Title: Reforming the UK producer responsibility system for waste electricals **IA No:** **RPC Reference No:** **Lead department or agency:** **Other departments or agencies:**	Impact Assessment (IA) **Date:** 28/12/2023 **Stage:** Consultation **Source of intervention:** Domestic **Type of measure:** Secondary Legislation **Contact for enquiries:** WEEE@DEFRA.gov.uk

Summary: Intervention and Options

RPC Opinion: Informal scrutiny

Cost of Preferred (or more likely) Option (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
£571.5m	-£725.9m	£130.8m	Qualifying provision

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

A UK-wide producer responsibility (PR) system for Waste Electrical and Electronic Equipment (WEEE) has been in place since 2006, which requires producers that place more than 5 tonnes of electronic and electrical equipment onto the market each year to finance the costs of collection, treatment, and disposal of those materials when they become waste. Despite leading to improvements in the recycling rates of WEEE items, research by Anthesis indicates that there is still only a 57% recycling rate, with around 450kt of WEEE disposed of through residual streams[1]. When WEEE is not treated correctly there are a range of environmental externalities (e.g., greenhouse gas emissions and environmental impacts on air, water, land, human and animal health from products going to Energy from Waste (EfW) and landfill) which are not fully accounted for in WEEE producers' and users' decisions. WEEE is also found in fly-tipping, an act which has social disamenity costs as well as environmental costs. In the case of WEEE found in residual waste and fly-tipping, the negative externalities are further exemplified by the hazardous materials contained within the items. WEEE also tends to contain valuable materials, which, when not recycled, are lost, undermining resource efficiency objectives. Without a change in government intervention, these problems will persist. The UK Government, together with the devolved administrations, are looking to reform the UK producer responsibility system for electrical and electronic equipment (EEE), to encourage the reuse and recycling of WEEE by making it more convenient for the public and businesses to deal with their WEEE properly. Consistent with the 'polluter pays' principle, it is proposed that the full net costs of managing WEEE will be placed on producers (as they are most knowledge on recyclability, and able to influence the design and of their products).

What are the policy objectives of the action or intervention and the intended effects? (7 lines)

The policy objective is to reduce the amount of WEEE sent to landfill, EfW and fly-tipping. The proposed policies plan to reform the current producer responsibility system for WEEE in a way that increases the collection, and improves the treatment, of WEEE. From a consumer's perspective, there should be a better understanding of how to responsibly dispose of their WEEE items with convenient collection routes, and the removal of financial barriers that some of the existing options possess. The system should fund better and more consistent recycling collections and encourage more domestic recycling and reprocessing. The new regulations should increase the current recycling and reuse rates of 57% of WEEE across the UK.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base) Maximum of 10 lines

There are six options assessed (including do nothing). Options are presented cumulatively with each option adding to the previous option.

Option 1 – Do nothing. Keep the current regulations in place with no amendments.
Option 2 – To introduce a UK wide household collection system for small items of WEEE, to be financed by producers and free of charge to households.
Option 3 – In addition to Option 2, to introduce a UK wide household collection system for bulky WEEE, to be financed by producers and free of charge to households.
Option 4 – In addition to Option 3, to strengthen distributor obligations to take back WEEE from their customers.
Option 5 – In addition to Option 4, to designate Online Marketplaces (OMPs) as a new class of producer.
Option 6 – In addition to Option 5, to create a new category for vapes. **This is the preferred option.**
Non-regulatory options have been disregarded and not appraised here. This is discussed in section 4.2

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

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:** -0.39mt	**Non-traded:** -0.05mt	

[1] https://wrap.org.uk/resources/report/quantifying-composition-municipal-waste

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

Signed by the responsible SELECT SIGNATORY: _____ Date: _____

Summary: Analysis & Evidence

Policy Option 2

Description: To introduce a UK wide household collection system for small items of WEEE, to be financed by producers and free of charge to households.

FULL ECONOMIC ASSESSMENT

Price Base	PV Base	Time Period	Net Benefit (Present Value (PV)) (£m)		
2019	2020	10 Years	**Low: -59.5**	**High: 7.6**	**Best Estimate: -25.9**

COSTS (£m)	Total Transition[2] (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	14.2	1	33.9	**307.8**
High	14.2		35.1	**317.5**
Best Estimate	14.2		34.5	**312.7**

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

Producers cover the full net cost of household collection of small items of WEEE, they face transition costs to fund purchasing containers (£13.7m), staff training (£0.1m) and Scheme Administrator set-up (0.4m). They also face operational costs: Scheme Administrator costs (£44.9m), crew costs (£38.0m), vehicle retrofitting costs (£18.0m), container replacement costs (£6.8m), overheads (£6.4m), communication costs (£170.7m), costs of treating WEEE for recycling (£43.4m) and the costs of additional fuel from extra weight (£0.9m). There will be costs to society from the additional carbon released in transport (£0.5m) and the public sector will face loss of landfill tax revenue (£15.5m).

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

Potential cost pass-through from producers to consumers is not considered in the cost benefit analysis (these costs are ascribed to businesses in the cost benefit analysis).

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant	Total Benefit (Present Value)
Low	0.0	0	31.3	**258.1**
High	0.0		38.2	**315.4**
Best Estimate	0.0		34.8	**286.7**

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

Society benefits from avoided greenhouse gas emissions from diverting waste from landfill and incineration to recycling (£188.9m), LAs benefit from avoided residual disposal costs from diverting WEEE from incineration and landfill treatment to recycling, including landfill tax savings (£15.5m) and landfill and EfW gate fee savings (£41.1m), there are also secondary market profits from additional material sales by the reprocessing and recycling industry (£102.1m).

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

There may be natural capital benefits from a reduced reliance on virgin materials and the negative externalities associated with their extraction, including greenhouse gases, and a reduction in the amount of waste going to landfill and incineration. There is also a benefit to consumers from clearer communications on how to recycle and dispose of Small Mixed WEEE (SMW) alongside improved recycling collection services making it easier for them to recycle and saving them time travelling to collection points. There are also several system-wide benefits including increased transparency in the system.

Key assumptions/sensitivities/risks	**Discount**	3.5%

The increase in tonnage of WEEE collected might be higher or lower than currently estimated, affecting recycling rates and sectoral costs. We conducted sensitivity analysis on the assumed increase in tonnage of WEEE as a result of the policy.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: 34.8	**Benefits: 5.4**	**Net: 29.4**	**146.8m**

[2] At this stage, only key costs and benefits have been included in sensitivity analysis (see Annex B), hence no high and low transition cost scenarios. This will be refined at final stage.

Summary: Analysis & Evidence

Policy Option 3

Description: In addition to Option 2, introduce a UK wide household collection system for bulky WEEE, to be financed by producers and free of charge to households

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -231.0	**High: 372.3**	**Best Estimate: 57.8**

COSTS (£m)	Total Transition[3] (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	14.2	1	64.5	**568.7**
High	14.2		93.0	**811.5**
Best Estimate	14.2		75.3	**660.8**

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

Same as option 2, with the inclusion of the additional costs for producers that pay for the collection of bulky WEEE, including operational costs (£327.4m), the additional fuel costs (£23.1m) and the additional treatment costs of bulky WEEE (28.3m). Society will face the costs from additional carbon (£12.2m) released from additional fuel and there will be costs to the public sector (HM Treasury) from landfill tax loss (£17.2m).

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

Same as in Option 2.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0	0	69.5	**580.5**
High	0.0		112.1	**941.0**
Best Estimate	0.0		85.9	**718.6**

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

Same as Option 2, with the addition of bulky WEEE collection which will divert bulky WEEE from landfill, incineration, and fly-tipping to recycling and reuse, generating further societal benefits in terms of carbon emissions reduction (£162.6m) and societal benefits from a reduction in fly-tipping reducing disamenity (£74.3m). Householders will also benefit from no longer having to pay for bulky WEEE collection (131.0m). There will be increased secondary market material revenues (£78.7m) for reprocessors as more material will be reprocessed. LAs benefit from additional avoided residual disposal costs, including landfill tax savings (£17.2m) and landfill and EfW gate fee savings (£45.6m).

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

Same as Option 2.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5%

Same as option 2 (albeit with the scale of sensitivities expected to be larger because of higher collection rates), with the analysis of Option 3 also being sensitive to the assumption of the percentage of WEEE diverted away from fly-tipping (10%) and the assumption of the weight of a bulky item of WEEE (60kg). We conducted sensitivity analysis on these two assumptions.

BUSINESS ASSESSMENT (Option 3)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: **72.3**	**Benefits: 11.6**	**Net: 60.8**	**303.9**

[3] At this stage, only key costs and benefits have been included in sensitivity analysis (see Annex B), hence no high and low transition cost scenarios. This will be refined at final stage.

Summary: Analysis & Evidence

Policy Option 4

Description: In addition to Options 2 and 3, strengthen distributor obligations to take back WEEE from their customers.

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: 13.1	High: 1338.7	Best Estimate: 571.5

COSTS (£m)	Total Transition[4] (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	14.2	1	140.3	**1214.7**
High	14.2		183.0	**1675.8**
Best Estimate	14.2		168.2	**1452.3**

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

Same as option 2 and 3, with the inclusion of the additional costs for producers that pay for the takeback of WEEE on a 0:1 basis in store[5]. Producers face the costs of the collection of handling of additional WEEE through strengthened take-back regulations (£318.4m), the costs of treating this WEEE (£44.0m), and retailers will face a loss of revenue from no longer being able to charge for collecting an item of WEEE from households when delivering a replacement (£517.8m). Society will face the costs from additional carbon (£7k) released from increased weights fuel and there will be costs to the public sector from landfill tax loss (£48.4m).

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

Same as option 2 and 3.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant	Total Benefit (Present Value)
Low	0.0	0	201.0	**1688.9**
High	0.0		303.0	**2553.5**
Best Estimate	0.0		240.6	**2023.8**

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

Same as option 2 and 3, with the addition of extended takeback obligations which will divert WEEE from landfill, incineration, and fly-tipping to recycling and reuse, generating further societal benefits in terms of carbon emissions reduction (£556.1m). Households will face savings because they no longer have to pay for retailer household takeback (£517.8m). There will be increased secondary market material revenues (£296.4m) for reprocessors as more material will be reprocessed. LAs benefit from additional avoided residual disposal costs, including landfill tax savings (£48.4m) and landfill and EfW gate fee savings (£128.2m).

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

Same as option 2 and 3, with potential additional benefits from reduced fly-tipping, reducing the cost of collections to LAs and reducing disamenity for the public. We have not quantified any additional fly-tipping benefits in our cost-benefit analysis under option 4 compared to option 3. This is due to a lack of evidence of the exact impact of each policy on fly-tipping specifically.

Key assumptions/sensitivities/risks	Discount	3.5%
Same as Option 3.		

BUSINESS ASSESSMENT (Option 4)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: 159.6	Benefits: 28.8	Net: 130.8	653.8

[4] At this stage, only key costs and benefits have been included in sensitivity analysis (see Annex B), hence no high and low transition cost scenarios. This will be refined at final stage.

[5] Consumers can return WEEE to store whether they purchase a new item or not

Summary: Analysis & Evidence

Policy Option 5

Description: In addition to Option 4, designate Online Marketplaces (OMP) as a new class of producer.

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: 13.1	**High: 1338.7**	**Best Estimate: 571.5**

COSTS (£m)	Total Transition[6] (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	14.2	1	140.3	**1214.7**
High	14.2		183.0	**1675.8**
Best Estimate	14.2		168.2	**1452.3**

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

The key impact of this option is to reduce the potential for certain businesses to free ride and ensure the EEE producers selling through online marketplaces are contributing towards compliance costs. As this is not expected to change the amount of WEEE being collected, rather the distribution of costs between producers, the main costs and benefits will be the same as option 4. Some additional transition and familiarisation costs are expected to occur for Online Market Places (OMPs) however these have not been quantified. These costs will be explored further through the consultation process.

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

Familiarisation and transition costs to OMPs, compliance schemes and regulators.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0	0	201.0	**1688.9**
High	0.0		303.0	**2553.5**
Best Estimate	0.0		240.6	**2023.8**

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

These are expected to be the same as in option 4. The key additional benefit of option 5 is to ensure more EEE producers are covered by the relevant regulations and ensure that costs are distributed amongst producers fairly (by limiting the opportunity for free riding). Producers already complying with their regulatory obligations will see a reduction in costs compared to those in option 4 with these costs passed to newly obligated producers, such that the overall cost to business remains the same.

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

A more equitable distribution of compliance costs across EEE producers

Key assumptions/sensitivities/risks	Discount rate	3.5%

Same as option 4. The impact assessment for the packaging producer responsibility reforms (published in 2022) estimated that 46 OMPs would be obligated under similar changes to producer regulations.

BUSINESS ASSESSMENT (Option 5)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: 159.6	**Benefits: 28.8**	**Net: 130.8**	**653.8**

[6] At this stage, only key costs and benefits have been included in sensitivity analysis (see Annex B), hence no high and low transition cost scenarios. This will be refined at final stage.

Summary: Analysis & Evidence Policy Option 6 (Preferred option)

Description: In addition to Option 5, to create a new category for vapes within the regulations

FULL ECONOMIC ASSESSMENT

Price Base Year 2019	PV Base Year 2020	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: 13.1	**High: 1338.7**	**Best Estimate: 571.5**

COSTS (£m)	Total Transition[7] (Constant Price)	Years	Average Annual (excl. Transition) (Constant	Total Cost (Present Value)
Low	14.2	1	140.3	**1214.7**
High	14.2		183.0	**1675.8**
Best Estimate	14.2		168.2	**1452.3**

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

The key aim of this option is to ensure that vapes producers alone are covering the cost of recycling vapes collected under the regulations. As vapes fall within EEE category 7 in the current regulatory system[8] (toys, leisure and sports equipment), other category 7 producers are likely to share in the cost of treating vapes collected for recycling. Creating a new category redistributes costs from other category 7 producers to only vapes producers exclusively. As vapes are more expensive to recycle than other WEEE items, were government to set ambitious targets on vapes specifically, this would lead to higher cost to producers overall. However, as Government are not currently consulting on target rates post the reforms outlined here, analysis for option 6 does not account for any additional recycled tonnage (and therefore costs) on top of that in the previous options. As such, costs are assumed to be the same as under option 5.

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

Familiarisation and transition costs to vapes producers, compliance schemes and regulators

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant	Total Benefit (Present Value)
Low	0.0	0	201.0	**1688.9**
High	0.0		303.0	**2553.5**
Best Estimate	0.0		240.6	**2023.8**

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

These are expected to be the same as in option 5. The key benefit is to ensure that vapes producers are paying the full cost of recycling vapes collected under the regulations. This ensures that other category 7 producers are not paying overinflated fees to meet their compliances, and incentivises vapes producers to ensure their products are recyclable.

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

A more equitable distribution of compliance costs across EEE producers

Key assumptions/sensitivities/risks	Discount rate	3.5%

Data on the manufacture and disposal of vapes is scarce. Some initial research suggests there may be 0.5bn vapes placed on the market in the UK each year, with 67m disposable vapes entering the residual stream annually. This will need to be explored further through the consultation process.

BUSINESS ASSESSMENT (Option 5)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: 159.6	**Benefits: 28.8**	**Net: 130.8**	**653.8**

[7] At this stage, only key costs and benefits have been included in sensitivity analysis (see Annex B), hence no high and low transition cost scenarios. This will be refined at final stage.

[8] https://www.gov.uk/government/publications/electrical-and-electronic-equipment-eee-covered-by-the-weee-regulations/electrical-and-electronic-equipment-eee-covered-by-the-weee-regulations#largehousehold

Glossary

0:1 Takeback – A takeback service provided by retailers, allowing consumers to return WEEE, equivalent in type to those purchased from the retailer, without requiring consumers to purchase a new EEE product

1:1 Takeback – A takeback service provided by retailers, allowing consumers to return items of WEEE, equivalent in type to those purchased from the retailer, when making a new purchase of EEE from the retailer

AATF – Approved accredited treatment facility

CMA – Competition and Markets Authority

CRM – Critical raw material

DCF – Designated collection facilities

Distributors – Retailers and distance sellers that sell EEE, such as those selling online

DMR – Dry-mixed recycling

DTS – Distributor takeback scheme

EANDCB – Equivalent Annual Net Direct Cost to Business

EEE – Electric and electronic equipment

EFW – Energy from Waste

EPR – Extended Producer Responsibility

GHG – Greenhouse gas

HMT – His Majesty's Treasury

HWRC – Household waste recycling centre

LA – Local Authority

LHA – Large household appliances

OMP – Online marketplace

PCS – Producer compliance scheme

pEPR – Packaging Extended Producer Responsibility

PIR – Post implementation review

Reprocessor – A facility that turns waste materials into usable input materials for new products.

RCV – Refuse collection vehicle

SDA – Small domestic appliance

SMW – Small mixed WEEE

WEEE – Waste electricals and electronic equipment

Executive Summary

Introduction

This impact assessment accompanies the government consultation for proposed reforms to The Waste Electrical and Electronic Equipment (WEEE) Regulations 2013[9].

The aims of these reforms are to increase the quantity of WEEE that is reused and recycled and place more responsibility on producers and distributors of electronic and electrical equipment (EEE). Under the current WEEE producer responsibility system, obligated WEEE producers are required to meet certain recycling collection targets set by Government and finance these collections. However, there are barriers to collecting further WEEE (such as inconvenience, and lack of consumer knowledge, of recycling routes), which are unlikely to be corrected under the current regulations.

The proposed reforms aim to create more convenient routes for households to recycle their WEEE and ensure that producers pay towards campaigns to raise awareness of these routes. These changes will address the twin problems with current routes, of inconvenience, and lack of awareness (as identified by the Post Implementation Review[10] of the current WEEE regulations as well as further research[11]). The proposed reforms also aim to address the imbalance in obligations and enforcement between online sellers and traditional sellers, which has resulted within the existing regulatory system.

These reforms will ensure that producers pay the costs of collecting, managing, and recycling of WEEE (in line with the polluter pays principle). Using a producer responsibility system to internalise the costs of dealing with WEEE can provide incentives for EEE producers to improve product lifetimes and use modular design to enable ease of repair and recycling as this will reduce their financial obligations for WEEE collection and treatment. Implementing the 'polluter pays principle' will lead to environmental benefits by reducing the negative environmental externalities associated with waste, EEE production and the extraction of raw materials, such as greenhouse gas emissions.

Through increasing the quantity of WEEE that is recycled and reused, these reforms can have numerous benefits, including increased resource efficiency, natural capital benefits from a reduction in WEEE sent to landfill and energy from waste, reducing carbon emissions through reduced extraction, processing, and manufacturing, reducing fly-tipping and increased revenue for material reprocessors.

This impact assessment explores six regulatory options for these reforms:

- **Option 1:** Do nothing. This would maintain the current system, whereby the point of producer responsibility remains at the household waste and recycling centre and to provide a system of return for WEEE collected by distributors.
- **Option 2:** To introduce a UK-wide household collection system for small mixed WEEE, to be financed by producers and free to households.
- **Option 3:** This option is the same as Option 2, with the addition introduction of a UK-wide household collection system for bulky WEEE, to be financed by producers, and free to households, in addition to the small mixed WEEE system.
- **Option 4:** This option is the same as Option 3, but with additional aspects to strengthen distributor obligations to take back WEEE from their customers.

[9] https://www.legislation.gov.uk/uksi/2013/3113/contents/made

[10] https://www.legislation.gov.uk/uksi/2013/3113/pdfs/uksiod_20133113_en.pdf

[11] Material Focus Report, Electrical Waste - Challenges and Opportunities: An independent study on WEEE flows in the UK

- **Option 5:** This option is the same as Option 4, but with the additional aspect of designated online marketplaces as a new class of producers.
- **Option 6:** This option is the same as Option 5, but with the additional aspect of creating a new category of EEE in the regulations for vapes[12]. **This is the preferred option.**

We have disregarded non-regulatory options. The key objective of the proposed policy is that businesses that distribute and place EEE on the market take on their share of responsibilities for that equipment when it becomes waste, whilst barriers to increasing the recycling of WEEE are removed. A voluntary approach would not ensure that this is achieved. This is because it would not be rational for one producer to voluntarily cover the full costs of recycling their share of WEEE, unless their competitors were also voluntarily paying. This is evidenced by the high levels of non-compliance amongst internet sellers that are based overseas. This is a market failure, and it can only be corrected through a regulatory approach. This policy requires that producers operate on a level playing field, therefore regulations are required to ensure that all obligated producers comply.

A regulatory system of producer responsibility for WEEE has been in place since 2005 and is well understood by the sector. Our proposed policy options are seeking to build on the existing obligations set out in those regulations rather than developing a new regulatory system from scratch. We will welcome views on non-regulatory options during the consultation process. The rationale for disregarding non-regulatory options and regulatory options that are unlikely to achieve the policy aims is explained further in section 4.2.

Summary of impacts on key actors

This section summarises the responsibilities and impacts on businesses and other key actors from across the EEE supply and waste chain from the proposed reforms in the preferred option (option 6).

<u>EEE Producers</u>

EEE producers will be obligated to cover the costs of UK-wide household collection system for small, mixed WEEE (SMW)[13] and bulky WEEE[14]. This will be both financed and led by producers. The costs associated with this include:

- Set-up costs including purchasing containers for SMW collections, staff training and familiarisation and the set-up of a Scheme Administrator
- Operational costs associated with SMW collections including costs of labour from additional crew time spent collecting SMW, costs for retrofitting vehicles with containers, the costs of replacing the containers, and local and commercial overheads.
- Costs for the collection, handling, and treatment of WEEE collected through the proposed routes
- Other operational costs such as Scheme Administrator costs, communication costs and the costs of additional fuel from carrying extra weight in collections

<u>EEE Distributors and retailers</u>

EEE distributors and retailers with annual sales of over £100k will be required to offer a 0:1 takeback service whereby they provide an (in store) takeback service for WEEE without requiring the purchase of a new item. They will also be required to offer a free collection on delivery service

[12] Also known as e-cigarettes
[13] WEEE categories 2-10; https://www.gov.uk/government/publications/electrical-and-electronic-equipment-eee-covered-by-the-weee-regulations/electrical-and-electronic-equipment-eee-covered-by-the-weee-regulations#largehousehold
[14] WEEE categories 1,11-12; https://www.gov.uk/government/publications/electrical-and-electronic-equipment-eee-covered-by-the-weee-regulations/electrical-and-electronic-equipment-eee-covered-by-the-weee-regulations#largehousehold

for replacement bulky electricals delivered to households. Distributors would be required to inform customers of their take-back schemes at the point of sale.

Distributors and retailers will have to pay for the cost of collecting and treating the additional tonnages of WEEE collected under the amended takeback regulations. This will be a loss of revenue[15] to those distributors and retailers who currently charge for takeback.

Public Sector

There will be gains to local authorities that currently provide a SMW kerbside collection service as producers pay to cover this service for all LAs. This is a transfer of costs from the public sector to EEE producers.

The Treasury will face reductions in landfill tax as more WEEE is diverted from residual waste collections to recycling. This is a transfer from HMT to LAs and waste collectors that benefit from paying less landfill tax from increased WEEE recycling.

Local authorities will benefit from landfill and EfW gate fees savings as WEEE is diverted from landfill and EfW sites to recycling. Gate fees are levied by owners of the waste facility to cover running costs.

Reprocessors and exporters

Reprocessors and exporters will gain through increased profits from selling reprocessed WEEE materials as an input for new products on the secondary materials market. This is due to the increased supply of WEEE for recycling due to the proposed policies.

Households

Consumers who are currently paying to have their bulky WEEE collected for recycling with the purchase of a new item will benefit from no longer having to pay to recycle and get rid of their bulky WEEE.

Households will benefit more generally from increased awareness and convenience of collections, reducing their need to, for example, hoard small mixed WEEE or to take WEEE to existing recycling points (e.g., recycling banks or Household Waste and Recycling Centres). Overall, this provides more options to consumers; if it is still more convenient for households to take their WEEE to a HWRC, this option remains. However, for households for whom this is inconvenient, new options will be created.

Society

There will be natural capital benefits to society from increased recycling and reuse of WEEE. Increased recycling of WEEE produces secondary materials for use in manufacturing. Recycling and reuse of WEEE will reduce the reliance on finite, virgin materials that compose EEE, conserving them preserves the stock of these resources, protecting natural capital. This reduces the greenhouse gas emissions associated with raw material extraction, EEE production and manufacturing, and waste management. Society will gain through reduced carbon emissions. Increased reuse and recycling of WEEE will also reduce other negative externalities associated with raw material extraction and production of EEE such as pollution to air and water, deforestation, and waste creation.

[15] Further analysis will be conducted prior to the final impact assessment to estimate the profit element of this revenue in accordance with appraisal guidance

There will also be reduced negative environmental and social externalities from a reduction in fly-tipping. Fly-tipped WEEE often contains hazardous materials which contaminate soil and waterways, negatively impacting the surrounding ecosystem and wildlife. Therefore, there will be reduced negative environmental impacts from a reduction in fly tipped WEEE. Moreover, there will be societal benefits from a reduction in fly-tipping, fly-tipping generates local social disamenity costs, which will be reduced because of the proposed reforms.

Emissions Savings

In our cost-benefit analysis, we quantified the changes in UK-based carbon emissions that would occur from the policy options and identified that there would be a reduction in UK-based carbon emissions in all policy options being considered when compared with doing nothing. However, it is important to acknowledge that this does not cover the total emissions reductions that could occur[16] because in each of the policy options because regulatory economic assessments are required to exclude the net reduction in international emissions, also known as scope 3, or imported emissions. However, greenhouse gas emissions are a global pollutant and reducing them, regardless of where they are generated provides the same benefit and reduces the impact of emissions on the climate, which is a global public good. In this IA we therefore present the expected additional emissions benefits in each policy option resulting from net reduction in international emissions, even though we do not incorporate them into our formal cost-benefit analysis.

The table below presents greenhouse-gas emissions using a territorial approach vs using consumption-based approach (which accounts for emissions savings occurring outside the UK). A more detailed description of this analysis is included in section 9.1.

	Net Carbon Benefit: Carbon Avoided Over the 10-Year Policy Period (kt) – marginal impact of each policy	
Policy Option	Territorial	Consumption
2	702	1091
3	608	1210
4	2082	3406

[16] Such as production emissions taking place overseas

Summary of policy objectives and outcomes

Below is a table of the issues that the reforms intend to tackle, outlining how the reforms will overcome them, and the expected outcomes and environmental, social, and economic benefits.

Issue	Activity	Expected behaviour change	Outcome	Environmental, economic and social benefit
Although the existing WEEE Regulations have been successful in ensuring that all WEEE collected by LAs (and distributors) is properly treated and funded by producers, there are still significant volumes of WEEE entering residual waste streams, being hoarded, and fly tipped.	To mandate that producers should finance the cost of a UK-wide household collection system for small and bulky WEEE, supported by appropriate communication campaigns. Strengthen distributor take-back obligations to ensure parity of compliance costs between retailers and internet sellers. Producers to finance the cost of transport of WEEE from distributor premises. Require free collection of WEEE on delivery service, i.e., on delivery of large appliances and TVs.	Producers via a central delivery body to develop the most efficient mechanism for household WEEE collections[17]. Distributors to increase the number and convenience of collection points for WEEE reuse and recycling, expanding disposal options for households[18]. Distributors incentivised to collect more, given that the cost of transport and premises is covered by producers[19]. Increased awareness and participation in WEEE reuse and recycling.	Households to send more unwanted items for reuse and recycling. Increased quantity recyclate for secondary raw material markets. The most convenient option for householders is also the best environmental option. New collection systems that are more readily able to support reuse compared to LA HWRCs.	Reduced WEEE in residual and fly-tipped waste. Increased resource efficiency as a consequence of greater reuse and material recovery. Increased revenue for WEEE recycling and reuse sector.

[17] As it will not be mandatory for producers to use LAs for collections, the responsibility for developing the most efficient mechanism will fall on producers.
[18] There will be obligations on distributors to collect WEEE on a 0:1, rather than the current 1:1, basis as well as advertise this service more clearly to consumers. This will coincide with a removal (to distributors) of the cost of transporting collected WEEE to recycling facilities (which will be funded by producers).
[19] Under the current system, distributors can request compliance schemes (pay for by producers) pay for the cost of recycling any WEEE they collect through consumer takeback, however, must deliver this to the recycling facility (AATF). Under the reforms, producers will be required to collect this WEEE from distributors.

There is an imbalance between obligations and enforcement of internet-based vs traditional sales channels of producers and distributors with internet-based distributors currently having differing obligations related to WEEE.	To strengthen obligations on internet-based distributors to ensure parity with retailers. To obligate Online Marketplaces (OMPs) as a category of producer.	Increased participation and compliance of internet-based distributors and OMPs.	A level playing field across the EEE producer and distributor sector. Transfer of compliance costs from overseas sellers trading on OMPs to the OMP itself.	Reduced share of WEEE compliance costs amongst UK based producers, since the cost of collecting and treating WEEE is shared with OMPs who facilitate direct sales from overseas producers.

Evidence Summary

A summary of the costs and benefits of the reforms are set out below. Note that these costs and benefits are cumulative, so option 6 costs include the costs of options 2-5.

Present value (2025-2034) £ millions	**Impact on business**	**Direct/ Indirect**	**Option 2**	**Option 3**	**Option 4/5/6**
Transition Costs					
SMW Kerbside Containers	Yes	Direct	13.7	13.7	13.7
Scheme Administrator set up costs	Yes	Direct	0.4	0.4	0.4
Staff training and familiarisation	Yes	Direct	0.1	0.1	0.1
Annual Costs					
Crew Costs	Yes	Direct	32.7	32.7	32.7
Vehicle Retrofitting Costs	Yes	Direct	15.5	15.5	15.5
Flat Container Replacement Costs	Yes	Direct	5.9	5.9	5.9
Additional Fuel Costs	Yes	Direct	0.7	20.7	20.7
Local and Commercial Overheads	Yes	Direct	5.5	5.5	5.5
Communication Costs	Yes	Direct	150.5	150.5	150.5
Scheme Administrator Operational Costs	Yes	Direct	38.6	38.6	38.6
Carbon from Additional Fuel	No		0.4	10.9	10.9
Treatment Costs	Yes	Direct	35.8	59.6	96.7
Landfill Tax Loss (HMT)	No		12.8	27.3	67.9
Cost of Collection (Baseline – Transfer)	Yes	Direct	-	111.8	111.8
Costs of Collection (Extended Service)	Yes	Direct	-	167.7	167.7
Retail handling and Collection Costs	Yes	Direct	-	-	271.8
Retailers Loss of Revenue[20]	Yes	Direct	-	-	442.0
Annual Benefits					
Carbon Savings	No		155.6	291.8	757.4
Material Revenue from the Recycled Materials	Yes	Indirect	84.4	150.5	399.6
Landfill Tax Saving (LA/ Waste Collector)	Yes	Direct	12.8	27.3	67.9
Landfill and EfW Gate Fee Savings	Yes	Direct	33.9	72.2	180.0
Savings to Households no longer paying for bulky WEEE collection: Consumer Group 1	No		-	111.8	553.8
Fly-tipping Collection Cost Savings	No		-	1.6	1.6
Fly-tipping Reduction in Disamenity	No		-	63.4	63.4
Non-Monetised Benefits					
Reduced environmental negative externalities (to soil, water, and wildlife) from fly-tipping					
Reduced environmental negative externalities from raw material extraction and EEE production					
Reduced value loss from sending critical raw materials to landfill/incineration					
Reduced social and environmental negative externalities from landfill					
Increased collection of WEEE for recycling as a result of coordinated communication campaigns					

[20] It is acknowledged that profit, rather than revenue, would generally be used in appraisal. Further data will be sought prior to the final impact assessment to estimate the proportion of this cost relating to profit.

International carbon emission savings					
Reduced volume of WEEE sent to landfill can help achieve legally binding residual waste targets					
Savings to households from reduced time, effort and fuel spent recycling WEEE					
Total Costs			**312.7**	**660.8**	**1452.3**
Total Benefits			**286.7**	**718.6**	**2023.8**
NPV			**-25.9**	**57.8**	**571.5**

A summary of the direct business costs and benefits and the equivalent annual net direct cost to business (EANDCB) are outlined in the table below.

Present Value (2025 - 2034) £ millions	**Option 2**	**Option 3**	**Option 4/5/6**
Transition Costs			
SMW Kerbside Containers	13.7	13.7	13.7
Scheme Administrator set up costs	0.4	0.4	0.4
Staff training and familiarisation	0.1	0.1	0.1
Annual Costs (total over 10-year appraisal period)			
Crew Costs	32.7	32.7	32.7
Vehicle Retrofitting Costs	15.5	15.5	15.5
Flat Container Replacement Costs	5.9	5.9	5.9
Additional Fuel Costs	0.7	20.7	20.7
Local and Commercial Overheads	5.5	5.5	5.5
Communication Costs	150.5	150.5	150.5
Scheme Administrator Operational Costs	38.6	38.6	38.6
Treatment Costs	35.8	59.6	96.7
Cost of Collection (Baseline – Transfer from LAs and consumers)	-	111.8	111.8
Costs of Collection (Extended Service)	-	167.7	167.7
Retail handling and Collection Costs	-	-	271.8
Retailers Loss of Revenue	-	-	442.0
Annual Benefits (total over 10-year appraisal period)			
Landfill Tax Saving (LA/ Waste Collector)	12.8	27.3	67.9
Landfill and EfW Gate Fee Savings	33.9	72.2	180.0
Direct Business Costs (Annualised)	**34.8**	**72.3**	**159.6**
Direct Business Benefits (Annualised)	**5.4**	**11.6**	**28.8**
EANDCB (Annualised)	**29.4**	**60.8**	**130.8**

Structure of the IA

Section 1: Problem Under Consideration

1.1 Introduction to the current system

Under the current Waste Electrical and Electronic Equipment (WEEE) producer responsibility system, obligated WEEE producers are required to meet certain collection targets set by Government and finance these collections. WEEE collection targets, placed on producer compliance schemes, have been set by the Secretary of State on a yearly basis since the introduction of the 2013 WEEE Regulations[21]. Provisions in the regulations provide for producer compliance schemes to pay a WEEE compliance fee as a legitimate way of meeting their WEEE collection obligations, should they not meet their physical share of the collection target.

At present, householders can return WEEE free of charge to their local household waste recycling centres (HWRC) and other collection points (such as bring banks for SMW), or they can return WEEE via retailer takeback schemes. Alternatively, most local authorities offer a charged-for bulky WEEE collection, and 86 local authorities offer free kerbside collection of SMW[22]. A total of 310kt of WEEE was collected at HWRCs and local authority waste transfer stations in 2019[23], with a further 190kt of household WEEE collected via retailer, and other takeback and collection schemes[24]. The table below shows the 14 categories of EEE under the regulations, producers must report the tonnage of EEE that they place on the market of each of these categories. The table also shows how these categories align with the classification as SMW or bulky WEEE.

Table 1: Categories of WEEE and SMW/ bulky WEEE classification

	Category of EEE
Bulky WEEE	1 - Large Household Appliances (LHA) (E.g., washing machines, dishwashers, cookers)
Small Mixed WEEE (SMW)	2 - Small Household Appliances
	3 - IT and Telecoms Equipment
	4 - Consumer Equipment
	5 - Lighting Equipment
	6 - Electrical and Electronic Tools
	7 - Toys, Leisure, and Sports equipment
	8 - Medical Devices
	9 - Monitoring and Control Instruments
	10 - Automatic Dispensers
Bulky WEEE	11 - Display Equipment (E.g., TVs, Monitors)
	12 - Cooling Appliances Containing Refrigerants (E.g., Fridges, Freezers)
N/A[25]	13 - Gas Discharge Lamps and LED light sources
	14 - Photovoltaic Panels

Since these regulations were introduced, through ensuring that EEE producers pay towards the cost of recycling or reusing WEEE from these routes, and requiring them to meet collection targets, the amount of WEEE that is collected, recycled, and reused, has improved[26], with 57% of WEEE now estimated to be collected for reuse and recycling[27]. The Post Implementation Review[28] (PIR) of the 2013 WEEE Regulations also found that this system has been largely successful at reducing the inflated costs of compliance that frequently occurred under the 2006

[21] https://www.legislation.gov.uk/uksi/2013/3113/contents/made
[22] Material-Focus-Update-to-A-Review-Economic-and-Environmental-of-Kerbside-Collections-for-Waste-Electricals-March-2022.pdf (squarespace.com)
[23] Waste electrical and electronic equipment (WEEE) in the UK - GOV.UK (www.gov.uk)
[24] Waste electrical and electronic equipment (WEEE) in the UK - GOV.UK (www.gov.uk)
[25] We did not use these categories in our analysis due to the low tonnages collected, so they are not included in SMW/ bulky WEEE categorisation.
[26] For example, 430kt of WEEE was reported as collected in 2008 compared to 500kt in 2021; https://www.gov.uk/government/statistical-data-sets/waste-electrical-and-electronic-equipment-weee-in-the-uk
[27] Research to identify and address gaps in existing WEEE data relative to the on-going policy review, Anthesis 2022, p.35
[28] Post Implementation Review of The Waste Electrical and Electronic Equipment Regulations 2013 (legislation.gov.uk)

Regulations[29], because of the inflated costs of "evidence" necessary to demonstrate compliance. Consequently, the PIR found that the costs that producers pay are largely reflective of the actual costs of collecting and treating the WEEE that is collected.

Despite being successful at increasing the amount of WEEE that is collected for recycling and reuse, whilst minimising compliance costs on producers, reliance on the current collection channels alone is likely to limit the amount of WEEE that is collected for recycling going forward. As discussed later in this chapter, several barriers to increasing collections exist. It is unlikely that the current regulations would be able to incentivise producers to set up the necessary systems to make significant improvements to the collection rate going forward.

With this in mind, we do not propose a fundamental overhaul of the existing system, but rather focus on expanding the existing collections infrastructure to ensure that more WEEE is collected and properly recycled or reused. The proceeding sections outline the barriers to increased collections and the consequences of failing to maximise the amount of WEEE that is reused and recycled. There are also issues specific to the 2013 WEEE Regulations which need to be addressed to ensure maximum effectiveness.

1.2 Barriers to increased collection of WEEE

1.2.1 Inconvenience and lack of knowledge of current collection systems

Annually, an estimated 155kt of WEEE is disposed of in household black-bin waste collections in the UK[30], which is then sent to landfill and energy from waste (EfW). This is equivalent to 5.3kg per household per year[31].

Research on public behaviour and attitudes has highlighted the public's lack of awareness and understanding of how, and where, to recycle WEEE, and the effort required to recycle WEEE compared to disposal in regular residual bin collections. Public attitudes behavioural research by Material Focus[32] found that 43% of respondents had put WEEE in general rubbish in the past 12 months. Of those respondents who had disposed of WEEE in general rubbish in the past year, 48% stated they were not aware that it could be recycled, 45% did not know how and where to recycle it, and the majority of other respondents referenced the lack of ease, and/or effort required, to recycle WEEE[33].

Since the introduction of the current regulations there has been some improvement in accessibility for consumers to dispose of their small mixed WEEE (SMW) responsibly, which has resulted in increased levels of collection of WEEE. For example, large retailers (which under the regulations are those with over £100k of turnover on electricals annually) must provide in-store takeback facilities for their customers, to meet Regulation 43 distributor takeback responsibilities[34]. Smaller stores (and internet sellers) can alternatively join the Distributor Take-back Scheme[35], approved by the secretary of state, which raises funds to support local authority WEEE collections.

Some Local Authorities (LAs) offer free household kerbside SMW collections, however, this only covers a minority of households. Of the 394 Local Authorities[36] with waste collection

[29] The 2006 WEEE Regulations created a market in which PCSs were forced to buy from collectors in order to avoid criminal offences. This "must buy" market lead to ransom pricing of WEEE evidence that that 2013 Regulations sought to address.
[30] Material Focus Report, Electrical Waste - Challenges and Opportunities: An independent study on WEEE flows in the UK, page 8 & 9, https://eq3pi6tq2z7.exactdn.com/wp-content/uploads/2021/04/Material-Focus-Electrical-waste-challenges-and-opportunities.pdf
[31] Page 76, https://static1.squarespace.com/static/5a60c3cc9f07f58443081f58/t/624309e80a326b69a211ca3c/1648560627060/Material-Focus-Update-to-A-Review-Economic-and-Environmental-of-Kerbside-Collections-for-Waste-Electricals-March-2022.pdf
[32] WEEE-public-attitudes-and-behaviours-original.pdf
[33] Among those who have put any WEEE items in the general rubbish in the last 12 months some of the further reasons given were: don't have easy access to a tip or HWRC (12%), didn't have time to take it to a top/HWRC/Recycling bank (12%), not worth the effort to recycle it (11%) and I couldn't be bothered (10%).
[34] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/292632/bis-14-604-weee-regulations-2013-government-guidance-notes.pdf
[35] https://www.gov.uk/electricalwaste-producer-supplier-responsibilities/join-the-distributor-takeback-scheme
[36] Excluding those that are Waste Disposal Authorities only.

responsibilities that have submitted collection scheme data to WRAP, only 86 offer a household kerbside SMW recycling service alongside their typical collection service. A SMW kerbside collection service is not a requirement of LAs under the current regulatory scheme, and so the services which exist cover just 22% of households[37]. The application of these kerbside SMW collections varies across the 86 LAs, for example, some LAs allow SMW in amongst other recycling items, and some require it to be placed next to the households' bin in a plastic bag. The mean weight of SMW presented by households with access to kerbside collection services is 0.7kg per household per year[38], just 13% of what is assumed to be going into the average household black bin. A shortcoming of many of these local schemes is low-level household awareness, due to limited communications.

Providing households with accessible and convenient routes to responsibly dispose of SMW, whilst supplying households with more information on how to recycle their WEEE, would undoubtedly improve recycling rates, and reduce the amount of WEEE seen in residual waste flows.

1.2.2 Costs to households

Despite the current WEEE regulations resulting in some headway in shifting some of the cost of collecting and managing WEEE onto producers, consumers are still required to take on some of the costs of collecting their WEEE. In fact, for many households, all routes to recycle WEEE lead to some form of cost.

Most LAs currently charge households to have their bulky WEEE collected, with the amount being charged varying across local authorities. Retailers/distributors also generally charge a fee for collecting bulky WEEE upon delivery of a new item of EEE. Alternatively, households can dispose of their WEEE at HWRCs and in-store with obligated retailers (those with a £100k turnover from EEE annually), however, this incurs travel and time costs for households.

These costs disincentivise some households to use the available services. Under these circumstances, they may find alternative routes of disposal, such as through residual waste, fly-tipping, or the informal scrap sector. Therefore, minimising or removing the cost to households of recycling WEEE is likely to remove another barrier to increased WEEE recycling.

1.3 Impacts of inappropriate disposal of WEEE

1.3.1 WEEE in residual waste streams

WEEE that is not collected for recycling or reuse is likely to end up in residual streams such as landfill and incineration which can lead to environmental and social disbenefits, that reduce natural capital. Hazardous materials in WEEE can contaminate soil and leach into groundwater, and landfill and incineration for EfW can generate greenhouse gases[3940]. Waste disposal can have social costs for nearby households, such as noise, dust, odours, visual intrusion, flies, and vermin[41]. Traffic to and from landfill and incineration sites can generate noise, traffic congestion, and localised air pollution[42]. These effects can undermine public enjoyment of an area, generate adverse health impacts for humans and animals, and reduce the value of the surrounding area.

1.3.2 Fly tipping

[37] Page 7, https://static1.squarespace.com/static/5a60c3cc9f07f58443081f58/t/624309e80a326b69a211ca3c/1648560627060/Material-Focus-Update-to-A-Review-Economic-and-Environmental-of-Kerbside-Collections-for-Waste-Electricals-March-2022.pdf
[38] Page 11, https://static1.squarespace.com/static/5a60c3cc9f07f58443081f58/t/624309e80a326b69a211ca3c/1648560627060/Material-Focus-Update-to-A-Review-Economic-and-Environmental-of-Kerbside-Collections-for-Waste-Electricals-March-2022.pdf
[39] Leaching characteristics of heavy metals and brominated flame retardants from waste printed circuit boards - ScienceDirect
[40] A review of the environmental fate and effects of hazardous substances released from electrical and electronic equipment during recycling: Examples from China and India - ScienceDirect
[41] Valuation of externalities of selected waste management alternatives: A comparative review and analysis - ScienceDirect
[42] Ibid.

Local Authorities in England reported 1.1 million incidents of fly-tipping in 2020/21[43], with LAs in Wales reporting 41,000 incidents[44][45]. About two-thirds of incidents in England involved household waste (65%)[46]. Fly-tipping incidents in England related to white goods (refrigerators, freezers, washing machines), and other electrical items, totalled at 75,000; a 19% increase from 2019/20 (c.62,900)[47].

Despite increased collections of WEEE, the amount of electricals identified at fly-tipping sites in England are increasing[48]. This indicates that the options available for households to dispose of their WEEE responsibly are not currently effective at addressing the problem of electricals being dumped in incidents of fly-tipping. As mentioned, the costs of using the current options are likely to be a significant factor for some households.

Fly-tipping is a source of negative externalities, the presence of fly-tipping creates disamenity for those who live locally, or travel by it. It is also damaging to the local environment. This is especially true for fly-tipping of electronic equipment as the materials can be hazardous to the environment[49], exacerbating the social disamenity to those who live locally.

It should be noted that unlike other waste streams, the cost of treatment of fly-tipped household WEEE that is cleared by local authorities and taken to a local "designated collection facility" under the WEEE Regulations (e.g., a Household Waste Recycling Centre) is already financed by producers, thereby taking a significant cost away from the local taxpayer.

1.3.3 Raw material depletion (including Critical Raw Materials)

EEE products contain a variety of critical raw materials which are lost if WEEE is not recycled or reused. Critical materials such as lithium, cobalt, copper, and rare earth elements are essential to the production of electronic devices and renewable energy systems[50]. However, these materials are finite resources, and the increased demand for EEE directly leads to an increased demand for these materials. Therefore, these critical raw materials are highly valuable to the economy.

By increasing collections of WEEE for recycling through producer funded programmes, the potential for critical raw materials to be recovered over time will increase. The Government published a Critical Minerals Strategy in August 2022[51], which commits Defra to explore regulatory interventions to promote reuse, recycling, and recovery of critical minerals.

As well as a loss of resources in the economy, there are also environmental impacts associated with raw material extraction, EEE production and manufacturing. This includes greenhouse gas emissions as well as pollution to air and water, deforestation, and waste creation. Ensuring that more WEEE is recycled and reused will minimise these impacts and increase natural capital.

[43] DEFRA (2021) Fly-tipping statistics for England, 2020 to 2021 (December 2021). Available at: https://www.gov.uk/government/statistics/fly-tipping-in-england/fly-tipping-statistics-for-england-2020-to-2021
[44] https://statswales.gov.wales/Catalogue/Environment-and-Countryside/Fly-tipping
[45] Fly-tipping statistics are not collected for Scotland and Northern Ireland.
[46] DEFRA (2021) Fly-tipping statistics for England, 2020 to 2021 (December 2021). Available at: https://www.gov.uk/government/statistics/fly-tipping-in-england/fly-tipping-statistics-for-england-2020-to-2021
[47] DEFRA (2021) Fly-tipping statistics for England, 2020 to 2021 (December 2021). Available at: https://www.gov.uk/government/statistics/fly-tipping-in-england/fly-tipping-statistics-for-england-2020-to-2021
[48] https://www.gov.uk/government/statistics/fly-tipping-in-england/fly-tipping-statistics-for-england-2020-to-2021
[49] For example, electrical waste can contain Persistent Organic Pollutants (POPs). Where WEEE is separately collected, regulations exist to ensure the appropriate disposal of WEEE containing POPs, however fly tipped WEEE will not conform to these regulations (https://www.gov.uk/guidance/classify-some-waste-electrical-devices-components-and-wastes-from-their-treatment#:~:text=If%20you%20treat%20an%20item,to%20below%20the%20concentration%20limit)
[50] World Energy Outlook, International Energy Agency, 13 October 2021; The Role of Critical Minerals in Clean Energy Transitions, International Energy Agency, 5 May 2021.
[51] Resilience for the Future: The United Kingdom's Critical Mineral Strategy https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1097298/resilience_for_the_future_the_uks_critical_minerals_strategy.pdf

1.4 The current regulations

1.4.1 Online Marketplaces (OMP)

The PIR of the 2013 WEEE regulations[52] recognised that online sales of WEEE have rapidly increased in recent years, allowing consumers to buy products from sellers in other countries more easily. This has resulted in new opportunities for "free riding" by companies defined as producers and distributors under the current regulations. Producers who are not registered with a Producer Compliance Scheme in the UK but are placing large volumes of EEE on to the UK market, are not meeting their regulatory obligations to finance the collection and treatment of that EEE when it becomes waste.

Instead, the cost of collection and treatment of these products when they become WEEE falls on obligated producers complying with the regulations by registering with the regulators. Non-compliant producers will often sell direct to UK customers online, in many instances via online marketplaces, creating a challenging environment for effective enforcement, particularly in the case of overseas sellers. Based on research undertaken by Anthesis it is estimated that 33% of EEE being placed on market is being sold by OMPs, which is 520kt of EEE[53]. Anthesis also estimate that 125-220kt of unreported EEE could be being sold by OMPs[54]. This dynamic creates an unlevel playing field between registered and unregistered producers of EEE, and we have had strong representations from industry to address this issue.

1.4.2 Vapes (e-cigarettes)

Under the WEEE regulations, EEE products are grouped into 14 categories[55]. Producers of products in a particular category are obligated to finance the cost of collection, treatment, recovery, and recycling, of all products from that category when they become waste, based on their market share, expressed in tonnes, of products placed on the market in that category. Producers fulfil that obligation through membership of a Producer Compliance Scheme. Vapes (also known as e-cigarettes) fall within category 7, which covers toys, leisure, and sports equipment. This creates a high probability that all producers of category 7 products (whether vapes or otherwise) share in the cost of recycling vapes. However, the costs of recycling vapes are significantly higher than other category 7 products. For example, stakeholders have advised that vapes can cost £13,000 to £20,000 per tonne to recycle, in comparison to £35 to £270 per tonne for other SMW items[56].

The current inclusion of vapes within category 7 leads to three key issues:

1. Producer compliance schemes and producers do not need to ensure that vapes are collected to meet their recycling targets. This is because targets can be met through financing the collection of any category 7 item.
2. Where vapes are collected for recycling by producer compliance schemes (for example where households return used vapes to their local HWRC), there is a significant risk that the other category 7 producers will share the significantly higher cost of treating these vapes. This unfairly increases the compliance cost to these producers.
3. The challenge for producer compliance schemes to fairly apportion costs of collection and treatment of vapes acts as a disincentive for them to sign up vape producers.

The current categorisation means that it is likely that vapes producers will not cover the full cost of vapes collected for recycling, which reduces the incentive for them to ensure that their products are easily recyclable.

[52] https://www.legislation.gov.uk/uksi/2013/3113/pdfs/uksiod_20133113_en.pdf
[53] Anthesis, Evidence Gaps, 2022, page 95 - 96
[54] Anthesis, Evidence Gaps, 2022, page 96
[55] https://www.gov.uk/government/publications/electrical-and-electronic-equipment-eee-covered-by-the-weee-regulations/electrical-and-electronic-equipment-eee-covered-by-the-weee-regulations#largehousehold
[56] This commercially sensitive data was provided confidentially by an industry stakeholder

At the point that the WEEE regulations were implemented, vape usage was low, and these products only made up a small proportion of category 7. However, there has been as significant increase in the use of vapes in the UK, with research suggesting that the number of vape users has increased by 400% in the last 10 years[57]. Recent estimates suggest that around 0.5 billion vapes are placed on the market each year, with 67 million disposable vapes thrown away annually[58].

Vapes contain plastic, lithium-ion batteries, and may contain other hazardous or harmful substances such as heavy metals, lead, mercury, and nicotine, which can contaminate the natural environment if vapes are not properly treated at end of life. Vapes are composed of critical, finite raw materials that are vital for the green economy and represent a value loss to the economy if vapes are not recycled.

Section 2: Rationale for Intervention

2.1 Negative externalities and the polluter pays principle

Waste generation can lead to negative externalities. WEEE disposed of via residual routes such as landfill and EfW can lead to environmental externalities such as greenhouse gas (GHG) emissions. Many electricals contain hazardous materials including lead, mercury, and a number of brominated flame retardants[59]. WEEE disposed of via fly-tipping and landfill can have a negative impact on land and water sources. For example, brominated flame retardants are classified as Persistent Organic Pollutants, meaning that they need to be irreversibly destroyed to avoid their impacts entering human and animal food chains[60]. When WEEE is sent to landfill or fly-tipped, these materials can lead to dangerous chemicals entering the environment, leaching into soil, groundwater, and waterways[616263]. This can adversely impact ecosystems, wildlife, livestock, and crops.

As well as environmental externalities, there are social externalities associated with landfill and incineration of WEEE; nearby households can be impacted by noise, dust, odours, visual intrusion, flies, and vermin[64]. Traffic to and from waste disposal sites can generate noise, traffic congestion and localised air pollution[65]. Fly-tipping also results in a social disamenity cost for those living locally[66]. These negative externalities can undermine public enjoyment of an area, generate adverse health impacts, and reduce the value of the surrounding area.

Furthermore, there are negative environmental externalities associated with critical raw material extraction and production for EEE. EEE is composed of finite, often scarce, raw materials[67]. The extraction and production of raw materials and manufacturing of EEE is an energy-intensive process, and results in greenhouse gas production, pollution to the air and water, deforestation, and waste generation[68]. When WEEE is not reused or recycled, the value of the critical raw materials is lost, and the negative externalities associated with EEE production are not avoided.

Using a producer responsibility system to internalise the costs of dealing with WEEE can provide incentives for EEE producers to reduce the environmental impacts of WEEE, and ensure a higher proportion is reused and recycled. It requires EEE producers to pay towards the cost of recycling;

[57] From 0.7m in 2012 to 3.6m in 2021: https://ash.org.uk/uploads/Use-of-e-cigarettes-vapes-among-adults-in-Great-Britain-2021.pdf
[58] https://eq3pi6tq2z7.exactdn.com/wp-content/uploads/2022/12/Material-Focus-Vapes-briefing-working-doc-6-Dec-2022.pdf
[59] Waste Electrical and Electronic Equipment recycling (WEEE) (hse.gov.uk)
[60] Using persistent organic pollutants (POPs) - GOV.UK (www.gov.uk)
[61] A review of the environmental fate and effects of hazardous substances released from electrical and electronic equipments during recycling: Examples from China and India - ScienceDirect
[62] Electronic waste and their leachates impact on human health and environment: Global ecological threat and management - ScienceDirect
[63] Valuation of externalities of selected waste management alternatives: A comparative review and analysis - ScienceDirect
[64] Ibid.
[65] Ibid.
[66] Evidence Review of Flytipping Behaviour.pdf (zerowastescotland.org.uk)
[67] https://eq3pi6tq2z7.exactdn.com/wp-content/uploads/2021/07/Contributing-towards-a-circular-economy-utilising-Critical-Raw-Materials-from-Waste-Electricals-Final.pdf
[68] metals_environmental_risks_report_english.pdf

incentivising them to improve product lifetimes and the ability to recycle products. This results in a reduction in the volume of WEEE and the environmental impacts of WEEE and EEE production[69].

Currently, producers do not pay the full cost of managing WEEE collected for recycling (for example, where households are paying for bulky WEEE collections or to return WEEE to a retailer). Expanding the regulations to cover the full cost of managing WEEE collected for recycling will enhance the incentives on producers.

2.2 Coordination failure

The previous section identified barriers to increasing the amount of WEEE collected for recycling, particularly from households. This includes the need to increase convenience of collection routes and consumer knowledge of WEEE recycling. Both aims are likely to be difficult for producers to achieve without government intervention, due to the requirement to coordinate.

Setting up more convenient collection systems (such as the options to be explored in the consultation) would likely require high set-up costs. This would make it inefficient and more expensive for individual producer compliance schemes to set up and run individual collection systems. The cost and complexity of the system is likely to be a barrier to a coordinated approach without government intervention.

WEEE producers have consistently missed collection targets in recent years. Since 2017, producers have only met SMW, and several bulky WEEE (cooling and LHA) targets on one occasion. The average proportion of target tonnage collected over this period was 87% for SMW and 93% for bulky WEEE categories (1,11-12) combined. The tonnage of SMW and bulky WEEE collected has fallen relative to the previous year, in 4 and 5 years, respectively out of the last 6 years. The tonnage of SMW collected in 2022 was 15% lower than 2017, and bulky WEEE collected was 9% lower in 2022 than 2017[70].

Unlike other waste streams, such as packaging, it is not possible to make a clear in-year link between what is placed on the market and what is available for collection within the WEEE system. This is because most EEE products do not become waste within a year of purchase. Therefore, it is difficult to draw strong conclusions on the amount of WEEE that is available for collection in a given year based on the amount of EEE that is placed on the market. However, there are enough datapoints in the WEEE data to compare the amount of WEEE collected as a proportion of POM over a longer period. This should, to some extent, account for this limitation.

Table 2 shows the amount of household WEEE collected in each year as a proportion of the average placed on the market tonnage for a given number of previous years. Bulky WEEE can last for 10 years or longer. Therefore, the average placed on the market tonnage for the previous 10 years is used for bulky WEEE. SMW is likely to become WEEE in a shorter timeframe and so 5 years is used. The table shows that for both bulky WEEE and SMW the tonnage collected as a proportion of placed on the market tonnage has slightly decreased over the period analysed.

Table 2: Proportion of WEEE collected in year as a proportion of average Placed on the Market (POM) tonnage over 5 or 10 years[71]

[69] As discussed by the OECD in their guide to Extended Producer Responsibility (EPR), EPR places "explicit responsibility" on the producer, essentially placing them in a leadership position to influence decision making and behaviour change across the supply and usage chain. The producer is seen as most able to influence the environmental impacts of their products, having greatest access to technological expertise, propriety information and product knowledge, and therefore influence over design. Producers are also at a key point in the supply chain to influence other members, including suppliers, businesses, consumers, and retailers. The full responsibility is initially placed on the producer, with the producer best placed to "distribute" this responsibility, such as to consumers in the form of higher prices (see section 9.3), leading to the externality to be fully internalised by the supply chain. Despite this the producers retains the "ultimate" or "primary" responsibility. https://www.oecd-ilibrary.org/environment/extended-producer-responsibility_9789264189867-en

[70] https://www.gov.uk/government/statistical-data-sets/waste-electrical-and-electronic-equipment-weee-in-the-uk

[71] https://www.gov.uk/government/statistical-data-sets/waste-electrical-and-electronic-equipment-weee-in-the-uk

	Categories	No of years POM averaged	2017	2018	2019	2020	2021	2022
SMW	2-10	5	34%	32%	31%	24%	25%	26%
Bulky WEEE	1,11-12	10	47%	44%	44%	42%	42%	40%

Despite the limitations identified, this analysis suggests that, even when accounting for shifting trends over time, the amount of WEEE collected through current routes has at least plateaued. Given that new collection routes are needed, but have not been initiated by producers, despite them consistently missing their targets, suggests that the current regulations alone have not provided enough incentive for producers to do so. This is backed by anecdotal evidence from industry stakeholders, who informed us that producers are collecting the maximum amount possible through current systems but are reluctant to do more without a level playing field across producers.

The current system has not adequately encouraged producers or compliance schemes to educate and inform consumers or finance such activities. This is because the cost of doing so would potentially be borne by one organisation, but the benefits could be felt by all. Some organisations have carried out consumer education campaigns, however, to reach high levels of collection and recycling, consumer education and information must be prioritised and scaled up.

The problem of insufficient information (households lacking knowledge about WEEE recycling), if left up to the free market, would not correct itself. This is because there is no incentive, as things stand, for producers to collectively make change. Introducing a regulatory framework which shifts direct communication and education responsibility onto producers of EEE will result in a shift towards a more complete, and better understood, WEEE recycling system.

2.3 Potential for producers to free ride obligations

The PIR[72] identified that online sales have rapidly increased in recent years, allowing consumers to buy products directly from sellers in other countries more easily, resulting in increased opportunity for avoidance of the obligations placed on producers and distributors.

The key challenge is the ability of regulators to take meaningful action against non-compliant internet sellers that operate from overseas territories that fall outside of the jurisdiction of UK-based regulators. Although online marketplaces (OMPs) are frequently used by overseas sellers to facilitate sales in the UK, they do not have any obligations under the current regulations in respect of the sellers that use their platforms.

This is not an issue specific to an extended producer responsibility (EPR) system for electricals. The reform of regulations that place obligations on producers of packaging[73], identified the same issue of overseas packaging producers free riding through OMPs, and the Government has set out its plans on how it will be addressed. That underlines the need for free riding to be addressed in the EEE market.

2.4 Avoiding Regulatory Failure

Although vapes producers are currently obligated under the WEEE regulations (and must contribute to the recycling of WEEE), the current regulations do little to incentivise the increased

[72] https://www.legislation.gov.uk/uksi/2013/3113/pdfs/uksiod_20133113_en.pdf
[73] https://www.gov.uk/government/consultations/packaging-and-packaging-waste-introducing-extended-producer-responsibility

recycling of vapes specifically. While vapes remain within category 7, vapes producers are unlikely to cover the full cost to treat vapes collected for recycling (in line with the producer pays principle), with other category 7 producers likely to also share this cost. As well as placing an unfair burden on other category 7 producers, this reduces the incentive on vapes producers to ensure that their products can be easily recycled (either through product design or recycling infrastructure).

Previously, vapes made up a small proportion of category 7, such that these issues were minimal. However, with the rapid increase in the use (and disposal) of vapes, amendments to the regulations are needed.

Section 3: Policy Objective

3.1 Strategic objectives

The proposed policy reforms (set out in the consultation document and in Section 4) build on the strategic objectives included in the commitments made in the Clean Growth Strategy[74], the 25 Year Environment Plan[75] and the Resources and Waste Strategy[76]. These commitments include:

- BEIS Clean Growth Strategy: Commitment to explore how we can better incentivise producers to manage resources more efficiently through producer responsibility systems.
- The 25 Year Environment Plan: Commitment to reform Producer Responsibility systems to incentivise producers to take greater responsibility for the environmental impacts of their products.
- Resources and Waste Strategy:
    - Maximising the value we get from resources throughout their lifetimes - by designing products more smartly to increase longevity and enable recyclability.
    - Managing materials at end of life – by targeting environmental impacts.

Furthermore, the Resources and Waste Strategy set out the following policy objectives specifically in relation to the 2013 WEEE Regulations to:

- Increase levels of WEEE collections for reuse and recycling,
- Review options for tackling the growing number of internet sellers who do not meet their obligations,
- Review the existing obligations placed on distributors; and
- Ensure alignment with the broader EPR framework, published in the Strategy.

3.2 Post Implementation Review of the WEEE Regulations 2013

The PIR[77] has found that the existing regulations have been effective in ensuring that producers finance the cost of collection and proper treatment of household WEEE currently separately collected. The market-based system, in which Producer Compliance Schemes are placed in “the chain of custody of the waste”, established under the existing regulations, has ensured that compliance costs are largely reflective of the costs incurred in transport and subsequent proper treatment of WEEE that enters the system established under the regulations.

However, there were some areas which the PIR identified as needing addressing through a further regulatory reform. These included:

1. To make it easier for consumers to responsibly discard of unwanted WEEE to drive up existing levels of separately collected WEEE for reuse and recycling.

[74] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/700496/clean-growth-strategy-correction-april-2018.pdf
[75] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/693158/25-year-environment-plan.pdf
[76] https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england/resources-and-waste-strategy-at-a-glance
[77] https://www.legislation.gov.uk/uksi/2013/3113/pdfs/uksiod_20133113_en.pdf

2. To review the role of different actors across the supply chain of EEE to bring investment in an expanded collections infrastructure for household WEEE.
3. To address high levels of non-compliance with producer obligations by online sellers.
4. To review scope of the distributor WEEE take-back obligations, to ensure parity of obligation between online sellers and retailers.
5. To review role of the "distributor take-back Scheme" whose membership provides an alternative to distributors taking back WEEE from customers and instead provides funds to support local authority WEEE collections for reuse and recycling.
6. To review the business-to-business (B2B) system so that it is easier to access for business end users of equipment to return WEEE to producers, leading to higher levels of collections of B2B WEEE.

3.3 Policy objectives

The specific policy objectives that have been developed from our commitments made in the Resources and Waste Strategy and following a review of the outcomes of the PIR are listed below. A further policy objective has been included to address issues in the regulations relating to vapes:

1. **Increase collections of household WEEE for reuse and recycling:** primarily by introducing a UK-wide household collection system for WEEE, moving the point of producer responsibility to the household[78], and extending the role of retailers and internet sellers in fulfilling their take back obligations.
2. **Tackle the issue of free riding in the WEEE system by online sellers:** by placing new producer obligations on online marketplaces through the creation of a new category of producer.
3. **To ensure that vapes producers are financing the full cost of recycling vapes collected in the regulations:** by creating a new category for vapes in the WEEE regulations.
4. **Increase collections of non-household WEEE for reuse and recycling:** by strengthened obligations on producers of B2B equipment. This includes gathering views on placing the point at which producer responsibility starts at the business end-user[79].
5. **Incentivise increased eco-design of products and supporting the circular economy:** this includes using incentives to encourage more reuse, circular economy business models, and using "eco modulation" of WEEE compliance costs, to encourage producers to make more sustainable products.
6. **Drive up treatment standards and explore policy interventions that incentivise the recovery of critical raw materials (CRMs)**

This impact assessment assesses policy options outlined in the accompanying consultation. These relate to Policy Objectives 1 to 3. A call for evidence will accompany the consultation to gather further evidence on additional policy options and proposals to support Policy Objectives 4 to 6. The contents of the call for evidence are outside the scope of this impact assessment and would be subject to future consultation and economic analysis.

Section 4: Summary of Policy Options Considered

The policy options considered in this analysis have been designed in line with the policy objectives discussed above, of aiding the convenience, understanding and ability to collect, reuse and recycle WEEE.

4.1 Appraised options

These options are presented with NPV calculations alongside the do-nothing option:

[78] I.e., producers are responsible for collecting WEEE from the household, rather than collection points such as HWRCs
[79] I.e., producers would be responsible for collecting WEEE from businesses directly

Option 1. The do-nothing option. This would maintain the current system, whereby the point of producer responsibility remains at the household waste and recycling centre, and to provide a system of return for WEEE collected by distributors.

Option 2. To introduce a UK-wide household collection system for small mixed WEEE (SMW), to be financed by producers and free to households. This option specifically aims to address the problem of inconvenience and cost to households of disposing of SMW, by ensuring that producers are responsible for collecting SMW directly from households free of charge. This should eliminate the lack of incentive to recycle SMW and reduce the amount that is disposed of in residual waste (and littering in the case of vapes)[80]. It is proposed that this would also include a coordinated consumer communications campaign to address the problem of the lack of knowledge around recycling of WEEE.

This option would move the point of producer responsibility from a local authority waste site to each respective household. We envisage that such an obligation is likely to be most effectively discharged on behalf of producers by an industry-led, not for profit, central body. Such a body would require government approval, which would be assessed against a set of criteria that are specified in legislation. The body would be responsible for establishing the system, contracting as necessary with organisations to undertake WEEE collections, and ensuring that these items are sent for proper treatment, reuse, and recycling. It would be required to propose a methodology for fairly charging the costs incurred in treatment, reuse, and recycling of WEEE to producers and/or producer compliance schemes[81]. These costs would also cover household-related communications, which the central body would be responsible for delivering on behalf of producers.

We are not mandating how this must be delivered. Currently, 86 local authorities offer a kerbside collection service for small mixed WEEE, and working with these, and the other LAs (and their waste management contractors), as delivery partners could be the most effective delivery model for the central body to adopt. This IA has therefore costed this option **on the assumption that the service will be delivered through local authorities and their service providers** as an add on to their existing waste collection services. However, in reality, producers may develop an alternative approach. It might also be the case that the model varies across different areas to reflect local demographics or that the industry adopts alternative methods to meet the obligations set out in regulation.

Option 3. To introduce a UK-wide household collection system for bulky WEEE, to be financed by producers, and free to households, in addition to the small mixed WEEE system. This is the same as Option 2, building upon it with the addition of a bulky WEEE collection from households. As with option 2, this aims to address the problems of cost and inconvenience to households of recycling WEEE by ensuring producers are responsible for collecting bulky WEEE directly from households free of charge.

As with Option 2, we envisage this being delivered on behalf of producers by a new industry-led, not for profit, central body, approved by government. Similarly, we will not be mandating how this service must be delivered, however we anticipate this would be an “on demand” service, similar to the bulky waste collection services currently offered by some local authorities. Again, the most efficient delivery route may be through partnerships with local authorities, who on the whole, currently provide households with a bulky waste service for a fee but ensuring that it is offered free-of-charge to households. This IA has therefore costed this option **on the assumption that the service will be delivered through local authorities and their service providers.**

[80] SMW is assumed more likely to be disposed of through residual than through other means such as fly tipping due to the ease of this disposal route

[81] It is anticipated that producers would be charged based on the costs of collecting SMW by the 14 category types in order to maximise the incentive for producers to consider recycling costs/recyclability in their product design. The exact mechanism will be determine by the Scheme Administrator once set up.

Option 4. This option is the same as Option 3, but with additional aspects to strengthen distributor obligations to take back WEEE from their customers. These aspects include:

- Part 1: We would seek to introduce a mandatory obligation on sellers to offer a free-of-charge collection of an old large domestic EEE appliance (i.e., bulky WEEE) upon delivery of a new replacement item[82]. Many retailers offer this service on a paid basis currently, but under the reform they would be required to offer this service for no additional charge. I.e., businesses would be mandated to provide this service, and the service should be free for charge to consumers.

- Part 2: Mandating distributors with an annual EEE turnover of over £100k to provide a "0:1 takeback service" for all categories of WEEE[83]. Currently, the take-back obligation is on a 1:1, like for like basis for goods sold. Under this option, these distributors would be mandated to provide a free takeback service[84] for EEE that is the same type as has been sold in their stores or online, without the requirement to purchase a new item to access the service. Distributors below the £100k threshold would continue to provide a 1:1 takeback service. The consultation asks for views on whether alternative obligations should exist for solely online sellers, fulfilment houses or online marketplaces, who are likely to find these requirements challenging.

- Part 3: Mandating producer compliance schemes to bear the cost of transport of WEEE from the distributors' premises to an approved accredited treatment facility (AATF) for treatment. Currently producer compliance schemes must simply have systems in place to receive WEEE from distributors. This means that the distributor bears the cost of transport from their premises to a specific point (e.g., treatment facility) nominated by the producer compliance scheme. This cost can act as a disincentive for the distributor to maximise their take-back from consumers.

This option will result in additional tonnes of WEEE being reused and recycled. As each of the considered options are cumulative, this option provides the highest quantity of WEEE captured for reuse and recycling (as demonstrated in this impact assessment). It is more convenient, and efficient for a retailer to pick up bulky WEEE when delivering a new item than for LAs to make additional journeys to collect bulky WEEE. Implementing both LA collection and retailer collection offers a wider range of options to enable households to recycle their WEEE, which addresses the current underlying problems of inconvenience and financial costs of recycling WEEE.

Option 5. This option is the same as Option 4, but with the additional aspect of designated online market places (OMPs) as a new class of producers. The proposal is designed to address problems with the current regulation and ensure that OMPs contribute to the costs of collection, treatment, recovery and reuse or recycling of WEEE, that reflects the UK market share of their overseas online sellers. By designating them as a new class of producer, OMPs would stand in the shoes of the overseas sellers on their platform and be obligated to register with a Producer Compliance Scheme and submit the same data as other producers. This is consistent with government proposals to place obligations on online marketplaces as part of wider proposals to introduce extended producer responsibility for packaging[85].

No specific costs and benefits have been quantified for this option as these are expected to be largely the same as in option 4 (albeit with some transition costs for which we plan to seek

[82] Generally, there is a requirement for the consumer to at home to take delivery of the replacement item which makes collection of the old appliance easier. However, current LA bulky waste services often allow households to leave their bulky items outside their home (either from the night before, or morning of to minimise damage from weather) which removes the need to be in at the time of collection.
[83] Online only sellers would be required to provide a 1:1 takeback service, however the consultation acknowledges that a 0:1 take back service for online only sellers could be challenging and asks for views on whether an alternative option for meeting takeback obligations should be offered to these sellers
[84] Such as in store takeback
[85] https://www.gov.uk/government/consultations/packaging-and-packaging-waste-introducing-extended-producer-responsibility

evidence on through the consultation process). See section 7.4 for more details on the costs and benefits in option 5.

Option 6 is our preferred option. Option 6 is the same as option 5, with the addition of the creation of a new category in the WEEE regulations for vapes. As with option 5, this would address problems existing under the current regulation and enhance their effectiveness.

Under the current regulations[86], EEE products are grouped into 14 categories. Producers of products in a particular category are obligated to finance the cost of collection, treatment, recovery and recycling of products from that category when they become waste, based on their market share and expressed in tonnes. Vapes fall within category 7 which covers toys, leisure, and sports equipment, which means that producers of other category 7 products share the cost of recycling vapes collected for recycling.

Creating a new category for vapes will ensure that vapes producers are paying the full cost of recycling vapes that are collected. It will remove the risk of other existing Category 7 producers subsidising the cost of collection and treatment of vapes. This is expected to enhance the incentive on vapes producers to minimise the cost of recycling their products.

No additional costs and benefits have been quantified for this option, on the basis that costs would largely remain the same as option 5. This is because the primary aim of this option is a redistribution of costs between producers. It is acknowledged that there may be transitional cost which have not been quantified. A more thorough discussion on the potential costs and benefits for this option are explored in section 7.5.

4.2 Disregarded options

We have disregarded non-regulatory options. The key objective of the proposed policy is that businesses that distribute and place EEE on the market take on their share of responsibilities for that equipment when it becomes waste. A voluntary approach would not ensure that this could be achieved. This is because it would not be rational for one producer to voluntarily cover the full costs of recycling their share of WEEE, unless their competitors were also voluntarily paying. This is a market failure, and it can only be corrected through a regulatory approach.

The PIR[87], along with external research[88], identified the need to increase the convenience of collections to households to see significant increases in the amount of WEEE collected for recycling (rather than being disposed of in residual or illegitimate disposal routes). As evidenced in section 2.2, producers have frequently missed targets in recent years, and producer representatives have consistency fed back (for example, through the annual target setting consultation process) that they feel that they are extracting as much WEEE for recycling as possible through the current collection systems.

As set out in sections 1.2 and 2.2, there is evidence of further WEEE existing that could be recycled if more convenient collection systems were in place. For reasons outlined in the previous paragraph, producers have thus far not set up these systems to meet their targets. To incentivise producers to set up these systems, a level playing field needs to be created to ensure individual producers cannot free ride contributing to costs. Therefore, regulations are required to ensure all obligated producers comply.

The high levels of non-compliance within the current system amongst internet sellers that are based overseas[89] provides evidence that in the absence of an enforceable, regulated regime,

[86] https://www.legislation.gov.uk/uksi/2013/3113/contents/made
[87] https://www.legislation.gov.uk/uksi/2013/3113/pdfs/uksiod_20133113_en.pdf
[88] WEEE-public-attitudes-and-behaviours-original.pdf
[89] As identified by the Post Implementation Review of the current regulations; https://www.legislation.gov.uk/uksi/2013/3113/pdfs/uksiod_20133113_en.pdf

businesses will not voluntarily seek to take on the necessary financial obligations that ensure producers and distributors finance the external cost of collection and proper treatment of their products when they become waste.

Furthermore, most categories of EEE are classified as hazardous waste at end of life, and the income generated from material recovery is outweighed by the costs incurred through collection and proper treatment. Thus, regulation is needed to guarantee the proper treatment of these materials. Taken together, both factors will disincentivise voluntary approaches to be undertaken by business.

A regulatory system of producer responsibility for WEEE has been in place since 2005 and is well understood by the sector. Our proposed policy options are seeking to build on the existing obligations set out in those regulations rather than developing a new regulatory system from scratch. The commitment to reform the existing regulations was set out in the Resources and Waste Strategy for England, published in 2018[90]. The objective is to embrace the principle of "full net cost recovery" set out in that strategy, and to do so in a way that ensures that compliance costs are shared fairly amongst producers and distributors, irrespective of their selling methods.

Options to further develop the current regulations must seek to address the problems identified, which are unlikely to be corrected without further intervention, and meet the policy aims. This includes ensuring that businesses are paying the full cost of recycling the WEEE they place on the market, while also removing barriers to the increase in WEEE collected for recycling. These aims should be achieved at minimal costs to those involved, to maximise net benefits to society.

Regulatory options that are unlikely to achieve these aims were therefore also disregarded. For example, mandating local authorities to collect SMW and bulky WEEE from households on a free of charge basis. Although more convenient for households, this does not place the financial cost of collecting and treating WEEE on producers. Mandating that producers finance the collection of WEEE from households through a specific scheme design would allow less scope for producers to explore different options and implement the most cost-effective option[91].

Lastly, an option that requires producers to just finance more communication campaigns would only partially meet the objectives and was therefore disregarded. By including communication campaigns alongside a national requirement on producers to provide households with more convenient collections, as set out in our preferred option, the effectiveness of communication campaigns is likely to be much higher than an option that only financed more communication campaigns with no other intervention, because there will be a simpler, more consistent national message[92]. We will welcome views on non-regulatory options during the consultation process.

Section 5: Detailed Description of Option 1 (Do Nothing)

5.1 Current Systems

The baseline scenario is presented as Option 1, 'Do nothing'. This assumes a maintenance of the current WEEE systems and regulations[93], whereby the point of producer responsibility remains at household waste and recycling centres. The current system for flows of WEEE is presented below in figure 1.

[90] Resources and waste strategy for England - GOV.UK (www.gov.uk)
[91] For example, to consider whether it is more cost effective to have different systems in different geographic areas due to specific characteristics of that area
[92] Although producers could in theory develop different schemes in different areas, the main message that every household is entitled to free collections of SMW and/or bulky WEEE from the home remains consistent
[93] https://www.legislation.gov.uk/uksi/2013/3113/contents/made

The baseline scenario assumes that distributors, producers, and local authorities make no changes with respect to the offered WEEE collection or takeback systems, the composition of the products material, and how WEEE is processed.

Existing distributor responsibilities for WEEE[94] are as follows:

- Provide either a free in-store take-back service to customers on a one-for-one, like-for-like basis, or
- Set up an alternative free take-back service, or
- Be a paying member of the distributor take-back scheme.

Existing producer responsibilities for WEEE are as follows:

- For producers who place less than 5 tonnes of EEE on the market per annum: Register as a small-scale producer of EEE with the regulator directly if they, or
- For producers who place more than 5 tonnes of EEE on the market per annum: Register with a producer compliance scheme, register with the relevant environment agency, report placed on the market data
- For all producers: Mark product with the crossed out wheeled bin symbol

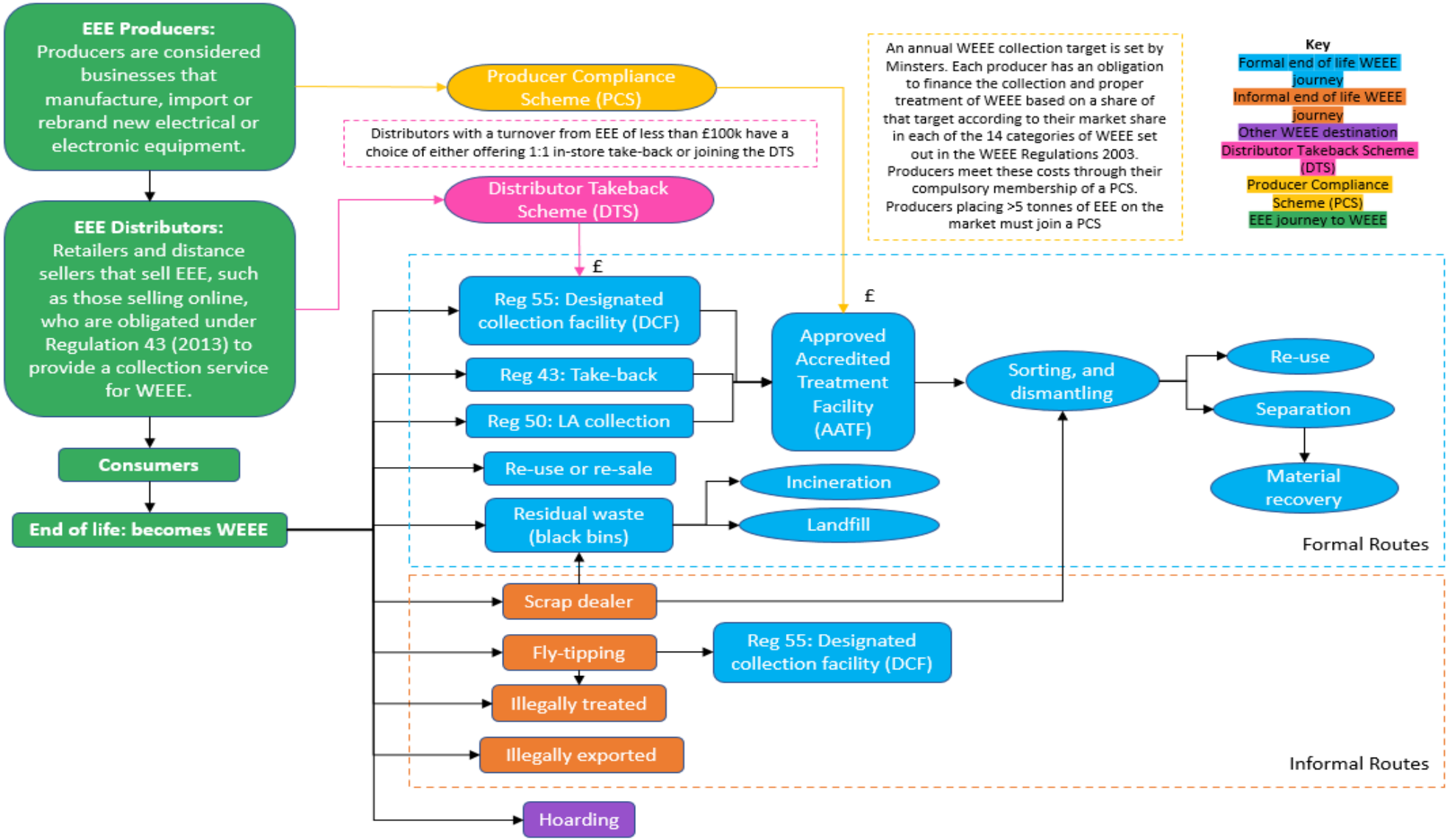
Producer compliance schemes are responsible for collecting member EEE data and reporting to the authorities, as well as meeting their collection targets by arranging for collection and treatment of WEEE. Their costs are covered by charging producer members a fee. This system is assumed to remain unchanged in the baseline as well as the policy options considered.

Although not regulated directly, local authorities already offer key services of collection of WEEE, including:

- 86 local authorities voluntarily offer a free kerbside collection service of small mixed WEEE, which is collected in parallel to existing recycling services. Households in these 86 local authorities are offered a service where they can place their SMW out for collection at the same time as their recycling collections. The way in which they are asked to do so varies, for example, placing within a recycling bin or placing next to these bins in a plastic bag.
- Local authorities offer a bulky waste collection to households for large domestic appliances and cooling equipment and other bulky items. This is typically a paid-for-service with only a minority of local authorities offering this for free. This paid-for-service is assumed to continue in the baseline.
- Operating HWRC networks, these can be approved by the Secretary of State's Designated Collection Facilities (DCFs) under the WEEE Regulation. The WEEE Code of Practice sets out roles and responsibilities of DCFs and the producer compliance schemes that service those sites.[95] The DCFs are then responsible for contracting with producer compliance schemes to manage WEEE via approved accredited treatment facilities (AATFs).

[94] https://www.gov.uk/electricalwaste-producer-supplier-responsibilities
[95] https://www.gov.uk/government/publications/waste-electrical-and-electronic-equipment-weee-collection-code-of-practice/collection-of-waste-electrical-and-electronic-equipment-weee-from-designated-collection-facilities-dcfs-code-of-practice

Figure 1: Baseline flows of WEEE under the current system



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[96] Regulation 43 obligates distributors (i.e., retailers and distance sellers such as those selling online) to provide a collection service for WEEE. Regulation 50 allows a local authority to establish and operate a system to take back WEEE from private households provided that the system is consistent with the WEEE Directive. Regulation 55 sets out the approval process and the Designated Collection Facility (CDF) operator responsibilities. (2013). The Waste Electrical and Electronic Equipment Regulations 2013 (legislation.gov.uk)

5.2 Tonnages Collected

The baseline WEEE tonnages presented in this impact assessment are based on modelling by Anthesis[97]. Their approach and output data are summarised here.

Baseline estimates have been created utilising 2019 data to avoid being skewed by any outlying impacts seen in years that were affected by the Covid-19 pandemic. Given that the data utilised for WEEE is typically reported in calendar years, the 2018/19 data is used as the most recent representation of a full year and is therefore assumed to be representative of 2019[98].

WEEE is collected and managed by multiple operators, including local authorities, retailers, and informal collectors. Although the collection routes differ, the main end destinations of WEEE are recycling, reuse, landfill and energy from waste. Estimates of tonnages associated with each of the collection systems influenced by this policy area are explained in detail below, along with assumptions surrounding the associated end treatment.

5.3 Local authorities

Local authorities directly collect segregated WEEE at kerbside[99] and HWRCs, as well as amongst municipal disposal routes. Local authority waste data is reported by WasteDataFlow (WDF) [100]. This is municipal waste data reporting completed quarterly by local authorities, which is validated by the WasteDataFlow team and the Environment Agency.

The questions relevant to WEEE, which were analysed by Anthesis, are presented in Annex C Four of the WDF questions analysed asked for the specific quantities of WEEE collected for recycling and reuse. This includes WEEE collected at kerbside and at HWRC's. This also specifically includes the reporting of SMW which is currently collected in kerbside collection schemes, akin to that proposed in policy option 2. This was reported as 2,278kt in the 2018/19 reporting[101].

Further to the questions on recycling and reuse, question 23 (in WDF) asks for reports on tonnages of waste collected for disposal. Utilising Waste and Resources Action Programme (WRAP)[102] composition analysis, we assume that 19% of general bulky waste collected for disposal is WEEE[103], and of the remaining collected residual waste, 1% is WEEE[104]. For other collections[105] (as per the UK recycling rate reporting calculations), 40% of this figure is assumed to be recycled. This has been calculated by Anthesis based on the remaining tonnage recorded as recycled but not captured by bulky WEEE collections; needed to meet the 56% recycling rate recorded.

5.4 Distributors

Distributors (i.e., retailers and distance sellers such as those selling online) are obligated under Regulation 43 to provide a collection service for WEEE. This includes both WEEE items collected

[97] Anthesis, Evidence Gaps Report, 2022
[98] The decision was made to use the full financial year rather than combining 2018/19 and 2019/20 to ensure there's no discrepancies in how the data's reported.
[99] 86 LAs currently collect WEEE via kerbside collections: Page 7, https://static1.squarespace.com/static/5a60c3cc9f07f58443081f58/t/624309e80a326b69a211ca3c/1648560627060/Material-Focus-Update-to-A-Review-Economic-and-Environmental-of-Kerbside-Collections-for-Waste-Electricals-March-2022.pdf
[100] https://www.wastedataflow.org/
[101] WasteDataFlow
[102] https://wrap.org.uk/
[103] https://preprod.wrap.org.uk/sites/default/files/2020-09/WRAP-UK%20bulky%20waste%20summary_0.pdf
[104] This proportion ranges within composition studies from 0.9% to 1.4 % for non-LA and LA collected residual waste respectively. (https://wrap.org.uk/sites/default/files/2020-11/WRAP-National%20municipal%20commercial%20waste%20composition_%20England%202017.pdf)
[105] All waste, not just WEEE

from households, and items taken in to stores by households. This analysis assumes that all WEEE which is collected by retailers under this regulation is recycled, apart from 5% which is reused[106].

The associated data is compiled by Approved Authorised Treatment Facilities (AATFs) and is published by the EA on a quarterly basis. As seen in table 3 below, the majority of these collections were LHA (66%) or cooling equipment (31%).

Table 3: Tonnages of household WEEE collected under Regulation 43 (tonnes, 2019)[107][108]

Large Household Appliances	85,332
Small Household Appliances	2,210
Display Equipment	1,395
Cooling Appliances Containing Refrigerants	40,948
Total	129,885

5.5 Baseline flows of WEEE

The recycling, reuse, and disposal tonnages described for local authorities and retailers are combined below. For the tonnages seen in disposal routes, this impact assessment assumes a split of 70% being sent to EfW (recovery) and 30% to landfill which is assumed to remain constant across the appraisal period[109]. This data point split of residual waste destination is based on residual waste flow modelling undertaken by Anthesis. This estimates 28-30 Mt of local authority collected waste and commercial and industrial residual waste (municipal like) with 21 Mt of EfW capacity (operating at 95% utilisation). This estimates 70% residual waste to EfW and the remainder to landfill (30%)[110].

Accumulating these collection routes provides the baseline for WEEE in 2019 in the UK, presented in table 4 below. These have been summarised in to the four WEEE categories used throughout this IA.

Table 4: Baseline flows of WEEE (tonnes, 2019)

Tonnage to reuse	LHA	21,760	96,246
	SMW	54,181	
	Display	17,777	
	Cooling	2,528	
Tonnage to recycling	LHA	305,380	767,195
	SMW	227,831	
	Display	58,942	
	Cooling	175,041	
Tonnage to recovery (EfW)[111]	LHA	160,777	458,760
	SMW	238,632	
	Display	14,113	
	Cooling	45,239	
Tonnage to landfill[111]	LHA	68,904	196,612
	SMW	102,271	
	Display	6,048	
	Cooling	19388	

[106] Anthesis, Evidence Gaps, 2022, page 71
[107] Note there is also 'Gas Discharge Lamps and LED Light Sources' and 'Photovoltaic Panels' reported in these tonnages which are out of scope of this analysis due to the specific complexities involved with managing the disposal of these items.
[108] Waste electrical and electronic equipment (WEEE) in the UK, WEEE collected in the UK. Waste electrical and electronic equipment (WEEE) in the UK - GOV.UK (www.gov.uk).
[109] Anthesis, Evidence Gaps 2022, page 106
[110] Anthesis, Evidence Gaps, 2022, page 106
[111] This includes some WEEE collected through recycling routes but separated for residual disposal (hence higher than the c450kt of WEEE disposed of through residual route in the summary section)

5.6 Growth rate

In this impact assessment, our baseline covers the period from 2019 to 2034[112]. We have assumed a 3% annual growth rate for WEEE arising across the period.

Using historical analysis and waste industry research, Anthesis modelling of general total waste arisings suggests an annual growth rate of 0.5%-1.5%[113]. However, in researching the WEEE and EEE industry specifically, their research suggests growth rates of WEEE arisings of 3-7%. For example, the consumer electronics market in the UK is forecast to have annual growth of 2.9% in the period 2020-26[114] but the revenue growth of the UK electronics sector is forecast to show annual growth of 7.3% in the period 2022-25[115]. This impact assessment therefore assumes a moderate estimate of the industry specific data, of 3%.

With this growth rate considered, the baseline across the appraisal period is presented below.

Table 5: Baseline tonnages collected across appraisal period (tonnes, with growth rate applied – with 3% growth rate applied to all four streams)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Reuse	114,922	118,370	121,921	125,579	129,346	133,226	137,223	141,340	145,580	149,948
Recycling	916,071	943,553	971,859	1,001,015	1,031,046	1,061,977	1,093,836	1,126,651	1,160,451	1,195,264
Recovery (EFW)[116]	547,784	564,218	581,144	598,578	616,536	635,032	654,083	673,705	693,917	714,734
Landfill	234,765	241,808	249,062	256,534	264,230	272,156	280,321	288,731	297,393	306,314

A point of interest is that WEEE does not directly reflect the tonnages of EEE placed on market because of consumer behaviour involved in EEE purchases. This includes retention, reuse, hoarding as well as that which is disposed of. Therefore, the amount of WEEE in a given year is the result of:

- EEE bought and disposed of within the year.
- WEEE which is disposed of as a result of purchasing new EEE.
- EEE that is disposed of without being replaced by a new item.

Despite this, the tonnages of EEE placed on the market (POM) have been presented below to provide a scale of the industry, and to cross check the scale of each category.

The total tonnages of EEE placed on the market have been drawn from the work undertaken by Anthesis for Material Focus and have been cross checked against the latest reported figures under producer obligation systems[117]. These systems report the EEE placed on the market by their members annually as part of existing regulations[118].

Table 6: Baseline placed on market data and assumed WEEE flows (tonnes, 2018/9)[119]

[112] This is because the proposed policies are implemented from 2025 and the appraisal period is from 2025 to 2034 (a 10-year appraisal period as per Green Book guidance)
[113] As above
[114] https://www.researchandmarkets.com/reports/4854842/united-kingdom-consumer-electronics-market-size
[115] https://www.statista.com/outlook/dmo/ecommerce/electronics/united-kingdom
[116] It is assumed that there would be sufficient EfW capacity for this additional WEEE. Evidence suggests that although UK EfW has historically run at around 90% capacity, there was still around 2Mt of spare capacity in 2020 (https://www.tolvik.com/wp-content/uploads/2021/05/Tolvik-UK-EfW-Statistics-2020-Report_Published-May-2021.pdf)
[117] https://www.gov.uk/government/statistical-data-sets/waste-electrical-and-electronic-equipment-weee-in-the-uk#:~:text=Updated%20WEEE%20collected%20in%20the,treatment%20facilities%20and%20approved%20exporters.&text=All%20reports%20updated%20to%20include%20quarter%201%20to%204%202019%20data.
[118] https://www.gov.uk/government/statistical-data-sets/waste-electrical-and-electronic-equipment-weee-in-the-uk#:~:text=Updated%20WEEE%20collected%20in%20the,treatment%20facilities%20and%20approved%20exporters.&text=All%20reports%20updated%20to%20include%20quarter%201%20to%204%202019%20data
[119] Anthesis, Evidence Gaps, page 24

WEEE Category	Tonnage POM	Tonnage Entering WEEE stream (all waste destinations)
Large Household Appliances	571,432	561,657
Small Household Appliances	157,442	154,749
IT and Telecoms Equipment	152,049	149,448
Consumer Equipment	48,098	47,275
Lighting Equipment	45,847	45,063
Electrical and Electronic Tools	97,429	95,763
Toys Leisure and Sports	55,394	54,446
Medical Devices	17,197	16,903
Monitoring and Control Instruments	34,147	33,563
Automatic Dispensers	5,669	5,572
Display Equipment	90,984	89,427
Cooling Appliances Containing Refrigerants	240,819	236,700
Gas Discharge Lamps and LED Light Sources	9,943	9,773
Photovoltaic Panels	19,205	18,876
Batteries	41,000	40,299

Section 6: Key Cross-Cutting Assumptions

Many of the assumptions used within the Cost Benefit Analysis (CBA) are used across a number of options. For ease of understanding, these cross-cutting assumptions are outlined here. Any option specific assumptions are described within that particular option.

Cross-cutting assumptions included within this section are listed below:

- 6.1 Scheme Administrator and Enforcement Costs
  - 6.1.1 Scheme Administrator costs
  - 6.1.2 Enforcement costs
- 6.2 Collection and Treatment Costs (and Benefits)
  - 6.2.1 Treatment costs
  - 6.2.2 Residual costs
  - 6.2.3 Household communications campaigns
  - 6.2.4 Material Revenue
- 6.3 Tonnages
  - 6.3.1 Fly-tipping modelling and costs
  - 6.3.2 Hoarding
- 6.4 Societal Impacts
  - 6.4.1 Carbon analysis
  - 6.4.2 Fly-tipping Disamenity

6.1 Scheme Administrator and Enforcement Costs

6.1.1 Scheme Administrator costs

With the introduction of the proposed policy options, it is suggested in the consultation document, alongside this impact assessment, that a Scheme Administrator may be best placed to manage the proposed obligations placed on producers. An approach presented in the consultation document is an administrator, jointly approved by the four governments, be responsible for managing and administering specific functions of the revised WEEE system on behalf of producers and other parties. Views are being sought in this consultation on the exact responsibilities of the Scheme Administrator.

For the purpose of this impact assessment, we assume a similar system to that of the Packaging Extended Producer Responsibility (pEPR) impact assessment analysis[120]. The pEPR Scheme Administrator's scope includes managing data, taking on the legal responsibility for collections, and making necessary arrangements with local authorities, and others, for the provision of collections. This is felt to be a reasonable proxy at this stage of the impact assessment analysis.

The costs associated with a Scheme Administrator, presented in the pEPR impact assessment, include set up costs and annual operational costs for offices, admin, and staff. These costs were derived by WRAP specifically for the pEPR analysis[121].

The pEPR costs have been adjusted relative to the number of producers associated with pEPR and WEEE policies, respectively. Since the number of producers in the EEE industry is approximately one third of the number of producers affected by the EPR policies[122], the Scheme Administrator costs are assumed to be around a third of those estimated under pEPR. This is a simplifying assumption used for illustrative purposes, based on limited data (and information on the final design of the scheme administrator). It is acknowledged that economies of scale may mean that scheme administrator costs would not fall proportionately based on the number of producers. These assumptions will be tested through the consultation process.

The set-up costs include office costs, non-labour HR costs, and interim team costs. These represent the cost of setting up physical offices in each nation of the UK, and the staff to support the introduction of the scheme administrator. These initial set-up costs are assumed to occur in 2025, the first year of appraisal.

Table 7: Scheme Administrator Set Up Costs (2025, £2019)

Set up costs (2019)	£393,900

Beyond this, there are annual operational costs associated with a Scheme Administrator, which include office costs, admin costs, and staff costs. The office costs include the cost of the premises, ground rent and other utilities, security, cleaning, and maintenance. Admin costs include audit and tax, legal, insurance, and other professional fees. Staff costs include the salaries of staff included in producer, LA, and admin roles, and the associated overheads[123]. These costs are all assumed to remain constant over time and to occur annually across the entire appraisal period.

Table 8: Scheme Administrator Annual Operating Costs (annually 2025-34, £2019)

Annual office operational costs (£2019)	£383,486
Annual admin operational costs (£2019)	£516,103
Annual staff operational costs (£2019)	£3,589,243
Total SA operational costs (£2019)	**£4,488,831**

6.1.2 Enforcement costs

We anticipate minimal additional costs arising in relation to the enforcement of our proposed reforms. This is because we are not proposing to obligate any new parties (beyond online marketplaces) but are to strengthen the obligations of parties who are already obligated under the existing regulations. This assumption was discussed with the Environmental Agency who confirmed that it was a reasonable assumption to make.

Registered producers are currently required to pay an annual registration fee by the relevant environment agency, charged on a cost recovery basis. Any changes to the cost of compliance

[120] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1063588/epr-final-impact-assessment.pdf
[121] "What is a likely cost for an EPR Scheme Administrator?" WRAP (unpublished)
[122] The pEPR impact assessment assumes that c.10.5k could be obligated under pEPR in one form or another. This is in comparison to c.3.1k WEEE producers (this excludes WEEE producers categorised as B2B only).
[123] Including non-wage labour costs

monitoring would be reflected in changes to the current registration fees to ensure that those costs did not fall on the relevant regulators.

Whilst the proposal to classify online marketplaces as producers will require regulators to ensure that this new category of producers are registered and supplying data, the regulator will have powers to recover their costs of compliance monitoring from those businesses via a registration fee. It should also be noted that the consequence of this proposal will be to remove from the regulatory requirements those overseas businesses that access the UK market via OMPs – thus, in overall terms, the number of businesses classified as producers with whom the regulator is required to engage with, will fall. There is no intention to widen the distributor obligations to a wider classification of businesses and so in a similar vein we do not envisage significant new costs for the regulator. That said, there will be familiarisation costs for the regulators and potentially some updates to IT systems that may be necessary, but we expect these to be minimal. These costs will be investigated further through the consultation process.

The relevant environment agencies would be responsible for monitoring and enforcing the scheme administrator in their duty to collect WEEE from households on behalf of producers, as well as responsibly recovering costs from producers. This would likely be akin to the way that these regulators monitor producer compliance schemes (who similarly have responsibility for collecting WEEE on behalf of their producer members from HWRCs, and recovering costs) under the current regulations, and hence the assumption that this would not lead to additional costs to regulators. However, the exact role of the Scheme Administrator, and its interaction with regulators, will be developed further based on the outcomes of the consultation. Monitor and enforcement cost assumptions will be reviewed as decisions are taken and updated (where necessary) for the final impact assessment.

6.2 Collection and Treatment Costs (and Benefits)

6.2.1 Treatment costs

Each policy option will result in a diversion effect away from either landfill or recovery. This has been modelled by Anthesis[124] for this impact assessment. An increased amount of WEEE collected for recycling will result in increased treatment costs. It is important to note that we expect that this diversion would also lead to an increase in reuse, as well as recycling. However, at present, there is an absence of data which analyses the costs of sorting WEEE for reuse beyond the costs associated with collecting it. This section will therefore outline the specific costs of treating the WEEE collected for recycling.

As part of our analysis, we have used cost per tonne figures provided by external stakeholders with expert knowledge of the UK WEEE recycling sector. These cost per tonne figures can be seen in table 9 below.

Table 9: Net Treatment Cost per Tonne of WEEE (£/t 2019)

Category of WEEE	Cost/t (2019 £'s)
LHA	£5
SMW	£75
Display	£260
Cooling	£190

Source: provided by industry source. Rounded to the nearest £5

[124] Anthesis, Evidence Gaps, 2022

These treatment costs per tonne include transporting the WEEE from HWRCs or other collection points, to the treatment facility, treating the WEEE, container costs, and any hazardous waste costs. The cost also includes landfill and EfW gate fees to recycling treatment facilities[125]. However, it does not include the cost of a LA or retailer collecting the WEEE, this cost is analysed separately. It is important to note that because of the way the data is collected and was subsequently provided to us, it is not possible to provide a disaggregated cost per tonne for each step of the treatment process.

It is noticeable from table 9, that the cost per tonne to treat LHA is much lower than the other categories of WEEE. Though the overall process operates at a small net cost per tonne, the treatment part of the process currently results in a receipt of revenue, due to the value of the recycled materials[126]. Note that this revenue is primary material revenue; this being the price waste reprocessors are willing to pay for collected material, which they use as inputs to the recycling process. Reprocessors can then turn this material into a virgin-material-like-state to be sold on the secondary material market, to be used as input for manufacturing new goods. It is important to distinguish that there are essentially two material revenue effects occurring in this IA. The primary revenue benefits are included in the treatment cost per tonne figures used. The secondary material revenue to reprocessors for selling this material post-reprocessing, are included as a separate benefit to reprocessors and described later in this section.

6.2.2 Residual Costs

There are costs associated with depositing waste at landfill and EfW sites. This is generally through landfill and EfW gate fees which are a charge levied per tonne of waste received at a waste site. This fee covers the costs incurred by the site for dealing with that waste. For the purposes of this IA, we have used the gate fees from WRAP's gates fees report 2019[127].

Table 10: Landfill and EfW Gate Fees by Waste Treatment

	Cost/t (2019 £'s)
EFW	£93
Landfill (excluding Landfill Tax)	£25

Source: WRAP

Landfill tax will also be charged on top of any landfill gate fee and is charged on a per tonne basis. As 2019 is our baseline year, we use the 2019 landfill standard tax rate of £91.35 per tonne of waste sent to landfill for our analysis. We assume that landfill tax will not increase in real terms[128].

Anthesis have modelled the tonnage diversions of WEEE away from landfill and recovery, to recycling and reuse, as a result of implementing policy options 2-4[129]. Multiplying these tonnages by the landfill tax rate provides an estimate of the total reduction in this tax revenue for HM Treasury. This total tax reduction will be a cost transfer from waste collectors to HM Treasury as waste collectors will no longer be liable to pay as much landfill tax as they currently do. As this will be result in a reduction of tax revenue for HM Treasury, this effect will not contribute to any net cost/benefit figures (however it will be a saving to businesses in the EANDCB).

Similarly, we can use Anthesis's modelling of the total WEEE diverted away from landfill and EfW to calculate the total landfill and EfW gate fee savings for waste collectors. This provides cost savings to local authorities, from reduced landfill and EfW gate fees, as less WEEE is collected as residual waste. The benefits from landfill and EfW gate fee savings will be achieved for each

[125] External partners confirmed to us the treatment cost per tonne includes landfill and EfW gate fees.
[126] Detail provided by external partners in industry confirming the nature of low treatment cost per tonne seen for the LHA category of WEEE.
[127] WRAP, Gate Fees 2019/20 Report, page 4
[128] I.e. once the impact of future inflation is removed
[129] Anthesis, Evidence Gaps Research, 2022

of the policy options (2-6), with each marginal impact of the option providing greater landfill and EfW gate fee savings as each policy provides additional diversion away from landfill and recovery. With the options presented cumulatively in this way, option 6 will encapsulate all cost and benefits from policy options (2-6) inclusive.

6.2.3 Household communications campaigns

Research by WRAP and Zero Waste Scotland shows that good communications campaigns are key to successful recycling schemes[130]. Research by Material Focus has shown that communications campaigns can specifically increase the effectiveness of WEEE recycling services. Their research suggests that 42% of people who saw their 2020 WEEE recycling advertising campaign either started to recycle, or recycled more, WEEE as a result[131]. The research also showed that targeted communications in one Local Authority area led to a 100% increase in recycling rates[132].

The exact nature of any communications campaigns would need to be agreed by producers but could include a mix of nationwide and local specific elements to maximise success. Organisations such as WRAP[133], and Zero Waste Scotland[134] provide detailed guidance on setting up successful recycling communications campaigns.

For the purpose of the impact assessment, communication costs have been split into transition costs, which consist of a significant wave of communications that occur in the first year of the policy to introduce it, and ongoing communication costs. It is assumed that communication costs in Option 2 and 3 will be the same as, under both options, producers will need to communicate the difference between small and bulky WEEE and how households should dispose of each. The only difference if Option 3 is implemented as well, is amendments to how and where bulky WEEE should be disposed of. Since communications about how to dispose of bulky WEEE will occur under both Option 2 and 3, we have not accounted for additional communication costs under Option 3[135].

For Option 4, additional costs are expected to be minimal and so have not been quantified in our cost and benefit analysis. In-store retailers are currently obligated to communicate to customers in writing how to recycle their products. Generally, this is done on their websites. Under Option 4, this communication will move to the point of sale[136]. Retailers may incur an initial cost for this change; however, the cost should be minimal as it does not consist of additional communication campaigns but simply marginally adapting the current communications. Exactly how retailers will be affected by this change will be explored at consultation.

Similarly, most online retailers already offer a charged 1:1 takeback service which they communicate to customers. If Option 4 is implemented, this communication will just need to change to clarify that the service is free. This change in messaging on websites should be of minimal cost to producers so it has not been quantified; producers will be asked about this communication change in the consultation.

Communication costs were modelled by circular economy consultants Oakdene Hollins and used a fixed cost per household amount taken from a Zero Waste Scotland study[137], which specifically considered improving recycling rates through communication campaigns[138]. These costs were

[130] https://www.materialfocus.org.uk/report-and-research/encouraging-battery-recycling-reduce-fires/
[131] https://www.letsrecycle.com/news/material-focus-adverts-help-increase-weee-recycling/
[132] https://www.materialfocus.org.uk/press-releases/material-focus-publishes-first-annual-review/
[133] https://wrap.org.uk/taking-action/collections-recycling/key-operational-areas/communications-guidance
[134] https://www.zerowastescotland.org.uk/resources/communications-support-local-authorities
[135] This will be tested at consultation
[136] I.e., the customer is made aware when they purchase a product (for example by clear signage at the till). Currently it is not specified where retailers must provide this information to customers and so this may not be communicated in a prominent location (for example, a less prominent part of their website).
[137] https://www.zerowastescotland.org.uk/sites/default/files/Improving%20Recycling%20Through%20Effective%20Communications_ZWS_0.pdf
[138] This report is somewhat specific to Scotland. We plan to do further analysis to ensure these costs are representative of the UK as whole for the final impact assessment.

adjusted to a 2019 price level[139]. The transition costs are assumed to be an average of £1.49 per household. Oakdene Hollins recognise that LAs would face different communication costs based on their size. The transition cost of £1.49 per household is an average, and accounts for smaller LAs paying £1.19 per household and larger LAs paying £1.79 per household. The ongoing costs are assumed to be £0.50 per household per year. This is based on WRAP's "routemap" modelling for the pEPR impact assessment. These costs are shown below in table 11.

Table 11: Communication costs per household

Cost	Cost of Communications per Household (£)
Transition (Year 1)	£1.49
Ongoing (Yearly)	£0.50

The responsibility to communicate the policies will be borne by the scheme administrator and paid for by producers. The assumptions and analysis on how the scheme administrator can be found in the section on Scheme Administrator costs.

There is an appreciation that there are a number of methodologies on communicating new policies to households. The differing potential communication cost methodologies will be explored in the sensitivity analysis section of the annex and reviewed for the final impact assessment.

6.2.4 Material Revenue/ Profit to Reprocessors

EEE is a diverse category of products, but the material used within each item is broadly similar. When WEEE is correctly managed and disposed of, most of these materials can be recycled, or reused rather than ending in EfW or landfill.

In this impact assessment, we assume that when WEEE is recycled, these materials are used in closed-loop recycling[140]. This is where the recycled materials are utilised to make another item, the material does not necessarily need to be used in a WEEE item, but the recovered material must be used in the same form. For example, recovered plastic from WEEE is used in a hard form plastic rather than as a substitute for textiles, and this is typically the case for metals[141].

The average material composition of WEEE has been derived from a review of European WEEE value chain analysis[142]. This includes metals, plastic, glass, and other materials, which will encapsulate some of the critical raw materials. Due to data limitations, this impact assessment has simplified these materials to the four most present in EEE: iron/steel, aluminium, plastic, and glass, presented below in table 12. These materials are shown to make up 80% of the average item of WEEE, however are scaled up to 100% for the purpose of this analysis[143].

Table 12: Material make up of a typical tonne of WEEE[144]

Material	% Makeup of a typical tonne of WEEE
Iron/Steel	55%
Aluminium	11%
Plastic	26%
Glass	7%

[139]Oakdene Hollins, A Review (Economic and Environmental) of Kerbside Collections for Waste Electricals, 2021 – consultants have calculated and provided the adjusted 2019 prices for communication costs.
[140] Under advice from WRAP.
[141] Note, it is understood through conversations with the AATF industry that WEEE is managed in a way where the material would typically not be used in a WEEE item again. But through conversations with WRAP, we've confirmed that this would still be considered closed-loop recycling when the material is made in the same format regardless of whether it is the same product.
[142]https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5ac195926&appId=PPGMS#:~:text=2.2%20COMPOSITION%20OF%20WEEE,-Electric%20and%20electronic&text=Base%20metals%2C%20the%20most%20common,Materials%2C%20CRM2)%20for%20EU
[143]The remaining 20% is made up of copper, gold, silver, palladium and unspecified other. These are excluded from the analysis due to a lack of evidence on material prices and GHG emissions
[144] May not add up to 100% due to rounding

This impact assessment assumes that the above proportions of material are constant across each category of WEEE, and overtime. Therefore, an increase in the quantity of recycling of WEEE provides an increase in the quantity of recycled iron, aluminium, plastic, and glass materials. This is a simplifying assumption based on the available data. We also assume that the composition of WEEE will not change over time which, again, is a simplifying assumption. We will consider conducting further work to account for differences between different types of WEEE.

The material is then sold in the secondary material market to be used in the production of a new item. Secondary material market prices are taken from a report by waste sector consultants Valpak[145]. Valpak's analysis was conducted in 2019 and like other commodities markets prices can fluctuate significantly. Valpak's analysis is seen as the most appropriate as it specifically relates to recycled material prices and brings together a number of material types into one common methodology. Although no known updates exist to this analysis, other sources suggest that secondary prices for these materials in 2022 were either at a similar level or higher than those in Valpak's report[146]. For example, this is particularly prevalent in the recent significant increases in oil prices, which influences the prices of recycled plastic[147]. For the purpose of this impact assessment, we assume there is no real terms increase in secondary material prices, ensuring that the analysis for this impact assessment at worst uses conservatively low prices. Table 13, below, presents the prices this impact assessment is using for the steel, aluminium, plastic, and glass recycled material.

Table 13: Price per tonne of each material (£2019, £/t)[148]

Recycled Material	Price per tonne (£2019, £/t)
Steel	£560
Aluminium	£1,578
Plastic (average polymers)	£884
Glass (clear)	£50

The price of iron is not included in Valpak's Report, so it is assumed that the steel price is representative of all iron and steel recycled from WEEE[149]. The plastic price used is an average across polymers, in the absence of being able to identify a clear understanding of the type of plastic used in EEE products, industry experts have advised that this can be assumed to be the appropriate recycled plastic price for recycled plastic recovered from WEEE. The price of glass varies dependent on the colour; however Valpak's report only presents a single price point for glass.

The prices per tonne of recycled material are used to calculate the additional revenue produced in the secondary materials market from the net increase in recycling associated with the policies. To accurately include this in our impact assessment analysis, we have only included the proportion of these sales which would account for the profit gained from the sale. This is done in order to avoid double counting, since some sale of the recycled materials has already been accounted for in our understanding of the treatment costs associated with managing WEEE[150]. To account for this, we have assumed that there is a gross margin of 25% for UK based recyclers. This has been assumed based on data from the Annual Business Survey (ABS)[151] and calculated

[145] Valpak, The impact of proposed packaging policy reforms on the UK's secondary materials markets, 2019 (Unpublished)
[146] Plastic: Sustainable Plastics data suggests that recycled plastic prices fell from 2019 into 2020 and 2021, but increased significantly into 2022 such that 2022 prices are higher than those in 2019 (https://www.sustainableplastics.com/topic/polymer-prices); Glass: Euorstat data shows European glass secondary material prices remaining relatively constant over the past decade with the 2021 price at 65 Euros (£56) per tonne (https://www.letsrecycle.com/prices/metals/non-ferrous-metal-prices/non-ferrous-metal-prices-2022/) ; Metals: Lets recycle show scrap Aluminium and Steel categories to be generally higher in 2022 than in 2019 (https://www.letsrecycle.com/prices/metals/)
[147] https://www.plasticexpert.co.uk/oil-prices-plastic-recycling/#:~:text=There%20is%20a%20direct%20relationship,of%20making%20plastic%20also%20decreases.
[148] Valpak, The impact of proposed packaging policy reforms on the UK's secondary materials markets, 2019 (Unpublished)
[149] As steel is a type of iron alloy, however further research will be conducted for the final impact assessment to account for materials which we currently have no information on price
[150] Any primary revenue to collectors from selling WEEE to recyclers.
[151]https://www.ons.gov.uk/businessindustryandtrade/business/businessservices/datasets/uknonfinancialbusinesseconomyannualbusinesssurvey sectionsas

as GVA divided by turnover[152] for the UK recycling sector[153]. The results of these calculations, tonnages of recycled material by price per tonne by profit margin, are presented in each policy options cost benefit analysis summary in section 7.

It must be acknowledged that because of data limitations and huge variability in the material composition of WEEE, the material composition in table 12 does not include all of the critical raw materials, particularly some rarer, high-value materials, which are used in EEE. Therefore, the estimated profits to reprocessors in our cost-benefit analysis are likely to be an underestimate of the potential profits available to reprocessors from the materials found in WEEE if CRMs are recovered. The review of European WEEE value chain analysis lists several CRMs that can be found in WEEE, including gold, silver, indium, gallium, cobalt, silicon, and other rare earth elements[154]. A review of CRM recovery by Material Focus[155], found that in PCs, laptops, tablets, TVs, monitors, smart phones, and lighting sent for recycling in 2017, there was £11.37 million worth of critical raw technology metals (which includes cobalt and nickel) and £126.5 million worth of gold and silver.

However, CRMs usually make up a small proportion of WEEE compared to other materials[156], which can make it difficult to efficiently recover such materials in a cost-effective manner. Nevertheless, gold and palladium, which make up of relatively low proportion of the weight WEEE, are the most valuable metals for recovery. According to the market price of gold, a tonne of gold in 2019 was worth £31,000,000, which is significantly higher than the prices of the materials in table 13.

Also, due to potential future supply scarcity and lack of substitution options, the future value of CRMs could rise significantly, making it economically viable to recover even small volumes of CRMs[157]. However, currently most categories of WEEE are expensive to recycle such that revenue from recovering materials in itself does not incentivise recycling.

6.3 Tonnages

6.3.1 Fly-tipping modelling

It is assumed that households that choose to fly-tip often do so because of the costs and/or lack of convenience of WEEE disposal/collection. By addressing these factors, the proposed policies are likely to have some effect in decreasing the amount of WEEE being fly tipped.

Based on their research, Anthesis estimate that the introduction of free kerbside collection of bulky WEEE will result in a 10%-15% reduction in fly-tipping of WEEE[158], with the lower end of this range used within this impact assessment modelling as a conservative estimate. This was established through discussions with local authorities, which included a survey of 12 local authorities, as well as interviews.

The surveys focussed on local authorities that currently run a bulky waste collection service who had either changed the price charged for that service, or had gone from a free, to a charged service. The majority of LAs surveyed were in the latter position, and they found that although increases in the price charged for these collections had led to a decrease in the demand for these collections, the increased charges appeared to have had a minimal impact on fly-tipping in the

[152] Average between 2015-2020
[153] SIC 38.3 – Material Recovery
[154] https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5ac195926&appId=PPGMS#:~:text=2.2%20COMPOSITION%20OF%20WEEE,-
[155] Contributing-towards-a-circular-economy-utilising-Critical-Raw-Materials-from-Waste-Electricals-Final.pdf (exactdn.com)
[156] https://ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5ac195926&appId=PPGMS#:~:text=2.2%20COMPOSITION%20OF%20WEEE,-
[157] Contributing-towards-a-circular-economy-utilising-Critical-Raw-Materials-from-Waste-Electricals-Final.pdf (exactdn.com)
[158] Anthesis, Evidence Gaps, page 50.

area. However, there was one local authority that changed from a free service to a charged service and reported a 10% increase in fly-tipping incidents after this change.

Council officers interviewed felt that most fly tipped waste is a result of illegitimate waste collection companies, who can currently provide a cheaper and more timely service than LAs. A producer led approach would therefore need to outcompete these illegitimate businesses to have a significant impact on fly-tipping. Based on this research, Anthesis conclude that some small reduction in fly-tipping could be achieved as a result of free bulky WEEE collections, which could be enhanced by targeted communications campaigns funded by producers (which is assumed as part of option 3).

Based on this research, we assume that a similar level reverse in the amount of flay tipping would occur were the service to return to free to customers. We assume this 10% reduction is from households who are seen to be price-sensitive to their methods of disposal. It is also reasonable to suggest that there is potential that additional WEEE would be diverted away from fly-tipping with adequate communication of the policy. This is explored in annex D, in the sensitivity analysis.

We assume that this 10% reduction in fly tipped WEEE will occur in options 3 and 4, irrespective of the additional collection route seen in option 4. As stated previously, it is assumed that no small electrical items of WEEE are fly-tipped (due to having more convenient disposal methods), and there is therefore no impact on fly-tipping as a result of option 2. We currently lack the evidence to suggest that the take-back addition to policy option 4 would have an additional impact on fly-tipping compared to option 3. We do, however, assume that take-back would have the same impact on fly-tipping in the absence of LA bulky WEEE collection due to it providing an additional free bulky WEEE collection service compared to the baseline, therefore, providing households less of an incentive to use illegitimate waste collectors.

6.3.2 Hoarding by households

DEFRA have used research by Anthesis on WEEE flows, which determines the level of diversion associated with each of the proposed policies. The policies are assumed to divert waste away from various disposal routes. For example, WEEE could be diverted away from the informal sector (fly-tipping, scrap dealer collections), residual waste, HWRC deposits, etc. However, we have assumed within this analysis there is no disposal occurring from “hoarded” material[159].

There has been research which suggests that households hoard electrical items[160]. However, it is difficult to know whether these items will be diverted to waste streams because of these policies. Another key difficulty is understanding how much hoarded EEE is considered waste. This is because although individuals might hold on to old electricals which they no longer use as a primary item (for example, keeping an old phone), it does not mean that the item is considered waste by the household. For example, an individual may give their old phone to another family member or may keep it in case their new item breaks. Therefore, for the purposes of this analysis, we have assumed that all small electricals classed as waste are currently disposed of either in residual waste, HWRC deposits or under the current in-store take-back policy. In contrast, we assume that all electricals which are in the household hold a certain value and are not considered waste[161].

This would also seem like a reasonable assumption for larger bulky WEEE items (from households), as is in most cases households will not have enough room to hoard bulky waste. Households will likely only buy an additional unit of bulky EEE, without disposing of any current EEE, if they intend to use this item in addition to ones that they already own. We therefore assume there will be no hoarding of bulky WEEE under any option (including the baseline). These

[159] Anthesis, Evidence Gaps, 2022
[160] Anthesis, Electrical Waste – Challenges and Opportunities: An independent study on Waste Electrical & Electronic Equipment (WEEE) flows in the UK, 2021
[161] This is a simplifying assumption. More convenient collection routes may encourage households to part with currently hoarded products.

assumptions were discussed with consultants from Anthesis[162], who agreed that they are the most reasonable assumptions for the analysis.

6.4 Societal Impacts

6.4.1 Carbon analysis

The greenhouse gas emissions analysis for this impact assessment considers the journeys involved in the collection of WEEE items, as well as the net increase, or decrease, in carbon emissions from the changes in WEEE flows to recycling, reuse, energy from waste, and landfill. To monetise these impacts, the central BEIS carbon factors are used[163]. Following the UK's Emissions Trading System (ETS) replacing the EU ETS, there was a review of BEIS carbon prices, and as a result, there is no difference between 'traded' and 'non-traded' carbon prices[164]. As part of this review, new carbon prices were released, and it is BEIS guidance that these emissions have the same price per tonne, so that there is equal weight for emissions from the two sectors.

The published BEIS carbon prices are presented as pound-per-tonne values in 2020 monetary terms, so for this impact assessment they have been discounted to 2019 values and are presented as such in table 14 below.

Table 14: Applied carbon prices, 2019, £/t, CO_2e (rounded)

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Central carbon per ton (£2019)	247	251	254	258	262	266	271	274	278	283

Territorial carbon analysis – changes in tonnage flows

The policies presented in this impact assessment are expected to result in changes to the flows of WEEE to reuse, recycling, and disposal, which will consequently have impacts on GHG emissions from WEEE. To assess the carbon dioxide emissions associated with changes in the waste flows of WEEE, this impact assessment analyses and monetises the carbon impact on UK territorial emissions of the changes in tonnages of WEEE that are sent to recycling, reuse, and disposal.

To provide an assessment of the carbon emissions associated with changes in WEEE waste flow, WRAP's 2017 carbon metrics are used, which provide a breakdown of the traded and non-traded carbon associated with different WEEE waste flows. However, WRAP does not provide WEEE specific carbon metrics for reuse, closed-loop recycling and EfW. This limitation in the data from WRAP is overcome by utilising a weighted carbon factor, based on carbon metrics for the materials which compose a typical tonne of WEEE, which is assessed below.

The material breakdown used is the same as that shown in table 12 in the material revenue section. To use the weighted average of material found in a typical tonne of WEEE, we assume that the tonnages of material in each waste flow are represented by the material composition of the typical tonne of WEEE. However, we recognise that the WEEE flow chain is likely to be more complicated than this, as WEEE items can be dismantled, with their separate components entering different waste flows. For example, an item of WEEE that is sent to recycling may be

[162] https://www.anthesisgroup.com/
[163] Valuation of greenhouse gas emissions: for policy appraisal and evaluation 2021, Annex 1, https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation#annex-1-carbon-values-in-2020-prices-per-tonne-of-co2
[164] Valuation of greenhouse gas emissions: for policy appraisal and evaluation - GOV.UK (www.gov.uk)

dismantled with metal components being recycled, and plastic components being sent to disposal because of flame-resistant chemicals making the plastic unrecyclable.

We also acknowledge that WEEE categories can be heterogenous, both in comparison to other categories of WEEE, and within each category, so the assumption that a typical tonne of WEEE is representative of all categories of WEEE is a simplification but it is the best that can be done with limited data.

For each material, WRAP provides carbon metrics for closed-loop recycling, EfW and Landfill. However, there is not enough data to provide a reuse metric. For the purpose of this impact assessment, we apply the recycling carbon factor to the WEEE items which are reused. This is likely to be an overestimate of the carbon associated with the reuse of WEEE (and is therefore an underestimate of the carbon benefits of increased reuse), as the process of reuse is likely to be more carbon beneficial than the recycling process, as it requires reduced processing, and does not include further manufacturing, so is less energy intensive[165]. There are also further benefits to reuse of WEEE, both socially, and economically, which are discussed in section 9.

For our cost benefit analysis, we measure the changes in territorial carbon emissions. To do this we focus on production emissions in the UK, assuming that once WEEE is broken down into the constitute materials, these enter the recycling system along with similar materials. For example, metal from WEEE is recycled alongside similar grade metal from other sources. For the production emissions, we use a method that is used by WRAP[166], who take trade data from Eurostat[167] to estimate the proportion of raw materials that are made in the UK. For the percentage of each material collected for recycling in the UK that is then recycled in the UK, we use data from WRAP, apart from for plastics where we used a study by Valpak[168] which includes estimates that are specific to plastic that is removed from WEEE. The proportion of each material sent to EfW in the UK compared to abroad is estimated using data from the most recent annual Tolvik UK EfW report[169] and data on the tonnage of residual exported from the UK for Refuse Derived Fuels (RDF)[170]. All materials collected for landfill are assumed to go to landfill in the UK. The reuse factor is assumed to be the same as recycling, except that we assume that WEEE displaces EEE production as opposed to virgin material production. WRAP, using data from Eurostat suggest that about 10% of WEEE is made in the UK.[171] These proportions are shown below in table 15.

Table 15: Proportion of virgin materials made, recycled, and disposed of in the UK

Waste Streams	Proportion made in the UK	Proportion recycled in the UK	Proportion to EfW in the UK	Proportion to landfill in the UK
Iron/ Steel (Scrap Metal)	70%	55%	87%	100%
Aluminium	70%	55%	87%	100%
Plastic (Average Plastics)	61%	76%	87%	100%
Glass (Colour Separated)	53%	72%	87%	100%

To calculate territorial emissions, the carbon factors, which have already been multiplied by the material breakdown of WEEE, are further multiplied by the proportion of material that is either made in the UK, recycled, or sent to landfill and EfW in the UK. The carbon metrics then consider increase in the carbon emissions released from the process of recycling, reuse, EfW or landfill,

[165] This assumption will be tested further through consultation
[166] WRAP – unpublished carbon factors modelling
[167] Eurostat – Import, Export and Sold Production data
[168] Valpak - The Impacts of Bans on UK Export of Plastic Wastes (unpublished) 2021
[169] https://www.tolvik.com/wp-content/uploads/2021/05/Tolvik-UK-EfW-Statistics-2020-Report_Published-May-2021.pdf
[170] https://www.letsrecycle.com/news/rdf-exports-fell-by-37-in-2020/
[171] WRAP – unpublished carbon factors modelling

and the carbon savings from emissions foregone from producing that same material for production and reduced reliance on production of raw materials. For example, recycling one tonne of metal from WEEE releases carbon in the sorting and treating process but it will provide around one tonne of metal for use in production[172], leading to carbon savings as there is no longer a need to produce one tonne of raw materials.

The territorial weighted averages of the carbon metric associated with each of the relevant material types are used to provide the carbon metrics of 2017 waste flows, presented in table 16.

Table 16: Territorial Weighted WRAP Carbon Metrics (2017)

			kgCO2e/ton	
Waste Flow[173]	Proportion which are traded	Proportion which are non-traded	Traded carbon factor	Non-traded carbon factor
Reuse	*100%*	*0%*	-231.12	-
Closed-loop recycling	100%	0%	-1119.03	-
Landfill	0%	100%	-	9.28
EfW	0%	100%	-	170.65

To calculate the net carbon impact of each policy option, these territorial waste flow weighted carbon metrics are multiplied by the respective change in tonnage of WEEE sent to each waste flow as a result of each policy option. To assess the impact of reuse and recycling, the production avoidance factor is presented as a carbon saving, and the carbon associated with reuse and recycling is subtracted from this. For landfill and energy from waste, the amount of WEEE sent for disposal is split amongst these routes, with 70% assumed to be sent to EfW and the remaining 30% to landfill[174].

Finally, the net carbon tonnages associated with the changes in waste flows from each policy option have been monetised with the BEIS carbon prices presented in table 14, and the results are presented in the relevant cost benefit analysis sections for each policy in Section 7.

It must be acknowledged that by using territorial carbon factors, we are underestimating the total carbon benefits that will be felt by society. There will be international carbon emission savings from the policy options that will be beneficial to people both in the UK and internationally, as reusing and recycling WEEE decreases the international reliance on raw material extraction and production and the associated emissions. However, our cost-benefit analysis considers just the territorial changes in carbon emissions.

Carbon analysis – increased fuel

Additional fuel uses (and relating Co2e emissions) are estimated in two different ways, depending on the specific impact of the policy option. For SMW collections and retailer takeback, policies introduced in options 2 and 4, it is assumed that no additional journeys will be made due to the policy, rather, the weight carried on these journeys will increase[175] (due to additional WEEE

[172] There are likely to be some losses in the recycling process however due to a lack of data this has not been included in the analysis
[173] The reuse and recycling factors include both the emissions from the recycling/reuse process and saved production emissions.
[174] Anthesis, Evidence Gaps, 2022, page 106
[175] Option 2 assumed that small mixed WEEE will be collected from household alongside existing Dry Mixed Recycling collections. Option 4 assumed that retailers delivering new EEE products to household will then collect used products as WEEE during the same journey.

collected). It is assumed that as the load weight of a collection vehicle increases, the Miles per Gallon (MPG) achieved will decrease.

The assumption used to measure this impact is taken from the Oakdene Hollins analysis. We are utilising the assumption presented in their report, that a 0.33% improvement in MPG is achieved from a 1% reduction in weight[176]. Therefore, by solving the following equation we can calculate the impact of additional weight on MPG:

$$\frac{0.33\% * original\ MPG}{Vehicle\ tonnage * 1\%} = \frac{\%\ reduction * original\ MPG}{additional\ weight\ carried}$$

The change in MPG can then be multiplied by the additional weight carried over the relevant distance to estimate the additional fuel used.

In contrast, LA bulky WEEE collections, introduced in option 3 are assumed to lead to additional journeys. It must be acknowledged that the policies are likely to cause a reduction in private journeys to specifically dispose of WEEE, particularly bulk WEEE, at HWRCs, return it to retailers or fly tip. However, we do not have sufficient data to quantify the reductions in private journeys, and therefore the associated carbon. Therefore, the additional carbon that is calculated is likely to be an overestimate, as it does not account for LA collection journeys replacing private journeys.

To calculate the additional carbon from fuel in option 3, the additional distance covered by collection vehicles under LA bulky WEEE collections is estimated and multiplied by kgCO2e per mile converters for the relevant vehicle class, to estimate the total CO2e, and then divided by the inverse of a kgCO2e per litre of fuel converter (2.59 kgCO2e/litre[177] based on an average diesel with biofuel blend), to estimate the amount of fuel used. This same kg/CO2e is used for options 2 and 4, to convert the estimated additional fuel used into an estimate of the additional CO2e emitted. For all options, the quantity of CO2e is converted to tonnes and multiplied by the BEIS carbon price per tonne shown in table 14.

The modelled litres of diesel associated with the policies are multiplied by the assumed price per litre of £1.28[178] (2019). This price is kept constant across the appraisal period to align with other cost assumptions used throughout the analysis, however we acknowledge that this is a simplification of the price of fuel. This simplification is particularly prevalent with the current fuel crisis, as well as the move towards electric vehicles[179], and the associated changes in fuel prices.

6.4.2 Fly-tipping disamenity

Fly-tipping creates social disamenity for those who live locally to the area, or pass by, as well as environmental negative externalities for local environments. Utilising Eftec's disamenity modelling[180], we have derived conditional values of the decrease in disamenity generated from reduced fly-tipping incidents. It is important to highlight that the disamenity values were created based on English data, since there was no available data for the other nations. Given the coverage of England, we have assumed that these values can be used across the UK. However, this could be an overestimate due to lower population densities in those nations.

The value per incident varies according to the number of people who experience the disamenity, and for how long they experience it (i.e., the duration assumption). Hence, the social cost of disamenity represents the expected time lag for fly-tipped waste to be collected and removed by

[176] Ricardo. Impact of Vehicle Weight Reduction on Fuel Economy for Various Vehicle Architectures. 2008. https://www.h3xed.com/blogmedia/Ricardo_FE_MPG_Study.pdf
[177] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019
[178] Eunomia: Ditching Diesel central assumption for residual RCV round mileage
[179] This impact assessment acknowledges that there is a move towards electrifying vehicles, including those involved in the waste industry. Due to a lack of understanding of the pace at which this will occur in refuse vehicles we have used a simplifying assumption that all vehicles are diesel based. This is likely to provide an overestimation of the carbon impacts of these journeys and further clarification of the impact of electric RCVs and vans will be sought for further stages of analysis.
[180] Eftec, Value of Reduced Disamentity from Fly-tipping – Waste Electricals, 2022

the Local Authority. Eftec estimated these values based on the assumption of 1,000 households being impacted by a single incident. Several clean up timeframes were modelled, with a central estimate of 3 days from the incident occurring, to being cleaned up, used.

Table 17: Disamenity value of fly-tipping involving waste electricals (2019£s/incident)

	1 day until collection	3 days until collection	5 days until collection
Central Value	£ 236	£ 707	£ 1,178

Notes: values rounded to nearest £1.

Table 17 presents Eftec's disamenity values per incident[181], albeit adjusted from 2022 prices to 2019 prices for the purpose of the impact assessment. This value per incident is then used to form a value per tonne, which can be used for our final analysis in this impact assessment.

The value per tonne is estimated based on the reported average of 0.12 tonnes per incident[182]. This aligns with assumptions set out in the baseline, that each incident of fly-tipping involving WEEE averages 2 items of WEEE at a weight of 60kg per item. These estimates are then presented in table 18. 3 days is used as for our central estimate.

Table 18: Disamenity value of fly-tipping involving waste electricals (£/tonne)[183]

	1 day until collection	3 days until collection	5 days until collection
Central Value	£1,965	£5,890	£9,815

Notes: values rounded to nearest £1. Based on average of 0.12 tonnes per incident.

It is important to also note that for consistency, it is assumed the value of disamenity will remain constant every year at the 2019 level.

Section 7: Costs and Benefits of Each Option

7.1 Option 2

7.1.1 Residual WEEE diverted to recycling/reuse in option 2

Policy option 2 proposes the introduction of a UK-wide household collection system for small mixed WEEE, which is financed by producers and is free to households. For the purposes of our cost and benefit analysis, we have assumed that this service is provided by local authorities. Currently, 86 LAs offer a SMW collection, and data on these LAs is used to estimate the current costs to these LAs[184]. Policy option 2 asserts that producers will pay all costs of household SMW collection, including the costs where LAs already have a SMW collection service in place. Ongoing costs relating to these 86 LAs will transfer from LAs to producers, which will not impact the NPV but will impact the EANDCB.

The costs of setting up household SMW collection are taken from modelling by Oakdene Hollins on providing a kerbside service[185]. The foundation of the model is based upon data provided by WRAP to Oakdene Hollins[186], on the number of households per Local Authority, and on the current dry mixed recycling (DMR) and residual collection schemes. WRAP categorises each LA in a 3 by 3 matrix, sorting them into 9 groups, based on their rurality and deprivation, which accounts

[181] Eftec, Value of Reduced Disamentity from Fly-tipping – Waste Electricals, 2022

[182] Eftec, Value of Reduced Disamentity from Fly-tipping – Waste Electricals, 2022

[183] Eftec, Value of Reduced Disamentity from Fly-tipping – Waste Electricals, 2022, p.5

[184] This groups of LAs includes a variety of ruralities and regions. It is therefore assumed that costs faced by these LAs reasonably represents LAs not currely offering this service. This will be tested further at consultation.

[185] https://www.oakdenehollins.com/reports/2021/8/2/update-to-a-review-economic-and-environmental-of-kerbside-collections-for-waste-electricals

[186] https://www.oakdenehollins.com/reports/2021/8/2/update-to-a-review-economic-and-environmental-of-kerbside-collections-for-waste-electricals assumed by Oakdene Hollins in their modelling

for differing costs faced by LAs. In this analysis, most costs are first estimated on a per unit basis, accounting for rurality and specific LA DMR and residual collection services, and then scaled up by the number of households that match these two categories.

In order to provide kerbside SMW collection, we assume that LAs will be able to retrofit refuse collection vehicles (RCVs) with a cage to collect SMW[187].

To calculate the anticipated tonnages flows of WEEE diverted to recycling and reuse once SMW household collection is rolled out in all local authority areas, current levels of SMW collection for LAs with SMW collection are scaled up. Currently, as a baseline, data from WasteDataFlow[188] suggests that in 2019, 2,277t of SMW was collected at kerbside. Oakdene Hollins[189] carried out surveys of LAs that currently offer a SMW collection service to understand the current annual household levels of SMW collected. Table 19 reflects the results of this survey which presents the median and upper quartile estimates of annual level of kilograms of SMW collected from each household (kg/hh per year).

Table 19: Annual SMW collection in LAs that currently offer kerbside SMW collection (kg per household per year)

Oakdene Hollins current median (kg/hh/year)	0.36
Oakdene Hollins current upper quartile (kg/hh/year)	0.96

It is assumed that the median household collection figures from Oakdene Hollins are representative of the current picture, and as option 2 is implemented, SMW household collection levels will reach the upper quartile of current collections over a 3-year transition period. From the first three years after implementation in 2025, we assume a 10% increase each year in the levels of SMW collected. Then from 2028, we assume that the rate of increase in SMW collections begins to decrease as the policy settles in and consumers have become accustomed to it, so we expect after the third year of implementation, a 7.5% increase, then 4%, then 2.5% and so on[190].

Using 2019 tonnage levels (not including any growth of WEEE), we calculated anticipated tonnage uptake of kerbside SMW collections and takeback in comparison to the baseline, presented below in table 20. It should be noted that we expect this to be a conservative estimate, as there are limitations with current collection services including the lack of coordinated nationwide communications campaigns which are proposed to be included as part of these reforms. As a lack of awareness of recycling routes (alongside lack of convenient options) have been found to be a key barrier to increased WEEE recycling, we expect the combination of communications campaigns and household collections to see a higher uptake than current household collection schemes.

Table 20: Anticipated SMW collection uptake from 2019 (tonnes)

	Baseline	Year 1	Year 5	Year 10	Total (Over ten years)
Anticipated uptake based on current observations	2,277.50	9,930	44,448	57,429	418,675
Additional takeback compared to baseline (2019 tonnages)	0	7,653	42,170	55,152	395,899

[187] https://www.oakdenehollins.com/reports/2021/8/2/update-to-a-review-economic-and-environmental-of-kerbside-collections-for-waste-electricals assumed by Oakdene Hollins in their modelling
[188] Waste data flow questions 10 and 11, Anthesis Evidence Gaps 2022, pg. 39
[189] https://www.oakdenehollins.com/reports/2021/8/2/update-to-a-review-economic-and-environmental-of-kerbside-collections-for-waste-electricals
[190] These assumptions account for the fact that it will take time for households to get used to these systems and that as they become more knowledgeable about the system more will be collected but the potential additional amount that can be collected will reduce over time. This will be tested further at consultation.

Anthesis[191] were commissioned by Defra to model this scenario and estimate the level of WEEE diversion due to implementing a SMW household collection service across all LA areas. Anthesis were provided with the data in table 20 on anticipated WEEE collections from 2019 data, and modelled it over the appraisal period, with the annual growth rate assumption that the total tonnage of WEEE increases by 3% per year, an assumption used throughout the impact assessment. In line with the rest of the modelling, the split of the residual WEEE is assumed to be 70% to EfW and 30% to landfill.

Table 21 presents the difference in tonnage flows for option 2, compared to the baseline.

Table 21: Tonnage of SMW to each waste flows over appraisal period under option 2

Category	Waste Flow	2025	2029	2034	Total (over 10 years)
SDA	Reuse				
	Recycling	11,395	57,408	83,892	565,707
	Recovery (EfW)	-7,977	-40,186	-58,724	-395,996
	Landfill	-3,419	-17,222	-25,167	-169,620

Fly-tipping assumptions

It is assumed that households that choose to fly-tip do so because of the costs and/or lack of convenience of WEEE disposal/collection. Small items of WEEE envisaged to be collected through the SMW kerbside collection system include phones, laptops, electric toothbrushes, small speakers, etc. Essentially, items that can be stored in a shopping bag. These are items that can be, and are currently, appearing in the 155kt of WEEE identified every year in residual waste. Other larger SMW items, such as microwaves, hoovers, large toasters, etc, can't be thrown in residual waste and also can't be collected through the SMW kerbside collection system (see option 2 specific assumptions on container sizes for SMW kerbside collection system). Throwing smaller SMW in residual is seen as a more convenient disposal methods than fly-tipping. Therefore, we are assuming that no fly-tipping will be diverted as a result of implementing the SMW kerbside collection system.

7.1.2 Option 2 transition costs

Set up costs – containers

The total container costs are based upon modelling by Oakdene Hollins. The costs depend upon the cost of the container, the cost of delivery, and the number of households living in flats in each LA. It is assumed that the same container is used, regardless of the collection type, and that only flats will need a new container. The cost of a 55-litre container without delivery is assumed to be £1.93 per box, with an additional 2% added for the cost of financing. The delivery costs vary depending on rurality and are in the range of £0.70 to £1.50 per household[192].

These unit costs are then scaled up by the number of flats in different categories of LAs. It must be acknowledged that this provides an upper estimate of the container costs, Oakdene Hollins recognise using the number of flats provides a "worst case scenario" of the costs, where it is assumed that all households in flats would require a container. However, this does not capture the considerable variability in types of flats and how they are set-up to dispose of waste. For example, flats in tower blocks with communal DMR may require one, slightly larger container. However, due to limited evidence on the number of flats within each waste disposal arrangement, we have made a simplification that is likely to be an overestimate of the actual costs. Refining this estimate is something that we aim to model in the final impact assessment.

[191] Anthesis, Evidence Gaps, 2022
[192] https://www.oakdenehollins.com/reports/2021/8/2/update-to-a-review-economic-and-environmental-of-kerbside-collections-for-waste-electricals

Oakdene Hollins's modelling includes data on the average proportion of households living in a flat in England and Northern Ireland but does not include data for Scotland or Wales. Therefore, we have gathered further data on the proportion of households living in flats in each of Scotland's LAs, but we have no additional data for Wales, so it is assumed to have the same proportion of households living in a flat as England. This data is presented below in table 22. For the final impact assessment, we would like to gather data for the proportion of households living in a flat in Welsh LAs.

Table 22: Average proportion of households living in a flat in an LA

England	Scotland	Wales	Northern Ireland
13%[193]	26%	13%[194]	8%

Source: Oakdene Hollins modelling adjusted by data provided by Zero Waste Scotland (ZWS)[195]

The total set up costs for providing the containers is presented below in table 23, showing the costs of inclusion and exclusion of LAs with existing SMW collection operations. In our cost-benefit analysis we use the total set-up costs including those with existing operations.

Table 23: Costs for the containers provided for flats (£ millions)

Total set up costs (including those with existing operations)	£13.7m
Total set up costs (excluding those with existing operations)	£11.8m

Staff training and familiarisation

As this would be a new policy for most local authorities and their waste management organisations, the staff who work in the related areas will need to undergo training to learn and familiarise themselves with how the new SMW kerbside collection system works should producers choose to engage them as delivery partners. If producers chose to work with other service providers, they also would equally incur training and familiarisation costs.

Oakdene Hollins's report was conducted with input from stakeholders and suggests that this additional training would be included in typical regular training, and that "the training costs were still negligible" - even if training was added part way through a contract[196]. However, to capture training and familiarisation costs, we have assumed additional training and familiarisation costs to be 0.8% of variable costs across the first two years, assuming that beyond these first two years, the costs would become part of general training and familiarisation costs for staff[197] and so a negligible amount of these costs would be attributable to the policy[198].

Table 24: Staff training and familiarisation over appraisal period (£)

	2025	2026	Total (10 years)
Staff training and familiarisation	£50,967	£50,967	£101,933

Scheme Administrator set up costs

As described in the section 6.1.1, an estimate of £392,941 Scheme Administrator set up costs has been calculated by scaling down costs estimated for the pEPR IA based on the number of producers expected to be obligated under each scheme.

[193] Note, the proportion of flats was not provided for 5 English Local Authorities.
[194] No data provided, so assumed to be the same as England
[195] https://webarchive.nrscotland.gov.uk/20200317165216/https:/www2.gov.scot/Topics/Statistics/16002/LAtables2018/2018Excel
[196] https://www.oakdenehollins.com/reports/2021/8/2/update-to-a-review-economic-and-environmental-of-kerbside-collections-for-waste-electricals, p.46
[197] This accounts for non wage labour costs
[198] As used in the Deposit Return Scheme impact assessment: https://consult.defra.gov.uk/environment/consultation-on-introducing-a-drs/supporting_documents/Impact%20Assessment.pdf

Table 25: Scheme Administrator set up costs (£ millions)

Scheme Administrator Set Up Costs	£0.4m

Communication costs

As described in the cross-cutting assumption section 6.2.3, it is assumed that in the first year of the policy there will be transition costs due to communication campaigns to introduce the policy to households, this cost is, on average, £1.49 per household. These costs will fall on the Scheme Administrator and will be passed onto producers.

Table 26: Initial Communication Costs (£ millions)

Communication Costs	£39.9m

7.1.3 Option 2 annual costs

Enforcement costs

As discussed in section 6.1.2, we expect that regulators will face no additional costs under the reformed system. This assumption was discussed with the Environmental Agency who confirmed that it was a reasonable assumption to make.

Table 27: Additional enforcement costs to regulators (£ millions)

Additional Enforcement Costs to Regulators	£0

Scheme Administrator operational costs

As set out in section 6.1.1, we estimate the annual Scheme Administrator operational (including office, admin, and staff) costs to be £4,488,831, totalling £44,888,313 over the 10-year appraisal period. This is based on scaling down Scheme Administrator costs estimated for the pEPR impact assessment, based on the number of producers obligated under each scheme.

Table 28: Scheme Administrator operational costs (£2019 millions)

	Annual	Total (10 years)
SA operational costs	£4.5m	£44.9m

Crew costs

There will be additional costs for labour associated with the extra workload that SMW collections will create for dry mixed recycling crews if such an approach was adopted to fulfil the producer obligation for household collections of SMW. Under this scenario, as SMW is expected to be collected at the same time as DMR, this will minimise costs. However, there will be increased labour costs for collection of SMW due to the additional time it will take crews to collect SMW. In order to calculate the additional crew costs of collecting SMW, the additional time per loader spent on collecting WEEE is multiplied by the salary costs of crew.

It is reasonable to assume that the RCV driver's role is fulfilled whether SMW is collected or not, and they have not been attributed to SMW. Therefore, we only consider the additional costs of the crew involved in loading the RCV. The number of other crew members depends on the rurality of the LA location. As in Oakdene and Holland's analysis, we assume that there is 1 loader per vehicle in rural areas, and 2 per vehicle in urban and suburban areas[199]. There is 1 supervisor employed for every 10 crew members. The average salary per loader is £25,341, and for supervisor's, is £42,400, which is based upon ICP2 data from WRAP[200]. For consistency, number

[199] https://www.oakdenehollins.com/reports/2021/8/2/update-to-a-review-economic-and-environmental-of-kerbside-collections-for-waste-electricals, p.29

200 This is WRAP's developed national indicative cost and performance assessments on known average baselines for different areas, which has been utilised by Oakdene Hollins. ICP2 - http://laportal.wrap.org.uk/Documents/ICP%20online%20tool%20assumptions.pdf,

of crew based on location, the crew to supervisor ratio and the salary costs are kept constant across the appraisal period.

To estimate the proportion of time spent per loader on collecting WEEE, the volume of a SMW cage as a proportion of the total refuse collection vehicle's capacity is used as a proxy. From contact with expert stakeholders, and findings from a mid-Sussex report[201], it is assumed that the volume of an average SMW cage is 0.18m^3, and the volume of an average DMR vehicle is 22m^3. Taking the volume of the SMW cage as a proportion of the volume of the vehicle, leads to an estimate of 0.81% of a loaders time being spent collecting SMW. Similarly, it is also assumed that 0.81% of supervisor time is allocated to SMW.

To calculate the specific labour costs from household SMW collection, the annual loader salary costs from DMR collections is multiplied by 0.0081 (the additional time taken to collect SMW) and the annual crew costs are presented below in table 29:

Table 29: Crew (labour) costs of SMW kerbside collection (£ millions)

	Annual	Total (10 years)
Crew costs	£3.8m	£38.0m

Vehicle retrofitting costs

The vehicles used for recycling and refuse collections are Refuse Collection Vehicles (RCVs) and kerbside-sort vehicles. We assume that kerbside-sort vehicles would be able to allocate a section of their vehicle to SMW, especially given that it can be assumed that SMW is not collected from every household and only takes up a small space, and once a Deposit Return Schemes for drinks containers is implemented, more space should be freed up in kerbside-sort vehicles. However, for RCVs, there is not spare capacity for SMW, and so it is assumed that RCVs will be retrofitted to add a SMW cage to the vehicle which is assumed to operate at an 80% fill level.

To calculate the vehicle retrofitting costs, the number of RCVs is multiplied by the average cost of a cage and the fitting costs. The cost of a SMW cage is taken from an average of the costs provided by two sources, a report from the Mid Sussex District Council[202], which proposes the cost of a cage as £657, and £500, suggested by a waste contractor[203]. We assume that the fitting costs per cage are £180, which was extracted from the Mid Sussex District Council report[204]. We assume that both the cost of the cage and of fitting it will not be impacted by either rurality or deprivation. The above assumptions will be tested during the consultation process.

Assuming that all RCVs that collect DMR are fitted with a cage, the number of RCVs needing SMW cages is estimated by dividing the number of households in each LA by the number of households that a vehicle can serve per collection journey, which is specific to the LAs rurality, and then further divide this by the number of working days within the collection frequency in the LA. For example, if DMR is collected weekly, it is divided by 5; if it is collected fortnightly, then it is divided by 10. Having estimated the number of RCVs requiring retrofitting of a SMW cage, this is multiplied by the average cage and fitting costs and this cost is annualised over 7 years, as in Oakdene Hollins report.

The cost of retrofitting RCVs with a SMW cage is presented below in table 30:

Table 30: Annual vehicle retrofitting costs (£2019 millions)

	Annual	Total (10 years)

201 Mid Sussex District Council Report: Proposal for an Enhanced Recycling Collection Service for Textiles and Small Waste Electrical and El.pdf (moderngov.co.uk)
202 Mid Sussex District Council Report: Proposal for an Enhanced Recycling Collection Service for Textiles and Small Waste Electrical and El.pdf (moderngov.co.uk)
203 This figure was collected during stakeholder engagement and is the waste contractor wants to remain confidential
204 Mid Sussex District Council Report: Proposal for an Enhanced Recycling Collection Service for Textiles and Small Waste Electrical and El.pdf (moderngov.co.uk)

Vehicle retrofitting costs	£1.8m	£18.0m

It is acknowledged that there might be limitations in the practicalities of installing SMW cages to RCV vehicles since RCVs do not have uniform proportions, as shown below in figure 2. This practicality issue may be exacerbated further as there is a movement towards electric RCVs. However, these practicality issues should not significantly impact the cost of retrofitting vehicles, and this impact could be analysed in the final impact assessment, collecting further views from waste management companies such as Biffa.

Figure 2: Examples of kerbside collection compartments on RCVs[205]

Flat container replacement costs

Anthesis assume that 5% of containers provided to flats will need to be replaced on average per year (for example due to breakages or loss). This is assumed to cost the same per container as previously outlined in this section.

Table 31: Annual container replacement costs (£ millions)

	Annual	Total (10 year)
Container replacement costs	£0.7m	£6.8m

Local and commercial overheads

Consideration of overheads was taken from the report by Oakdene Hollins[206]. This is considered an annual operating cost for local and commercial overheads, assumed to be a flat rate of 10% of the collection costs. This 10% rate is in line with the ICP3 methodology and assumed to remain constant over the appraisal period.

The Oakdene Hollins report also addressed that no specialist equipment would be anticipated, so we have not diverged from the 10% rate suggested.

Table 32: Annual local and commercial overheads (£ millions)

	Annual	Total (10 years)
Local and commercial overheads (per year)	£0.6m	£6.4m

Ongoing Communication costs

As described in the cross-cutting assumption section 6.2.3, it is assumed that ongoing communication campaigns will cost £0.5 per household. As explained, campaigns are assumed

205 Oakdene Hollin's Report, page 24, Left: Example of undercarriage cage installed under RCV in Mid Sussex where WEEE are presented in carrier bags; Right: Example in Urbaser where the compartments are used for clothing, SMW and batteries

206 https://www.oakdenehollins.com/reports/2021/8/2/update-to-a-review-economic-and-environmental-of-kerbside-collections-for-waste-electricals, p.29

to have a significant transition cost then a fixed yearly operational cost. These costs will fall on the Scheme Administrator and will be passed onto producers.

Table 33: On-going Communications campaigns costs (£ millions)

	2025	2029	2034	Total (10 years)
Communications costs	0m	14.5m	14.5m	130.8m

Treatment costs

The assumed cost per tonne of treating WEEE was discussed in the cross-cutting assumptions section 6.2.1. Multiplying the relevant cost per tonne by the estimated WEEE diverted to recycling from residual waste provides an estimate of £43m over the appraisal period.

Table 34: The cost of treating WEEE (£ millions)

	2025	2029	2034	Total (10 years)
Treatment costs	£0.9m	£4.4m	£6.4m	£43.4m

Cost of additional fuel attributed to SMW collections

As previously stated, it is assumed that SMW collections will be collected alongside current DMR collections. Therefore, it is assumed that the distance travelled by collection vehicles under option 2 will remain the same as in the baseline, but that the weight of waste carried by each vehicle will increase because of the additional SMW collected.

The additional fuel use was modelled by Anthesis as part of their research into the cost of introducing kerbside SMW collections. They assume that the average DMR vehicle travels 13,780k miles per vehicle year for collections in urban areas and 19,500k miles per vehicle per year for collections in rural areas[207]. This is multiplied by the estimated number of vehicles needed for each LA[208] (based on the rurality of the LA), to calculate a total number of miles covered per year.

The reduction in Miles per Gallon (MPG) attainted by vehicles as a result of the increased weight from SMW collections (estimated using the equation set out in the cross-cutting assumptions section 6.4.1), is then multiplied by the number of miles travelled per year, to estimate the fuel usage. This is then converted to litres and multiplied by the assumed 2019 fuel cost per litre (£1.28)[209].

Overall, this leads to an increase in fuel costs of £0.9 million over the appraisal period.

Table 35: Cost of additional fuel attributed to SMW collections (£)

	2025	2029	2034	Total (10 years)
Cost of additional fuel attributed to SMW collections	£85,760	£85,760	£85,760	£857,604

Additional carbon from transport

The same total additional fuel use is then multiplied by the assumed 2.59 kgCO2e/litre for an average diesel biofuel mix[210] and converted into tonnes of CO2e. This is then multiplied by the BEIS carbon prices[211].

[207] https://www.eunomia.co.uk/reports-tools/the-climate-change-impacts-of-recycling-services-in-wales/
[208] Method set out under vehicle retrofitting costs
[209] Eunomia: Ditching Diesel central assumption for residual RCV round mileage
[210] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2019
[211] Valuation of greenhouse gas emissions: for policy appraisal and evaluation 2021, Annex 1, https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation#annex-1-carbon-values-in-2020-prices-per-tonne-of-co2

This leads to an estimate of £460k of additional carbon over the appraisal period.

Table 36: Cost of additional carbon from additional fuel used in SMW collections (£)

	2025	2029	2034	Total (10 years)
Additional carbon from transport	£42,907	£45,547	£49,178	£459,599

Landfill tax loss to the public sector

Diverting WEEE away from residual disposal routes will lead to less WEEE ending up in landfill. This will lead to a loss of landfill tax to the public sector. As described in section 5.5, we assume that 30% of WEEE sent to residual will be disposed of in landfill. Multiplying the expected tonnage of WEEE diverted away from residual by 30%, and then by the landfill tax rate of £91.35 per tonne, leads to an estimate of £16m over the appraisal period.

Table 37: Landfill tax loss to the public sector (£ millions)

	2025	2029	2034	Total (10 years)
Landfill tax loss to the public sector	£0.3m	£1.6m	£2.3m	£15.5m

7.1.4 Annual Benefits

Net carbon reduction resulting from tonnage diverted from residual to recycling/reuse

By applying territorial carbon factors and BEIS carbon prices (as set out in the cross-cutting assumptions section 6.4.1) to the estimated tonnage diverted from residual disposal to recycling and reuse under option 2, we estimate total societal GHG benefits of £189m over the 10-year appraisal period.

Table 38: Net Carbon reduction from WEEE diversion to recycling/reuse (£ millions)

	2025	2029	2034	Total (10 years)
Net carbon reduction resulting from tonnage diverted from residual to recycling/reuse	£3.5m	£18.7m	£29.5m	£188.9m

Secondary market profits to reprocessors from additional recycled materials

As described in the cross-cutting assumptions section 6.2.1, additional revenue to reprocessors is estimated by multiplying secondary material prices by the estimated additional WEEE tonnage diverted to recycling from residual. To account for the cost faced by reprocessors during the recycling process, only the assumed profit proportion of this revenue is included as a benefit. This leads to an estimated £102m in increased profit to reprocessors over the appraisal period.

Table 39: Secondary market profits to reprocessors (£ millions)

	2025	2029	2034	Total (10 years)
Secondary market profits to reprocessors from additional recycled materials	£2.1m	£10.4m	£15.1m	£102.1m

Landfill tax saving (LA/waste collector)

Diverting WEEE away from residual disposal routes will lead to less WEEE ending up in landfill. This will lead to a saving to LAs who currently pay landfill tax to dispose of WEEE collected as residual waste from households. As described in the section 5.5, we assume that 30% of WEEE sent to residual will be disposed of in landfill. Multiplying the expected tonnage of WEEE diverted away from residual by 30%, and then by the landfill tax rate of £91.35 per tonne, leads to an estimate of £16m over the appraisal.

This is a transfer from the public sector to LAs.

Table 40: Landfill tax savings for LAs/ Waste Collector (£ millions)

	2025	2029	2034	Total (10 years)
Landfill tax savings	£0.3m	£1.6m	£2.3m	£15.5m

Landfill and EfW Gate Fee Savings

As well as landfill tax savings, there will also be other disposal cost savings to LAs: landfill and EfW gate fees. To estimate these savings, the proportion of the estimated tonnage diverted from residual is split between landfill and EfW (30% to landfill and 70% to EfW) and then multiplied by the respective gate fee per tonne rate.

Overall, LAs will save £41m over the appraisal period.

Table 41: Landfill and EfW gate fee savings to LAs (£ millions)

	2025	2029	2034	Total (10 years)
Gate fee savings	£0.8m	£4.2m	£6.1m	£41.1m

7.2 Option 3

This section outlines the ***additional*** costs and benefits attributable to option 3.

7.2.1 Residual WEEE diverted to recycling/reuse in option 3

Policy option 3 proposes the introduction of a free household bulky WEEE collection service, funded by producers. For the purposes of this IA, we have assumed that this collection will be undertaken by local authorities; with local authorities then charging producers for this service. This assumption has been applied because of the availability of data concerning bulky waste collection services currently operated by local authorities. Using this data has allowed us to model a system where LAs operate a free bulky WEEE collection service for households that is funded by producers.

Anthesis were commissioned by DEFRA to model this scenario, and form estimates of the amount of WEEE collected due to implementing a free household bulky WEEE collection service. This research sought to understand how households might change their disposal behaviour if the price structure of bulky waste collections changes. For example, if the service were to change from charged to free.

Anthesis reviewed documents from 12 local authorities that have implemented bulky waste collections (11 of which changed from a free collection, to a charged for collection). Evidence gathered from the 12 LAs indicates that charging for bulky WEEE collections can lead to up to an 85% reduction in the number of collections, with an average reduction in collections of roughly 65%[212]. Therefore, it is not unreasonable to suggest that if the reverse is implemented, the reduction in bulky WEEE collections witnessed after changing from a free to a paid for collection, would be reversed. We therefore assume the increase in tonnage collected through this route as a response to the policy option to be equivalent to the reversal of this trend, albeit with 5% of the additional tonnage removed. This 5% has been applied due to the increasing number of options to households to dispose of their WEEE (e.g., take-back routes, HWRC drop off, etc.) as a result of the reforms outlined, and therefore, we have assumed that reversing the price increase of collections would not result in a complete return to previous collection levels[213].

[212] Anthesis, Evidence Gaps, 2022
[213] Anthesis, Evidence Gaps, 2022

We apply this increase to data on the amount of WEEE collected through current bulky WEEE collection services to estimate the new collected tonnage post policy implementation[214]. The additional tonnage is assumed to be diverted away from other collection routes. This is because for bulky WEEE, there is assumed to be no hoarding in the system[215]. Therefore, we assume that the additional WEEE collected has been diverted away from HWRC deposits and the informal sector.

Due to the inconvenience of taking WEEE to HWRCs, and the assumption that informal and illegal disposals cost less than formal collections, it is assumed that the informal sector will provide the bulk of the uplift in performance. We therefore assume that 85% of the increased tonnage collected is diverted from the informal sector. This includes both a reduction in fly-tipping, and a reduction in WEEE being collected by local scrap dealers. The remaining 15% is assumed to be diverted away from HWRC deposits, which consists of households transporting their own WEEE to collections points.

Moving to implementation of a free bulky WEEE collection service is expected to increase reuse as well as recycling. This is because moving to a formal bulky WEEE collection service, funded by producers (assumed, for the purpose of this IA, to be operated by LAs), should enable a greater separation and quality in condition of the WEEE that is collected. As it is being left up to producers how to implement the reforms, they may choose to work with the third sector, e.g., the Reuse Network. Therefore, this should increase the chance of reuse/refurbishment opportunities, while also improving recycling rates.

Table 42: Change in bulky WEEE recycling and reuse rate from baseline to policy options[216]

	Assumed in baseline	**Assumed in option 3**
Recycled	**20%**	**60%**
Reused	**0%**	**10%**
Disposal (Landfill and EfW)	**80%**	**30%**

Source: Anthesis Evidence gaps research[217]

Overall, as depicted in table 42, the modelling assumes that the recycling rate for WEEE in bulky waste will rise from 20% to 60%, with reuse increasing from 0% to 10%[218]. The remainder of WEEE collected through the free bulky WEEE collections is assumed to be sent to disposal at EfW or landfill sites. In line with the rest of the modelling, the split of the residual WEEE is assumed to be 70% to EfW, and 30% to landfill[219].

Table 43 depicts the difference in tonnage flows for option 3, compared to the baseline. It is important to note that the total amount of WEEE collected through all routes is assumed not to change because of the policy implementation, as it is assumed that there is no hoarding of bulky WEEE. Any change therefore reflects a diversion from disposal to recycling and reuse. As throughout the modelling, it is assumed that the total tonnage of WEEE increased by 3% per year.

Table 43: Waste diversion impacts from introduction of free household bulky WEEE collections (tonnes)

Category	Waste Flow	2025	2029	2034	Total (over 10 years)
LHA	Reuse	4018	13705	15888	127173

[214] Anthesis, Evidence Gaps, 2022
[215] Conversations with consultants confirmed that it would be realistic to assume that on a household basis there would be a negligible amount of hoarding of bulky WEEE due to a lack of space. Households would either be using multiple items of bulky WEEE or disposing of bulky WEEE to replace it with a new item rather than hoarding the waste.
[216] This is the marginal impact of option 4
[217] Anthesis, Evidence Gaps, 2022 – The other recycling factor is explained in the baseline assumptions section.
[218] Anthesis Evidence Gaps, 2022
[219] Anthesis, Evidence Gaps 2022

	Recycling	9082	30974	35907	287411
	Recovery (EfW)	-9170	-31276	-36257	-290208
	Landfill	-3930	-13404	-15539	-124375
SDA	Reuse	46	158	183	1466
	Recycling	185	632	733	5865
	Recovery (EfW)	-162	-553	-641	-5132
	Landfill	-69	-237	-275	-2199
Display	Reuse	66	224	260	2079
	Recycling	148	506	587	4699
	Recovery (EfW)	-150	-511	-593	-4745
	Landfill	-64	-219	-254	-2033
Cooling	Reuse	1928	6577	7624	61025
	Recycling	4358	14863	17231	137917
	Recovery (EfW)	-4400	-15008	-17398	-139260
	Landfill	-1886	-6432	-7456	-59683

7.3.2 Reduction in Fly Tipped WEEE in Option 3

As mentioned, it is assumed households that choose to fly-tip or use illegitimate waste collection companies that fly-tip, do so because of the costs and/or lack of convenience of WEEE disposal/collection. By addressing these factors, the proposed policies are likely to have some effect in decreasing the amount of WEEE being fly tipped.

As described in more detail in the cross-cutting assumptions section 6.3.1, Anthesis suggest that a free bulky waste WEEE collection service for households could decrease fly tipped WEEE by around 10%-15%. As a conservative estimate we used 10% in the impact assessment modelling.

Table 44: Reduction in fly-tipping under option 3 (tonnes, assumed 10% reduction)

Category	**2025**	**2029**	**2034**	**10-year policy period total**
Lower Bound	585	658	763	6,701
Mid-point	**1,101**	**1,239**	**1,436**	**12,617**
Upper Bound	1,617	1,820	2,109	18,533

Source: DEFRA modelling

Table 44 depicts the total tonnage diversion that would be realised if option 3 was implemented. As mentioned in the section on baseline fly-tipping tonnages, it is assumed that fly-tipping tonnages increase by 3% p.a., which is in-line with the assumed increase in electrical waste every year.

7.2.3 Annual costs

Enforcement Costs

As discussed in the cross-cutting assumptions section 6.1.2, we expect that regulators will face no additional costs under the reformed system.

Table 45: Additional Enforcement Costs to Regulators

Additional Enforcement Costs to Regulators	£0

Scheme Administrator Costs

We do not currently have sufficient evidence to determine the additional Scheme Administrator costs needed for each individual policy option. As such, we assume the same Scheme Administrator costs in each option. There are therefore no additional Scheme Administrator costs in option 3. Scheme Administrator costs will be reviewed, following consultation, for the final impact assessment.

Table 46: Option 3 Scheme Administrator Costs

Additional Scheme Administrator Operational Costs	£0

Bulky WEEE Collection Costs to Producers

Anthesis have estimated a cost of £8.87 per item for bulky WEEE collections, which is based on the prices charged by LAs currently for this service[220]. We assume that this covers the full cost of the collection service (including vehicle costs, staff etc)[221]. Under the assumption that the average bulky WEEE item weights 60kg[222], this translates to £147.83 per tonne. Multiplying this by the current tonnage of bulky WEEE reported as collected by LAs[223][224], leads to an estimated baseline cost (2019) of £9,567,677.

Anthesis assume that under option 3, the tonnage of bulky WEEE collected through LA bulky WEEE services will increase by 250%[225]. Multiplying this additional tonnage by the estimated £147.83 per tonne provides an estimation of the additional costs under option 3.

It should be noted that baseline bulky WEEE collection costs are assumed to be faced by households who are generally charged by LAs for using this service. Under option 3, producers will face the full cost of this service, including that currently paid for by households. As such, the baseline costs are a transfer from households to producers.

Overall, it is estimated that producers will face costs of £327,417,191 over the appraisal period. This includes both the baseline costs which have been transferred to businesses, and the costs associated with collecting the increased tonnage modelled.

Table 47: Bulky WEEE collection costs (£ millions 2019)

	2025	**2029**	**2034**	**10-year policy period total**
Baseline costs (transferred)	£11.4m	£12.9m	£14.9m	£131.0m
Additional option 3 costs	£17.1m	£19.3m	£22.4m	£196.5m
Total costs	£28.6m	£32.1m	£37.3m	£327.4m

Communication cost to business

[220] Anthesis Evidence Gaps 2022
[221] We will test this assumption through the consultation process
[222] Anthesis, Evidence Gaps, 2022
[223] Waste Data Flow
[224] Assumed to increase by 3% over the appraisal period in line with the rest of the analysis.
[225] Anthesis, Evidence Gaps, 2022

As set out in the cross-cutting assumptions section 6.2.3, there will be no additional communication costs for Option 3, since the difference between small and bulky WEEE and their disposal methods would have to be communicated under both options. Thus, under Option 3, the messaging may be slightly different, but the costs should be the same.

Table 48: Communication campaign costs for option 3

	10-year policy period total
Communication campaigns costs	£0m

Treatment Costs to Business

To estimate the treatment (recycling) costs for the tonnage collected under option 3, the estimated tonnage of each type of WEEE collected is multiplied by the specific treatment cost for that WEEE category (as set out in the cross-cutting assumptions section). This leads to costs of £28m over the appraisal period.

Table 49: Costs to businesses of treating additional WEEE

	2025	**2029**	**2034**	**10-year policy period total**
Treatment Costs to Business	£0.9m	£3.1m	£3.5m	£28.3m

Carbon costs (from additional fuel)

Under option 3, it is assumed that ensuring that household bulky WEEE collections are free to households will lead to an increased demand for bulky WEEE collections. Therefore, LAs will have to make additional collection journeys. This will lead to additional fuel usage (and additional CO2e emissions)[226]. Oakdene Hollins' modelling[227] is used to estimate this.

Whilst there will be additional fuel usage from additional journeys made by LAs, there may be reductions in fuel use from households taking bulky WEEE to HWRCs in private vehicles and from journeys made to fly-tip. However, we do not have the data to quantify the potential reduction in carbon costs from a reduction in journeys in the counterfactual. Therefore, the carbon costs under Option 3 are likely to be an overestimate of the cost of greenhouse gas emissions from additional fuel.

Oakdene Hollins first estimate the total distance covered by these collections once option 3 is implemented. As the extent of journeys under this option is uncertain, the number of miles covered by kerbside residual vehicles operating biweekly collection services are used to estimate the milage of collection vehicles. This would roughly represent a bulky WEEE service driving down every road once every two weeks[228]. Oakdene Hollins assume that each residual collection vehicle travels 18,000 miles per year if in an urban area, or 24,000 miles for those in rural areas[229]. Based on 261 working days per year, and each household being visited every 10 working days (2 working weeks), this suggests 67 and 95 miles per vehicle, per round, respectively. Assuming that each urban round visits 2.5k households, and each rural round visits 1.5k households[230], this suggests 0.03 and 0.06 miles per household for urban and rural areas respectively. This is likely an overestimate however is used as a conservative estimate due to a lack of specific data on the miles covered by bulky waste services.

[226] Note there may be fuel and carbon savings as a result of households no longer taking WEEE to collections points however these are likely to be small and have not been quantified.
[227] Oakdene Hollins, A Review (Economic and Environmental) of Kerbside Collections for Waste Electricals, 2021
[228] The distance covered visiting each road is assumed to be roughly the same whether waste is collected from one household or all households.
[229] Oakdene Hollins, A Review (Economic and Environmental) of Kerbside Collections for Waste Electricals, 2021
[230] Oakdene Hollins, A Review (Economic and Environmental) of Kerbside Collections for Waste Electricals, 2021

Dividing the total number of households in each LA[231] by 10 provides the number of households visited per round, which is then multiplied by the miles per household (depending on rurality) and multiplied by the number of working days per year to estimate the total distance covered per LA. Summing all LAs leads to the total distance covered by bulky WEEE services once option 3 is operational.

It is assumed that a Class II van (1.305 to 1.74 tonnes) is used for this policy due to its payload capacity of 0.85t[232]. This aligns with our assumptions that each journey collects 0.72t of WEEE, with each item estimated to weigh 60kg, with 4 items per collection, and 3 collections per journey[233]. The kgCO2e per mile covered by a Class II vehicle are understood to be 0.23 kgCO2e/mile, this is multiplied by the miles covered, to provide a total kgCO2e impact of these journeys. However, some collections are already occurring under a paid-for system, therefore, only the relevant increase in journeys is associated with this policy. It is assumed here that there will be a 250% increase in collections in comparison to those seen in the current system, therefore 60% of the total fuel is associated with the introduction of a free-of-charge service.

Multiplying these estimated additional CO2e tonnages by the BEIS carbon prices[234], leads to an additional £12m of CO2e over the appraisal period.

Table 50: Carbon costs from additional fuel usage in bulky WEEE collections (£ millions)

	2025	2029	2034	Total (10 years)
Carbon costs (from additional fuel)	£1,1m	£1.2m	£1.3m	£12.2m

Landfill tax loss to the public sector

Diverting WEEE away from residual disposal routes will lead to less WEEE ending up in landfill. This will lead to a loss of landfill tax to the public sector. As described in section 5.5, we assume that 30% of WEEE sent to residual waste will be disposed of in landfill. Multiplying the expected tonnage of WEEE diverted away from residual by 30%, and then by the landfill tax rate of £91.35 per tonne, leads to an estimate of £17m tax loss to the public sector over the appraisal period.

Table 51: Landfill tax loss to the public sector (£ millions)

	2025	2029	2034	Total (10 years)
Landfill tax loss to the public sector	£0.5m	£1.9m	£2.1m	£17.2m

7.2.4 Option 3 annual benefits

Carbon savings

By applying carbon factors and BEIS carbon prices (as set out in the cross-cutting assumptions section 6.4.1) to the estimated tonnage of WEEE diverted from residual disposal to recycling and reuse under option 3, we estimate total additional territorial carbon emission benefits of £162.6m over the 10-year appraisal period. As mentioned in section 6.4.1, these are an underestimate of the carbon reduction under Option 3 as it does not take into account international emissions savings.

Table 52: Net carbon reduction from diversion of WEEE to reuse/ recycling in Option 3 (£ millions)

[231] WRAP https://preprod.wrap.org.uk/sites/default/files/2020-09/WRAP-UK%20bulky%20waste%20summary_0.pdf
[232] https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021
[233] These assumptions have been taken under advice of industry research and understanding of consumer behaviours. This assumes that it is bulky items which are being collected and that most will call upon a collection service when they're getting rid of more than one item.
[234] Valuation of greenhouse gas emissions: for policy appraisal and evaluation 2021, Annex 1, https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation#annex-1-carbon-values-in-2020-prices-per-tonne-of-co2

	2025	2029	2034	Total (10 years)
Net carbon reduction resulting from tonnage diverted from residual to recycling/reuse	£4.7m	£17.2	£21.5m	£162.6m

Reduced fly-tipping disamenity

To estimate the fly-tipping disameity reduction as a result of option 3, the estimated reduction in fly tipped WEEE (12,617 tonnes over the appraisal period) is multiplied by the estimated disamenity value per tonne (£5,890). The calculations behind this disamenity value are set out in the cross-cutting analysis section. Overall, it is estimated that this will lead to £74m of societal benefit over the appraisal period.

Table 53: Benefits of reduction in fly-tipping disamenity (£)

	2025	2029	2034	Total (10 years)
Fly-tipping disamenity benefits	£6.5m	£7.3m	£8.5m	£74.3m

Savings to households no longer paying for bulky WEEE collection

On-demand bulky waste (including bulky WEEE) services already exist and are generally offered through Local Authorities. As has been discussed, these services are generally offered as a paid services such that there will be a direct cost to households from using this service. Under option 3 this service will be paid for by producers. This means that there are savings to those household who would have used this service under the baseline scenario. This is a transfer from households to producers.

To calculate the baseline costs (which are savings in option 3) to households for using these services, we can use collection tonnage data associated with the current paid for bulky WEEE collection service operated by LAs[235]. This data is provided for 2018/19 from waste data flow and will our baseline tonnage for our analysis. The tonnage increases by 3% each year which is in-line with the waste growth assumption discussed in previous sections. This is reflected in table 54 below.

Table 54: Tonnage of bulky WEEE which is collected from households by LAs

	2019	2025	2029	2034
Tonnes Collected	64,719	77,278	86,977	100,831

As discussed in the cross-cutting assumption section, an average price per unit of £8.87 per item of WEEE collected through these services has been estimated[236]. As throughout this analysis we assume the average weight of a unit of bulky WEEE is 60kg. By dividing the baseline tonnages collected in each year by 60kg and then multiplying by £8.87 we can estimate the savings to households.

Over the appraisal period this amounts to savings of £131m.

Table 55: Savings to households from no longer paying for bulky WEEE collection (£ millions)

[235] Anthesis, Evidence Gaps, 2022 – Tonnage provided in this research based on Q23 on Waste Data Flow.
[236] Anthesis Evidence Gaps – review of a number of LA charges for bulky waste collections found an average per unit cost of £8.87.

	2025	2029	2034	10-year policy period total
Baseline costs	£11.4m	£12.9	£14.9m	£131.0m

Secondary market profits to reprocessors from additional recycled materials

As described in the cross-cutting assumptions section 6.2.1, additional revenue to reprocessors is estimated by multiplying secondary material prices by the estimated additional WEEE tonnage diverted to recycling from residual. To account for the cost faced by reprocessors during the recycling process, only the assumed profit proportion of this revenue is included as a benefit. This leads to an estimated £78.7m in increased profit to reprocessors over the appraisal period.

Table 56: Secondary market profits to reprocessors from additional recycled materials (£ millions)

	2025	2030	2034	Total (10 years)
Secondary market profits to reprocessors from additional recycled materials	£2.5	£8.5m	£9.8m	£78.7m

Landfill tax saving (LA/waste collector)

Diverting WEEE away from residual disposal route will lead to less WEEE ending up in landfill. This will result in a saving to LAs who currently pay to dispose WEEE collected as residual from households. As described in the section 5.5, we assume that 30% of WEEE sent to residual will be disposed of in landfill. Multiplying the expected tonnage of WEEE diverted away from residual by 30%, and then by the landfill tax rate of £91.35 per tonne, leads to an estimate of £17m over the appraisal.

This is a transfer from the public sector to LAs.

Table 57: Landfill tax savings (£ millions)

	2025	2029	2034	Total (10 years)
Landfill tax savings	£0.5m	£1.9m	£2.1m	£17.2m

Landfill and EfW Gate Fee Savings

As well as landfill tax savings, there will also be other disposal cost savings to LAs: landfill and EfW gate fees. To estimate these savings, the proportion of the estimated tonnage diverted from residual is split between landfill and EfW (30% to landfill and 70% to EfW), and then multiplied by the respective gate fee per tonne rate.

Overall, LAs will save £46m over the appraisal period.

Table 58: Landfill and EfW gate fee savings for LAs (£ millions)

	2025	2029	2034	Total (10 years)
Gate fee savings	£1.4m	£4.9m	£5.7m	£45.6m

7.3 Option 4

This section outlines the ***additional*** costs and benefits attributable to option 4.

7.3.1 Residual WEEE diverted to recycling/reuse in Option 4

Policy option 4 proposes to amend current take-back regulations (Regulation 43)[237]. The amendment would change in-store take-back policies so that larger businesses must offer to take-back WEEE on a 0:1 basis (rather than the current 1:1 take-back obligation). The amendment would also result in the current 1:1 collection on delivery of WEEE from the household (currently charged for), becoming a free 1:1 household collection policy under the new policy proposals.

Defra commissioned research from Anthesis to model this scenario and form estimates of the amount of WEEE that will likely be collected as a result of implementing the extended take-back regulations. The research undertaken has modelled how the implementation of this policy could work, by drawing on data from other nations in Europe who have already introduced similar policies of take-back, to predict how a similar implementation would work here in the United Kingdom.

Since our Options are cumulative; in Option 4, SMW and bulky WEEE kerbside collection will also be implemented, there may be competition between the collection methods. Amended retailer takeback could compete with bulky WEEE collection and SMW kerbside collection. For example, households may choose to return their bulk WEEE through free 1:1 takeback, as opposed to using the free bulky WEEE collection proposed in Option 3. Conversely, households may choose to dispose of their SMW through kerbside collection, instead of returning to store. In their modelling, Anthesis have accounted for the fact that the streams are competing by calculating the marginal impact of each policy on tonnages collected; taking into account the other collection methods (free on-demand bulky WEEE collection and SMW kerbside collection) available to consumers as the policy options are cumulative. Therefore, there is no double-counting of WEEE within this analysis of tonnes collected[238].

Anthesis compared the level of WEEE collected through the current take-back routes (Regulation 43 data), with the potential uplift due to the reforms. As shown in table 59, they have modelled an increase from a 19% to a 58% collection rate[239] for LHA and Cooling equipment, and from 1% and to a 3% and a <1% to a 2% increase in collection rates respectively for Display equipment and SMW[240]. The potential modelled uplift estimates are based on reported data from Ireland and Germany, and feedback from large brands and their experience operating in European markets. Although international benchmarks are used, there is still a potential risk that these represent a high estimate of potential take-back performance for the UK[241].

Table 59: Collection Rates (as proportion of EEE POM data) in Baseline and Option 4[242]

Stream	Baseline[243]	Option 4
Refrigeration	19%	58%
Other LHA	15%	58%
TV and monitors	1%	3%
Other small EEE	<1%	2%

The estimated uplifts in collection rates detailed above are used in this impact assessment to assess the potential uplift in performance of retail takeback tonnages under policy option 4. The percentage capture rates are applied to the placed-on market figures (by category of EEE), to estimate the tonnage of material collected via this route. This uplift of WEEE tonnage is assumed to be diverted from alternative collection routes. For example, for collections of large WEEE, 75% of the tonnage collected through the amended take-back route is assumed to be diverted away

[237] The Waste Electrical and Electronic Equipment Regulations 2013 (legislation.gov.uk)
[238] Option 4 shows the method used to estimate the marginal increase in WEEE collected as a result of option 4. As explained later in this section, it is assumed that a proportion of this is a diversion away from collection systems in previous options. Where this is the case the total tonnage of WEEE collected in option 4 is the marginal increase from option 4, plus any tonnage from previous options minus the tonnage diverted from a previous option.
[239] Collection as a proportion of POM
[240] Anthesis, Evidence gaps 2022
[241] Anthesis, Evidence gaps 2022
[242] This is the marginal impact of option 4. See footnote 212 for details of how this relates to previous options.
[243] Baseline collection is based on the average collected tonnage between 2016-20 and the POM in 2020

from informal collections, which were described in the tonnage assumptions section for option 3. 10% of the tonnage is also assumed to be diverted from HWRC deposits, with the final 15% assumed to be diverted away from bulky waste collections[244].

Alternatively, for small items of WEEE, the assumed diversion from other routes is different to that assumed for large WEEE. This is because the behaviours involved with the disposal of small WEEE are different to larger WEEE. For example, large WEEE cannot easily be thrown in residual waste, whereas small WEEE can. This means that the disposal of large WEEE through the informal sector is more appealing and cheaper, whereas the most convenient and cheapest disposal method for small WEEE currently may be throwing it in residual waste. Therefore, for the tonnage collected through the amended take-back policy, it is assumed that 30% comes from informal collections, 10% from HWRC deposits and 60% from household residual waste[245].

Although there is competition between the collection routes, implementing option 4 provides households with multiple routes to dispose of SMW and bulky WEEE, which addresses the current underlying problems of inconvenience and financial costs of recycling WEEE. To add, it is more convenient, and efficient for a retailer to collect bulky WEEE when delivering a new item of EEE to the household, than for LAs to make additional journeys to collect bulky WEEE. Therefore, even though retailer takeback may divert WEEE from LA bulky WEEE collections, retailer collection is a more efficient and environmentally beneficial route. Option 4 results in additional WEEE being recycled, on top of SMW collections and LA bulky WEEE collections, as shown in table 60.

It is important to note that the assumed change in the proportions of material reused and recycled is the same as what was reflected within table 12 in section 6.2.4

Now that these end flow proportions have been applied to the tonnage of WEEE which is collected, we can compare this final tonnage calculation to the baseline tonnages (and tonnages of option 2 and option 3, to see the marginal impact take-back measures will have in terms of collecting WEEE). It is important to remember that the total amount of WEEE collected through all routes has not changed as a result of the policy implementation. This is because for bulky WEEE, there is assumed to be no hoarding in the system (as has been stated in a previous assumption section). The only change is the increased tonnage which is going to reuse and recycling systems; having been diverted away from EfW and landfill streams. This is how the difference between policy option 4 and the previous policy options has been presented. The diversion away from residual waste, towards recycling and reuse, is depicted in table 60 below and will be used in our analysis when calculating the costs and benefits associated with policy option 4.

Table 60: Tonnage diversion as a result of extended take-back measures

Category	Waste Flow	2025	2029	2034	Total (over 10 years)
LHA	Reuse	3316	11309	13110	104938
	Recycling	43579	148634	172307	1379182
	Recovery (EfW)	-32827	-111960	-129792	-1038884
	Landfill	-14069	-47983	-55625	-445236
SDA	Reuse	193	658	763	6105
	Recycling	2685	9157	10616	84970
	Recovery (EfW)	-2014	-6871	-7965	-63752
	Landfill	-863	-2945	-3414	-27322

[244] This assumption has been based on Anthesis's view of consumer behaviour and recycling behaviours.
[245] This assumption has been based on Anthesis's view of consumer behaviour and recycling behaviours. In general SMW is more likely to be inappropriately disposed of in household residual than bulky WEEE which is more likely to be disposed on in informal routes including fly tipping.

Display	Reuse	43	147	170	1361
	Recycling	301	1026	1190	9524
	Recovery (EfW)	-241	-821	-952	-7619
	Landfill	-103	-352	-408	-3265
Cooling	Reuse	380	1295	1501	12014
	Recycling	5315	18126	21013	168191
	Recovery (EfW)	-3986	-13594	-15760	-126143
	Landfill	-1708	-5826	-6754	-54061

As mentioned, table 60 shows the tonnage diversion between the four end-of-life flow routes. The tonnage diverted towards recycling and reuse increases every year. This is in line with the assumption that waste within the system increases by 3% each year, which is a consistent assumption applied to each policy option and the baseline analysis.

Tonnage collected from each retailer collection route

Policy option 4 requires distributors (i.e., retailers and distance sellers) to collect WEEE via two different routes:

- Distributors must offer takeback on a 0:1 basis (for businesses with annual EEE turnover of over £100k pa[246])[247]. Smaller businesses would continue to offer a 1:1 take-back service
- Distributors must offer a free collection of WEEE from households when they deliver a replacement item (1:1) for large domestic appliances such as fridges/freezers and TVs

Anthesis have modelled overall tonnage diversion levels for each WEEE category as a result of this policy[248]. However, some of the costs associated with collecting and storing this WEEE will differ between the two collection routes. We have no specific evidence to suggest how much WEEE from each category would be collected through each of the two collection methods. As such, for our analysis we have assumed the following:

- All SMW (category 2-10) collected as a result of this option is collected via the in-store take-back route (0:1)[249]
- All bulky WEEE (category 1,11,12) is collected from the household in the free 1:1 collection[250].

It is assumed that, due to the small size and weight of individual items, SMW is more easily deliverable to in-store take-back collection points. Households could also easily take these items in bulk to an in-store take-back if they so desire. Being able to bring multiple smaller items in store without needing to purchase a replacement (which is not always the case when disposing of SMW), is more convenient.

In contrast, bulky WEEE items are far more difficult to take back into store (due to their weight and size) and are more likely to be disposed of when purchasing a replacement. The 1:1 household collection system would therefore be the most convenient option for bulk WEEE.

[246] This the same threshold for retailer/distributor obligations as under the current regulations

[247] It is acknowledged in the consultation document that offering a 0:1 takeback may be challenging for online only sellers. The consultation therefore seeks views on whether online only sellers should have alternative means of meeting these obligations. Online only sellers will be expected to provide a 1:1 takeback. The service should be of at least equivalent convenience to that currently provided by businesses selling via stores. This could for example be offered via a collection on delivery service, access to local drop off points, a system of pre-paid or refundable returns akin to that provided for return of unwanted purchases.

[248] Anthesis, Evidence Gaps, 2022

[249] This is based on the expertise of Anthesis rather than any particular consumer behaviour research

[250] This is a simplifying assumption. Some consumers may still collect from store.

Through conversations while working on the Defra commissioned WEEE research project[251], Anthesis confirmed that in the absence of data, these assumptions are the best approach for our analysis.

7.3.2 Reduction in Fly Tipped WEEE in Option 4

As previously mentioned in the methodology for the reduction in fly-tipping caused in option 3, the total reduction in fly-tipping will be 10% regardless of how many policy options are introduced to collect bulky WEEE. As the options are cumulative, we will simply be adding an additional collection method of WEEE to the collection method added in policy option 3 (LA bulky WEEE household collection). This means that there will be no marginal impact on the reduction in fly-tipping as a result of adopting policy option 4. The diversion from fly-tipping will be split between the two collection methods, however, the overall reduction in fly-tipping tonnage will remain at 10%.

The calculated split of fly-tipping tonnage that will be diverted from each of the two policies is assumed to be equal to the proportional split of the increased total tonnage of bulky WEEE that is collected as a result of implementing free retailer bulky WEEE 1:1 collections, and free LA bulky WEEE collections. To note, this tonnage split does not include the total tonnage currently collected in the baseline.

Table 61: Proportional split of WEEE collected from retailer kerbside take-back and LA Bulky WEEE collections

Collection Route	Total increased tonnage collected (10-year policy period)	Proportion
LA Bulky WEEE collection	1,328,863	20%
Retailers take-back (1:1 at kerbside)	5,397,123	80%
Total	6,725,987	

Source: DEFRA modelling based on Anthesis Evidence Gaps research

Table 61 depicts the proportion of WEEE that is collected through each route of collection proposed in the policies. As mentioned, for the purposes of our analysis, we have assumed that if both collection routes are introduced, the diverted tonnage of WEEE away from fly-tipping as a result of both collection routes will reflect the proportional split each policy is estimated to collect (with the total fly-tipping diverted equal to 10% of the yearly tonnage of fly-tipped WEEE).

Table 62: Tonnage diverted from each of the proposed collection routes – Midpoint tonnage

Collection Route	2025	2029	2034	10-year policy period total
LA Bulky WEEE collection	217	245	284	2493
Retailer take-back (1:1 at kerbside)	883	994	1152	10124
Total	1101	1239	1436	12617

Source: DEFRA modelling

[251] DEFRA consulted with Anthesis who confirmed in the absence of data this would be a reasonable assumption.

Table 62 highlights the assumed tonnage split (diversion away from fly-tipping) between the two collection routes if policy option 4 was adopted. As mentioned, the total fly-tipping diversion (in tonnes) will be the same, regardless of whether option 3 or option 4 was adopted. As can be seen in the total section of table 62 above, and the midpoint analysis tonnage from table 44 in the option 3 tonnage diversion section; they are the same. Therefore, there are no marginal changes to the amount of tonnage diversion when implementing retailer take-back from households.

7.3.3 Annual costs

Enforcement costs

As discussed in the cross-cutting assumptions section, we expect that regulators will face no additional costs under the reformed system.

Table 63: Additional Enforcement Costs to Regulators (£)

Additional Enforcement Costs to Regulators	£0

Scheme Administrator costs

We do not envisage a role for the Scheme Administrator arising from changes to the distributor obligations. There are therefore no additional Scheme Administrator costs in option 4.

Table 64: Additional Scheme Administrator Operational Costs (£)

Additional Scheme Administrator Operational Costs	£0

Handling and collection costs to retailers

Implementing extended requirements on retailers, producers, and internet sellers to facilitate take-back in-store on a 0:1 basis, and from the household on a 1:1 basis, will result in additional handling and collection costs being incurred by these businesses.

Anthesis modelled retailer data on estimated take-back operational costs so that they could provide estimated cost per tonne collection and handling costs[252]. Predicting exact retailer costs is difficult, particularly for the free household collection on a 1:1 basis because the cost of delivering the replacement item is already factored into the service costs. Data gathered through discussions with retailers (who provided some cost per tonne and per unit data) has produced a range of costs associated with the collection, handling, and storage of WEEE collected through this amended take-back scheme[253]. A mid-point of these costs has been used for the initial analysis and the two lower and upper bound extremes included in our sensitivity analysis. The costs have been detailed in table 65 below.

Table 65: Costs of handling and collecting WEEE within take-back policy implementation (£ per tonne)

Stream	Distributor in store management cost	Distributor doorstep collection and warehouse operational cost	Distributor logistics cost to PCS network cost per tonne	Scenario	Cost associated with in-store take-back	Cost associated with retailer household collection
Cooling	£10.00	-	£34.00	Refrigeration low point		£34.00
				Mid-Point		**£51.00**
	£15.00	£34.00	£34.00	Refrigeration high point		£68.00
LHA	£10.00	-	£34.00	LHA low estimate		£34.00

[252] Anthesis, Evidence gaps, 2022

[253] As this is commercially sensitive data, disaggregated costs were not provided. However, based on conversations with Anthesis we feel it is reasonable to assume that these costs include fuel costs, labour costs, capital costs, storage costs, etc.

				Mid-Point		**£51.00**
	£15.00	£34.00	£34.00	LHA high estimate		£68.00
Display	£30.00	-	£50.00	Display low estimate		£50.00
				Mid-Point		**£100.00**
	£45.00	£100.00	£50.00	Display high estimate		£150.00
SMW	£192.00	£64.00	£160.00	SDA low estimate	£352.00	
				Mid-Point	**£400.00**	
	£288.00	£96.00	£160.00	SDA high estimate	£448.00	

Source: Defra, based on Anthesis (2022)

As table 65 shows, there are two mid-point cost per tonne values (in bold) for each of the 1:1 household collection and 0:1 in-store take-back systems. It is assumed that in-store take-back costs only include the distributor in-store management cost and the distributor logistics cost to producer compliance scheme network cost per tonne. As we have assumed that only SMW is collected through the in-store take-back method only the final in-store costs for this method have been presented in the above table (as seen in column “Cost associated with in-store take-back”).

As has been mentioned, the 1:1 household collection includes all bulky WEEE assumed to be collected from option 4. The collection costs associated with this bulky WEEE collection route are Distributor doorstep collection and warehouse operational costs, alongside distributor logistics cost to producer compliance scheme network cost per tonne. The mid-point cost per tonne for collecting bulky WEEE from households is presented in table 65 above. These mid-point costs are then multiplied by the tonne of WEEE collected from take-back policy implementation to calculate the costs faced by retailers of handing and collecting WEEE under policy 4.

Using these assumptions, we estimate these costs to be £318m over the appraisal period.

Table 66: Cost of handling and collection of WEEE to retailers (£ millions)

	2025	**2029**	**2034**	**10-year policy period total**
Handling and collection costs to retailers	£27.8m	£31.3m	£36.2m	£318.4m

Treatment costs business

The assumed cost per tonne of treating WEEE was discussed in the cross-cutting assumptions section. Multiplying the relevant cost per tonne by the estimated WEEE diverted to recycling from residual provides an estimate of £44m over the appraisal period.

Table 67: Costs to businesses of treating WEEE (£ millions)

	2025	**2029**	**2034**	**10-year policy period total**
Treatment costs to retailers	£1.4m	£4.7m	£5.5m	£44.0m

Communication campaigns costs to producers

As set out in the cross-cutting assumptions section, the costs to producers for Option 4 are likely to be minimal and have not been quantified since they involve simple changes to current messaging. Producers will be asked about the effect of these communication costs during the consultation and these assumptions will therefore be reviewed for the final impact assessment.

Table 68: Communication campaigns costs (£ millions)

	10-year policy period total
Communication campaigns costs	£0m

Increased carbon from additional weight on journeys

As with option 2, it is assumed that no additional journeys will take place as a result of this policy option. It is assumed that retailers will pick up WEEE from households at the same time as delivering new EEE products. However, where this WEEE would not have been collected by retailers previously, this represents an increase in the weight of the load of collections, leading to higher fuel usage[254].

However, it must be acknowledged that where this WEEE would not have been collected by retailers previously, retailer takeback may replace journeys by households in private vehicles to dispose of WEEE. Therefore, the carbon from additional weight on journeys may be an overestimate of the impact of the costs of the policy.

As stated previously, we assume that retailers would charge for this service currently, and these charges have been assumed to fully represent the costs to the retailer of this service. As such, our estimates of the additional cost to retailers are assumed to already include increased fuel costs. However, we still need to estimate the additional CO2e from this fuel usage.

The same Miles per Gallon (MPG) change calculations as in option 2 are used to estimate the impact of the additional weight. However, as we do not know the total distance covered, a slightly different overall methodology is used. The CO2e per tonne of WEEE collected in option 3 (assumed to be similar to option 4 due to both the type of WEEE collected, and the ad hoc nature of collections) is used to estimate the total CO2e under option 4 based in the total tonnage of WEEE collected. This is multiplied by the difference in MPG to estimate the additional CO2e as a result of the policy, and then multiplied by the BEIS carbon prices[255].

Table 69: Increased carbon from additional weight on journeys (£)

	2025	2029	2034	Total (10 years)
Increased carbon from additional weight on journeys	£568	£679	£850	£7,005

Landfill tax loss (HMT)

Diverting WEEE away from residual disposal route will lead to less WEEE ending up in landfill. This will lead to a loss of landfill tax to the public sector. As described in section 5.5, we assume that 30% of WEEE sent to residual will be disposed of in landfill. Multiplying the expected tonnage of WEEE diverted away from residual by 30%, and then by the landfill tax rate of £91.35 per tonne leads to an estimate of £48m over the appraisal period.

Table 70: Landfill tax loss to the public sector (£ millions)

	2025	2029	2034	Total (10 years)

[254] Note there may be fuel and carbon savings as a result of households no longer taking WEEE to collections points however these have not been quantified.

[255] Valuation of greenhouse gas emissions: for policy appraisal and evaluation 2021, Annex 1, https://www.gov.uk/government/publications/valuing-greenhouse-gas-emissions-in-policy-appraisal/valuation-of-greenhouse-gas-emissions-for-policy-appraisal-and-evaluation#annex-1-carbon-values-in-2020-prices-per-tonne-of-co2

Landfill tax loss to the public sector	£1.5m	£5.2m	£6.0m	£48.4m

7.3.4 Annual benefits

Carbon savings from changes in flows

By applying carbon factors and BEIS carbon prices (as set out in the cross-cutting assumptions section) to the estimated tonnages of WEEE diverted from residual disposal to recycling and reuse under option 4, we estimate total additional territorial GHG benefits of £556.1m over the 10-year appraisal period. As mentioned in section 6.4.1, this is an underestimate of the total benefits in emissions reductions from policy Option 4 since it does not take into account the international emissions savings from reduced reliance on virgin material extraction and production as well as manufacturing.

Table 71: Net carbon reduction from tonnage diverted from residual to recycling/reuse (£ millions)

	2025	2029	2034	Total (10 years)
Net carbon reduction resulting from tonnage diverted from residual to recycling/reuse	£16.2m	£58.8m	£73.6m	£556.1m

Fly-tipping disamenity and collection costs savings

We have not quantified any additional fly-tipping benefits under option 4 compared to option 3. This is due to a lack of evidence of the exact impact of each policy on fly-tipping specifically. Instead, it is assumed that the same reduction fly-tipping seen in option 3 would also occur in option 4 in the absence of option 3; this is to say that that the lack of quantified estimates for option 4 does not mean that we assume that option 4 would have no impact on fly-tipping, rather that we do not have suitable evidence to estimate it.

Savings to households from no longer paying for retailer takeback collections

Retailers currently tend to charge households to remove WEEE when delivering a new item (on a 1:1 basis). As under option 4 retailers will no longer be able to charge for this service, this will be a saving to households. Based on information provided by industry stakeholders, we assume that consumers pay £20 per item of WEEE removed. Based on the assumption that the average bulky WEEE item is 60kg[256], and the tonnages collected by retailers on a 1:1 basis currently. This £20 per item is estimated to relate to £333.33 per tonne. Multiplying the current tonnage collected by this figure suggests that households would have paid £517.8m for these services under the baseline and so under option 4, this is a saving to households[257].

Table 72: Savings to households from no longer paying for retailer takeback collections (£ millions)

	2025	2029	2034	Total (10 years)
Savings to households from no longer paying for retailer takeback collections	£45.2m	£50.8m	£58.9m	£517.8m

Secondary market profits to reprocessors from additional recycled materials

As described in the cross-cutting assumptions section, additional revenue to reprocessors is estimated by multiplying secondary material prices by the estimated additional WEEE tonnage diverted to recycling from residual. To account for the cost faced by reprocessors during the

[256] As used in the rest of the analysis

[257] This could then be passed back to consumers through higher prices. However, as the extent to which this occurs is based on the decisions of businesses and the market structure they work within, this is not accounted for in the cost benefit analysis. The extent to which increased costs to businesses may be passed on to consumers is discussed in the wider impacts.

recycling process, only the assumed profit proportion of this revenue is included as a benefit. This leads to an estimated £296m in increased profit to reprocessors over the appraisal period.

Table 73: Secondary market profits to reprocessors from additional recycled materials (£ millions)

	2025	2030	2034	Total (10 years)
Secondary market profits to reprocessors from additional recycled materials	£9.4m	£32.9m	£37.0m	£296.4m

Landfill tax saving (LA/waste collector)

Diverting WEEE away from residual disposal routes will lead to less WEEE ending up in landfill. This will lead to a saving to LAs who currently pay to dispose of WEEE collected as residual from households. As described in section 5.5, we assume that 30% of WEEE sent to residual will be disposed of in landfill. Multiplying the expected tonnage of WEEE diverted away from residual by 30% and then by the landfill tax rate of £91.35 per tonne leads to an estimate of £48m over the appraisal.

This is a transfer from the public sector to LAs.

Table 74: Landfill tax savings to LA/ waste collector (£ millions)

	2025	2029	2034	Total (10 years)
Landfill tax savings	£1.5m	£5.2m	£6.0m	£48.4m

Landfill and EfW gate fee savings

As well as landfill tax savings, there will also be other disposal cost savings to local authorities in no longer having to pay landfill and EfW gate fees for WEEE that is diverted away from residual to recycling and reuse. To estimate these savings, the proportion of the estimated tonnage diverted from residual is split between landfill and EfW (30% to landfill and 70% to EfW), and then multiplied by the respective gate fee per tonne rate.

Overall, LAs will save £128m over the appraisal period.

Table 75: Landfill and EfW gate fee savings (£ millions)

	2025	2029	2034	Total (10 years)
Gate fee savings	£4.1m	£13.8m	£16.0m	£128.2m

7.4 Option 5

This option is the same as Option 4, but with the additional aspect of designating OMPs as a new class of producers. This means that businesses based in the UK who operate a website, or any other means by which information is made available over the internet, through which persons based outside the UK, other than the operator, can offer EEE for sale in the UK (whether or not the operator also does so), will have an obligation. This new requirement is a cost transfer from the overseas seller to the OMP designed to reduce the scale of noncompliance with the producer obligations in the WEEE Regulations in respect of goods sold online.

The proposal is designed to ensure OMPs contribute to the costs of collection, treatment, recovery and reuse or recycling of WEEE that reflects the UK market share of their overseas online sellers. By designating them as a new class of producer, OMPs would stand in the shoes of the overseas sellers on their platform and be obligated to register with a Producer Compliance Scheme and submit the same data as other producers. This is consistent with government proposals to place

obligations on online marketplaces as part of wider proposals to introduce extended producer responsibility for packaging[258].

Costs and benefits

No additional costs and benefits have been quantified on top of those presented in option 4. The main intention of this policy is to ensure that producers of all in scope EEE products are contributing to collection costs under the WEEE regulations. As such the key expected outcome of option 5 is that household collection costs (as set out in option 2 and 3) are spread across producers in a more equitable way, such that there is reduced opportunity for producers to free ride. The most significant impact of this option is therefore the redistribution of costs across producers rather than imposing greater obligations on producers as a whole.

Redistribution of costs

The main factor in determining the total cost profile to be met by producers is the amount of WEEE that is collected. Under the current system, compliance schemes (on behalf of their producer members) must ensure enough WEEE is collected to meet Government met targets. Targets are set on a tonnage basis and calculated based on the tonnage of WEEE collected over the previous 5 years. This is contrast to packaging targets which are set on a percentage basis, such that packaging producers must ensure that a certain proportion of packaging placed on the market by registered producers in a given year is recycled.

In the case of WEEE, therefore, the amount of EEE placed on the market by registered producers does not impact the total target to be met. This means that the aggregate amount to be financed by EEE producers is fixed based on the amount of WEEE collected in previous years rather than how much is reported as placed on the market by registered producers; a change in the number of producers registered with the regulator does not impact the aggregate cost of be financed. The target amount of WEEE to be collected is distributed across compliances schemes based on the market share of their producer members. Compliance schemes finance enough WEEE collections to meet their target and then recover costs from their members.

In a similar way, it is assumed that the cost to producers of setting up household collection systems (options 2 and 3) will not be dependent on the amount placed on the market by registered producers.

Overall, therefore, option 5 is not expected to alter the total cost to producers of collecting and recycling WEEE under the regulations. Rather by ensuring that more producers are meeting their obligations, aggregate costs will be spread over more producers.

Transition costs

All the main impact is expected to be a redistribution of costs across obligated producers, there may be some transition costs as a result of this option:

- **OMPs** will face costs to set up additional billing systems to recover cost from EEE producers selling through their platform[259]. They will also face costs of joining a compliance scheme and submitting data on the amount of EEE sold through their platform.

- **EEE producers selling through OMPs** may face additional familiarisation costs.

[258] https://www.gov.uk/government/consultations/packaging-and-packaging-waste-introducing-extended-producer-responsibility
[259] OMPs will be able to decide whether/how to recover these costs from EEE producers

- **Compliance schemes** will face costs associated with becoming familiar with the regulations involving OMPs in order that they can ensure their members are meeting the regulations.

Due to data limitations, we have not been able to quantify these additional costs as this stage and will seek to gain a broader understanding of these potential costs during the consultation process.

As highlighted, these proposals are in line with those expected to be implemented for packaging producers under pEPR. The final pEPR impact assessment[260] included estimates of the number of producers in scope of these changes, and quantified costs. Using data on OMPs operating in the UK[261], the pEPR impact assessment estimates that 46 online marketplaces would be in scope of packaging regulations. Data provided by packaging stakeholders was provided to estimate the familiarisation costs to be faced by these producers. As these costs are specific to the packaging regulations, it has not been deemed appropriate to use them to the additional cost on WEEE OMPs. Further research will be conducted through the consultation to ascertain appropriate costs for EEE OMPs.

7.5 Option 6

This option is the same as option 5, albeit with the addition of a new category for vapes in the WEEE regulations. This will ensure that the cost of recycling vapes falls solely on vapes producers, enhancing the incentive on these producers to increase the recyclability of their products, and lowering the recycling costs.

Costs and benefits

No additional costs and benefits have been quantified on top of those in the previous options. All else remaining equal, creating a new category for vapes is not expected to increase overall costs on producers (albeit some minimal transition costs discussed later). This is because the cost of recycling vapes collected for recycling under the regulations would have been met by producers under the current arrangement. Creating a new category would redistribute costs from all category 7 producers, to vapes producers specifically.

Redistribution of costs

Under the current regulations compliance schemes (on behalf of producers) are obligated to finance the recycling of all WEEE returned by householders to HWRCs and any WEEE delivered to them by retailers (for example, that which has been returned to store by consumers under 1:1 takebacks). Where compliance schemes finance the cost of recycling WEEE in a particular category, they recover the costs from their producer members who place EEE from that category on the market. Therefore, all vapes collected through these routes should be recycled and financed by producers in the relevant category (7). Similarly, it is expected that the Scheme Administrator for household collections under the reforms will allocate costs to producers based on the amount of each category of WEEE collected.

This option (all being equal) therefore does not create additional collection and recycling costs to producers in aggregate, rather redistributes costs away from other category 7 producers to exclusively vapes producers.

Creating a new category for vapes producers would also increase the flexibility for Government to set specific targets on vapes producers. Were the Government to set ambitious targets on vapes producers (higher than the amount of vapes that would have been collected for recycling under the previous options), this would lead to additional costs to vapes producers. The

[260] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1063588/epr-final-impact-assessment.pdf
[261] https://www.webretailer.com/marketplaces-worldwide/online-marketplaces/

Government are not currently consulting on what targets should be set following the introduction of the reforms, it is therefore not possible to estimate the additional cost to vapes producers at this stage.

It must be noted that the primary aim of creating a new category is to increase fairness in the distribution of costs across producers, and ensure the polluter pays principle by placing the full cost of recycling vapes on vapes producers. As such, not quantifying additional vapes collected for recycling (and therefore additional costs) is reasonable at this stage. This will be tested further through the consultation.

Although we have not quantified the change in vapes collected as WEEE from creating a new category of EEE, we would expect there to be an increase in the number of vapes collected for recycling as a result of the reforms on a whole. Both kerbside SMW collections and enhanced retailer takeback of WEEE will provide more convenient routes for consumers to recycle vapes. Communications campaigns across all options will also provide consumers with more knowledge of what can be recycled and where. In addition, the consultation will also seek views on whether further policy intervention is required to minimise the environmental impacts of vapes through improper disposal.

Transition costs
All the main impact is expected to be a redistribution of costs across obligated producers, there may be some transition costs as a result of this option:

- **Vapes producers** may face additional familiarisation costs however these are expected to be minimal as they are already required to join a compliance scheme, register with the regulator and report data, and contribute to the cost of collection, treatment, recycling, and recovery of WEEE under the current regulations.

- **Compliance schemes** may also face familiarisation costs, however these should be minimal as vapes producer members will be obligated in the same way as other category producers.

- **Regulators** may face costs associated with making minor changes to their reporting systems to include the new category

Interaction with health impacts
The environmental impacts policies involving vapes need to be balanced with health impacts. There are clear public health benefits to using vaping products as an alternative to smoking, and the government encourages adult smokers to switch to vapes as they are substantially less harmful than smoking. Vaping (using an e-cigarette) is an important tool to help the government achieve its ambition for England to be smokefree by 2030.

As such, Defra are working closely across government, including with the Department of Health and Social Care (DHSC) to ensure policies involving vapes meet the twin goals of improving environmental and health outcomes for society. In October 2023, government published a UK wide consultation: ‘creating a smokefree generation and tackling youth vaping’ proposing a number of actions, including placing restrictions on the sale and supply of disposable vapes.

7.6 Non-Quantified Costs and Benefits

Benefits

- Benefits of communications campaigns – the quantified increase in recycled WEEE from policies in option 2 and 3 are currently modelled based on evidence on the introduction or

change (from free to charged) of local household collection schemes. Although these local collections likely included some communication to households, we anticipate that there will be more significant increases in the amount collected by holding significant, nationwide, targeted communications campaigns which are currently not captured in the modelling.

- CRM & treatment standards - due to limitations in the evidence base, we have been unable to include the monetised benefits directly associated with diverting recyclable critical raw materials from residual streams. This area is also closely associated with treatment standards which is out of scope of this impact assessment, DEFRA are seeking evidence and views on this in the accompanying consultation document.
- Increase to reuse markets – an increased reuse market would increase competition, potentially leading to higher quality used products and more choice for consumers. This would particularly benefit those on lower incomes by increasing the availability of higher quality but cheaper EEE items.
- Natural capital benefits – reducing the volume of WEEE that enters the residual waste stream, and increasing reuse recycling, will have several benefits for the natural environment, beyond a reduction in greenhouse gas emissions. The interactions of these benefits are complex and so have not been quantified; these natural capital benefits have been described in section 9.2.
- Consumer experience – Increasing the availability and understanding of household collection options will have benefits for consumers, saving households' time and effort spent recycling their items. Where bulky WEEE is collected by LAs or retailers and replaces specific journeys by households to dispose of WEEE, households will face lower fuel costs. For larger items of WEEE, there are risks to households attempting to move heavy items, which could cause injuries; a household collection service would reduce the need for households to move large items themselves.

<u>Costs</u>

- Communications costs in option 4 – as stated in the specific section, we acknowledge that there are likely to be some transition costs to retailers through changes to their communication obligations under the proposals set out. We expect these to be minimal however have not currently quantified these and will seek to gain a better understanding of these costs through the consultation.
- Familiarisation costs in option 5 – similarly, we are aware that there may be some transition and familiarisation costs to OMPs based on the proposals set out in option 5. Again, these costs will be explored through the consultation process.

Section 8: Small and Micro Businesses and Medium-sized Business Assessment

8.1 Medium-sized business assessment

We do not have data on the proportion of medium (50-499 employees[262]) obligated WEEE producers. ONS publish data on the number of businesses and turnover by business size for different sectors[263]. EEE producers are most likely to fall within SICs 26 (Manufacture of computer, electronic and optical products) and 27 (Manufacture of electrical equipment). ONS data suggests that within these sectors, 4.7% of businesses are medium sized businesses. These businesses generate 47.5% of turnover in these sectors.

Table 76: Proportion of businesses and turnover by employee number for SICs 26 and 27

[262] Based in the BEIS definition of a medium-sized business: https://www.gov.uk/government/publications/better-regulation-framework/medium-sized-business-regulatory-exemption-assessment-supplementary-guidance
[263] https://www.gov.uk/government/collections/business-population-estimates

Business Size	Proportion of businesses	Proportion of turnover
Micro (0-9 employees)	83.4%	8.1%
Small (10 – 49 employees)	11.7%	16.7%
Medium (50 – 499 employees)	4.7%	47.5%
Large (500+ employees)	0.3%	27.8%

Based on the simplifying assumption that turnover is somewhat correlated with the number, or tonnage, of EEE products placed on the market by a business, this would suggest that excluding all businesses with less than 500 employees would exempt producers handling almost two thirds of EEE from obligations in total. This would leave 0.3% of businesses, representing just over a third of EEE placed on the market, to cover the full cost of collecting and treating WEEE placed on the market by the other 99.7% of producers.

As well as placing a disproportionate financial burden on non-excluded businesses, by requiring producers generating 27.8% of the turnover in the sector to pay 100% of the cost of collecting and treating WEEE, this would not be in line with the polluter pays principle. This would dilute incentives on producers to consider the recyclability of their products and minimise recycling costs.

8.2 Small and Micro Business Assessment

Similarly, table 76 also shows that small and micro businesses make up 95% of businesses and produce 25% of turnover in these sectors. Again, by excluding all small and micro businesses, businesses producing a quarter of the turnover in the industry would not be required to contribute to costs, leaving this cost to fall on the remaining businesses.

Despite this, it is recognised that there is a need to minimise the impact on the smallest businesses. Measures within the current regulations to reduce the burden on smaller producers and distributors are outlined below.

Under these measures, small businesses are defined by the tonnage of WEEE placed on the market or the turnover from EEE sales each year, rather than by employee size. It is acknowledged that this is a variation on how SMBs are generally defined (i.e., by employee size). RPC guidance recognises that employee size might not always work perfectly as an indicator of SMBs[264]. Under the WEEE regulations, the use of tonnage and turnover are used to ensure that the main obligations apply to all businesses placing a significant amount of EEE on the market, whilst also reducing the burden for the smallest businesses.

It should be noted that an individual producer's share of collection and treatment costs are (and will continue to be), calculated on a market share basis, such that those that sell less EEE face lower overall costs. ONS data[265] shows a clear correlation between business size by employee numbers and average turnover per business[266]. As turnover is likely to be significantly related to sales, this suggests that smaller businesses will face a smaller overall financial obligation under the WEEE regulations. Any small or micro business obligated under the regulations will therefore face financial obligations proportionate to their size.

The consultation will seek views on whether the de minimis thresholds set out below will remain appropriate under the reforms.

[264]https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/827960/RPC_Small_and_Micro_Business_Assessment__SaMBA___August_2019.pdf
[265] https://www.gov.uk/government/collections/business-population-estimates
[266] For example, in SICs 26 and 27, the average turnover for businesses by size are as follows: Micro (£0.2m), Small (£2.9m), Medium (£21.2m), Large (216.5m)

Small Producer Obligation – The 2013 WEEE Regulations introduced a de minimis threshold of 5 tonnes of equipment placed on the UK market annually. Producers who fall below that threshold are required to register with the Environment Agency and report the tonnage they place on the UK market annually in each of the 14 categories of equipment defined in the 2013 Regulations. A fee of £30 is payable. This contrasts with a registration fee of between £100 and £750 for producers placing equipment on the market above that threshold. In addition, large producers are also required to join a Producer Compliance Scheme and in the case of those trading in household equipment they are required to report data quarterly rather than annually.

In addition to the reduced administrative burdens listed above, small producers do not have to contribute to the costs of collection, treatment, reuse/recycling/recovering of WEEE in line with the targets set annually by the Secretary of State. WEEE arising from product placed on the market by small producers is financed by those producers above the de minimis threshold. In 2022, there were 3,320 small producers registered with the Environment Agency, compared to 3,139 other producers. There are no plans to change the de minimis threshold under the proposed changes to the WEEE regulations.

Distributor Obligations – The 2013 WEEE Regulations require distributors to offer a 1:1 take back service for unwanted EEE from customers on purchase of a similar product. This applies to all distributors unless they are a member of a Distributor Takeback Scheme (DTS). The regulations state that the Secretary of State, "…may after consultation with such persons or bodies as appear to him representative of the interests concerned, approve a distributor take back scheme…". The DTS allows an alternative method for distributors to comply with their take back obligations (through joining the scheme). Fees raised through the DTS are used to support local initiatives designed to drive up collections of household WEEE for reuse and recycling.

Currently Valpak (a WEEE compliance scheme) run a DTS covering the whole of the UK. This scheme was approved by the Secretary of State based on a proposal that it could offer membership to distributors with a turnover of under £100k per year in EEE sales (as proposed by Valpak in their application), or if they sell online only. This option provides smaller retailers with a choice of compliance options and avoids the need for the business to make provision to collect WEEE in store and make the necessary arrangements for the transportation of that WEEE to a point nominated by a producer compliance scheme for it to be recycled or prepared for reuse. Approval for this iteration of the scheme was given for the period 1st January 2021 until 31st December 2023. Once this period comes to an end, further consultation and approval would be needed to maintain the scheme. In anticipation of this, the WEEE consultation (which this IA accompanies) will ask for views on whether £100k remains an appropriate threshold for schemes of this nature. Additional consultation will then occur based on any suitable bid for approval once received.

Our proposed policy measure to mandate distributors go beyond the current take back requirement for WEEE from householders and instead offer a 0:1 in store take back service will only affect those distributors who currently sell above the threshold of £100k turnover in EEE sales per year. Smaller distributors will therefore continue to have flexibility of compliance options.

Section 9: Wider Impacts

9.1 Carbon analysis

As part of their modelling for the IA, Anthesis provided us with estimated tonnages of carbon dioxide emissions for WEEE from reuse, recycling, EfW, and landfill for the baseline and for each policy scenario[267]. The tonnes of carbon dioxide emissions they provided were a product of the tonnage changes in WEEE flows across the appraisal period[268], the material make-up of a typical tonne of WEEE, which is assumed to be constant across the appraisal period[269], and WRAP's

[267] "Research to identify and address gaps in existing WEEE data", DEFRA, by Anthesis; October 2022
[268] Anthesis (2022) analysis of the baseline WEEE compared to the WEEE waste flow under the policy
[269] European Commission analysis of the WEEE value chain summarised by Anthesis to Steel, Aluminium, Glass, and Dense Plastics.

Carbon Waste and Recycling Metric (WARM), specific to the waste flow of each material[270]. WRAP's carbon WARM factors include carbon dioxide emissions resulting from the extraction and refining of the raw material, the production of a material product, the end-of-life collection, the emissions associated with the treatment or disposal option, and the emissions offset by the treatment or disposal option[271]. They exclude the production of the finished product, packing and filling, distribution, and use, since WRAP believes that this is a "realistic representation of the UK recycling system" which produce materials as a raw output rather than finished consumer products[272].

Whilst Anthesis's general methodology of calculating estimated carbon impacts is similar to our own, we did not monetise and use the carbon dioxide tonnages from Anthesis in our model since WRAP's Carbon WARM tool utilises a consumption-based approach to allocating emissions from the production of products and services, which is at odds with the territorial approach required for impact assessments. The consumption-based approach of WRAP's carbon WARM allocates production emissions to the country in which the product was consumed. WRAP asserts that they use a consumption-based emissions approach because their aim is to "quantify the global emissions impact of treating products and materials at end of life"[273]. On the other hand, this impact assessment employs a territorial approach that quantifies emissions based on the country in which the EEE were produced, so only emissions associated with EEE produced in the UK are counted in the carbon production emissions.

As a result of this difference in approach, the carbon factors from WEEE provided by Anthesis have not been monetised and are not included in the modelling for our cost-benefit analysis. However, it is useful to present the carbon tonnages outlined in Anthesis as they show increased carbon savings from the policy proposals, which demonstrates that the policy proposals could have wider benefits than those quantified in our NPV. The carbon factors for WEEE calculated by Anthesis are shown below in table 77:

Table 77: WRAP Carbon WARM Factors (Used by Anthesis)

	Un-normalised values (kg.CO2eq/tonne)				**% Of WEEE by material**
Material	Closed loop recycling	Open loop recycling	Recovery (EfW)	Landfill	Composition of WEEE
Steel	-1062	-	19	9	55%
Aluminium	-7479	-	24	9	12%
Glass	-326	33	8	9	7%
Plastic	-90	205	1691	9	26%
Weighted for WEEE material mix	-1665	56.6	461.2	9	

This is an important difference in approach since the UK imports a high volume of EEE (and the materials that make up EEE) from abroad[274] and since the carbon emissions from production of these EEE imports are not accounted for within our model, our carbon benefits may be an underestimate of the possible carbon savings from increased reuse and recycling under the policy options. Therefore, this variation in approach can partially account for our net carbon benefits being below the carbon savings estimates in the Anthesis Report, as shown below in table 78. For example, for policy option 4, we estimate a net carbon benefit of carbon avoided over the 10-

[270] Carbon Waste and Resources Metric | WRAP
[271] Carbon Waste and Resources Metric | WRAP Pg. 7
[272] Carbon Waste and Resources Metric | WRAP Pg. 8
[273] Carbon Waste and Resources Metric | WRAP pg. 7
[274] Unpublished WRAP analysis, using Eurostat data

year policy period of 2082kt, whereas Anthesis estimate a net carbon saving of 3406kt. When taking into account the production emissions from the UK consumption of imported EEE, as in the Anthesis report, there are increased carbon benefits of policy action and hence increased benefits for society from intervention.

Table 78: A Comparison of this Impact Assessment's Territorial-Based Net Carbon Benefits and Consumption-Based Net Carbon Benefits for each Policy Option

	Net Carbon Benefit: Carbon Avoided Over the 10-Year Policy Period (kt) – marginal impact of each policy	
Policy Option	Territorial	Consumption
2	702	1091
3	608	1210
4	2082	3406

9.2 Natural capital benefits

When WEEE is not reused or recycled, it produces a number of environmental and social negative externalities, that the policy options seek to address. Therefore, there will be a plethora of natural capital benefits to society as a result of the policy options.

According to HM's Treasury's Green Book, natural capital is defined as:

"Natural capital includes certain stocks of the elements of nature that have value to society, such as forests, fisheries, rivers, biodiversity, land, and minerals. Natural capital includes both the living and non-living aspects of ecosystems."[275]

Some of these natural capital benefits of the reforms have been monetised and included in the cost benefit analysis, such as carbon emissions from changes in flows of WEEE and increased fuel use, and disamenity from WEEE fly-tipping. However, several natural capital benefits, which are outlined below, have not been quantified in the cost-benefit analysis due to complicated interactions and a lack of data making it hard to quantify these effects for WEEE:

- Reduced environmental negative externalities (to soil, water, and wildlife) from fly-tipping.
- Reduced environmental negative externalities from raw material extraction and EEE production.
- Reduced value loss from sending critical raw materials to landfill/incineration.
- Reduced social and environmental negative externalities from landfill.

Landfill

A reduction in demand for landfill as WEEE is diverted away from landfill towards reuse and recycling as a result of the proposed reforms will result in a reduction in the negative externalities from landfill, which is a natural capital benefit. Many electricals contain hazardous materials which are volatile and not biologically degradable, including arsenic, cadmium, lead, mercury and a number of brominated flame retardants[276]. For example, brominated flame retardants are classified as Persistent Organic Pollutants meaning they need to be irreversibly destroyed to avoid their impacts entering the human and animal food chain[277]. Hazardous materials from WEEE in landfill can cause degradation and pollution of soil and leaching which contaminates water sources[278][279][280]. By ensuring that more WEEE is diverted away from landfill, more hazardous

[275] The Green Book: appraisal and evaluation in central government, The Green Book: appraisal and evaluation in central government - GOV.UK (www.gov.uk), page 63
[276] Waste Electrical and Electronic Equipment recycling (WEEE) (hse.gov.uk)
[277] Using persistent organic pollutants (POPs) - GOV.UK (www.gov.uk)
[278] A review of the environmental fate and effects of hazardous substances released from electrical and electronic equipments during recycling: Examples from China and India - ScienceDirect
[279] Electronic waste and their leachates impact on human health and environment: Global ecological threat and management - ScienceDirect
[280] Electronic waste and their leachates impact on human health and environment: Global ecological threat and management - ScienceDirect 2021

materials can be captured for appropriate end-of -life treatment, which will reduce the potential for harmful impacts on natural capital.

Furthermore, waste disposal can have negative social externalities for nearby households, such as noise, dust, odours, visual intrusion, flies, and vermin[281]. Traffic to and from landfill sites can generate noise, traffic congestion and localised air pollution[282]. These effects can undermine public enjoyment of an area, generate adverse health impacts, and reduce the value of the surrounding area. Reducing the volume of WEEE sent to landfill will reduce these negative social externalities.

Fly-tipping

Similarly, when WEEE is fly tipped, hazardous materials from WEEE can cause soil pollution which can contaminate crops, livestock, and wildlife, and result in leaching, causing ground water pollution[283]. Therefore fly-tipping can have adverse effects on natural capital, which is a negative externality. Through the proposed reforms, less WEEE will be fly tipped, reducing the harmful impacts on natural capital.

Energy from waste

When WEEE is sent for incineration for energy from waste, it usually burns material under pressure in a closed, controlled system, which removes some emissions and filters out pollutants[284]. However, a small volume of toxic fumes and pollutants can still be emitted from the controlled systems, polluting the air, which can directly affect the health of living organisms. Incineration also releases carbon dioxide, which is accounted for in the cost-benefit analysis. People living near incinerators often face noise, litter, increased vehicle traffic, smells and air pollution resulting from the increased traffic to the site. The reduced demand for incineration as a result of the reforms will reduce the negative externalities associated with incineration and increase natural capital.

Material extraction and EEE production

When WEEE is not reused or recycled there is value lost from the loss of critical materials that compose WEEE. The materials that compose EEE, shown in table 12, are finite resources and depleting these critical finite resources is unsustainable. The reforms will allow for the recovery of valuable metals and hence increase the stock of natural capital.

As well as the recovery of valuable materials, the reduced reliance on raw material extraction and EEE production as a result of the reforms will reduce the negative externalities associated with extraction and production[285]. Mining of raw materials involves toxic substances, such as sulfuric acid, to separate and process the mineral from the ore[286]. This can cause environmental degradation of nearby soil as toxic substances poison the top layers of the soil. Processing of raw materials and production of EEE is energy intensive, releasing greenhouse gases[287]. Raw material extraction and processing can result in pollution to the air and water, deforestation, and the creation of waste. Therefore, reducing the demand for raw material extraction and EEE production will decrease negative externalities associated with them.

[281] Valuation of externalities of selected waste management alternatives: A comparative review and analysis - ScienceDirect
[282] Ibid.
[283] Evidence Review of Flytipping Behaviour.pdf (zerowastescotland.org.uk)
[284] Energy from waste: a guide to the debate (publishing.service.gov.uk)
[285] metals_environmental_risks_report_english.pdf
[286] Mineral Extraction - an overview | ScienceDirect Topics
[287] Increased carbon footprint of materials production driven by rise in investments | Nature Geoscience

9.3 Consumer costs

The policy options outlined in this impact assessment will place greater responsibility on producers and retailers of EEE products to pay for the collection and treatment/disposal costs associated with these products. As such, these businesses will face additional costs compared to the baseline scenario. EEE producers and retailers may decide to pass some, or all, of these additional costs onto consumers in the form of higher prices for EEE products. This section explores the extent to which cost pass through may occur.

Consumer Impacts: Cost-pass through assumptions associated with the disposal of SMW

EEE is not one homogenous category of products, and therefore an attempt has been made to determine whether cost pass through pressures differ across EEE categories. Due to limitations in currently available data, EEE has been disaggregated into two categories for this analysis: small mixed WEEE (SMW) and bulky WEEE. This is also in line with the policy options considered, which include policies to increase collections of each of these categories separately.

There is no specific evidence on pass through rates for SMW and so a theory-based assessment has been made. The extent to which producers can pass on costs to consumers is likely to be related to the relative elasticity of demand of products. There is insufficient research to determine the degree of price elasticity for SMW products, however, SMW comprises of 9 EEE categories, and within each of those categories exists significant homogeneity across products. This means that consumers can switch to a similar product in the same category if the cost of an individual item increases. Similarly, as some of these goods are not deemed necessities, consumers could choose not to buy the product at all. This may lead to individual producers having limited power to increase prices in the event of an increase in their costs.

However, it could be argued that regulatory reforms are more in line with an industry wide shock than a shock to individual businesses. The Office of Fair Trading (OFT) suggests that when there are industry wide shocks there is usually some form of cost pass through in the form of price rises[288]. They show that cost pass through is likely to be between two extremes of 50% under an industry with a monopoly and 100% under a perfect competitive market. The EEE industry is likely to be neither a monopoly or pure competition and the true pass through is therefore likely to be somewhere between these two extremes.

Table 79: Scenario of percentage of increase in cost which could be passed through to consumers

Low scenario (Pure Monopoly)	High Scenario (Perfect Competition)
50%	100%

Consumer Impacts: Cost-pass through assumptions associated with the disposal of bulky WEEE

There is some existing evidence on the elasticity of demand for bulky EEE products (category 1,11,12). Dale, L. & Fujita, S., estimate that the average price elasticity of demand for a combination of electrical appliances (larger bulky electrical appliances and white goods) is low at -0.35[289]. This relatively inelastic price elasticity of demand has led us to assume that producers are able to pass through 65% of costs to consumers (in the form of price rises of new bulky electrical items), with producers bearing 35% of the costs associated with the collection and

[288] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/320912/Cost_Pass-Through_Report.pdf
[289] Dale, L. & Fujita, S. (2008), "*An Analysis of the Price Elasticity of Demand for Household Appliances";* University of California Berkeley, (February 2008).

treatment of bulky WEEE. This is also within the range of cost pass through scenarios put forward by the OFT for an industry wide shock

Final cost pass through assumptions for SMW and bulky EEE

For consistency and with the absence of any more data we will adopt an identical cost pass through percentage associated with the costs of collecting SMW. This use of 65% cost pass through across all types of WEEE is supported by the analysis within OFT's report on cost pass through as it sits within the range of cost pass through of 50%-100%.

Table 80: Cost pass through adopted proportion.

Low scenario (Pure Monopoly)	Central Scenario (for bulky and SMW)	High Scenario (Perfect Competition)
50%	65%	100%

How policy proposals will impact different groups of households/consumers

Although consumers may face increased prices for EEE products, some households will make direct savings where they previously paid for service which will be provided to them for free under the reforms. For simplicity, we have split households into two separate consumer groups to assess this.

Both on-demand collection of bulky WEEE (usually collected by LAs) and 1:1 retailer collections from the home are existing services which are generally offered at a fee to households. It is proposed that businesses will pay for these services under options 3 and 4 respectively, effectively transferring the costs previously paid directly by households onto businesses. As such households that pre-policy implementation would have paid to have their WEEE collected are now benefitting from no longer having to pay for this service. For the purpose of this analysis this group of households are labelled as consumer group 1. Consumer group 2 are the remaining households who purchase new electrical products but would not have used either of these services before the reforms.[290]

Although some LAs currently provide household SMW collections similar to those expected to be provided by producers under option 2, these are currently funded by LAs rather than directly by households. For simplicity, we therefore assume there will be no direct savings to households under option 2, whilst acknowledging that any transfer in costs from LAs to producers will be an indirect benefit to council tax paying households.

The direct savings to consumer group 1 were estimated in the cost benefit analysis section and are presented in table 81.

Table 81: Total gross savings to consumer group 1 from no longer paying for bulky WEEE collections (£2019m).

	2025	2029	2034	Total (10-year appraisal period)
On demand bulky WEEE collections (option 3)	11.4m	12.9m	£14.9m	131.0m

[290] These households either purchase a new electrical item without disposing of an old one (does not mean that they hoard the old bulky WEEE item; it is assumed that no hoarding takes place when it involves bulky WEEE) or use alternative disposal methods such as fly-tipping, taking their WEEE to a HWRC or in-store collections when purchasing a replacement item (under the current 1:1 policy requirement for in-store take-back).

Free retailer 1:1 collections (option 4)	45.2m	50.8m	58.9m	517.8m

These are gross savings to consumer group 1 as a result of no longer paying for bulky WEEE services. Consumer group 1 could still face higher prices for EEE products should producers pass on these costs. This is because producers can't discriminate between different groups of consumers when setting prices and any increase in prices for EEE products will impact all households purchasing new EEE (whether in consumer group 1 or 2). As we assume no direct savings to households as a result of option 2, all consumer purchasing small WEEE products will experience a net cost as a result of this options (assuming producers pass on some of their costs through higher prices).

The total costs to producers and retailers resulting from SMW household collection, on-demand collections and free 1:1 retailer collections were estimated in the cost benefit analysis section and are presented in table 82.

Table 82: Total costs to business (£2019m)

	2025	**2029**	**2034**	**Total (10-year appraisal period)**
SMW household collection	£61.6m	£25.9m	£28.0m	£297.9m
Total cost to producers (on-demand collection)	£31.8m	£37.5m	£43.1m	£378.9m
Total costs to retailers (free 1:1 retailer collections)	£29.2m	£36.0m	£41.7m	£362.5m

As discussed, it is assumed that 65% of these costs are passed on to consumers. The total cost that producers will pass through to households through higher prices as a result of each option are presented in table 83 below.

Table 83: Total costs passed through to households in the form of price rises when purchasing new EEE (£2019m).

	2025	**2029**	**2034**	**Total (10-year appraisal period)**
SMW Household collection	£40.0m	£16.9m	£18.2m	£193.7m
Total cost to households (on-demand collection)	£20.7m	£24.4m	£28.0m	£246.3m
Total costs to households (free 1:1 retailer collections)	£19.0m	£23.4m	£27.1m	£235.6m

The following method was used to estimate the split of cost pass through between consumer groups 1 and 2[291]. It is assumed that the tonnage of waste collected from consumer group 1 is equivalent to the amount of WEEE they purchase, i.e., that consumer group 1 are disposing of WEEE due to purchasing a replacement. This is a simplifying assumption but matches assumptions used previously in the analysis (as has been discussed in previous sections, it has

[291] Note: This cost pass through split between consumer group 1 and 2 will only apply to costs from option 3 and 4. As was previously reported, as option 2 proposes a completely knew SMW household collection there would be no savings to households as the new collection system would only require households to move electrical items away from residual waste streams towards separate dry recycling streams.

been assumed that there is no hoarding of bulky WEEE in the waste system[292]). This would suggest that the remaining tonnage of relevant WEEE POM is that purchased by consumer group 2.

For option 3 costs we use categories 1,2,11,12. It is worth noting that that this POM figure includes category 2 (Small Domestic Appliances; microwaves, hoovers, etc). This is because a small amount of SDA is collected through the bulky WEEE collection service. We are however only using this POM tonnage to create an estimate of the split of the cost's producers will pass through to consumers. The actual costs accounted for in the cost pass through calculations will only be the costs associated with collecting bulky WEEE (category 1,11,12). To provide a consistent level of tonnage that is comparable with the baseline tonnage (attributable to consumer group 1) we have used 2018/19 place of market data[293].

For option 4 we only use POM data for category 1,11 and 12. This is to remain consistent with the baseline tonnage collected under regulation 43 which is assumed to only include tonnage from category 1,11 and 12. Again, this does also include a small amount of SMW, however given the reasons stated in the previous this is seen as reasonable. The POM data used is also 2019 data only. This is again to create a comparable data set with the baseline tonnage collected under regulation 43 which is also for the year 2019 only.

Table 84: Estimate of proportion of relevant EEE producers purchased by each consumer group

	Option 3	**Option 4**
Tonnes collected from consumer group 1 (baseline)	64,719	116,886
Total POM (of relevant categories) minus baseline collected tonnage	1,060,676	981,941
Consumer group 1 proportion	6%	12%
Consumer group 2 proportion	94%	88%

Note: Option 3 POM tonnes includes SMW as in the baseline there is a small proportion of SMW which is being collected.

The total costs and benefits to each consumer group for each option are presented in table 83. This shows that consumer group 1 will experience net gains as a result of options 3 and 4, whereas consumer groups 2 will experience a net cost as a result of all options. Across all three policies there is estimated to be a net cost to households of just under £27m annually, or £0.95 per household per year[294]. This does not include savings to the taxpayer, increased convenience (and lower transport costs) to households or wider gains to society through reduced environmental disbenefits and fly-tipping disamenity.

We are not aware of any specific differences in the profile of consumers in group 1 and 2. Further work will be conducted for the final impact assessment on whether this causes any adverse distributional impacts.

Table 85: Estimate of proportion of relevant EEE producers purchased by each consumer group for each option (£2019m).

[292] Discussion with consultants Anthesis stated that it would be unlikely bulky WEEE would be hoarded because of the size it can take up in the household. Either the item is kept as an additional unit (e.g. an extra fridge) or the household will dispose of the item of WEEE. There is an appreciation that there might be anecdotal examples of where a household does hoard an item of WEEE.

[293] Data provided by Anthesis in the Evidence Gaps research.

[294] Based on 28.1m UK households:
https://www.ons.gov.uk/peoplepopulationandcommunity/birthsdeathsandmarriages/families/bulletins/familiesandhouseholds/2021

		Consumer group 1	Consumer group 2	Total (all consumer groups)
Option 2	Savings compared baseline	£0m	£0m	£0
	Additional costs from cost pass through	£0m	£193.7m	£193.7m
	Net cost/benefit	£0m	-£193.7m	-£193.7m
Option 3	Savings compared baseline	£131.0m	£0m	£131.0
	Additional costs from cost pass through	£15.0m	£231.2m	£246.3m
	Net cost/benefit	+£115.9m	-£231.2m	-£115.3m
Option 4	Savings compared baseline	£517.8m	£0m	£517.8m
	Additional costs from cost pass through	£28.0m	£207.6m	£235.6m
	Net cost/benefit	+£489.7m	-£207.6m	£282.2m
All options combined	Savings compared baseline	£648.8m	£0m	£648.8m
	Additional costs from cost pass through	£43.1m	£632.5	£675.5m
	Net cost/benefit	£605.7m	-£632.5m	-£26.8m

Note: Some rows or columns don't sum due to rounding.

9.4 Consumer experience

Currently, of those who have recycled their WEEE in the last 12 months the majority did so by taking the item to a HWRC[295]; 27% of respondents saying they have disposed of WEEE in this way in the last 12 months and 22% having taken to a recycling bank for electricals.

Increasing the availability and understanding of household collection options will impact households' time and effort spent recycling their items. These savings have not been monetised

[295] In response to being asked what their household has done with WEEE in the last 12 months: 27% taken to tip/HWRC, 22% taken to recycling bank for electrical items, 10% sold or given away, 7% took/sent it back to the retailer or manufacturer to be recycled, 4% repaired, 43% put in general rubbish, 22% hoarded, 15% put in kerbside recycling. WEEE-public-attitudes-and-behaviours-original.pdf

but would encapsulate time, effort, fuel, and other impacts if a household is able to have their items collected from the home rather than transporting these themselves. In larger items of WEEE there are also risks to households attempting to move heavy items which could cause injuries. Having a household collection would reduce the need for households to move large items themselves, a benefit in particular for the elderly and vulnerable.

9.5 Health and safety

In addition to householders moving heavy items, there are risks across the disposal route if WEEE is disposed of incorrectly. Many items of WEEE involve glass and metals which can be delicate and sharp when broken. Reducing WEEE which is incorrectly placed in residual and mixed-recycling collections reduces the risk of injury to those working in these areas, who could be injured by broken glass for when sorting recycling for example.

9.6 Quality of recyclate

The suggested WEEE policies would provide a disposal route which will be purely for WEEE. One of the current routes of disposal is to take WEEE to HWRCs where there can be issues with contamination if incorrect items are placed in WEEE specific bins. Contamination rates for SMW at HWRCs is 4.9% and for large appliances this is less than 1%[296]. Although not quantified in this impact assessment, increasing the quantity of WEEE which is recycled through uncontaminated routes could improve the quality of the recyclate and have an impact on increasing the price of this material too as higher quality material warrants higher prices.

9.7 Recycling and secondary materials market

Increasing the tonnages of recycling may impact the secondary materials market. Having an increase of materials could lead to economies of scale efficiencies as more material is being processed.

The extent to which capacity exists for additional recycling of WEEE (and the cost of creating additional capacity) because of these policies will be explored further for the final impact assessment.

9.8 Equality Impact Assessment

DEFRA currently do not have an understanding of the proportional impacts that introducing these policy options would have on various groups in society. It's important to consider how different groups of consumers will be impacted in different ways. For example, older or disabled individuals may face more difficulties returning items to a store than others. It is felt that the combination of the variety of policy options should ensure there's accessible options for all needs by furthering at home collections reducing the need for vulnerable individuals to move their WEEE themselves who would find it difficult to utilise the current systems. The equality impact will be further considered in later stages of the impact assessment.

9.9 Jobs

Circular economy policies (such as those encouraging increased recycling and reuse) have been shown to have the potential to create (hundreds of) thousands of new jobs[297]. Due to the nature of these jobs, they are also likely to be distributed across the country, contributing to levelling up.

[296] Waste electrical and electronic equipment (WEEE): evidence and national protocols guidance - GOV.UK (www.gov.uk)
[297] https://green-alliance.org.uk/publication/levelling-up-through-circular-economy-jobs/

9.10 Trade

Under the current regulations a business is classed as an EEE producer if they:

- manufacture and sell EEE under their own brand in the UK
- resell equipment made by someone else under their own brand (if the maker's brand appears on the equipment, they are the producer)
- import EEE on a commercial basis into the UK
- are established outside of the UK and supply EEE directly to the UK market by distance selling (for example online, mail order, by phone)

The regulations are therefore designed to capture all producers placing EEE onto the UK market, and aim to apply equally across all obligated producers, whether domestic or based overseas.

The Post Implementation Review of the 2013 WEEE regulations found evidence of high levels of non-compliance with producer obligations from online sellers, particularly overseas sellers selling through online marketplaces (OMPs). Where overseas sellers can free ride their obligations, they gain an advantage over domestic sellers.

The consultation therefore proposes to make OMPs a new category of producer. OMPs would stand in the shoes of overseas seller on their platform and be obligated to register with a Producer Compliance Scheme and submit the same data as other producers. OMPs would then be able to take action to recover these costs from their sellers. This aims to correct a distortion in trade whereby certain overseas sellers can gain an advantage by free riding their obligations and ensure that all producers placing EEE on the UK market face the same obligations.

9.11 Competition

The Competition and Markets Authority (CMA) provide guidelines to policymakers to identify how new policies might affect competition in markets. The CMA asserts that "healthy competition between firms in a market can deliver benefits to consumers through lower prices, more choice and innovation and can help increase productivity and growth"[298]. This section follows the guidance of the CMA conducts a competition assessment, answering the competition checklist questions they provide. This is an initial assessment and will be developed further for the final impact assessment through engagement with stakeholders using the consultation process.

Will the measure directly or indirectly limit the number or range of suppliers?

The measures will not directly limit the number of suppliers. However, higher costs faced by businesses can indirectly limit the number of suppliers. The proposed reforms will be financed by producers, which will face £66.0 million of costs on average annually, to finance SMW and bulky WEEE collections[299]. Annually, retailers will face £71.4 million of costs because of the amended takeback regulations[300]. As analysed in section 9.3, producers and retailers may decide to pass some, or all, or these additional costs onto consumers in the form of higher prices for EEE products. Raising costs can result in firms leaving the market, subsequently enhancing the market power for the firms that remain, which would translate into a reduction in the variety of products available for consumers.

However, we expect the annual average costs to businesses to be relatively low which should minimise the risk of this occurring. Table 86, for example, shows that annual costs to producers as a percentage of average annual turnover under the preferred policy is estimated to be less

[298] Competition impact assessment - Part 2: guidelines (publishing.service.gov.uk), pg. 2
[299] Costs to producers include SMW operational costs (crew costs, vehicle retrofitting costs, flat container replacement costs, local and commercial overheads) additional fuel costs, communication costs, Scheme Administrator operational costs, treatment costs, cost of collection (baseline – transfer from LAs and consumers), costs of collection (extended service).
[300] Costs to retailers include handling and collection costs, and loss of revenue.

than 1%. Therefore, the costs of the policy should not cause a significant reduction in the number of producers able to operate.

Table 86: Cost of preferred option to producers compared to average annual turnover

	Number of. Producers	Average Annual Turnover	Annual Costs of Preferred Option	Average Annual Cost per Producer	% Of Turnover
Producers of EEE	3,300[301]	£2.1m[302]	£66.0m	£0.02m	0.95%

Using the annual costs under the preferred option, we allocated these between the costs to retailers (of handling and collection costs and loss of revenue) and to producers (to pay for SMW and bulky WEEE collection services). These costs were then divided by the number of businesses to calculate the average cost per business per year, which was divided by the average turnover to estimate what percentage of the turnover these costs were.

Will the measure limit the ability of suppliers to compete?

No, the preferred policy option should increase the ability of suppliers to compete by creating a level playing field. By designating OMPs as a new class of producers, there will be a redistribution of household collection costs so that they are spread across producers in a more equitable way. Therefore, there will be reduced opportunities for producers to free ride. By removing the free rider problem, it will increase the ability of producers, particularly UK producers to compete with overseas sellers.

Will the measures increase incentives to collude?

The preferred policy options will not directly increase incentives for businesses to collude. However, if higher costs cause businesses to exit the market, a reduction in the number of businesses in the market may increase the risk of collusive behaviour amongst the remaining businesses. As outlined earlier in this section, additional costs to businesses are expected to be low and the risk of this occurring minimal.

Will the measures limit the choices and information available to consumers?

The measures will not directly limit the choices and information available to consumers, instead the communication campaigns will increase the information available to consumers. If customers have more knowledge about how to recycle WEEE, they may be able to make more informed decisions when purchasing electricals. However, if the increased costs faced by businesses causes some businesses to leave the electricals market, consumers may face reduced choices. Again, as costs to businesses are relatively low, the risk of this occurring is minimal.

Section 10: Monitoring and Evaluation

10.1 Current monitoring arrangements

Monitoring change is focused on our intended outcomes, namely reductions in waste production, resource use 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

[301] Number of registered WEEE producers identified as B2C or both in the NPWD in 2022 (https://www.gov.uk/government/publications/waste-electrical-and-electronic-equipment-weee-public-registers)
[302] Average turnover of businesses in SIC 26 (Manufacture of computer, electronic and optical products) and 27 (Manufacture of electrical equipment) in 2022 (https://www.gov.uk/government/collections/business-population-estimates)

the 25 Year Environment Plan[303], the Clean Growth Strategy[304], and the Litter Strategy[305]. The framework of indicators is set out on page 139 of the Resources and Waste Strategy[306] and shown below in figure 3, for ease of reference.

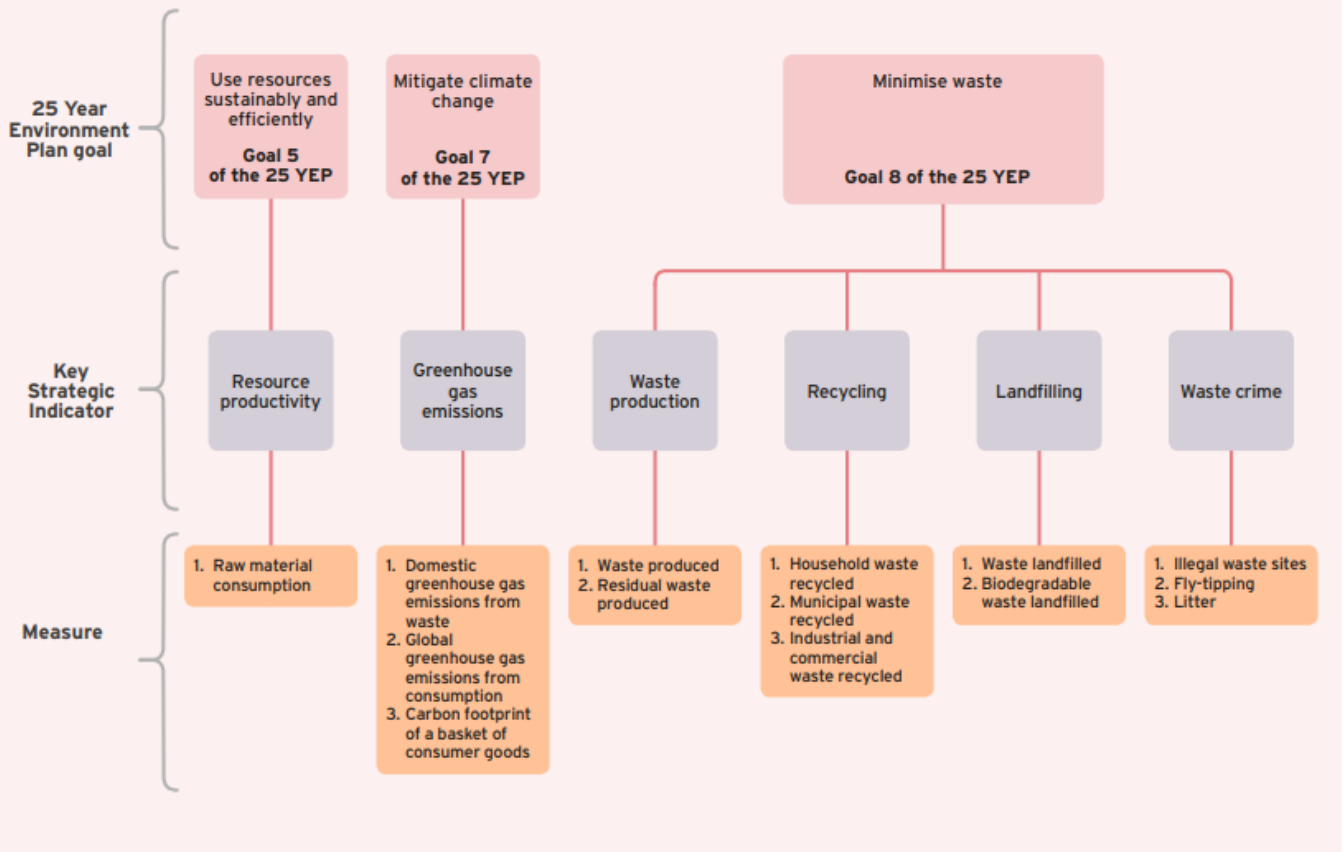

Figure 3: Indicator Framework for Monitoring the Resource and Waste Strategy

The framework was devised prior to the focus on Net Zero, to which all three 25 Year Environment Plan goals are relevant. We have set out our approach to monitoring change in our Monitoring Progress report (available here)[307].

10.2 Current data collection regime

Under the current WEEE producer responsibility system, Defra sets household collection targets for each category of WEEE, and these are apportioned out to Producer Compliance Schemes on a market share basis. As a result, the environmental performance of the system tends to be measured by the extent to which these targets are met and/or whether they have been exceeded. While the consultation does not propose to change this approach, at least in the short term, it has been identified that collection targets may not be the most accurate reflection of how well the system is performing, particularly as the amount of EEE being placed on the market does not always directly correlate to the amount of WEEE being generated.

10.3 Evaluation

Defra made a commitment in the Resources & Waste Strategy that "all significant policies, programmes and projects should be subject to comprehensive but proportionate evaluation" (page 143)[308]. In 2020, we published the Evaluation Plan[309]. Since then we have commissioned

[303] 25 Year Environment Plan - GOV.UK (www.gov.uk)
[304] Clean Growth Strategy - GOV.UK (www.gov.uk)
[305] Litter Strategy for England - GOV.UK (www.gov.uk)
[306] Resources and waste strategy for England - GOV.UK (www.gov.uk)
[307] Resources and Waste Strategy - Monitoring Progress (publishing.service.gov.uk)
[308] Resources and waste strategy for England - GOV.UK (www.gov.uk)
[309] Resources and waste strategy for England: monitoring and evaluation - GOV.UK (www.gov.uk)

the evaluation and published the Programme of Work for 2022/2023 which provides further information on the evaluation approach[310].

The evaluation programme will deploy three types of evaluation – process, impact, and value-for-money. Each is outlined below.

10.3.1 Process evaluation

Reforming the WEEE regulations will be subject to process evaluation. This will check progress as the policy rolls out, enabling us to adjust, where we can, to increase effectiveness, efficiency, and equity of impact. The process evaluations will primarily be based on qualitative interview data with Defra and other stakeholders, and programme documentation and reporting information. It will assess the extent to which progress is being made as intended, why and for whom; summarise the early benefits and disbenefits; and make recommendations for adjustments. Each process evaluation will start six months prior to policy go-live date and be complete 12 months after the go-live date.

10.3.2 Impact evaluation

The impact evaluation will take the monitoring data on amounts of residual waste arising and answer the question, "to what extent, how, for whom and in what circumstances, have the policies in the Resources and Waste Strategy (including the reforms to the WEEE regulations) contributed to the observed outcome?". Recognising the complexity of the context and the interacting nature of the policies, we will take a theory-based approach. Data sources will include available monitoring and datasets, qualitative interviews with Defra colleagues and four online surveys among local authorities, businesses, waste sector businesses and citizens[311].

Six outcomes will be assessed:

1. More products are regularly retained, reused, repurposed, refurbished, or remanufactured.
2. Recycling rates for households, businesses, municipal waste increase.
3. Household, municipal and business waste streams improve in quality.
4. Plastics waste is prevented at all stages of the plastics life cycle.
5. Waste crime reduces.
6. Food Waste is near eliminated from landfill .

Reforming the WEEE regulations will be considered and evaluated under the first, second, third and fifth outcomes[312].

10.3.3 Value for money (economic) evaluation

A cost-benefit analysis will be carried out for the Strategy, using the quantified attribution of impact and data to be collected by the contractor on costs of taking action. Impacts will be monetised in accordance with best practice and will draw on official Government guidance, published impact assessments and the knowledge of Defra's team of resources and waste economists. It will involve making estimates of costs and monetising direct and consequential benefits. The analysis will produce estimates of uncertainty, using sensitivity analysis and qualitative ratings where quantitative measures are unavailable. Results will be reported as cost benefit ratios which demonstrate the scale of return (or otherwise) on public investment. The evaluation budget for the Resources & Waste Strategy evaluation is £2.5 million for 2022 - 2027, with £300,000 committed for FY23/24.

[310] Resources and Waste Strategy - Monitoring Progress - November 2022 (publishing.service.gov.uk)

[311] These surveys will aim to understand the impact of the Resources and Waste Strategy on citizens and businesses, including understanding any behaviour changes resulting from the policies.

[312] Collecting data to inform lessons learnt will be embedded in the evaluation process.

10.4 Proposed monitoring arrangements

As part of the evaluation, a list of indicators of change based on the Theories of Change for the Strategy, outcomes and policies will be developed. This will include measurable, meaningful, and manageable indicators of outcomes (or proxy indicators) and impacts. A Monitoring Data Collection Plan will be produced in 2023 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 for the Resource & Waste Strategy and baseline data will be collected in 2023. Monitoring data will be reported (approximately) annually in the Monitoring Progress publication.

Proposed indicators under development may include:

- Consumer awareness and ease of recycling electricals, preferred channel for recycling electricals.
- Perceived importance of the circularity of EEE.
- Amount of donated, reused, hoarded, repaired, recycled, and disposed of electricals (in items and tonnes).
- Growth in the number of companies, profits, and employment recycling/repairing electricals.
- Share of new electrical products launched that are repairable.
- Percentage of households that purchase second hand EEE.
- Share of EEE in residual waste.

Material Focus[313] are currently carrying out an independent assessment to consider whether weight-based targets remain the best approach to drive performance or whether other metrics and outcomes should be pursued instead, and the potential costs/benefits of these approaches. We will also use the consultation to gather views on alternative measures which could be used in the future to measure the performance of the system. These could be metrics which measure the impact of new policies aimed at reducing the amount of WEEE going to landfill or a potential appraisal of the carbon impact of the system.

10.5 External influencing factors

The context within which the proposed WEEE regulations will be implemented is extremely complex, with many interacting parts, policies, and actors.

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

- How producers decide to implement household WEEE collections.
- The extent to which householders respond positively to messaging on recycling and reuse of WEEE.
- Technical advances in product design and consumer demand for new technology which could impact on future WEEE arisings.
- Changes to future consumption arising from changes to economic conditions.
- Technological advances that impact collection systems and costs of treatment.

[313] https://www.materialfocus.org.uk/

Annex A: Full cost benefit analysis profile for the appraisal period

Option 2

Table A.1: Full costs and benefits for Option 2 (undiscounted £2019)

2019 £s		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	*Total*
Set up costs	Set up costs - containers	13,703,979	-	-	-	-	-	-	-	-	-	***13,703,979***
	Scheme Administrator Set up costs	393,900	-	-	-	-	-	-	-	-	-	***393,900***
	Staff training and familiarisation	50,967	50,967	-	-	-	-	-	-	-	-	***101,933***
Operational costs	Crew costs	3,804,177	3,804,177	3,804,177	3,804,177	3,804,177	3,804,177	3,804,177	3,804,177	3,804,177	3,804,177	***38,041,772***
	Vehicle retrofitting costs	1,800,336	1,800,336	1,800,336	1,800,336	1,800,336	1,800,336	1,800,336	1,800,336	1,800,336	1,800,336	***18,003,365***
	Flat container replacement costs	680,564	680,564	680,564	680,564	680,564	680,564	680,564	680,564	680,564	680,564	***6,805,640***
	Cost of additional fuel attributed to SMW collections	85,760	85,760	85,760	85,760	85,760	85,760	85,760	85,760	85,760	85,760	***857,604***
	Local and commercial overheads	637,084	637,084	637,084	637,084	637,084	637,084	637,084	637,084	637,084	637,084	***6,370,838***
	Communication costs	39,931,718	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	***170,685,586***
	Scheme Administrator operational costs	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	***44,888,313***
	Additional carbon from transport	42,907	43,567	44,227	44,887	45,547	46,207	47,033	47,693	48,353	49,178	***459,599***

	Treatment costs	873,491	1,683,741	3,428,117	3,884,065	4,400,647	4,985,913	5,520,663	5,913,753	6,243,449	6,430,796	***43,364,637***
	Landfill tax loss (HMT)	312,326	601,905	1,225,552	1,388,611	1,573,230	1,782,513	1,973,708	2,114,204	2,232,046	2,299,005	***15,503,100***
Benefits	Net carbon reduction from improved treatment	3,491,799	6,834,136	14,125,508	16,242,908	18,673,977	21,464,335	24,190,797	26,276,683	28,125,801	29,463,936	***188,889,879***
	Material revenue from the recycled materials	2,057,241	3,965,418	8,073,812	9,147,538	10,364,231	11,742,721	13,002,134	13,927,784	14,704,376	15,145,508	**102,130,763**
	Landfill tax saving (LA/waste collector)	312,326	601,905	1,225,552	1,388,611	1,573,230	1,782,513	1,973,708	2,114,204	2,232,046	2,299,005	***15,503,100***
	Landfill and EfW Gate Fee Savings	827,336	1,594,600	3,246,765	3,678,549	4,167,848	4,722,115	5,228,652	5,600,879	5,913,152	6,090,507	***41,070,403***
Total costs	**359,180,367**											
Total benefits	**347,594,171**											

Option 3

Table A.2: Full costs and benefits for Option 3 (undiscounted £2019)

2019 £s		**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**Total**
Set up costs	SMW kerbside containers	13,703,979	-	-	-	-	-	-	-	-	-	***13,703,979***
	Scheme Administrator Set Up costs	393,900	-	-	-	-	-	-	-	-	-	***393,900***
	Staff training and familiarisation	50,967	50,967	-	-	-	-	-	-	-	-	***101,933***
Operational costs	Scheme Administrator operational costs	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	***44,888,313***
	SMW operational costs (crew, retrofitting,	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	***69,221,615***

	replacement containers, overheads)											
	Costs of collection (baseline - transfer)	11,424,307	11,767,036	12,120,047	12,483,649	12,858,158	13,243,903	13,641,220	14,050,457	14,471,970	14,906,129	***130,966,877***
	Costs of collection (extended service)	17,136,460	17,650,554	18,180,071	18,725,473	19,287,237	19,865,854	20,461,830	21,075,685	21,707,955	22,359,194	***196,450,315***
	Fuel costs	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	***23,993,581***
	Carbon from additional fuel	1,182,145	1,200,332	1,218,519	1,236,706	1,254,893	1,273,080	1,295,813	1,314,000	1,332,187	1,354,921	***12,662,596***
	Communication costs	39,931,718	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	**170,685,586**
	Treatment costs	1,768,439	3,527,333	6,305,238	6,847,500	7,452,985	8,129,821	8,758,888	9,249,125	9,678,882	9,969,291	***71,687,502***
	Landfill tax loss	855,823	1,721,510	2,972,814	3,188,292	3,426,901	3,691,794	3,940,268	4,139,761	4,318,369	4,447,918	***32,703,450***
Benefits	Fly-tipping collection cost savings	162,703	167,584	172,612	177,790	183,124	188,618	194,276	200,105	206,108	212,291	***1,865,211***
	Fly-tipping reduction in disamenity	6,482,482	6,676,956	6,877,265	7,083,583	7,296,090	7,514,973	7,740,422	7,972,635	8,211,814	8,458,169	***74,314,390***
	Carbon savings from change in flows	8,240,862	16,767,714	29,862,795	32,694,246	35,868,044	39,430,890	43,026,804	45,950,066	48,669,850	50,985,406	**351,496,676**
	Material Revenue	4,543,831	9,087,794	16,067,822	17,381,368	18,845,076	20,477,992	21,999,463	23,195,033	24,249,642	24,977,132	**180,825,153**
	Consumer group 1 no longer paying for Bulky collection	11,424,307	11,767,036	12,120,047	12,483,649	12,858,158	13,243,903	13,641,220	14,050,457	14,471,970	14,906,129	***130,966,877***
	Landfill tax saving (LA/waste collector)	855,823	1,721,510	2,972,814	3,188,292	3,426,901	3,691,794	3,940,268	4,139,761	4,318,369	4,447,918	***32,703,450***
	Landfill and EfW Gate Fee Savings	2,267,144	4,560,604	7,875,529	8,446,176	9,078,504	9,780,090	10,438,367	10,966,885	11,440,138	11,783,303	***86,636,739***
Total costs	**767,459,747**											
Total benefits	**858,808,522**											

Option 4

Table A.3: Full costs and benefits for Option 4/5/6 (undiscounted £2019)

2019 £s		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	Total
Set up costs	SMW kerbside containers	13,703,979	-	-	-	-	-	-	-	-	-	***13,703,979***
	Scheme Administrator Set Up costs	393,900	-	-	-	-	-	-	-	-	-	***393,900***
	Staff training and familiarisation	50,967	50,967	-	-	-	-	-	-	-	-	***101,933***
Operational costs	Scheme Administrator operational costs	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	4,488,831	***44,888,313***
	SMW operational costs (crew, retrofitting, replacement containers, overheads)	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	6,922,162	***69,221,615***
	Costs of collection (baseline - transfer)	11,424,307	11,767,036	12,120,047	12,483,649	12,858,158	13,243,903	13,641,220	14,050,457	14,471,970	14,906,129	***130,966,877***
	Costs of collection (extended service)	17,136,460	17,650,554	18,180,071	18,725,473	19,287,237	19,865,854	20,461,830	21,075,685	21,707,955	22,359,194	***196,450,315***
	Fuel costs	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	2,399,358	***23,993,581***
	Retail handling and collection Costs	27,778,484	28,611,838	29,470,193	30,354,299	31,264,928	32,202,876	33,168,962	34,164,031	35,188,952	36,244,620	***318,449,183***
	Carbon from additional fuel	1,182,714	1,200,927	1,219,141	1,237,356	1,255,572	1,273,789	1,296,557	1,314,777	1,332,998	1,355,770	***12,669,601***
	Communication costs	39,931,718	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	14,528,208	***170,685,586***
	Treatment Costs	3,160,134	6,394,226	10,779,328	11,455,812	12,199,547	13,018,780	13,794,516	14,435,822	15,021,180	15,471,858	***115,731,203***
	Retailers' loss of revenue from charging for kerbside takeback	45,167,636	46,522,666	47,918,346	49,355,896	50,836,573	52,361,670	53,932,520	55,550,496	57,217,011	58,933,521	***517,796,333***

	+ collecting baseline tonnage											
	Landfill tax loss	2,385,327	4,872,289	7,889,938	8,252,930	8,643,478	9,064,868	9,474,534	9,840,055	10,189,672	10,495,360	***81,108,452***
Benefits	Fly-tipping collection cost savings	162,703	167,584	172,612	177,790	183,124	188,618	194,276	200,105	206,108	212,291	***1,865,211***
	Fly-tipping reduction in disamenity	6,482,482	6,676,956	6,877,265	7,083,583	7,296,090	7,514,973	7,740,422	7,972,635	8,211,814	8,458,169	***74,314,390***
	Carbon savings from changes in flows	24,481,248	50,737,604	83,679,649	88,952,938	94,666,651	100,871,173	107,440,358	113,227,199	118,924,403	124,582,445	***907,563,668***
	Material revenue	13,910,028	28,382,158	46,178,725	48,395,598	50,789,733	53,380,988	55,889,549	58,101,822	60,203,635	62,009,744	***477,241,981***
	Consumer group 1 Savings	56,591,943	58,289,702	60,038,393	61,839,545	63,694,731	65,605,573	67,573,740	69,600,952	71,688,981	73,839,650	***648,763,210***
	Landfill tax savings	2,385,327	4,872,289	7,889,938	8,252,930	8,643,478	9,064,868	9,474,534	9,840,055	10,189,672	10,495,360	***81,108,452***
	Landfill and EfW Gate Fee Savings	6,319,032	12,907,494	20,901,736	21,863,169	22,898,007	24,014,178	25,099,477	26,067,829	26,994,110	27,803,894	***214,868,926***
Total costs	**1,696,160,971**											
Total benefits	**2,405,725,864**											

Annex B: Sensitivity analysis

Sensitivity analyses explores how the outcome of the policy scenarios may vary due to uncertainty around key input variables used in our models.

Table B.1 lists all the variables that we use for our combined sensitivity analysis to identify our low and high NPV for each option (also presented in the summary sheets at the beginning of this document). This means that we combine several sensitivities to identify the best and worst outcome; and how these outcomes differ from our central one(s). The low NPV estimates assume low benefits and high costs and the high NPV estimates assume high benefits and low costs.

Table B.1: Summary of sensitivities

Sensitivities	Low NPV: low benefit/ high-cost change from central estimate	High NPV: high benefit/ low-cost change from central estimate
Fly-tipping diversion	5% decrease from 10% to 5%	5% increase from 10% to 15%
Fly-tipping tonnage of WEEE present	The lower bound tonnage	The upper bound tonnage
Fly-tipping disamenity	Fly-tipping incident takes 1 day, rather than 3, to clear	Fly-tipping incident takes 5 days, rather than 3, to clear
Weight of bulky WEEE item	Average weight of bulky WEEE item is 40kg, not 60kg	Average weight of bulky WEEE item is 80kg, not 60kg
Tonnage collected by policy	Decrease by 10%	Increase by 10%

Fly-tipping diversion

It is assumed that the policies will cause a 10% diversion of fly tipped WEEE away from fly-tipping and to the collection methods introduced by the policies as they make recycling WEEE more convenient than fly-tipping it[314]. However, there is uncertainty about how much the policy will cause a diversion away from fly-tipping to the more convenient collections.

Varying the assumption of how much WEEE is diverted from fly-tipping will affect two benefits, the fly-tipping collection costs and the fly-tipping disamenity, as shown in the table below.

Table B.2: Changes in benefits from varying the fly-tipping diversion assumption (2019m)

	Total for Option 4, £ 2019 million		
Cost or benefit affected	**Low benefit:** 5% diversion	**Average benefit:** 10% diversion	**High benefit:** 15% diversion
Fly-tipping collection cost savings	£0.9m	£1.9m	£2.8m
Fly-tipping disamenity	£37.2m	£74.3m	£111.5m

Fly-tipping tonnage of WEEE present

There is uncertainty as to the tonnage of WEEE present in fly-tipping in the system. Changing the tonnage of WEEE present in fly-tipping will change the volume of WEEE that is diverted from fly-tipping. This will then affect the benefits received through fly-tipping collection cost savings and the benefits from reduced disamenity.

Table B.3: Changes in benefits from varying the assumption of WEEE present in fly-tipping tonnage (£2019m)

Total for Option 4, £ 2019 million

[314] Anthesis, Evidence Gaps, page 50

Cost or benefit affected	Low benefit: Lower bound tonnage	Average benefit: Tonnage used in IA NPV	High benefit: Upper bound tonnage
Fly-tipping collection cost savings	£1.0m	£ 1.9m	£2.7m
Fly-tipping disamenity	£39.5m	£74.3m	£109.2m

Fly-tipping disamenity

The number of days that it takes for fly tipped WEEE to be collected will affect the amount of public disamenity experienced. Varying the number of days it takes for WEEE to be collected affects how much benefits are received from avoided disamenity.

Table B.4: Changes in benefits from varying the assumption of how long it takes fly-tipping to clear (£2019m)

	Total for Option 4, £ 2019 million		
Cost or benefit affected	**Low benefit:** 1 day to clear	**Average benefit:** 3 days to clear	**High benefit:** 5 days to clear
Fly-tipping disamenity	£24.8m	£74.3m	£123.8m

Weight of bulky WEEE item

There is some uncertainty related to the weight of an item of bulky WEEE. Since the cost of collection per item is assumed to be fixed, by varying the assumption of the weight of a bulky WEEE item, it will have a number of effects on the costs and benefits of the policy. It will affect the costs of collection of both the baseline and extended service, varying the weight will also affect fuel costs, the carbon from additional fuel and retailers' loss of revenue. It will also change the benefits from reduction in disamenity from fly-tipping and savings to consumer group 1.

Table B.5: Changes in costs and benefits from varying the assumption of the weight of a bulky WEEE item (£2019m).

	Total for Option 4, £ 2019 million		
Cost or benefit affected	**Low:** 40kg	**Average:** 60kg	**High:** 80kg
Costs			
Costs of collection (baseline - transfer)	£196.5m	£131.0m	£98.2m
Costs of collection (extended service)	£294.7m	£196.5m	£147.3m
Fuel costs	£12.7m	£24.0m	£44.9m
Carbon from additional fuel	£6.7m	£12.7m	£23.7m
Retailers' loss of revenue	£776.7m	£517.8m	£388.4m
Benefits			
Fly tipping reduction in disamenity	£111.4m	£74.3m	£55.7m
Savings to consumer group 1	£973.1m	£648.8m	£486.6m

Tonnage collected by policy

There is considerable uncertainty over the tonnages that will be collected and sent to recycling and reuse as a result of the policies. Changing the collection rates resulting from the policy will affect a number of costs and benefits associated with collection and treatment of WEEE.

Changing the tonnage of WEEE collected affects the costs associated with costs of collection, fuel costs, retail handling and collection costs, the costs from carbon associated with fuel, treatment costs and landfill costs. It also affects the benefits from the policy including the carbon savings, material revenue, landfill tax savings and landfill and EfW gate fee savings, as shown below.

Table B.6: Changes in costs and benefits for preferred option from varying the tonnage collected by policy (£2019m).

	Total for Option 4, £ 2019 million		
Cost or benefit affected	**Low:** -10%	**Average:** Tonnage used in IA NPV	**High:** +10%
Cost			
Cost of collection (extended service)	£176.8m	£196.5m	£216.1m
Fuel costs	£23.0m	£24.0m	£24.9m
Retail handling and collection costs	£286.6m	£318.5m	£350.3m
Additional carbon costs	£12.2m	£12.7m	£13.13m
Treatment costs	£104.4m	£115.7m	£127.1m
Landfill tax loss	£73.0m	£81.1m	£89.2m
Benefits			
Carbon Savings	£816.8m	£907.6m	£998.3m
Material Revenue	£429.7m	£477.2m	£524.8m
Landfill tax savings	£73.03m	£81.1m	£89.2m
Landfill and EfW Gate fee savings	£193.4m	£214.9m	£236.4m

High and low estimates

Table B.7: Best Case Scenario - high benefit, low-cost analysis, for Options 2-4, 2019 prices, £m.

	Option 2	Option 3	Option 4
Transition Costs			
SMW Kerbside Containers	13.7	13.7	13.7
Scheme Administrator set up costs	0.4	0.4	0.4
Staff training and familiarisation	0.1	0.1	0.1
Operational Costs			
Crew Costs	32.7	32.7	32.7
Vehicle Retrofitting Costs	15.5	15.5	15.5
Flat Container Replacement Costs	5.9	5.9	5.9
Additional Fuel Costs	0.7	10.9	10.9
Local and Commercial Overheads	5.5	5.5	5.5
Communication Costs	150.5	150.5	150.5
Scheme Administrator Operational Costs	38.6	38.6	38.6
Carbon from Additional Fuel	0.4	5.8	5.8
Treatment Costs	32.3	53.7	87.0
Landfill Tax Loss (HMT)	11.5	24.5	61.2
Cost of Collection (Baseline – Transfer)	-	83.8	83.8
Costs of Collection (Extended Service)	-	127.1	127.1
Retail handling and Collection Costs	-	-	244.6
Retailers Loss of Revenue	-	-	331.5
Benefits			
Carbon Savings	171.1	320.9	833.1

Material Revenue from the Recycled Materials	92.8	165.5	439.6
Landfill Tax Saving (LA/ Waste Collector)	14.1	30.0	74.7
Landfill and EfW Gate Fee Savings	37.3	79.5	198.0
Savings to Consumer Group 1	-	167.7	830.7
Fly-tipping Collection Cost Savings	-	2.6	2.6
Fly-tipping Reduction in Disamenity	-	174.7	174.7
Total Costs	**307.8**	**568.7**	**1214.7**
Total Benefits	**315.4**	**941.0**	**2553.5**
NPSV	**7.6**	**372.3**	**1338.7**

Table B.8: Worst case scenario - low benefit, high-cost, analysis, for the Options 2-4, 2019 prices, £m.

	Option 2	**Option 3**	**Option 4**
Transition Costs			
SMW Kerbside Containers	13.7	13.7	13.7
Scheme Administrator set up costs	0.4	0.4	0.4
Staff training and familiarisation	0.1	0.1	0.1
Operational Costs			
Crew Costs	32.7	32.7	32.7
Vehicle Retrofitting Costs	15.5	15.5	15.5
Flat Container Replacement Costs	5.9	5.9	5.9
Additional Fuel Costs	0.7	38.6	38.6
Local and Commercial Overheads	5.5	5.5	5.5
Communication Costs	150.5	150.5	150.5
Scheme Administrator Operational Costs	38.6	38.6	38.6
Carbon from Additional Fuel	0.4	20.3	20.3
Treatment Costs	32.3	65.6	106.3
Landfill Tax Loss (HMT)	11.5	30.0	74.7
Cost of Collection (Baseline – Transfer)	-	167.7	167.7
Costs of Collection (Extended Service)	-	226.4	226.4
Retail handling and Collection Costs	-	-	299.0
Retailers Loss of Revenue	-	-	663.0
Benefits			
Carbon Savings	140.0	262.6	681.7
Material Revenue from the Recycled Materials	76.0	135.5	359.7
Landfill Tax Saving (LA/ Waste Collector)	11.5	24.5	61.2
Landfill and EfW Gate Fee Savings	30.5	65.0	162.0
Savings to Consumer Group 1	-	83.8	415.3
Fly-tipping Collection Cost Savings	-	0.6	0.6
Fly-tipping Reduction in Disamenity	-	8.4	8.4
Total Costs	**317.5**	**811.5**	**1675.8**
Total Benefits	**258.1**	**580.5**	**1688.9**
NPV	**-59.5**	**-231.0**	**13.1**

Annex C: Waste Data Flow questions used in baseline analysis

Table C.1 lists the questions from Waste Data Flow (WDF)[315] used by Anthesis[316] as part of their baseline analysis (as discussed in section 5.3).

Table C.1: **Waste Data Flow Questions Relevant to WEEE**

				Authority type required to complete the question		
Question type	**Question number**	**Question frequency**	**Question text**	***Unitary Authority***	***Waste Collection Authority***	***Waste Disposal Authority***
Recycling/ reuse tonnages	Q010	Quarterly	Tonnes of material collected through kerbside schemes from household sources by LA or its contractors	Yes	Yes	No
Recycling/ reuse tonnages	Q011	Quarterly	Tonnes of material collected from commercial, industrial, or other non-household sources by LA or its contractors	Yes	Yes	Yes
Recycling/ reuse tonnages	Q014	Quarterly	Tonnes of material collected through kerbside schemes by non-contracted voluntary/community sector household sources	Yes	Yes	No
Recycling/ reuse tonnages	Q016	Quarterly	Tonnes of material collected for recycling/reuse at CA Sites operated by LA or its contractors	Yes	Yes	No
Waste collected for disposal	Q023	Quarterly	Please provide details of other waste collected for disposal. (The destination of the residual is required for authorities in Wales only.)	Yes	Yes	Yes
Waste management	Q100	Quarterly	This question should be used to record waste sent for treatment or disposal. The end of each route must be the point the waste becomes a resource, or landfill. The question can be used for all waste streams, but usage differs by country.	Yes	Yes	Yes

[315] https://www.wastedataflow.org/
[316] Research to identify and address gaps in existing WEEE data relative to the on-going policy review, Anthesis 2022