access HWRCs.

Source: Defra

²⁸¹ <https://www.gov.uk/government/consultations/consistency-in-household-and-business-recycling-in-england/outcome/government-response>

The responses to the consultation showed some support for these measures. Amongst respondents, the most popular cost mitigation options were co-collection (20%). There was a similar preference for the collaborative procurement option ‘encouraging businesses to use shared facilities on a site/estate’ (19%). Just over a third of respondents (37%) believed that none of the options available aligned to their preference.

Further work will be undertaken to assess the benefits of cost reduction options to businesses and to gather greater understanding from real world examples of these options by engaging relevant sectors. This will help to determine where non-statutory guidance would be useful to support businesses and waste collectors. It will also help to build an evidence base to determine the most effective policies for future cost support policies.

Although we have not monetised these proposed cost mitigation measures, our cost estimates presented in this section do account for optimisation, which will be supported by the commissioned business support tools, and to some extent a level of shared waste provision (up to two firms sharing a bin). See Section 6 – ‘Key assumptions and data used’ – for more detail on NHM methodology and assumptions.

The impact of using different business definitions: enterprise versus local business units

As part of the Small and Micro sized Business Assessment, we have also analysed the impact of using the local business unit definition²⁸² in the WRAP NHM model and associated grouping per business size. The rationale for using local business units is to reflect the actual collection of waste from businesses and not the business’ ability to provide a level of recycling provision most aligned with its business size. By using local unit data in the central analysis for identifying micro-firms in this impact assessment, this helps to better estimate correctly the total cost associated with the NHM sector, specifically around collection costs. This is distinct from the exemption we are proposing under section 45AZC of the Environmental Protection Act 1990, which will apply to any entity carrying on an activity or enterprise from a premises to which section 45AZA or section 45AZB of the Environmental Protection Act 1990 applies, which has fewer than 10 full time equivalent employees. In other words, the number of employees for the exemption will relate to the enterprise and not the local business unit. This methodology of using local units affects the distribution of costs per businesses size (i.e., results as presented above). This means that the costs and tonnages by business size refer to the costs and tonnages arising from *units* of that size rather than *enterprises* of that size i.e., the total cost given for small businesses refers to the total cost arising from all small units, rather than from all small enterprises^{283,284}. There is a risk that it overestimates the impact of exempting micro-firms; fewer micro-firms will be given an exemption on the basis of employees per enterprise than employees per local unit. In this section of the SaMBA, we are interested in the total cost for micro and small enterprises rather than the total cost for micro and small units – reflecting that some micro and small units will be owned by larger enterprises. In order to calculate these costs, we need to know the breakdown of local units owned by enterprises and how many are small and how many are micro.

²⁸² Local units are individual sites that can also belong to an enterprise.

²⁸³ An enterprise (group) is a group of legal units under common ownership.

<https://www.ons.gov.uk/businessindustryandtrade/business/activitysizeandlocation/methodologies/ukbusinessactivitysizeandlocationmi>

²⁸⁴ A national restaurant chain is a good example. It is very likely that they have several micro and small-size units that belong to a small, medium, or large enterprise.

Based on available ONS data²⁸⁵, we only know the total number of units owned by different size enterprises. We do not know the breakdown of distribution of these units, and this is why the main results have not been updated to account for the actual enterprises and their sizes. As such, we make assumptions around business unit ownership, and how they can only belong to enterprises of equal or greater size i.e., that enterprises do not own units that are bigger than the enterprise. This means that a micro enterprise can only own micro units and a small enterprise can only own small and micro units, not medium or large. We used this data assumption, and data²⁸⁶ on multi-site businesses to figure out the difference in unit and enterprise numbers, and faced with the uncertainty of distribution of these units, made further assumptions about the remainder being one of three scenarios:

- High scenario – 100% of the remainder are micro units, in every sector. Meaning multi-site small enterprises only own micro units. This is the maximum number of micro units that can be owned by small enterprises.
- Mid scenario – 75% of the remainder are micro units, 25% are small. Multi-site enterprises own a mix of small and micro units, but more micro units.
- Low scenario – 50% of the remainder are micro units, 50% are small. Multi-site enterprises own a mix of small and micro units, equal proportion.

The tables 38, and 39 below illustrate the potential impact on waste management collection costs after adjusting to reflect the local units parent enterprise ownership.

Table 38: Scenario net appraisal (2027-35) cost (+) or saving (-), relative to baseline, micro firms only, in 2020 prices, pounds undiscounted.

	Low scenario		Middle scenario		High scenario	
	Net appraisal cost per sector, £m	Indicative net cost per year, per firm, £	Net appraisal cost per sector, £m	Indicative net cost per year, per firm, £	Net appraisal cost per sector, £m	Indicative net cost per year, per firm, £
Hospitality	£73	£71	£73	£71	£73	£71
Retail & Wholesale	-£846	-£267	-£846	-£267	-£846	-£267
Health	-£24	-£29	-£24	-£29	-£24	-£29
Education	£113	£396	£113	£396	£113	£396
Transport & Storage	£214	£247	£214	£247	£214	£247
Offices & other Services	£4,175	£416	£4,175	£416	£4,175	£416
All	£3,705	£228	£3,705	£228	£3,705	£228

Source: Defra's estimates based on WRAP's NHM Modelling

The 'new' cost change experienced by the adjusted micro firm sectors is relatively cheaper than unadjusted, as some of the cost is owned by the parent enterprise. This is seen in the per business cost across all sectors, moving from an average of £239 per business per year, to £228. A saving of just over £11 a year when reallocating costs by the unit's enterprise size. As stated above, the modelling assumption that all the units owned by micro enterprises are assumed to be micro units means that its cost profile (once adjusted) is the same across all three scenarios. This is not the case for small enterprises. Below table 39 shows a small unit adjustment in cost profiles.

²⁸⁵<https://www.ons.gov.uk/file?uri=/businessindustryandtrade/business/activitysizeandlocation/adhocs/13158localunitsinenglandbyenterpriseemploymentsize/ah820.xls>

²⁸⁶<https://www.ons.gov.uk/file?uri=/businessindustryandtrade/business/activitysizeandlocation/adhocs/13520multisitesmallandmediumenterprisesbydivision/ah869.xls>

Table 39: Scenario net appraisal (2024-35) cost (+) or saving (-), relative to baseline, small businesses only, micro to be exempt, in 2020 prices, pounds undiscounted.

	Low		Middle		High	
	Net appraisal cost per sector, £m	Indicative net cost per year, per firm, £	Net appraisal cost per sector, £m	Indicative net cost per year, per firm, £	Net appraisal cost per sector, £m	Indicative net cost per year, per firm, £
Hospitality	£82	£155	£80	£151	£78	£148
Retail & Wholesale	-£430	-£543	-£403	-£509	-£375	-£474
Health	-£56	-£119	-£52	-£111	-£48	-£103
Education	£75	£371	£73	£359	£71	£348
Transport & Storage	£13	£111	£14	£116	£14	£121
Offices & other Services	£31	£29	£51	£48	£72	£68
All	-£286	-£89	-£237	-£74	-£189	-£59

Source: Defra's estimates based on WRAP's NHM Modelling

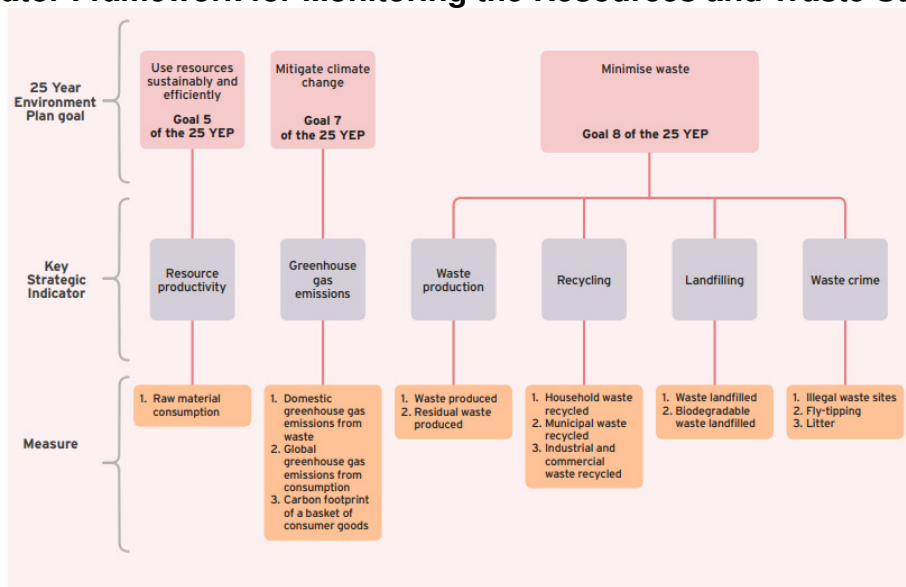
The cost experienced by small businesses once adjusting for enterprise ownership, ranges from -£59 to -£89 net saving, per business, per year, depending on the distribution scenario assumed. The reduction in savings reflects some of the cost burden of micro businesses now being borne by the small parent enterprise.

Section 9: Monitoring & Evaluation

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 Plan, 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 Strategy and shown below for ease of reference (see Figure 5).

Figure 5: Indicator Framework for Monitoring the Resources and Waste Strategy



Source: Defra

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” report²⁸⁷.

Current data collection regimes

Data on waste is limited, something we are addressing through our work on a) mandatory reporting on food waste and b) Waste Tracking. Both are due to be implemented, subject to consultation and legislative change, in the next couple of years. 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 (e.g. FoWST), and on bespoke Defra-funded measurement initiatives.

Evaluation plan

Defra made a commitment in the Resources & Waste Strategy²⁸⁸ that “all significant policies, programmes and projects should be subject to comprehensive but proportionate evaluation” (p.143). In 2020, we published the Evaluation Plan²⁸⁹.

²⁸⁷ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/907029/resources-and-waste-strategy-monitoring-progress.pdf

²⁸⁸ Resources and Waste Strategy 2018 available here: <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england>

²⁸⁹ <https://assets.publishing.service.gov.uk/media/5f2ac1a6e90e0732e5efe2af/resources-and-waste-strategy-evaluation-plan.pdf>

In February 2022 we appointed a contracted research consultant consortium led by Ipsos and including Technopolis and Ricardo, to deliver the evaluation of the Strategy. Simpler Recycling is one of the major waste reforms included in the Strategy and therefore will be evaluated as part of this commission (in addition to other policies such as DRS and EPR).

The evaluation will run over at least five years and will design and deliver:

- Rapid feedback on policies as they are implemented to help understand performance and inform adjustments (PROCESS evaluation)
- An understanding of what has or hasn't worked, how, for whom and in what circumstances towards achieving our desired policy outcomes (IMPACT evaluation)
- An estimate of the cost-effectiveness and value for money of the policies (ECONOMIC evaluation)

The aim of the evaluation is to help Defra understand what has and has not been successful about key objectives and commitments of the Strategy, why and for whom. We will use that knowledge to adapt design, implementation and/or regulation, or provide additional input into the operating context to make policies more effective. Understanding what has and has not worked, why and for whom, will help us design better resources and waste policy in the future.

Five high-level desired policy outcomes will be assessed:

1. Producing less waste
2. Increasing recycling of municipal packaging waste
3. Increasing recycling of other municipal wastes, especially food waste but also paper, card, garden waste, WEEE and batteries
4. Improving resource efficiency (production, management, and fate) of plastics
5. Reducing waste crime

The evaluation started in February 2022 with implementation, planning and baseline data collection taking place until the end of the year. The process evaluation will start six months prior to the policy being implemented in 2024/2025 and all elements of the evaluation will be reported on by 2027.

As part of the evaluation, a list of SMART indicators of change based on the Theory of Change for the policy will be developed. This will include measurable, meaningful, and manageable indicators of outcomes (or proxy indicators) and impacts. 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. A Monitoring Data Collection Plan will be produced outlining available data sources and new approaches to gathering necessary data (what, how and how frequently). This will feed into the existing Monitoring Progress report, and it will link to the 25 Year Environment Plan indicators.

The evaluation budget is £2.5 million for 2023 - 2027, with £390,000 and £300,000 committed for FY2022/23 and FY2023/24 respectively.

Scoping	May-22
Development of Theory of Change	June - Sept 2022
Indicator plan & monitoring data collection plan	Sep-22
Baseline data collection	Summer 2024
Process evaluation	2024 - 2026
Impact evaluation	2025 - 2029
Economic evaluation	2028

External influencing factors

The context within which Simpler Recycling 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.

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

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 Simpler Recycling 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 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 Simpler Recycling 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 Simpler Recycling 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.

Annex A: Non-monetised costs and benefits

Familiarisation and inconvenience costs to households

The scope of household familiarisation costs would be constrained to households taking time to read and understand the new required way to dispose of their waste as set out in the Simpler Recycling reforms. This would entail households reading the materials distributed by local authorities and understanding the requirement to further separate materials. A public consultation related to household and business recycling in England did not return significant concerns over potential familiarisation and sorting costs to households to further separate their recycling waste. The question “Do you have any comments and/or evidence on familiarisation costs (e.g., FTE time spent on understanding and implementing new requirements) and ongoing costs (e.g., sorting costs) to households and businesses?” was asked. The group which contained households did not have any comments or evidence regarding familiarisation costs, or concerns about too many recycling streams²⁹⁰.

We expect low household familiarisation costs due to existing communications between local authorities and households. Therefore, these costs are not monetised in this impact assessment. Currently, local authorities communicate with households on residual and recyclable waste collections by providing physical leaflets and hosting information online²⁹¹. This means that households can check what type of bin will be collected on the collection day, and which bin specific material types should be placed in. In a recent recycling tracking survey published by WRAP, 60% of respondents from a total of 4,729 UK adults aged 18+ reported that they had received information from the council about waste and recycling collections, e.g., leaflet/calendar with a further 52% of respondents answering that they had searched for information about waste and recycling online or by phone²⁹². Information on Simpler Recycling is very likely to use the same method and style of communication between local authorities and households by only adding additional information on what and how materials will be accepted. Respondents in a public consultation estimated familiarisation costs to local authorities “between £2 and £3.50 per household for the necessary communication campaigns”²⁹³. These costs are included in our analysis on the costs to local authorities.

Furthermore, current public behaviour already involves separating some recyclable material from residual waste streams. According to WRAP, in 2020/21, 46 local authorities operate a form of multi stream collections, with a further 131 local authorities operating a twin stream for dry recycling²⁹⁴. This means that the cost to households to modify their behaviour to align with systems with further separation (by sorting additional materials) will be minimal. There is an increasing public interest in ensuring that recycle is properly disposed and reprocessed to protect the environment²⁹⁵, with 69% of respondents in a WRAP survey published in 2020 stating that “it is the right thing to do”²⁹⁶. Public interest is further demonstrated by the number of respondents saying they recycle regularly with a response rate around c. 89% (i.e., a very similar

²⁹⁰ “Consistency in Household and Business Recycling in England”, Traverse, Pg. 289

²⁹¹ Based on an online search of local authorities’ websites.

²⁹² <https://wrap.org.uk/sites/default/files/2021-03/Recycling%20Tracker%20Report%20-%20October%20KPI%20Wave%20FINAL.pdf> pgs. 15-16

²⁹³ “Consistency in Household and Business Recycling in England”, Traverse, Pg. 289

²⁹⁴ Based on data from WRAP’s LA Portal from self-reported inputs.

²⁹⁵ https://wrap.org.uk/sites/default/files/2020-10/WRAP_Plastics_market_situation_report.pdf pg. 23

²⁹⁶ <https://wrap.org.uk/sites/default/files/2020-10/WRAP-Recycling%20Tracker%20Report%202020.pdf> pg.6

trend across multiple surveys). Furthermore, 56% of respondents reported recycling more than they were last year²⁹⁷.

Sorting materials will be made easier by the implementation of standardised recycling labels as laid out in the EPR policy²⁹⁸. Mandatory labelling on all packaging will indicate if packaging is recyclable or not. This will in turn facilitate consumers participating in recycling packaging. Additionally, when respondents were asked to rate their recycling and waste collection on a scale from 0-10, clarity on which items should and should not be included in their recycling collection was a larger issue than the number of separate containers needed to sort recycling into for collection²⁹⁹. This suggests that households are already sorting their recycling, and that the lack of clear guidance on where certain materials should go is a bigger problem to households. Proposed consistency changes in collections, in conjunction with EPR should make it easier for households to sort their material into the recycling bins. As such, we expect any additional sorting costs to households to be minimal.

Furthermore, as containers will be provided to households, we do not expect there to be any significant costs in adopting the new collections system. In our recent public consultation, stakeholders were asked whether certain materials could be co-collected or not. Respondents with concerns focussed on the fact that “households may lack space to accommodate multiple containers”³⁰⁰ for separated waste collections. However, stakeholders did not raise any concerns with households facing difficulty in having to source new bins/containers. Our analysis, for example, assumes that local authorities continue to collect dry recyclables from high-rise properties under existing collection schemes (i.e., new dry recyclable waste streams are added to the existing schemes³⁰¹ (e.g., multi-stream, twin-stream or comingled collection)). This reflects that there are more technical challenges (including space) associated with these properties. As such, our assumption is that they have already been considered as part of existing arrangements.

Familiarisation and inconvenience costs to the non-household municipal sector

In this impact assessment, we monetised familiarisation costs and waste management costs for additional recycling to the NHM sector. However, we did not monetise the time spent by business employees to sort and separate waste in the NHM sector for the reasons explained below.

Once the initial familiarisation costs for workers have been incurred to understand and comply with the new requirements, workers will understand how to correctly separate the required materials. This means that any additional waste sorting costs (i.e., putting waste into the right recycling bins) should be relatively small, compared to the familiarisation costs and increased waste collection costs which we have monetised in our analysis. The latter reflects additional financial costs through commercial contracts with waste management companies.

It should be noted that similar requirements will be placed on households, who will be able to transfer their understanding of separating/sorting materials to the workplace³⁰². Through

²⁹⁷ <https://wrap.org.uk/sites/default/files/2021-03/Recycling%20Tracker%20Report%20-%20October%20KPI%20Wave%20FINAL.pdf> pg.5

²⁹⁸ EPR Final Impact Assessment, available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1063588/epr-final-impact-assessment.pdf pgs. 7, 28-29

²⁹⁹ <https://wrap.org.uk/sites/default/files/2021-03/Recycling%20Tracker%20Report%20-%20October%20KPI%20Wave%20FINAL.pdf> pg. 19

³⁰⁰ “Consistency in Household and Business Recycling in England”, Traverse, Pg. 104

³⁰¹ Recycling performance is based on the existing system.

³⁰² <https://www.gov.uk/government/consultations/consistency-in-household-and-business-recycling-in-england/outcome/government-response>

mandating increased standardisation of materials collected for recycling across England, we expect to improve waste collection services and performance (i.e., this is because the current approach to recycling is fragmented and inconsistent across England). We also expect communications and clearer labelling³⁰³ to improve business and residential understanding of what can be recycled, leading to higher recycling rates by both sectors as well as lower contamination and greater compliance with the requirements. Furthermore, we have some evidence³⁰⁴ to suggest that business waste is less likely to be contaminated and is more consistent concerning the types of recyclable waste arising. This means that that sorting waste in the NHM sector should be even simpler compared to the HH sector.

Although there will be an exemption allowing for mixed collections, in the modelling we have assumed that all businesses choose to separate waste into mixed dry recyclables (except glass³⁰⁵), with separate collections for glass and food waste. We use this option as the most likely scenario on the assumption that the majority of businesses are likely to rely on one of the exemptions from the requirement to collect the recyclable waste streams separately from each other. This is based on the national surveys of waste collections from businesses and waste collector offerings³⁰⁶. This shows that the majority of recyclable waste collections provided to the NHM sector are currently for mixed dry recyclables. This is because most sites have limited space; and, also, not every business generates all the material streams in scope of reforms. This should reduce the amount of time spent sorting waste for employees, thereby reducing any opportunity cost of time to the NHM sector.

As part of the public consultation, stakeholders were asked, “Do you have any comments and/or evidence on familiarisation costs (e.g., FTE time spent on understanding and implementing new requirements) and ongoing costs (e.g., sorting costs) to households and businesses?”. Stakeholders which responded to the public consultation and our business survey³⁰⁷ included a number of individuals and organisations such as the British Retail Consortium (BRC), Food and Drink Federation (FDF), The Institute of Workplace and Facilities Management (IWFM), and the Association of Convenience Stores (ACS) and a number of Business Improvement Districts (i.e., BIDs, representatives of various businesses, including hospitality). Only 3% of the group which included businesses expressed some concerns over additional/ongoing costs. Respondents were unable to provide any estimated costs to inform our analysis. Given that only a small number of stakeholders expressed concerns associated with these costs, this further suggests that these costs are unlikely to be significant. Similarly, there were a number of workshops during the first and second consultations to discuss with stakeholders their business collections. Ongoing sorting costs (i.e., the opportunity cost of time) were not mentioned by any of the stakeholders as an issue to the NHM businesses. It is important to note that the majority of businesses (particularly large franchises in the hospitality sector) are already separating out recycling streams to some degree³⁰⁸. In an open job market, staff will have some experience of separating recyclables from residual streams in one or more vocations which will increase over time. Given that there was no evidence provided and/or concerns raised over additional sorting costs via numerous stakeholder-related opportunities from a wide range of businesses affected leads us to conclude that these costs are insignificant.

In this impact assessment, we have included ongoing policy support costs to Government. These costs include business support tools, outreach activities and one-to-one business support. These

³⁰³ Impacts associated with labelling are assessed as part of the EPR IA.

³⁰⁴ Based on WRAP’s evidence

³⁰⁵ Please see Section 6 for more information.

³⁰⁶ Source: WRAP

³⁰⁷ We undertook the business survey in June 2021. The focus was to gather information on familiarisation and ongoing costs (including sorting costs) directly from business and business representatives.

³⁰⁸ Based on WRAP’s intelligence gathered through their ground surveys as well as their work on various industry pacts and commitments (e.g., the Courtauld Commitment).

support tools will help to reduce the sorting costs for businesses by highlighting good practice in similar premises. They will also allow the targeting of additional resources to specific sectors if they are identified as having relatively higher costs than other sectors. They will also address stakeholder concerns raised about time taken to locate recycling advice on contracts, arrangement of containers and training. We have already commissioned WRAP to develop new materials, and refine existing ones, as part of an online business support hub. Part of this work will be to develop training materials which will clearly set out, to businesses and their staff, their obligations under the new requirements as well as advice on how to efficiently integrate new services into their business models. Some of these resources will be printable materials which can be positioned near bins to help staff to sort waste appropriately. These materials will help further minimise the time that staff will need to spend sorting waste. Defra is still exploring one-to-one business support options.

With the implementation of business support measures (i.e., to help mitigate costs to businesses), stakeholders not raising waste sorting costs as being a significant concern, and waste sorting costs being relatively minor compared to other monetised costs included in the analysis, we have not monetised waste sorting costs for the NHM sector.

Finally, as part of our evaluation plan, we have committed to undertake both impact and process evaluations. They will provide evidence to support the proposed policy and/or to make changes where it may not be working as intended.

Recycling and waste infrastructure implications

The implementation of Simpler Recycling is forecast to increase the quantity and quality of material collected for recycling across the four scenarios relative to the baseline. This reduces the amount of waste sent to energy from waste plants, landfill and other residual waste treatment facilities. Consequently, there would be less pressure on additional residual waste infrastructure across England. This is contrary to the reprocessing infrastructure for which demand is likely to increase.

Note that the costs associated with waste treatment (e.g., landfill) have been monetised as part of this impact assessment. As such, in this section, we discuss wider impacts on the key parts of the waste infrastructure, starting with recycling.

Dry material recycling

Both household options generate the same amount of direct dry material recycling. However, there is a difference in total dry material recycling due to indirect recycling. This is because some amount of recyclate can be recovered from residual treatment facilities (e.g., MBT or EfW). This indirect recycling will be affected by the residual waste composition which is slightly different in the household scenarios due to garden waste assumptions (i.e., free vs charged garden waste).

Any further source separation of recyclable materials is likely to have a negative economic impact on some material recycling facilities (MRFs). Current kerbside collections have around 3.0Mt of dry recyclables collected as comingled material by local authorities. We estimate this amount to reduce to 0.7 Mt by 2035 (i.e., mainly associated with high-rise properties).

Under all municipal options, we expect the NHM sector to offset the loss of supply of comingled dry recyclables to MRFs from the household sector. All NHM scenarios assume significant increases in the collection of dry mixed materials that will need to be sorted by MRFs.

Irrespective of the above, it is very likely that MRFs will need to make some changes. This is, for example, to reflect changes in the composition of recyclate to include materials such as plastic films. MRFs might need to invest in technologies such as air scythes or vacuum chutes to prevent

films being wrapped around rollers³⁰⁹. This has been modelled via higher MRF gate fees associated with additional materials (see Section 6 for further detail).

Tables 40, 41, 42 & 43 show the projected changes to dry recycling tonnages under Options 1M, 2M, 3M and 4M. For the below tables, we have given the breakdown for additional dry material recycling tonnages by sector. Please note that in the tables, HH and NHM tonnages only include direct recycling, whilst the municipal sector includes indirect recycling as explained in the glossary. Therefore, it should be noted that the additional HH and NHM dry recycling tonnages will not equal the additional municipal dry recycling tonnages.

Table 40: Projected net change to dry recycling tonnages under option 1M, in thousand tonnes (Kt)³¹⁰

	2025	2028	2031	2035	Total, 2025-35
HH dry recycling (direct only)	0	62	76	77	918
NHM dry recycling (direct only)	2,576	2,622	2,622	2,622	28,753
MSW dry recycling (direct and indirect)	2,576	2,701	2,716	2,717	29,834

Source: Defra's modelling

Table 41: Projected net change to dry recycling tonnages under option 2M, in thousand tonnes (Kt)³¹¹

	2025	2028	2031	2035	Total, 2025-35
HH dry recycling (direct only)	0	62	76	77	918
NHM dry recycling (direct only)	2,576	4,528	4,528	4,528	45,900
MSW dry recycling (direct and indirect)	2,576	4,569	4,585	4,585	46,650

Source: Defra's modelling

Table 42: Projected net change to dry recycling tonnages under option 3M, in thousand tonnes (Kt)³¹²

	2025	2028	2031	2035	Total, 2025-35
HH dry recycling (direct only)	0	62	76	77	918
NHM dry recycling (direct only)	2,576	2,622	2,622	2,622	28,753
MSW dry recycling (direct and indirect)	2,576	2,672	2,688	2,688	29,534

³⁰⁹ Based on WRAP's advice.

³¹⁰ Municipal DMR tonnages will not equal HH DMR + NHM DMR tonnages as explained.

³¹¹ Municipal DMR tonnages will not equal HH DMR + NHM DMR tonnages as explained.

³¹² Municipal DMR tonnages will not equal HH DMR + NHM DMR tonnages as explained.

Source: Defra's modelling

Table 43: Projected net change to dry recycling tonnages under option 4M, in thousand tonnes (Kt)³¹³

	2025	2028	2031	2035	Total, 2025-35
HH dry recycling (direct only)	0	62	76	77	918
NHM dry recycling (direct only)	2,576	4,528	4,528	4,528	45,900
MSW dry recycling (direct and indirect)	2,576	4,539	4,554	4,455	46,334

Source: Defra's modelling

Once different material types are separated via MRFs or separate collections, they are then traded on the commodities market³¹⁴ or sold directly to reprocessors, domestically or abroad. End destination infrastructure capacity estimates for waste streams impacted by CPR will be included within the 'Recycling Infrastructure Roadmap'.

In 2019, the estimated plastic reprocessing capacity in England was 545kt, with already planned investment expected to increase it to 765kt by 2023³¹⁵. It is difficult to predict capacity beyond 2023, however. This is because there is uncertainty regarding export markets and whether they remain stable going forward. Our conversations with industry suggest that they are willing to invest in the infrastructure³¹⁶. They cited that one of the barriers to investment is uncertainties related to the Collection and Packaging Reforms (CPRs) which we believe will be addressed via final government responses on these policies.

There are several policies to incentivise the demand for secondary materials. The introduction of the plastic packaging tax at £200 per tonne on packaging with <30% recycled content³¹⁷ is to incentivise the use of recycled material in the production of plastic packaging.

With the implementation of EPR, there may be increased demand for recycled plastic and paper. Fee modulation may prompt companies to transition from virgin plastic to more recyclable materials such as paper packaging³¹⁸.

With public commitments from firms to reduce their virgin plastic consumption and pressure for firms to join the plastics packaging front, there has been a significant increase in the demand for certain types of recycled plastics. This is, for example, evident from the price of food grade pellet PET which increased by 40% to £1,075 per tonne³¹⁹ (from 2016 to 2019), reaching an equivalent

³¹³ Municipal DMR tonnages will not equal HH DMR + NHM DMR tonnages as explained.

³¹⁴ https://www.biffa.co.uk/biffablog/2019/august/material-recycling-facility-what-is-it-and-what-does-it-do?gclid=785098d59e681553c515f9844173a95e&gclidsrc=3p.ds&&infinity=ict2~net~mac~ar~77446994447493~kr~2329246664084761~kw~https%3A%2F%2Fwww.biffa.co.uk%2F~mt~b~cmp~UM-Search-Biffa-National-Dynamic%20Search%20Ads-DSA~ag~BL-Search-Biffa-National-DSA&mclid=785098d59e681553c515f9844173a95e&utm_source=bing&utm_medium=cpc&utm_campaign=UM-Search-Biffa-National-Dynamic%20Search%20Ads-DSA&utm_term=https%3A%2F%2Fwww.biffa.co.uk%2F&utm_content=BL-Search-Biffa-National-DSA

³¹⁵ Valpak, Verde Research and Consulting, WRAP, 2020, The Impact of Bans on UK Exports of Plastic Wastes

³¹⁶ Via various forums.

³¹⁷ <https://www.gov.uk/guidance/check-if-you-need-to-register-for-plastic-packaging-tax#background-to-the-measure>

³¹⁸ EPR FIA, available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1063588/epr-final-impact-assessment.pdf

³¹⁹ https://wrap.org.uk/sites/default/files/2020-10/WRAP_Plastics_market_situation_report.pdf pg. 16

price to virgin PET. Other plastic types which have seen similar increases in price include HDPE, which has seen natural HDPE increase by 50%³²⁰ in the same period.

Garden and food waste recycling

Anaerobic digestion (AD) plants

We assume that there will be enough capacity to treat new tonnages of food waste arising from our reforms by 31st March 2025 for businesses and non-domestic premises (except micro-firms), by 31st March 2026 from households and by 31st March 2027 from micro-firms.

Defra and WRAP's Recycling Infrastructure Roadmap (2024) highlights current investment opportunities for AD developers, including through HMG's Green Gas Support Scheme (GGSS) outlined before (which provides a guaranteed tariff for the sale of biomethane to grid AD plants). Assuming full GGSS roll out³²¹, by 2030 there will be approximately 5.3Mt of AD capacity in England to treat 4.8Mt of food waste collected for recycling or composting.

Since the second consultation stage impact assessment, there has been consideration of how Simpler Recycling will interact with the GGSS. Simpler Recycling will increase the tonnage of food waste collected for recycling or composting in England and the GGSS will improve AD capacity to treat this waste. The GGSS follows on from the biomethane element of the non-domestic renewable heat incentive by providing tariff support for biomethane produced via AD and injected into the gas grid.

During peak production years of the GGSS (2029/30 to 2040/41), modelling assumes the following feedstock tonnages are used to produce 2.8 TWh of biomethane per annum (rounded to the nearest 0.1 Mt):

- Food waste 1.3Mt
- Maize: 0.9Mt
- Agricultural waste: 1.8Mt
- Sewage sludge: 2.0Mt

These figures are based on the biomethane potentials and assumed feedstock mix outlined in the final stage Green Gas Support Scheme Impact assessment³²². Note that, the feedstock mix assumed in this impact assessment is not the feedstock mix (formerly) BEIS would expect an individual plant to use, but rather represents the feedstocks that (formerly) BEIS might expect to be used for the total biomethane produced from plants under the scheme. There are large variations in the stock of existing biomethane plants, and HMG expect new plants supported by these proposals will also be heterogeneous. As such, there is significant uncertainty in the assumed feedstock mix.

Furthermore, industry have indicated that there is some additional capacity in existing permitted sites and that some sites could be converted to accept waste, helping to feed into the estimates provided within the Recycling Infrastructure Roadmap referenced above³²³.

Impact on In-Vessel Composting (IVC) Projects

We do not expect that there will be significant negative impacts on IVC sites. We assume this because whilst IVC sites currently use comingled collections of food and garden waste, it will be

³²⁰ https://wrap.org.uk/sites/default/files/2020-10/WRAP_Plastics_market_situation_report.pdf pg. 17

³²¹ Green Gas Support Scheme (GGSS) capacity estimates assume that 50% of the feedstock is food waste.

³²² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1018133/green-gas-impact-assessment.pdf

³²³ Based on policy engagement with different industry stakeholders.

possible for IVC sites to comingle separately collected food and garden waste collections on site. Furthermore, new s45 of the Environmental Protection Act 1990 (as amended by the Environment Act 2021) allows for the comingled collection of food and garden waste.

An area of concern for IVC projects is that there is a maximum ratio for the amount of food: garden waste that can be processed by IVC facilities. If the ratio of food waste was to increase to this maximum limit, then IVC projects would either need to source more garden waste or refuse additional food waste.

IVC projects which have a merchant arrangement contract are likely to have to compete with the expansion of AD facilities on gate fees for food waste once their current contracts end. This might impact IVC projects, as they may have to change their gate fees depending on the level of gates fees at AD facilities.

Impact on open windrows

Open windrows could be impacted by increased demand for garden waste at IVC sites. This is because open windrows use separate garden waste as a feedstock. If local authorities that currently co-collect food and garden waste instead decide to separately collect food waste for treatment by anaerobic digestion, there could be an increase in the quantity of separately collected garden waste sent to open windrows (due to its low complexity and cost).

Residual waste

The policies would also likely have an impact on residual waste treatment facilities. Table 44 shows the estimated tonnage entering residual treatment (mechanical and biological treatments (MBTs), EfW plants and landfill) under each scenario. This projection is heavily dependent on the extent to which some waste is 'untreatable' by existing methods, as this is a factor which becomes increasingly important with higher recycling rates. Any reduction in waste going to treatment is also sensitive to the level of uncertainty in future recycling rates and future waste arisings. Table 44 shows estimated tonnages undergoing treatment under each option. Note that these projections are subject to significant uncertainty; in particular, the time profile is likely to have been distorted by the modelling approach (see 'Key municipal-wide assumptions' in Section 6).

Table 44: Projected residual treatment tonnages for the MSW sector under each option, in thousand tonnes (Kt)

	2025	2028	2031	2035	Total (2025-35)
Baseline	28,917	29,246	29,507	29,532	380,339
Option 1M	25,721	24,121	24,333	24,357	325,751
Option 2M	25,721	21,757	21,969	21,993	304,475
Option 3M	25,721	24,828	25,054	25,079	332,890
Option 4M	25,721	22,464	22,690	22,715	311,614

Source: Defra's modelling

We have not included disposal contracts in our impact assessment modelling. This is because we expect only a relatively small number of LAs to have long-term disposal contracts that might be negatively affected by our presented policy options.

Some local authorities have long term residual waste disposal contracts that may be affected by introducing a separate food waste collection (e.g., some Energy from Waste or Mechanical Biological Treatment contracts). Because of this, we consulted on providing an implementation date for these local authorities which would require them to begin food waste collections as soon as contracts allow, with an end date to meet this requirement to be set between 2024/25 and by 2030/31. We recognise that there are exceptional circumstances in which specific local authorities may need longer due to long-term waste disposal (mechanical biological treatment and energy from waste) contracts that run beyond 31 March 2026 (the implementation date for households). Government is not prepared to meet the costs of varying or breaking long-term contracts. Therefore, in the government response to the 2021 consultation, we announced that Defra will provide transitional arrangements for certain local authorities where needed to avoid variation costs or contract-breaking.

Projected residual treatment tonnages for the MSW sector given here will not precisely match projected residual municipal waste tonnages provided in the Residual Waste Infrastructure Capacity evidence note. The evidence note uses forecasts produced as part of the analysis supporting the development of the Government's Residual Waste Reduction Target. The Residual Waste Reduction Target modelling uses the Future Waste Arisings project, commissioned by Defra to forecast total waste generation figures for waste from households and non-household municipal waste, utilising a number of socio-economic drivers, as the basis of its business-as-usual scenario. It models municipal waste as the total of waste from households plus non-household municipal waste. Other key differences include the use of a non-residual treatment rate to derive residual waste tonnages from total waste arisings as opposed to a recycling rate, the inclusion of food manufacturing waste in non-household municipal tonnages, and that the Residual Waste Reduction Target removes 20% of waste code 19 12 12 from its definition of municipal waste.

Impact on Mechanical Biological Treatment Projects

In 2018/19, there were 16 principal MBT facilities in England which received c.2.6Mt of residual waste collected by local authorities³²⁴³²⁵. These facilities will see a significant adjustment in both composition and tonnages, especially as a result of the removal of organic material. This will have significant process, and potentially, contract implications.

There are contracts between the WCAs (either in their capacity as UAs or via WDAs) and the MBT operators which extend beyond the 31st March 2026 (the date from which local authorities are required to have a weekly separate food waste collection in place), with the last contract expiring in 2043. Therefore, Defra has explored whether transitional arrangements are necessary to mitigate any negative impact³²⁶.

Impact on Energy from Waste facilities

Additional recycling (including of food waste) can change the composition and tonnage of residual waste being sent for incineration. This can change the energy content of mixed residual waste, i.e., its calorific value (CV). Higher CVs imply a higher amount of heat being released during the combustion process. CV changes can have an impact on incineration plant throughputs, with higher CVs reducing the amount of waste a plant can burn and vice-versa. This could lead to

³²⁴ 2018/19 WDF.

³²⁵ This has now fallen to 14 MBT facilities which received 1.9Mt of residual waste collected by local authorities in 2018/19.

³²⁶ The terms for transitional arrangements were outlined in the government response on the 2021 consultation. This can be found here: <https://www.gov.uk/government/consultations/consistency-in-household-and-business-recycling-in-england/outcome/government-response>

Actual transitional arrangements will be listed in the regulations, which will be published alongside this impact assessment.

additional costs to local authorities with long-term EfW contracts, which contain guaranteed minimum tonnage clauses. As such, Defra has explored whether transitional arrangements are required to mitigate these costs³²⁷.

Landfill

Implementation of the policies of the Resources and Waste Strategy³²⁸ (RWS) are expected to reduce the total tonnage of household-like waste from municipal sources going to landfill. They will also, depending on the quantity of biodegradable waste they divert from landfill, reduce gas and leachate generation³²⁹. In the long run this should reduce the landfill aftercare costs³³⁰, however, landfill revenues from gate fees and landfill gas extraction will reduce proportionately. Some of these changes are already anticipated by landfill operators, as demonstrated in a report³³¹ written by Resource and Waste Solutions LLP (RWSP), commissioned by Defra.

The (RWSP) report aimed to review the financial implications and the climate change impacts of current landfill operations, under the projected policy proposals associated with the RWS, the Environment Act 2021³³² and the Climate Change Act 2008³³³. The findings of the report are summarised below:

- The amount of residual waste going to landfill, in the period 2013-18, remained relatively constant at around 27 million tonnes (+/- 1 million) with the waste being comprised of three main types: soil and stones (42%), wastes from mechanical treatment (28%) and household-like waste (11%). In the same period, the number of operational landfill sites reduced from 170 to 155, with 75% of remaining capacity concentrated at 36 of the remaining plants. At current landfilling rates, the report found there are c. 6 years of permitted capacity for non-hazardous waste left at these existing plants³³⁴ – though significant regional variations exist (particularly limited capacity in north-east and south-west areas). However, the Resource and Waste Strategy may mean this existing capacity extend this to between 10 and 12 years³³⁵.
- Furthermore, it showed that many operators are actively engaged in reducing the number of active landfill sites. It is expected that the total number of active biodegradable waste landfills will continue to fall steadily over the next 10 to 15 years. Similarly, the companies – that were contacted as part of this project – have no firm plans to develop new landfill sites, however, this doesn't mean future landfill sites won't ever be built if needed.
- The importance of landfill is not to be misunderstood. Successful waste initiatives and better waste management practice will not completely eliminate the need for landfill sites. There will still exist some continued disposal of inert and construction, demolition and excavation wastes, and landfill provides an emergency disposal measure in the case of recycle market failures, treatment plant breakdowns or incidents such as the Foot and

³²⁷ The terms for transitional arrangements were outlined in the government response on the 2021 consultation. This can be found here: <https://www.gov.uk/government/consultations/consistency-in-household-and-business-recycling-in-england/outcome/government-response>

Actual transitional arrangements will be listed in the regulations, which will be published alongside this impact assessment.

³²⁸ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/765914/resources-waste-strategy-dec-2018.pdf

³²⁹ Biodegradable waste in landfill breaks down anaerobically, leading to generation of methane emissions to atmosphere, and the generation of leachate, an acidic liquid which needs to be extracted and treated.

³³⁰ <http://sciencesearch.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=20039&FromSearch=Y&Publisher=1&SearchText=WR1919&SortString=ProjectCode&SortOrder=Asc&Paging=10>

³³¹ http://randd.defra.gov.uk/Document.aspx?Document=14981_DefraLandfillwastefinal.pdf

³³² <https://www.legislation.gov.uk/ukpga/2021/30/contents/enacted>

³³³ <https://www.legislation.gov.uk/ukpga/2008/27/contents>

³³⁴ This is not irregular for the landfill industry, where new landfills are generally built on future demand projections.

³³⁵ Based on the modelling presented in the report.

Mouth outbreak³³⁶. Some of this is already being reflected in individual strategies by the landfill operators, e.g., focus on inert, construction, demolition and excavation wastes.

- Taking the above into account, and the advice from industry experts, the report finds it is unlikely there will be further additional unit costs (i.e., cost per tonne to landfill) associated with landfilling or aftercare costs. This is because the effect of lower gas production, predicted under the RWS scenario, is offset by the cessation of renewable obligation (ROCs) payments in 2027. These payments are very similar to the costs of landfill gas generation.
- The overall deprioritising of landfill disposal has been a successful result of increasing pressures to deliver better environmental outcomes via measures such as the landfill tax and deployment of better disposal technologies. This will be further supported by the measures set out in the Environment Bill, including recommendations set out in this IA.

Environment Agency data³³⁷ shows that at the end of 2022 (the most recent data available), the total remaining permitted landfill capacity in England was 340,359,000 cubic metres (m³)³³⁸. The remaining non-hazardous landfill capacity in England was 202,604,000m³ which, using a conversion factor, equates to approximately 235Mt of remaining capacity^{339,340}.

Material quality and associated prices

We were not able to monetise the quality of recyclate produced due to improved material segregation and lower contamination of recycling streams. This is because of uncertainty related to changes in material quality and the associated price premiums which higher quality material can attract³⁴¹. It should also be noted that market conditions will have a significant impact on the premiums higher material quality can attract, with significant events such as countries potentially banning the imports of certain material streams or quality grades in the future^{342, 343}.

Our literature review suggests that there is the potential for certain recyclate streams to attract a quality premium when materials are separately collected^{344, 345}. By separating paper and cardboard into a separate stream, it may reduce contamination from plastic or metal drinks containers, which can cause the paper/card to become sodden and end up being rejected by MRFs as a contaminant. According to a report commissioned by Valpak, there is potential for a premium to be attracted for high quality paper & card recycling. A report investigating the impact

³³⁶ Suitable residual void space at landfills may be required in times of emergency in regionalised areas e.g., an outbreak of foot and mouth could not be handled at an energy from waste plant.

³³⁷ EA Remaining Landfill Capacity. See: [Remaining Landfill Capacity - data.gov.uk](https://data.gov.uk).

³³⁸ This includes all landfill types (i.e. Non-Hazardous Landfill, Non-Hazardous Landfill with SNRHW cell, Inert Landfill, Hazardous Merchant Landfill, Hazardous Restricted Landfill)

³³⁹ Non-hazardous landfill, here, refers to non-hazardous landfills and non-hazardous landfill with SNRHW cells.

³⁴⁰ Using the conversion factor 1.159. See: [Financial Costs and Climate Change Impacts of Current and Future Landfill Operations \(2020\)](#)

³⁴¹ WRAP, 2019, Banbury, The impact of proposed packaging policy reforms on the UK's secondary materials markets, Prepared by Valpak and Verde Research and Consulting pg. 53

³⁴² <https://wrap.org.uk/sites/default/files/2021-10/WRAP-Plastics-Market-Situation-Report-2021.pdf>

³⁴³ WRAP, 2019, Banbury, The impact of proposed packaging policy reforms on the UK's secondary materials markets, Prepared by Valpak and Verde Research and Consulting pg. 53

³⁴⁴ WRAP and Eunomia, 2021, Approaches to Material Sales: A Practical Guide for local authorities pg. 6 Available at <https://wrap.org.uk/sites/default/files/2021-07/WRAP-Approaches-to-Material-Sales-Practical-Guide-for-Local-Authorities-April-2021.pdf>

³⁴⁵ WRAP, 2019, Banbury, The impact of proposed packaging policy reforms on the UK's secondary materials markets, Prepared by Valpak and Verde Research and Consulting pgs. 50-54

of proposed packaging reforms estimated a £10 per tonne uplift for separately collected paper and cardboard, although this report notes that the modelled uplift was a conservative estimate³⁴⁶.

Not all material types are expected to receive a premium as a result of reduced contamination. Material types such as steel/aluminium are easy to be separated by MRFs and their existing technologies (e.g., magnets), and are not easily contaminated. Furthermore, these material types when sold at their respective markets (London Metals Exchange for Aluminium and the Metal Bulletin) are sold at a specified ingot purity³⁴⁷. As such, Steel and Aluminium are not expected to attract a premium when sold by local authorities to the market.

Local authority Material Selling Mechanisms

A local authority can decide if they want to pursue a sale of materials contract, or a provision of service contract. A sale of materials contract involves the local authority organising the collection and sale of recyclate, whilst a procurement of services contract will involve a local authority agreeing a contract with a bidder over several aspects such as the collection, sorting and then payment to the local authority for the recyclate³⁴⁸.

A local authority can opt to pursue a sale of materials contract over a service contract if they separately collect material. By pursuing a sale of materials contract, local authorities are responsible for organising the collection and sale of recyclate which they collect. Local authorities have several options on how they can decide to sell recyclable material which they have collected. These approaches are often influenced by the local authorities' approach to risk. In order for a local authority to engage with the market and sell recyclate, they would need to collect information on tonnages, material grades, contamination/quality, cost/income per tonne. When agreeing to a sales contract, local authorities can agree on selling material at a spot price, a variable price, or a fixed price (it should be noted however that certain materials e.g., aluminium are typically sold on spot markets so this might not always be avoidable³⁴⁹). The differences between these pricing options are:

- Spot Price: Prices received by a local authority will follow market conditions.
- Variable Price: A local authority sells materials at a price tracking against an industry index. Prices will follow market conditions as an average of the index. This arrangement often comes with a contract over a fixed term, with break clauses and price reviews – e.g., a 3-year contract might have price reviews every year.
- Fixed Price: A local authority sells material at a fixed price for a fixed term contract.

Alternatively, a local authority can decide to enter a provision of service contract if they do not want to organise all aspects of selling material, as they would be required to under a sale of material contract.

³⁴⁶ WRAP, 2019, Banbury, The impact of proposed packaging policy reforms on the UK's secondary materials markets, Prepared by Valpak and Verde Research and Consulting pg. 53

³⁴⁷ WRAP, 2019, Banbury, The impact of proposed packaging policy reforms on the UK's secondary materials markets, Prepared by Valpak and Verde Research and Consulting pg. 52

³⁴⁸ WRAP and Eunomia, 2021, Approaches to Material Sales: A Practical Guide for local authorities pg. 5
Available at <https://wrap.org.uk/sites/default/files/2021-07/WRAP-Approaches-to-Material-Sales-Practical-Guide-for-Local-Authorities-April-2021.pdf>

³⁴⁹ WRAP and Eunomia, 2021, Approaches to Material Sales: A Practical Guide for local authorities pg. 13
Available at <https://wrap.org.uk/sites/default/files/2021-07/WRAP-Approaches-to-Material-Sales-Practical-Guide-for-Local-Authorities-April-2021.pdf>

Jobs

We believe Simpler Recycling will have a positive impact on employment levels, although there is scope for capital investment to increase levels of automation in some activities (e.g., separating recyclate sent to MRFs). According to the International Labour Organisation, a low-carbon, resource efficient economy is more labour intensive than an economy with a production modelled on high carbon, resource and material intensity³⁵⁰. Compared to residual waste treatment, recycling is a more labour-intensive economic activity. All activities of bulking, sorting, processing and preparing for selling at secondary material markets require labour input. Hence, moving towards higher separation would require additional staff, possibly increasing the net job creation in the sector³⁵¹. A World Bank report also believes that recycling can lead to job creation over a range of skill levels³⁵².

Based on the analysis for the household sector (presented in this impact assessment), WRAP were able to estimate that between 5,667 (Option 2hh charged garden waste) and 10,224 (Option 1hh free garden waste) additional collection related jobs could be created, depending on the household option³⁵³. This would be an increase from 21,459 jobs (baseline) to 27,059 (Option 2hh) and 31,616 (Option 1hh) jobs. There are more jobs created under Option 1hh. This is because garden waste collections tend to be more labour intense and have to expand significantly to cover all households with gardens.

The above increase in job creation for the household sector do not include additional jobs expected in the commercial collection and treatment site sectors. The impact of the changes in service to the NHM sector would see greater increases in recycling collections due to the high proportion of recycling not captured currently in the NHM waste composition. Therefore, we expected further additional jobs to be created to service these additional rounds on top of household collections.

Finally, the waste management related jobs are well paid and have transferable driving and materials handling skills. However, the qualifications that are required are needed for the necessary emerging logistics and transportation sector across England post Brexit³⁵⁴. More jobs are created under a free garden waste scenario as more households are assumed to participate in a free garden waste scenario, and more staff are required to collect additional garden waste from the kerbside.

Innovation

We believe that Simpler Recycling will have positive impacts on innovation in conjunction with other policies and initiatives:

- The GGSS is expected to benefit from the separate food waste collections that is proposed under Simpler Recycling. As a result, there will be an increase in the quantity and quality of feedstock currently collected to be sent to AD plants. It is hoped that by increasing the quantity of separate food waste sent to AD, plants will be able to benefit from economies of scale as the quantity of food waste being recycled increases. This should lower the gate fees that local authorities pay. The GGSS IA notes that there may be benefits to innovation

³⁵⁰ International Labour Office, 2018, World Employment and Social Outlook 2018: Greening with jobs pg. 38 available at https://www.ilo.org/weso-greening/documents/WESO_Greening_EN_web2.pdf

³⁵¹ Green Alliance and WRAP, 2015, Employment and the circular economy – job creation in a more resource efficient Britain.

³⁵² https://www.s4ye.org/sites/default/files/2021-11/S4YE%20Discussion%20Note%20-Circular%20Economy%20and%20Jobs_2.pdf?mc_cid=c06aede96a&mc_eid=6d82868c9d pgs. 34-35

³⁵³ Based on WRAP's household analysis.

³⁵⁴ WRAP's analysis.

due to a wider expansion of AD plants. These include potential cost reductions in the construction and operation of plants from learning and wider deployment driven by the scheme. As such, there is potential for future decarbonisation efforts to be more cost effective³⁵⁵.

- Simpler Recycling will help increase the quantity and quality of materials collected, including plastics. The UK Research and Innovation (UKRI) Industrial Strategy Challenge is investing £20 million alongside £65 million of industry investment in four recycling plants to reduce landfill and incineration, recycle waste into new sustainable plastics and expand the range of plastics that can be recycled. By increasing the quantity and quality of plastics collected for recycling, it is possible that these plants will be able to discover more efficient ways of recycling plastics into new materials as a result of an increase in the supply of plastics. Simpler Recycling will also ensure that there is a reliable supply of plastics available to be reprocessed. This is particularly important as different types of plastics will be needed at the new reprocessing plants³⁵⁶. This expansion and investment in reprocessing facilities could also have positive impacts on end markets if it is possible to produce plastics with a higher recycled content.
- Requirements to collect additional materials will put pressure on MRFs and may drive them towards greater investment in new capital to reduce their operational costs. MRFs may need to invest in technologies such as air scythes or vacuum chutes to prevent films being wrapped around rollers³⁵⁷. MRFs may also further invest in new technology such as laser scanning if technologies such as smart barcodes become more prevalent, thereby making the sorting process less labour intensive and reducing operational costs. New technologies such as Artificial Intelligence (AI) and invisible barcodes may become more widespread and allow for improved separation. This improvement in automation has the potential to reduce processing costs and increase competitiveness for UK recyclers.³⁵⁸

Trade

Based on RPC guidance (produced by the (formerly) Department for International Trade (DIT) and Better Regulations (BRE))³⁵⁹, we concluded that our policy options do not have a significant impact on trade. The assessed options do not impose any additional barriers to trade, or mandate different requirements for domestic or foreign businesses. The requirement for Simpler Recycling is about how waste materials need to be collected from households and municipal businesses in England only (i.e., this is a domestic policy).

That said, a positive effect of Simpler Recycling is an improvement in the material quality, including reduced contamination of the recyclate collected. This is relevant as several countries have tightened their import controls of recyclate over concerns of contamination and poor material quality³⁶⁰. An additional benefit is that the improved material quality of recyclate collected in England can be sold on the secondary materials market at a premium price. Simpler Recycling will help England to continue to export to these countries, and/or promote the domestic reprocessing industry as a result of improvements in the quantity and quality of recycling collected in England. This has been highlighted in this Annex in estimating the reduction in the quantity of

³⁵⁵ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1018133/green-gas-impact-assessment.pdf

³⁵⁶ <https://www.ukri.org/news/ukri-funding-puts-uk-at-the-forefront-of-plastic-recycling/>

³⁵⁷ Based on WRAP's advice.

³⁵⁸ WRAP, 2019, Banbury, The impact of proposed packaging policy reforms on the UK's secondary materials markets, Prepared by Valpak and Verde Research and Consulting pg. 150

³⁵⁹ RPC_case_histories_-_trade_and_investment_Oct_20.pdf (publishing.service.gov.uk)

³⁶⁰ <https://wrap.org.uk/sites/default/files/2021-10/WRAP-Plastics-Market-Situation-Report-2021.pdf> pgs. 17, 26

dry recyclables to be collected comingled by local authorities. Finally, the Devolved Administrations and other countries have waste policies with similar objectives to reduce waste by making use of the secondary materials^{361, 362}.

GHG savings from increased material quality

There are additional GHG savings from having waste streams with greater waste and recycling separation that have not been monetised at this stage. Collections under systems with further separation produces higher quality recyclate that is more likely to find a market and thus be recycled. This has not been possible to monetise here, as the data quality of WDF limits details of the end destinations of materials (limited descriptions, missing/incomplete responses, limited auditing). Until better auditing and completions are made, it is very difficult to identify the treatment process used for recycling (i.e., closed-loop vs open-loop) and in-turn the GHG benefit. For purposes of our modelling, we assumed closed-loop recycling³⁶³.

International GHGs emissions savings

The estimates calculated in Section 7 and Annex C reflect the contribution of municipal recycling policies with respect to the UK's territorial emissions. We would expect that a further reduction in international GHGs emissions would be observed as a result of reduced production from virgin materials. This has not been monetised in this impact assessment because it is outside the scope of this analysis.

Competition

Simpler Recycling will have an impact on all waste management companies and NHM businesses through the introduction of separate waste collections. The Competitions and Markets Authority (CMA) outline, in the competition assessment guidelines, four areas to be considered when addressing impacts of policies:

- 1) Whether the policy directly or indirectly limits the number or range of supplier

We do not believe that Simpler Recycling will have any negative impact/limit the number of suppliers for the NHM sector. This is because there are many hundreds of private waste management companies who are already competing for services across the country³⁶⁴. Similarly, most local authorities are also offering chargeable services for the NHM sector³⁶⁵. Although the service requests from business will increase demand for suppliers, the service profiles required via proposed consistency in collections (food waste, dry recyclables) are relatively straightforward.

- 2) Whether it limits the ability of suppliers to compete

³⁶¹ <https://www.gov.scot/publications/delivering-scotlands-circular-economy-proposals-legislation/documents/>

³⁶² https://ec.europa.eu/environment/topics/waste-and-recycling_en

³⁶³ Closed-loop recycling means that materials are made from recycled content where the previous product was the same as the new product (the process recycles the same product). Open-loop recycling produces a new product which is different to the previous product.

³⁶⁴ <https://www.gov.uk/government/publications/waste-management-in-the-uk-investment-opportunities/waste-management-in-the-uk-investment-opportunities#:~:text=1.-,Overview,the%20sector%20across%203%2C000%20companies.>

³⁶⁵ <https://www.letsrecycle.com/news/framework-commercialisation-waste-services/>

Private waste management collection is an “easy-to-enter” market with low barriers to entry represented by the large number of players, already supplying collections³⁶⁶. The relatively low take up of recycling services in over two million businesses mean that there are considerable opportunities for existing companies to grow their businesses.

3) Whether it increases incentives to collude

Analysis completed by the CMA and summarised in a report³⁶⁷ concluded longer and broader waste collection contracts, which can limit competition, do remain in use by some local authorities (associated with significant local authority spending). In contrast, collection contracts in the NHM sector tend to be much shorter (typically, around one year in length), in turn, allowing a review of service provider and keeping the supplier choice competitive. The large number of private waste collectors available reduce the likelihood of collusion being able to cause market failure. The CMA report summarises that to make the most of potential benefits of competition, contracts tendered out should be no longer than necessary, and tender services separately wherever possible.

4) Where it limits choices and information available to consumers

Information campaigns and recycling leaflets will be provided as part of the proposed policy support to make sure information is consistent. This policy would still encourage businesses to locate a suitable service provider who is offering the range of materials in scope of Simpler Recycling’s requirements. It may be that some service providers focus on single materials such as residual waste and do not offer the range of recycling materials in line with the proposed requirements. However, businesses can still procure from a range of service providers as they wish, as long as they are separating into the required waste streams.

³⁶⁶ WRAP analysis of the market reveals at least 400 in scope NHM collectors in England, adding together lists of collectors and councils. WRAP suggest in reality there are many more when smaller businesses collection waste can be sourced locally. Until changes in registration with the Environment Agency changes, it cannot be accounted for precisely.

³⁶⁷ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/657858/local-authority-waste-contracts-cma-analysis.pdf

Annex B: Sensitivity analyses

Sensitivity analyses explores how the outcome of the policy scenarios may vary due to uncertainty around key input variables used in our models. This policy affects the household and non-household municipal sectors, and also has cross-cutting impacts (such as carbon emissions). As part of our sensitivity analyses, we scrutinised the quality of evidence and approach to accounting for uncertainty in both sectors. This was to identify relevant variables to determine how switching their values change the overall outcome of the net present value (NPV) for the four municipal options delivered in this impact assessment. The same methodology was applied to the cross-cutting impacts.

Table 44 lists all the variables that we use for our combined sensitivity analysis to identify our low and high NPV for each municipal option (also presented in the summary sheets at the beginning of this document). This means that we combine several sensitivities (concerning both sectors as well as wider impacts) to identify the best and worst outcome; and how these outcomes differ from our central scenario(s). Low NPV estimates assume low benefits and high costs. High NPV estimates assume high benefits and low costs.

In Table 45, we also explain the rationale for including each variable for the combined sensitivity analysis. We ensured that these variables can be isolated to avoid double counting.

Table 45: Summaries of variables tested for the combined sensitivity analysis, presented by sector

Sensitivities	Sensitivity description	Low NPV: low benefit/ high-cost change from central estimate	High NPV: high benefit/ low-cost change from central estimate
HH sector: MRF gate fees	Material recovery facilities (MRF) are likely to see volatility in material prices once the policy is implemented. This also reflects uncertainty related to technology required at sites due to new materials (e.g., plastic film).	10% increase	10% decrease
HH sector: bulking and haulage costs	Bulking and haulage costs of different materials could change per local authority (there is limited detail on end destinations from WDF Q100 ³⁶⁸).	20% increase	20% decrease
HH sector: dry recyclate material revenue	There is some uncertainty related to material revenue prices, e.g. reduced contamination of dry materials could affect current prices.	10% decrease	10% increase
HH sector: vehicle and container capital	To align with the new requirements, local authorities will need to buy new vehicles and bin containers. This could create demand pressures. Both variables could have a significant impact on estimated capital costs for both the transition and post-transition period.	10% increase	10% decrease
HH sector: collection costs concerning labour (drivers and loaders)	Salary costs make up the highest proportion of collection costs. There are well recognised national shortages of drivers ³⁶⁹ and low competition for loaders. As such, there is no high benefit / low-cost scenario.	Driver salaries up by 15%, regardless of vehicle class. Supervisor and loader salaries up by 5%.	No high benefit assumed

³⁶⁸ This question on WasteDataFlow does not help with calculation of costs as using the average rate may not reflect the change in pricing associated with longer journeys to specific material type reprocessors.

³⁶⁹ As a result of impacts from Covid-19 and Brexit, see here for an example: <https://www.bbc.co.uk/news/57810729>

HH sector: flatted property operational costs	There is a large variation in costs observed for flatted property collection schemes. The central analysis has been based on efficient costs. It is very unlikely that these costs could reduce further. Hence, a very small change for the high NPV scenario.	Plus £23.05/hh/yr, from a central estimate of £16.95.	Minus £1.95/hh/yr, from a central estimate of £16.95.
NHM: familiarisation costs	Central modelling assumes 4 hours per manager are required to read and understand the new requirements; and 15 minutes per staff member are required to undertake training.	Assumes 8 hours for reading and understanding, and 20 minutes training.	Assumes 2 hours for reading and understanding, and 10 minutes training.
NHM sector: lift prices	NHM lift prices could change as a result of new materials required to be recycled and/or increased route density (if, for example, the same contractor is able to win more contracts on the same round (economies of scale)). Lift prices are also dependent on gate fees which could change due to packaging recovery note values. NB we were not able to obtain any new evidence concerning lower NHM lift prices due to improvements in the efficiency of collections only. As such, we modelled low and high NHM prices covering a number of factors that could increase/decrease the lift prices going forward.	15% increase	10% decrease
NHM sector: film collection cost	There is a lot of uncertainty related to plastic film and how this material will affect collection and treatment costs. For the NHM sector, it is very likely to increase associated lift prices for dry mixed recyclables. ³⁷⁰	10% increase	No high benefit assumed
NHM: DRS impact	There is uncertainty around how the removal of DRS in-scope material will affect lift costs for dry materials. The central costs outcomes assume a 15% increase in dry lift costs (based on engagement with the sector).	25% increase in dry costs	10% increase in dry costs
Cross-cutting: capture rate concerning NHM recyclables	The estimated NHM recycling rates are very uncertain. As such, we have modelled three different capture rates. 80% is our central estimate. Note this assumption affects estimated recycling rates and GHG impacts for the municipal sector.	70% capture rate	90% capture rate
Cross-cutting: carbon prices	We use central carbon prices based on (department formerly called) BEIS guidance for policy appraisal ³⁷¹	Low carbon prices	High carbon prices

Source: Defra's and WRAP's analysis

Tables 46, 47, and 48, below, summarise the results from the combined sensitivity analysis. Table 46 shows the results associated with central values. Table 47 and 48 shows the results associated with high NPV values (i.e., high benefits and low costs) and with low NPV values (i.e., low benefits and high costs), respectively.

³⁷⁰ This 10% increase in costs for DMR is on top of the 6% increase in central modelling when plastic film is required to be collected from 2027.

³⁷¹ BEIS (former department name), https://www.legislation.gov.uk/ukia/2021/68/pdfs/ukia_20210068_en.pdf

Table 46: Central analysis, for the municipal scenarios 1M-4M, (with DRS effects, 2020 prices, discounted (£m)).

	Option 1M	Option 2M	Option 3M	Option 4M
Municipal recycling rate achieved (baseline rate 42.3%)	52.9%	57.6%	51.2%	55.9%
Savings to households from removed garden waste charging	£1,322	£1,322	-£1,003	-£1,003
GHG emissions savings (traded and non-traded)	£7,795	£10,943	£7,269	£10,466
NHM landfill tax saving	£3,995	£5,576	£3,486	£5,067
Reduction in government landfill tax receipts (benefits to municipal sector included in LA and NHM rows)	-£4,175	-£5,756	-£3,636	-£5,216
Social Benefits (Total)	£8,936	£12,085	£6,116	£9,313
Additional local authorities net service costs (+)/savings (-) from changes in dry recycling, food waste and free garden waste collections for all HHs	£3,513	£3,513	-£188	-£188
Transition costs	£998	£998	£722	£722
Net service cost minus transition ³⁷²	£2,515	£2,515	-£910	-£910
Net cost to NHM businesses under increased recycling collections	-£429	£3,518	-£429	£3,518
Waste management cost with DRS effect)	-£561	£3,164	-£561	£3,164
Familiarisation	£132	£354	£132	£354
Policy costs to apply best practices in recycling collections	£63	£63	£63	£63
Social costs (total)	£3,147	£7,094	-£554	£3,392
Net present value, costs (-) / savings (+)	£5,789	£4,992	£6,670	£5,921

Source: Defra's analysis based on WRAP's modelling

³⁷² This captures all local authority net costs presented in Table 13 minus transition costs related to capital purchases i.e., vehicle, container, DRS effect and liner charges.

Table 47: High benefit, low cost, analysis, for the municipal scenarios 1M-4M, (with DRS effects, 2020 prices, discounted (£m)).

	Option 1M	Option 2M	Option 3M	Option 4M
Municipal recycling rate achieved (baseline rate 42.3%)	56.0%	61.2%	54.4%	59.6%
Savings to households from removed garden waste charging	£1,322	£1,322	-£1,003	-£1,003
GHG emissions savings (traded and non-traded)	£11,431	£16,148	£10,693	£15,923
NHM landfill tax saving	£5,331	£6,709	£4,822	£6,571
Reduction in government landfill tax receipts (benefits to municipal sector included in LA and NHM rows)	-£5,511	-£6,889	-£4,972	-£6,720
Social Benefits (Total)	£12,573	£17,290	£9,540	£14,771
Additional local authorities net service costs (+)/savings (-) from changes in dry recycling, food waste and free garden waste collections for all HHs	£3,430	£3,430	-£228	-£228
Transition costs	£927	£927	£678	£678
Net service cost minus transition ³⁷³	£2,503	£2,503	-£905	-£905
Net cost to NHM businesses under increased recycling collections	-£553	£2,742	-£553	£2,742
Waste management cost with DRS effect)	-£636	£2,545	-£636	£2,545
Familiarisation	£83	£197	£83	£197
Policy costs to apply best practices in recycling collections	£63	£63	£63	£63
Social costs (total)	£2,940	£6,235	-£718	£2,578
Net present value, costs (-) / savings (+)	£9,633	£11,055	£10,258	£12,193

Source: Defra's analysis based on WRAP's modelling

³⁷³ This captures all local authority net costs presented in Table 13 minus transition costs related to capital purchases i.e., vehicle, container, DRS effect and liner charges.

Table 48: Low benefit, high cost, analysis, for the municipal scenarios 1M-4M, (with DRS effects, 2020 prices, discounted (£m)).

	Option 1M	Option 2M	Option 3M	Option 4M
Municipal recycling rate achieved (baseline rate 42.3%)	49.8%	53.9%	48.1%	52.2%
Savings to households from removed garden waste charging	£1,322	£1,322	-£1,003	-£1,003
GHG emissions savings (traded and non-traded)	£6,910	£8,314	£6,633	£8,054
NHM landfill tax saving	£2,659	£4,042	£2,150	£3,683
Reduction in government landfill tax receipts (benefits to municipal sector included in LA and NHM rows)	-£2,839	-£4,222	-£2,300	-£3,533
Social Benefits (Total)	£8,052	£9,456	£5,480	£7,200
Additional local authorities net service costs (+)/savings (-) from changes in dry recycling, food waste and free garden waste collections for all HHs	£4,363	£4,363	£526	£526
Transition costs	£1,104	£1,104	£787	£787
Net service cost minus transition ³⁷⁴	£3,258	£3,258	-£261	-£261
Net cost to NHM businesses under increased recycling collections	-£113	£5,111	-£113	£5,111
Waste management cost with DRS effect)	-£310	£4,483	-£310	£4,483
Familiarisation	£197	£629	£197	£629
Policy costs to apply best practices in recycling collections	£63	£63	£63	£63
Social costs (total)	£4,313	£9,537	£476	£5,701
Net present value, costs (-) / savings (+)	£3,739	-£81	£5,004	£1,500

Source: Defra's analysis based on WRAP's modelling

Tables 46, 47, and 48, above, show how introducing the combined sensitivity analysis can change the order of preference in terms of net present values. Table 49 below shows how this order changes.

In terms of the high NPV outcomes (reflecting low service costs, high carbon prices and high capture rates for the NHM sector³⁷⁵), introducing micro firms with the phased transition is a less costly outcome compared to central NPV values. There are also additional carbon savings due to additional recycle generated via a higher capture rate of 90%. This means there is a better rate of return (in terms of carbon savings) per additional business expenditure on waste management. The high NPV outcomes mean that Option 4M has the highest NPV (which has the second best NPV value under the central values). Furthermore, our sensitivity of high captures rates demonstrates potential for economies of scale, e.g., high levels of participation in recycling services mean additional recycled waste tonnages captured, which improve the efficacy of the waste systems by lowering operational costs.

The low NPV outcomes have Option 3M with the highest NPV. This is the same outcome as the central modelling. Option 2M has the lowest NPV under the low benefits and high costs scenario. Again, the same order as the central modelling. However, the notable change is that this scenario no longer has a positive NPV due to reduced environmental benefits (via lower capture) and increased costs to both businesses and local authorities.

³⁷⁴ This captures all local authority net costs presented in Table 13 minus transition costs related to capital purchases i.e., vehicle, container, and liner charges.

³⁷⁵ Through a higher capture rate (90%, rather than 80% assumed in the central analysis) of the total NHM tonnage that could be further recycled.

Table 49: The order of NPV outcomes under low/central/high sensitivities

	NPV outcomes			
	Best case	Middle case		Worst case
Central	3M	4M	1M	2M
High NPV	4M	2M	3M	1M
Low NPV	3M	1M	4M	2M

Source: Defra's analysis based on WRAP's modelling

Annex C: Greenhouse gas emissions impact

This section presents the estimated GHG impacts in more detail from the four municipal waste collection system options. As part of our consideration of environmental and wider impacts, we have only been able to monetise the GHG impact but discuss other areas in more detail under the non-monetised impacts section in Annex A.

Note that the separate household and NHM estimates do not add up to total municipal estimates. This is because changes in one sector have implications to the whole municipal sector's waste treatment. Furthermore, the HH and NHM sector results are not GGSS adjusted. This is because there is no explicit assumption by HMG from which sector the food waste is sourced from. As such, these tables are for illustration only.

Table 50 presents the GHGs emissions savings for household scenarios only while assuming no change in the NHM sector. As discussed above, these estimates should reflect the fact that:

- Increased household recycling activities (from around 45% in 2019 to around 50-53% by 2035) divert waste from energy from waste plants and landfill, thus reducing overall GHGs emissions in the sector.
- Reduced amount of household residual waste decreases the proportion of EfW capacity used by local authorities. This allows the NHM waste to utilise it and reduce the amount of waste sent to landfill.

Option 2hh shows slightly lower GHG savings as a result of LAs switching to a charged garden waste service. As a result, it is expected that a small percentage of garden waste in the charged garden waste scenario may be diverted from recycling to the residual waste stream.

Table 50: Household recycling scenarios' GHGs emissions savings in million tonnes of CO₂e

In MtCO ₂ e	2025-2035	5 th carbon budget (2028-2032)
Option 1hh	-1.8Mt traded, -6.9Mt non-traded	-1.0Mt traded, -3.5Mt non-traded
Option 2hh	-1.5Mt traded, -4.6Mt non-traded	-0.8Mt traded, -2.3Mt non-traded

Source: Defra's analysis

These GHGs savings are then monetised using relevant traded and non-traded carbon prices over the period of 2025-2035. Note that these monetary savings are not discounted in Table 51. The range of savings is purely due to different carbon prices.

Table 51: Household GHG savings, £bn undiscounted central carbon prices (low and high carbon prices)

Household scenarios	2025-2035	5 th carbon budget
Option 1hh	-£2.5bn (-£1.4bn, -£4.2bn)	-£1.3bn (-£0.7bn, -£2.0bn)
Option 2hh	-£1.7bn (-£1.0bn, -£3.0bn)	-£0.9bn (-£0.5bn, -£1.4bn)

Source: Defra's analysis

Further, Table 52 presents the GHGs emissions savings associated with NHM options. Our modelling suggests that the NHM sector shows a substantial potential of GHGs emission reduction. This is significantly higher savings compared to the household sector, and reflects a number of factors, including:

- Slightly lower baseline recycling rate for the NHM sector when compared to household (36.5%³⁷⁶ against 45.1%).
- Higher proportion of NHM residual waste currently sent to landfill, thus allowing scope for higher emissions savings from diverting materials such as paper, cardboard and food waste to recycling.
- High level of recycling potential across all NHM options, ranging from 48.4% to 57.8% across the options with assumed 80% capture rate³⁷⁷.

Table 52: NHM scenarios' GHG emissions savings, in MtCO_{2e}

NHM scenarios	2025-2035	5 th carbon budget (2028-2032)
Option 1nhm	-9.4Mt traded, -15.8Mt non-traded	-4.2Mt traded, -7.6Mt non-traded
Option 2nhm	-15.7Mt traded, -24.1Mt non-traded	-7.8Mt traded, -11.9Mt non-traded

Source: Defra's analysis

This means that monetary values for the GHGs emissions savings are also higher for the NHM sector. Table 53 shows the estimated savings for different NHM options.

Table 53: NHM scenarios' GHGs savings, in £bn, undiscounted central carbon prices (low and high)

NHM scenarios	2025-2035	5 th carbon budget (2028 – 2032)
Option 1nhm	-£7.1bn (-£3.6bn, -£10.7bn)	-£3.3bn (-£1.7bn, -£5.0bn)
Option 2nhm	-£11.3bn (-£5.7bn, -£17.0bn)	-£5.5bn (-£2.8bn, -£8.3bn)

Source: Defra's analysis

Tables 54 and 55 present GHGs emissions savings with respect to the four municipal options. Again, only the central estimates are presented, broken down into traded and non-traded emissions savings. Overall, the emission savings are between 15.6 MtCO_{2e} and 24.2 MtCO_{2e} over the period of the 5th carbon budget. In general, the highest savings are observed under Option 2M, but they are only marginally higher compared to Option 4M. There are wider environmental and economic benefits associated with greater waste and recycling separation that have not been monetised at this stage (see Annex A). Both Options 2M and 4M highlight the importance of including micro firms in terms of carbon savings.

Table 54: Municipal sector GHGs savings, in MtCO_{2e} (AR4)

Municipal scenarios	2025-2035	5 th carbon budget (2028 – 2032)
Option 1M	-12.5Mt traded, -22.1Mt non-traded	-5.8Mt traded, -10.8Mt non-traded
Option 2M	-18.9Mt traded, -29.9Mt non-traded	-9.4Mt traded, -14.8Mt non-traded
Option 3M	-12.1Mt traded, -20.2Mt non-traded	-5.6Mt traded, -9.8Mt non-traded
Option 4M	-18.5Mt traded, -28.2Mt non-traded	-9.1Mt traded, -13.9Mt non-traded

Source: Defra's analysis

³⁷⁶ Actual recycling rate based on the end destination of waste streams.

³⁷⁷ For the NHM sector, we assume that only 80% out of the total tonnage that could be recycled (i.e., capture rate) is presented by businesses in all policy scenarios. Furthermore, for all capture rates, we assume a process loss of 15%.

As above, the monetary savings in Table 55 present a range of estimates in order to reflect the uncertainty with respect to future carbon prices. Household and NHM policy option recycling rates are unchanged across the range of estimates.

Table 55: Municipal sector GHGs savings, in £bn, undiscounted central carbon prices (low and high)

Municipal scenarios	2025-2035	5th carbon budget (2028 – 2032)
Option 1M	-£9.8bn (-£4.9bn, -£14.8bn)	-£4.7bn (-£2.4bn, -£7.1bn)
Option 2M	-£13.9bn (-£7.0bn, -£20.9bn)	-£6.8bn (-£3.3bn, -£10.3bn)
Option 3M	-£9.2bn (-£4.6bn, -£13.7bn)	-£4.3bn (-£2.2bn, -£6.5bn)
Option 4M	-£13.3bn (-£6.6bn, -£19.9bn)	-£6.5bn (-£3.2bn, -£9.7bn)

Source: Defra's analysis

Whilst this is not the main sensitivity analysis, we have modelled the effects of using higher carbon equivalent factors for methane on the municipal sector GHG savings. This difference is due to the different warming potentials of methane at different temperatures (i.e., AR 4 and AR 5 without/with feedback); and only affects our calculations on non-traded emissions in our impact assessment.

Our central calculations are based on AR4, based on guidance from BEIS (former departmental name), but it is very likely that this guidance will be updated to require to use one of the AR5 values.

For ease of comparison, Tables 56 and 57 compare the impact of CO₂e savings in tonnages and monetary value between the modelling using AR4, AR5 without feedback, and AR5 with feedback. This is for the total appraisal period. Tables 54 and 55 compare the same impact, but only over carbon budget 5 (2028-2032). These tables demonstrate that the environmental benefits associated with our policy options increase when we use AR5 without and with feedback.

Table 56: Summary of Municipal sector GHGs savings, using different AR values, 2025-35, in MtCO₂e

Municipal scenarios	AR4 (2025-2035)	AR5 without Feedback (2025-2035)	AR5 with Feedback (2025-2035)
Option 1M	-12.5Mt traded, -22.1Mt non-traded	-12.6Mt traded, -24.0Mt non-traded	-12.6Mt traded, -27.9Mt non-traded
Option 2M	-18.9Mt traded, -29.9Mt non-traded	-19.0Mt traded, -29.8Mt non-traded	-19.0Mt traded, -37.6Mt non-traded
Option 3M	-12.1Mt traded, -20.2Mt non-traded	-12.0Mt traded, -22.0Mt non-traded	-12.0Mt traded, -25.2Mt non-traded
Option 4M	-18.5Mt traded, -28.2Mt non-traded	-18.5Mt traded, -30.6Mt non-traded	-18.5Mt traded, -35.1Mt non-traded

Source: Defra's analysis

Table 57: Summary of Municipal sector GHGs savings, using different AR values, 2025-35, in £bn, undiscounted central carbon prices

Municipal scenarios	AR4 (2025-2025)	AR5 without Feedback (2025-2035)	AR5 with Feedback (2025-2035)
Option 1M	-£9.8bn	-£10.3bn	-£11.4bn
Option 2M	-£13.9bn	-£14.6bn	-£16.2bn
Option 3M	-£9.2bn	-£9.6bn	-£10.6bn
Option 4M	-£13.3bn	-£14.0bn	-£15.2bn

Source: Defra's analysis

Table 58: Summary of Municipal sector GHGs savings over carbon budget 5 (2028-32) using different AR values, in MtCO_{2e}

Municipal scenarios	AR4, 5 th carbon budget (2028 – 2032)	AR5 without feedback, 5 th carbon budget (2028 – 2032)	AR5 with feedback, 5 th carbon budget (2028 – 2032)
Option 1M	-5.8Mt traded, -10.8Mt non-traded	-5.7Mt traded, -11.8Mt non-traded	-5.8Mt traded, -13.6Mt non-traded
Option 2M	-9.4Mt traded, -14.8Mt non-traded	-9.4Mt traded, -16.0Mt non-traded	-9.4Mt traded, -18.5Mt non-traded
Option 3M	-5.6Mt traded, -9.8Mt non-traded	-5.6Mt traded, -10.6Mt non-traded	-5.5Mt traded, -12.2Mt non-traded
Option 4M	-9.1Mt traded, -13.9Mt non-traded	-9.1Mt traded, -15.1Mt non-traded	-9.1Mt traded, -17.2Mt non-traded

Source: Defra's analysis

Table 59: Summary of Municipal sector GHGs savings over carbon budget 5 (2028-32), using different AR values, in £bn, undiscounted central carbon prices

Municipal scenarios	AR4, 5 th carbon budget (2028 – 2032)	AR5 without feedback, 5 th carbon budget (2028 – 2032)	AR5 with feedback, 5 th carbon budget (2028 – 2032)
Option 1M	-£4.7bn	-£5.0bn	-£5.4bn
Option 2M	-£6.8bn	-£7.1bn	-£7.8bn
Option 3M	-£4.3bn	-£4.5bn	-£5.0bn
Option 4M	-£6.5bn	-£6.8bn	-£7.4bn

Source: Defra's analysis

Annex D: Covid-19 considerations

This section discusses Covid-19 impacts on kerbside collections by qualitatively appraising changes in waste arisings, collection services and treatment facilities since the start of the pandemic. Covid-19 has also been reflected upon in the main sensitivity analysis to capture any potential longer-term impacts from the pandemic (e.g., driver shortage and associated impact on their salaries). It should be noted that the impacts of Covid-19 would be present in the baseline scenario as well as the policy scenarios modelled.

According to the 2021 Association of Directors of Environment, Economy, Planning & Transport (ADEPT) study (w/c 15th March 2021), which surveyed local authorities on the continuing impacts of Covid-19, there was some ongoing minor disruption to collections services. The greatest reported cause of disruptions to collection services (by 49% of responding local authorities) was staff absence due to self-isolation, followed by staff absence due to sickness as the second largest cause (with 37% of local authorities reporting), and third, the effects of social distancing³⁷⁸. These disruptions had an impact on the collection of household kerbside waste streams, as some local authorities were unable to maintain collections of dry recyclate, and some garden waste services were suspended³⁷⁹.

Covid-19 had impacts on the level of waste arisings generated by household kerbsides throughout 2020/21 as shown by the published statistics on waste managed by local authorities in England. According to the release, there was an increase in household waste arisings and residual streams, whilst there was a decrease in the amount of waste recycled. The amount of waste from households increased by 1.8% in 2020 compared to 2019, whilst the amount of residual waste being treated increased by 5.1% and the amount of waste recycled decreased by 1.2%³⁸⁰. This increase in household arisings is in part driven by the amount of people only working from home or hybrid working increased in periods of restrictions. This can be seen in an ONS analysis on working practices throughout the pandemic which shows a fall in office only working over the periods where restrictions were in place, and then recovering when restrictions were lifted³⁸¹. This disruption and the decrease in recycling was also due to the closure of Household Waste Recycling Centres (HWRCs)³⁸² as a result of staff shortages and the introduction of changes to working practice³⁸³. This disruption can be seen in the ADEPT study published on the 15th of March 2021.

Figure 6 shows the large impact on HWRCs during the first national lockdown, where 77% of Waste Disposal Authorities (WDAs) withdrew their services temporarily, with a further 21% experiencing severe disruption³⁸⁴. The situation improved throughout the pandemic, with 24% of HWRCs operating normally, and 62% operating with minor disruption by the end of the 2021 lockdown³⁸⁵. The ADEPT studies show that there were no HWRC's where no service was available as a result of the pandemic from 15th June 2020 – 15th March 2021³⁸⁶.

³⁷⁸ <https://www.adeptnet.org.uk/covid-19-waste-survey-results> Covid-19 waste survey results w/c 15th March 2021 pg. 5

³⁷⁹ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf pg. 5

³⁸⁰ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf pg. 2

³⁸¹ [Business and individual attitudes towards the future of homeworking, UK - Office for National Statistics \(ons.gov.uk\)](https://www.ons.gov.uk/business-and-individual-attitudes-towards-the-future-of-homeworking)

³⁸² https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf pg. 8

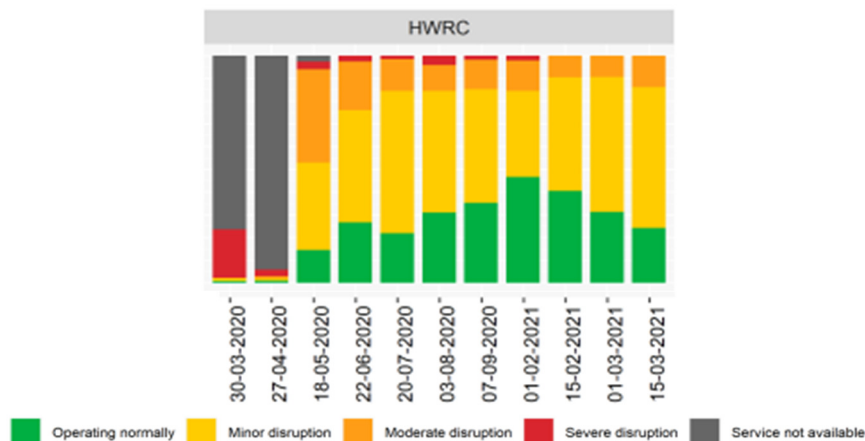
³⁸³ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf pg. 5

³⁸⁴ <https://www.adeptnet.org.uk/covid-19-waste-survey-results> Covid-19 waste survey results w/c 30th March 2020

³⁸⁵ <https://www.adeptnet.org.uk/covid-19-waste-survey-results> Covid-19 waste survey results w/c 15th March 2021 pg. 7

³⁸⁶ <https://www.adeptnet.org.uk/covid-19-waste-survey-results>

Figure 6: The operational status of HWRCs over the ADEPT study³⁸⁷



Source: ADEPT

According to statistics on local authority waste release, limited reopening of HWRCs from July to September 2020 saw tonnages partially recover compared to the same timescale in 2019³⁸⁸; and despite continuing disruption between October 2020 and March 2021, “tonnages reported for the 6 months showed a continuing increase to return to near the levels reported for October 2019 to March 2020”³⁸⁹. Other treatment services were less heavily impacted than HWRCs. As such, we do not expect that Covid-19 will have long lasting impacts on the ability to sort waste for recycling (the percentage of MRFs and Transfer stations which have been operating normally has shown a slight improvement from 75% to 85% of MRFs, and from 90% to 93% of Transfer Stations from 27th April 2020 to 15th March 2021). This is shown below in Figure 7, which has been taken from the 2021 ADEPT study (15th March 2021) which shows the operational status of other disposal facilities from the 8th March 2021 to 15th March 2021.

Figure 7: Operational status of disposal facilities w/c 15th March 2021³⁹⁰

	Operating normally	Minor disruption	Moderate disruption	Severe disruption	Service not available
Landfill	100%	0%	0%	0%	0%
EFW	93%	7%	0%	0%	0%
MRF	85%	11%	4%	0%	0%
HWRC	24%	62%	14%	0%	0%
Transfer Stations	93%	3%	3%	0%	0%
MBT	100%	0%	0%	0%	0%
OWC	92%	4%	0%	0%	4%
IVC/AD	100%	0%	0%	0%	0%

Source: ADEPT

Furthermore, WRAP reported via their Tracker Survey that there were some changes in HH arising due to the pandemic³⁹¹. These changes included an increase in the amount of food waste, and packaging generated from households. Due to the lag in WDF reporting, WRAP would need

³⁸⁷<https://www.adeptnet.org.uk/covid-19-waste-survey-results> Covid-19 waste survey results w/c 15th March 2021 pg. 11

³⁸⁸https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf pg.7

³⁸⁹https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf pg. 7

³⁹⁰<https://www.adeptnet.org.uk/covid-19-waste-survey-results> Covid-19 waste survey results w/c 15th March 2021 pg.7

³⁹¹ WRAP’s Tracker Survey is a qualitative survey completed through self-reporting local authorities.

a further years' data to be able to start to quantitatively assess the impact of these changes (including determining whether they are likely to be temporary or longer-term changes).

It should be noted that whilst there is continuing uncertainty over the possible impacts of Covid-19, the largest disruption to waste collections and commercial waste was during April to June 2020 as local authorities and businesses adapted to working under national lockdown and COVID-19 pandemic conditions³⁹². As such, the second national lockdown in November did not have as large impact as the first national lockdown³⁹³.

Finally, we have seen reduced Covid restrictions and workers returning to offices. This leads us to believe that there are unlikely to be significant long-term changes, especially affecting waste arisings and associated policy preferences for waste collections.

³⁹²https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf pg. 32

³⁹³https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1040756/Statistics_on_waste_managed_by_local_authorities_in_England_in_2020_v2rev_accessible.pdf pg. 5

Annex E: Sources of data and evidence

Throughout this impact assessment, we have referenced the data and evidence underpinning all the internal and external modelling.

For the household and NHM analysis, we have used WRAP's models and associated outputs. Defra provides a grant agreement for WRAP to focus on sustained analysis of waste data sets and collation of scheme profiles. These models have been developed over time and are based on a combination of data sources. The HH model was originally built for the cost and performance analysis of 2020 household recycling target and subsequently refined for the national Consistency Framework as requested by Minister Rory Stewart³⁹⁴. At the time, it was endorsed and assured by the national Consistency Industry representative group supporting the Framework. The model uses a combination of WasteDataFlow (WDF) and local authority data, which is supplied to provide standardised comparative costs for use in national or regional modelling. WDF is the web-based system for municipal waste data reporting by UK local authorities to government. It is funded and managed by DEFRA and the UK government and is made publicly available.

WRAP also collects voluntary submissions of local authority data from their LA Portal (some of which are **commercially sensitive**, e.g., local gates fees). This data is validated through a local authority team within WRAP which interface regularly with Councils. The data captured via surveys are generated into series of benchmarks to present back to Councils on WRAP's website³⁹⁵. This is to support local authorities and aid transparency in understanding their performance and delivery of services. Similarly, the **commercially sensitive** data such as treatment contract prices are anonymised and presented back to users via the WRAP's website³⁹⁶.

All operators of regulated waste management facilities have to provide the Environment Agency with details of the quantities and types of waste they deal with i.e., waste received into site and waste sent on from site to other facilities or processes (NB local authorities are required to provide details of tonnages and end-destinations of materials via WDF). A key challenge is that waste reporting cannot be split at different business levels (NB NHM waste collectors service a wide range of businesses). WRAP undertakes large scale surveys of waste container profiles from the NHM sector to help understand the baseline profiles for the businesses in scope and then combines this with waste composition profiles and tonnage estimates for each sector. This is to generate site level profiles for the NHM sub-sectors (hospitality, education, retails etc.). They also commissioned surveys of national pricing for collecting NHM collections for a range of material streams under contract and considered variations across the country. Individual supplier details remain **commercially sensitive** although aggregated summaries are provided to reviewers for further assurance. Despite these surveys, the general data associated with the NHM sector is considered to be relatively poor. This is because of: (1) the absence of any formal waste reporting framework like WDF; (2) the EA data is difficult to attribute to a business site level; and (3) that there are 2.15 million businesses and public administration units' addresses requiring collections that are not required to be reported. However, significant improvements to data are expected via Waste Tracking³⁹⁷.

Throughout our analysis, we have made use of stakeholder feedback, including public consultations responses. We have also invited WRAP to participate in stakeholder events, where relevant. For areas with limited evidence (e.g., familiarisation costs to businesses), we organised a specific session with business representatives, followed by a survey to gather more information

³⁹⁴ <https://www.wrap.org.uk/collections-and-reprocessing/consistency>

³⁹⁵ <https://laportal.wrap.org.uk/>

³⁹⁶ <https://wrap.org.uk/resources/report/gate-fees-reports>

³⁹⁷ Waste management: smart tracking of waste (GovTech Catalyst) - GOV.UK (www.gov.uk)

from a bigger group of stakeholders. We also directly engaged with industry experts to help test our analysis and our understanding about potential impacts on both the household and NHM sectors.

Finally, we have conducted literature reviews, which we referenced throughout the impact assessment. We used the latest reports, where applicable. Concerning international evidence, WRAP concluded through their review that international scheme profiles and associated funding arrangements are not directly comparable with our policy options (meaning that the impacts cannot be cross checked). The evidence from Devolved Administrations was considered where it was available, and was used to inform WRAP's estimates on policy costs (see Section 6).

Annex F: Quality assurance

WRAP is responsible for quality assurance (QA) of their own models as well as outputs. WRAP builds in QA into its workstreams following the Aqua book guidelines and with proportionality to the analysis and intended use of outputs. WRAP uses a range of experienced staff to perform the calculations and a buddy system to review modelling inputs and outputs. WRAP's approach also includes periodic external peer reviews where relevant. The external peer reviews come from a wide range of skilled contractors on WRAP's frameworks who undertake the reviews and also who engage directly with industry to source and review assumptions. In addition to WRAP's QA Defra has reviewed the outputs from the model, however have been unable to separately QA the model due to commercial sensitivities of the local authority and private sector contract data embedded within.

GHG estimates from waste collection and treatment have been estimated using Defra's Fates of Waste Simulation Tool (FoWST) model. This model has been built within Defra, using an older "WasteMan" model (used for the previous impact assessment) as a guide; FoWST is functionally similar to WasteMan but has been restructured to increase transparency of the assumptions and calculations. Calculations have been peer-reviewed for consistency with the Wasteman specification, and results have been sense-checked by multiple analysts. Calculations which are critical to the conclusions of this IA, including the GHG emissions from landfill and avoided emissions from recycling (both of which are significantly affected by the evaluated policies), have been subject to reperformance tests outside the model.

Most of the data and assumptions in FoWST are currently drawn from the older WasteMan model. Subject matter experts have been consulted on the sources of these assumptions and they have been documented. Key assumptions and limitations of the model have been communicated in Section 6 of this document.

Annex G: Cost and benefit summary tables, presented with a different base year and appraisal period for comparison with other policies

The SNPV and carbon savings reported in this impact assessment should be considered jointly with the SNPV and carbon savings reported in the final stage impact assessment for HMG's GGSS (due to the interactions between policies as presented in this impact assessment). Although both impact assessments are based on 2020 prices, they use different base years to discount associated costs and benefits³⁹⁸. To enable joint interpretation between Simpler Recycling and the GGSS³⁹⁹ Table 60 presents the costs and benefits using 2020 as a base year to align with the GGSS analysis (i.e., this impact assessment uses 2024 as its base year). In this Annex G, we also present low and high SNPV discounted to 2020 (Tables 61 and 62 respectively).

Table 60: Central analysis for the municipal scenarios 1M-4M, (with DRS effects, 2020 prices, discounted to 2020 PV (£m)).

	Option 1M	Option 2M	Option 3M	Option 4M
Municipal recycling rate achieved (baseline rate 42.3%)	52.9%	57.6%	51.2%	55.9%
Savings to households from removed garden waste charging	£1,152	£1,152	-£874	-£874
GHG emissions savings (traded and non-traded)	£6,792	£9,537	£6,334	£9,120
NHM landfill tax saving	£3,482	£4,859	£3,038	£4,416
Reduction in government landfill tax receipts (benefits to municipal sector included in LA and NHM rows)	-£3,638	-£5,016	-£3,168	-£4,546
Social Benefits (Total)	£7,787	£10,532	£5,330	£8,116
Additional local authorities net service costs (+)/savings (-) from changes in dry recycling, food waste and free garden waste collections for all HHs	£3,061	£3,061	-£164	-£164
Transition costs	£869	£869	£629	£629
Net service cost minus transition ⁴⁰⁰	£2,192	£2,192	-£793	-£793
Net cost to NHM businesses under increased recycling collections	-£374	£3,065	-£374	£3,065
Waste management cost with DRS effect)	-£489	£2,757	-£489	£2,757
Familiarisation	£115	£309	£115	£309
Policy costs to apply best practices in recycling collections	£55	£55	£55	£55
Social costs (total)	£2,743	£6,182	-£483	£2,956
Net present value, costs (-) / savings (+)	£5,045	£4,350	£5,812	£5,159

Source: Defra's analysis based on WRAP's modelling

³⁹⁸ https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1018133/green-gas-impact-assessment.pdf

³⁹⁹ The GGSS follows on from the biomethane element of the non-domestic renewable heat incentive by providing tariff support for biomethane produced via AD and injected into the gas grid– Impact Assessment found here:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1018133/green-gas-impact-assessment.pdf

⁴⁰⁰ This captures all local authority net costs presented in Table 13 minus transition costs related to capital purchases i.e., vehicle, container, and liner charges.

Table 61: High cost, low benefit analysis for the municipal scenarios 1M-4M, (with DRS effects, 2020 prices, discounted to 2020 PV (£m)).

	Option 1M	Option 2M	Option 3M	Option 4M
Municipal recycling rate achieved (baseline rate 42.3%)	49.8%	53.9%	48.1%	52.2%
Savings to households from removed garden waste charging	£1,152	£1,152	-£874	-£874
GHG emissions savings (traded and non-traded)	£6,022	£7,245	£5,780	£7,019
NHM landfill tax saving	£2,317	£3,523	£1,874	£3,209
Reduction in government landfill tax receipts (benefits to municipal sector included in LA and NHM rows)	-£2,474	-£3,679	-£2,004	-£3,079
Social Benefits (Total)	£7,017	£8,240	£4,776	£6,275
Additional local authorities net service costs (+)/savings (-) from changes in dry recycling, food waste and free garden waste collections for all HHs	£3,802	£3,802	£459	£459
Transition costs	£963	£963	£686	£686
Net service cost minus transition ⁴⁰¹	£2,839	£2,839	-£227	-£227
Net cost to NHM businesses under increased recycling collections	-£99	£4,454	£99	£4,454
Waste management cost with DRS effect)	-£270	£3,906	-£270	£3,906
Familiarisation	£171	£548	£171	£548
Policy costs to apply best practices in recycling collections	£55	£55	£55	£55
Social costs (total)	£3,758	£8,311	£415	£4,968
Net present value, costs (-) / savings (+)	£3,258	-£71	£4,360	£1,307

Source: Defra's analysis based on WRAP's modelling

⁴⁰¹ This captures all local authority net costs presented in Table 13 minus transition costs related to capital purchases i.e., vehicle, container, and liner charges.

Table 62: High benefit, low-cost analysis for the municipal scenarios 1M-4M, (with DRS effects, 2020 prices, discounted to 2020 PV (£m))

	Option 1M	Option 2M	Option 3M	Option 4M
Municipal recycling rate achieved (baseline rate 42.3%)	56.0%	61.2%	54.4%	59.6%
Savings to households from removed garden waste charging	£1,152	£1,152	-£874	-£874
GHG emissions savings (traded and non-traded)	£9,961	£14,072	£9,318	£13,876
NHM landfill tax saving	£4,646	£5,847	£4,202	£5,726
Reduction in government landfill tax receipts (benefits to municipal sector included in LA and NHM rows)	-£4,803	-£6,003	-£4,333	-£5,856
Social Benefits (Total)	£10,956	£15,067	£8,314	£12,872
Additional local authorities net service costs (+)/savings (-) from changes in dry recycling, food waste and free garden waste collections for all HHs	£2,989	£2,989	-£198	-£198
Transition costs	£807	£807	£591	£591
Net service cost minus transition ⁴⁰²	£2,182	£2,182	-£789	-£789
Net cost to NHM businesses under increased recycling collections	-£482	£2,390	-£482	£2,390
Waste management cost with DRS effect)	-£554	£2,218	-£554	£2,218
Familiarisation	£72	£172	£72	£172
Policy costs to apply best practices in recycling collections	£55	£55	£55	£55
Social costs (total)	£2,562	£5,434	-£625	£2,246
Net present value, costs (-) / savings (+)	£8,394	£9,634	£8,939	£10,625

Source: Defra's analysis based on WRAP's modelling

Comparison with other waste reforms

The appraisal period of 12 years is used for the main analysis to help measure our progress against the ambition to reach 65% municipal recycling rate by 2035 (that Government stated in the 2018 Resource and Waste Strategy). This is because Simpler Recycling is the largest contributor towards this ambition in comparison with the other waste reforms. However, we have also replicated the central analysis with an appraisal period of ten years (from 2024-3033, rather than the 12 years used in the main analysis). As this impact assessment assumes the Deposit Return Scheme is implemented as part of its baseline (i.e., it does not include Extended Producer Responsibility), the DRS effect is adjusted to accommodate a 12-year appraisal period used in the main analyses to assess costs and benefits associated with Simpler Recycling. We assumed that the amount of DRS materials that are diverted from kerbside collections stay the same from 10-year to 12-year appraisal. This then allows EPR IA baseline scenario to assume both DRS and Simpler Recycling impacts. To allow a comparison of outcomes against the other major waste reforms (i.e., EPR and DRS) – see Table 63 below.

⁴⁰² This captures all local authority net costs presented in Table 13 minus transition costs related to capital purchases i.e., vehicle, container, and liner charges.

Table 63: Central analysis for the municipal scenarios 1M-4M, with a 10-year appraisal period from 2024 to 2033 (with DRS effects, 2020 prices, discounted to 2024 PV (£m)).

	Option 1M	Option 2M	Option 3M	Option 4M
Municipal recycling rate achieved (baseline rate 42.3%)	52.9%	57.6%	51.2%	55.9%
Savings to households from removed garden waste charging	£1,088	£1,088	-£826	-£826
GHG emissions savings (traded and non-traded)	£6,087	£8,426	£5,702	£8,078
NHM landfill tax saving	£3,348	£4,618	£2,928	£4,199
Reduction in government landfill tax receipts (benefits to municipal sector included in LA and NHM rows)	-£3,496	-£4,766	-£3,051	-£4,322
Social benefits (total)	£7,027	£9,365	£4,753	£7,129
Additional local authorities net service costs (+)/savings (-) from changes in dry recycling, food waste and free garden waste collections for all HHs	£3,068	£3,068	-£27	-£27
Transition costs	£998	£998	£722	£722
Savings and on-going costs	£2,070	£2,070	-£748	-£748
Net cost to NHM businesses under increased recycling collections	-£377	£2,825	-£377	£2,825
Waste management cost with DRS effect	-£509	£2,471	-£509	£2,471
Familiarisation	£132	£354	£132	£354
Policy costs to apply best practices in recycling collections	£55	£55	£55	£55
Social costs (total)	£2,746	£5,948	-£348	£2,853
Net present value, costs (-) / savings (+)	£4,281	£3,418	£5,102	£4,276

Source: Defra's analysis