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Welsh Government

Regulatory Impact Assessment

Regulatory Impact of Options to Increase Workplace Recycling in Wales – Update to include Small Waste Electrical and Electronic Equipment

The Waste Separation Requirements (Wales) Regulations 2023

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Mae'r ddogfen yma hefyd ar gael yn Gymraeg.

This document is also available in Welsh.

Contents

1.0 Introduction

1.1 This annexe examines the impact of a proposed requirement on non-domestic premises in Wales to separate all small Waste Electrical and Electronic Equipment (sWEEE) for recycling. This proposal is part of the phased implementation of the Welsh Government's reform package for non-domestic waste management, which was originally consulted on in 2019 and again in 2022.

1.2 Following that consultation, a package of reforms collectively known as the Workplace Recycling Regulations were introduced through three pieces of legislation:

- The Waste Separation Requirements (Wales) Regulations 2023[1]
- The Prohibition on the Incineration, or the Deposit in Landfill, of Specified Waste (Wales) Regulations 2023[2]
- The Prohibition on Disposal of Food Waste to Sewer (Civil Sanctions) (Wales) Order 2023[3]

1.3 The waste separation requirements are explained further in the document *Separate Collection of Waste Materials for Recycling: A Code of Practice for Wales*.[4]

1.4 The package of reforms collectively known as the Workplace Recycling Regulations required non-domestic premises to separate food waste, three streams of dry recyclables, unsold sWEEE and unsold textiles for recycling, as well as proscribing the disposal of food waste to sewer, and the disposal of certain separately collected recyclables (including separately collected sWEEE) to landfill and/or incineration. However, it was decided to take a phased approach to the introduction of further changes that were consulted on in 2019 to allow additional time for the market to prepare for some of the changes. Accordingly, the economic case for implementing each additional stage, such as the requirement to separate all sWEEE that is now proposed, should be more widely considered within the full scope of the Workplace Recycling Regulations rather than as stand-alone proposals.

1.5 This change now proposed would require the occupiers of non-domestic premises (including the business, public and third sectors) to separate their sWEEE and either take it to a local authority Household Recycling Centre that permits access to trade customers, take it to a privately-owned drop-off or take-back location, or present it separately for collection by a licensed waste carrier. It would create a corresponding obligation on waste collectors that

[1] The Waste Separation Requirements (Wales) Regulations 2023 (2023 No. 1290 (W. 228)). Available at: https://www.legislation.gov.uk/wsi/2023/1290/contents/made
[2] The Prohibition on the Incineration, or the Deposit in Landfill, of Specified Waste (Wales) Regulations 2023 (2023 No. 1289 (W. 227)). Available at: https://www.legislation.gov.uk/wsi/2023/1289/contents/made
[3] The Prohibition on Disposal of Food Waste to Sewer (Civil Sanctions) (Wales) Order 2023 (2023 No. 1296 (W. 231)). Available at: https://www.legislation.gov.uk/wsi/2023/1296/contents/made
[4] Welsh Government (2024) Separate Collection of Waste Materials for Recycling: A Code of Practice for Wales (WG23-51). Available at: https://www.gov.wales/sites/default/files/publications/2024-01/separate-collection-of-waste-materials-for-recycling-a-code-of-practice-for-wales.pdf

collect this material to do so separately from other materials, not to subsequently mix it and to send it for recycling.

1.6 For the purpose of this impact assessment, sWEEE is defined in accordance with Annex 5 of the document Separate Collection of Waste Materials for Recycling: A Code of Practice for Wales. In summary, this includes any electrical item less than 50 centimetres on its longest edge, excluding the cable. 'Separate collection' refers to sWEEE that is collected separately for recycling.

1.7 The costs and benefits of the proposed extension of the regulations to include separate collection of all small WEEE ('the policy') are assessed relative to a baseline of the current "business as usual" scenario, which includes the modelled effects of The Waste Separation Requirements (Wales) Regulations 2023 as they currently exist, alongside the current Landfill Disposals Tax as it applies in Wales and current wider Welsh legislative requirements regarding waste.

1.8 The RIA has been informed by work primarily undertaken by independent consultants Eunomia Research and Consulting Ltd on behalf of the Welsh Government. The work included an assessment of the potential costs and benefits of implementing the legislative proposals and the potential impacts on impacted stakeholders in the public and the private sectors. Eunomia has comprehensively updated the modelling conducted for the previous Regulatory Impact of Options to Increase Workplace Recycling in Wales (2023).[5]

1.9 The analysis presents a best estimate of costs and benefits based upon the currently available information. For the purpose of modelling, the appraisal period covers ten years following the implementation of the policy. Where modelling for an individual year is presented for illustrative purposes, 2030 is presented as a typical year, as by this point transitional costs of implementing the policy have been incurred and the recurrent costs have reached a 'steady state'.

1.10 As previously mentioned, the modelling of the impacts of these regulations builds upon previous modelling work related to the 2023 Workplace Recycling Regulations. For consistency with the 2023 RIA, the cost-benefit modelling for the sWEEE changes retains the same base price year of 2020 and a 10-year assessment period, therefore assuming that the sWEEE policy changes were implemented in 2024. For the analysis of sWEEE changes, we have retained the same assessment period to enable straightforward comparisons with previous results and to enable an assessment of the cumulative impacts of the full suite of Workplace Recycling Regulations. The impact of having the sWEEE changes come in early are very small and will have a minimal impact on the overall results. Nonetheless, we recognise that these modelling

[5] Welsh Government (2023) Regulatory Impact of Options to Increase Workplace Recycling in Wales. Available at: https://www.gov.wales/sites/default/files/publications/2023-11/options-to-increase-workplace-recycling-in-wales-regulatory-impact-assessment.pdf

assumptions are not without their drawbacks, in particular, due to prices being based in an atypical economic year, namely, 2020 and also price fluctuations during the intervening period. For context, inflation (as measured by the GDP deflator series) between 2020-21 and 2024-25 was approximately 17%.

1.11 Unless otherwise stated, the basis for modelling is as for Regulatory Impact of Options to Increase Workplace Recycling in Wales (2023).

2.0 Costs and Benefits

2.1 As noted in Section 1 above, the analysis presented here is primarily based on modelling carried out by Eunomia Research & Consulting Ltd on behalf of the Welsh Government.

2.2 The modelling analysed the expected effect of the policy on the waste management behaviour of occupiers of non-domestic premises and the impact the requirements would have on waste management logistics and costs.

2.3 In the modelling, some costs are attributed to waste collectors. This category includes local authority collections of waste from non-domestic premises under their duty (under the Environmental Protection Act 1990) to collect commercial waste on request. However, within a properly functioning competitive market, waste collectors (including local authorities) will pass their costs on to the customer (non-domestic property waste producers). Thus, these costs will apply in part to waste producers rather than the waste industry.

2.4 The modelling has been carried out using the best available data, including the latest survey of industrial and commercial waste arisings in Wales,[6] the Environment Agency's data on Non-Household WEEE placed on the market and collected for recycling in the UK, compositional data gathered by WRAP and ONS data on the business population of Wales.[7] Key assumptions regarding collection logistics have been tested with other experts and representatives of the waste industry. However, there are a number of areas of uncertainty that should be acknowledged, as follows:

- No Wales-specific data on non-household sWEEE arisings is available.
- Some sWEEE is dual use between households and other types of premises, and may not be fully accounted for in the UK-level data on material placed on the market or collected for recycling.
- Data on non-household sWEEE collected for recycling or as part of mixed waste streams in Wales is very limited, with even the detailed survey of

[6] Natural Resources Wales (2021) *Survey of Industrial and Commercial Waste Generated in Wales 2018*, available here: https://naturalresources.wales/media/693534/survey-of-commerical-and-industrial-waste-generated-in-wales-2018.pdf

[7] Office for National Statistics (2022) *UK Business Counts* available here: https://www.nomisweb.co.uk/sources/ukbc

industrial and commercial waste not distinguishing between small and larger WEEE.

- Current collection methodologies for sWEEE have been developed in a context where small numbers of non-domestic premises occupiers currently choose to have separate collections. While efforts have been made to understand how waste collectors would respond to increased demand for this service, which would be expected to improve round efficiency, it is possible that new containment and collection models will emerge that would improve on those modelled.
- The value of sWEEE can vary over time and is affected by a number of factors including the market value of its constituent materials, the costs of dismantling sWEEE to access those materials, and the value of producer responsibility payments in any particular year.
- The cost of treating residual waste can also vary over time depending on market conditions and the prevailing rate of Landfill Tax. It is not yet possible to give a reliable estimate of the impact that the inclusion of incineration within the UK Emissions Trading Scheme may have on the cost of sending residual waste in Wales for thermal treatment or the impact that removing some or all sWEEE from that residual waste might have on the cost.

2.5 The costs that arise as a result of implementing the policy are presented below.

Environmental Costs and Benefits

2.6 For the analysis, a range of environmental costs were modelled, including:

- Emissions of greenhouse gases (expressed as CO_2e equivalent)
- Levels of NO_2 pollution
- Tonnes of recycling
- Monetised environmental impacts

The costs are shown below.

Table 1: Environmental Impacts, 10 Years

Environmental Factor	Impact of the policy
Tonnes CO_2e	-7,437
Tonnes NO_2	-6
Tonnes recycling	37,757
Monetised Environmental Cost (NPV)	-£1.9m

Landfill Disposals Tax and Fuel Duty

2.7 Table 2 shows the modelled estimate of Landfill Disposals Tax revenue as a result of the landfilling of materials and the Fuel Duty under this option.

Table 2: Landfill Disposals Tax and Fuel Duty, 10 Year NPV

	Impact of the policy (£m)
Landfill Disposals Tax and Fuel Duty	-£0.3m

Jobs

2.8 The modelling predicts the policy will create an average of 91 new jobs in the waste management sector (both in waste collection and sWEEE reprocessing) across the first 10 years of its operation.

Costs and Benefits to the Main Sectors

2.9 The costs to the different sectors are presented in the sections below and summarised in Table 9.

Costs and Benefits to Waste Management Businesses

2.10 The waste management industry includes waste collection companies, local authorities that collect waste from non-domestic premises, operators of intermediate storage and treatment facilities such as waste transfer stations and end stage recovery and disposal facilities such as energy from waste facilities and landfill sites.

2.11 In a properly functioning, competitive market the costs and costs savings accruing to waste management businesses would be expected to be passed on to the customer (non-domestic waste producers).

2.12 The modelling has assumed that the changes resulting from the policy intervention will not result in a change to the way that the waste market allocates costs. Thus, for the purposes of estimating the costs to businesses for this section, it has been assumed that all costs or cost savings to waste management businesses will be passed to their customers (ultimately waste producers).

2.13 The costs or costs savings to waste management businesses are included within Table 3, but are assumed in this model to ultimate passed to the waste producer.

2.14 Costs include:

- Transitional costs
- On-going administrative costs
- Costs of Waste Collection (Residual and recycling/recovery)
- Landfill Disposals Tax

The benefits include:

- Disposal/Processing of residual waste
- Materials Revenue

2.15 The net impact is a cost (£1.6m NPV over 10 years) to waste management businesses compared to the baseline over the appraisal period. However, as noted above, it is anticipated that competitive forces will result in waste management businesses passing much of this cost onto waste producers.

Table 3: Breakdown of Financial Costs to Waste Management Businesses

	Financial costs to waste management businesses of collecting additional sWEEE, £m (NPV)
Infrastructure transitional costs	£0.0m
Transitional and On-going administrative costs	£4.1m
Waste collections (recycling & residual)	£10.4m
Residual waste processing/disposal	-£4.6m
Materials revenue (net of processing)	-£8.0m
Landfill Disposals Tax and Fuel Duty	-£0.3m
NET FINANCIAL COST	**£1.6m**

Infrastructure Transitional Costs and Benefits

2.16 The infrastructure transitional costs are the financial costs of upgrading and/or building new waste transfer stations under the options. As the policy does not affect a large tonnage of material, and much of this is expected to be handled through existing infrastructure that is already permitted to receive WEEE, it is not predicted that any significant additional investment in new infrastructure would be required.

Administrative Costs and Benefits

2.17

2.18 Table 4 shows the administrative costs as a result of the sWEEE policy. The majority (72%) of this cost is accounted for by the requirements for operational changes such as updating collection routes and amending driver timetables, followed by the requirement for new guidelines for employees and / or customers (28%).

Table 4: Administrative Costs to Waste Management Businesses (rounded to nearest £1,000)

Activity	Year 1 (£)	Year 2 (£)	Sum of Years 3 – 10 (£)	10 Year Total (NPV £)
Waste Collection and Processing – Additional sWEEE Policy Costs				
Understanding the policy	3,000	0	0	3,000
Determining how to implement the policy	1,148,000	0	0	1,148,000

Activity	Year 1 (£)	Year 2 (£)	Sum of Years 3 – 10 (£)	10 Year Total (NPV £)
Making operational changes	0	3,022,000	0	2,920,000
Total sWEEE costs	**1,151,000**	**3,022,000**	**0**	**4,071,000**

Costs and Benefits to Waste Producers

2.19 As noted above, in a properly functioning market, the costs (and savings) accruing to waste management businesses are passed to their customers in the form of charges to remove waste, subject to competition between service providers. Thus, the costs above would be expected to be incurred by waste producers.

2.20 Waste producers may incur additional transitional costs related to:

- Training and awareness
- Modifying internal procedures and guidance
- Implementing a new bin system
- Organising a new collection system

2.21 Eunomia assumed that bin systems are reviewed reasonably regularly, and therefore after the second year of the assessment period, any updates to the bins and their collection systems would not be additional to what would have occurred otherwise (i.e. within the baseline).

2.22 It has also been assumed that the effort required by employees to place the small amount of sWEEE that arises into a separate bin would be negligible and that the time this action requires would not be significant enough to result in an additional cost.

2.23 The transitional costs on waste producers of the policy are presented in Table 5 below, these transitional costs are incurred in the first two years.

Table 5: Forecast Transitional Costs for Waste Producers (rounded to nearest £1,000)

Activity	Year 1 (£)	Year 2 (£)	Sum of Years 3 – 10 (£)	10 Year Total (NPV £)
Waste Producer – Additional sWEEE Costs				
Understanding the policy	4,000	0	0	4,000
Internal Procedures	1,783,000	0	0	1,783,000

Organising New Bin System	0	607,000	0	587,000
Organising New Collections	0	896,000	0	866,000
Total (£)	**1,787,000**	**1,503,000**	**0**	**3,240,000**

2.24 To estimate the overall costs or cost savings to waste producers, Eunomia has taken into account the combined net costs of the option. These consist of the costs or savings to waste management businesses and the transitional costs to waste producers, applied to a typical waste producer, based on size of local units (number of employees). The results are shown in Table 6.

Table 6: Weekly Financial and Administrative Cost Impact per local unit of sWEEE collection, relative to the baseline - 2030 (£), (negative values represent a saving)

Size band	Local Unit Size Band (Employees)						
	0-4	**5-9**	**10-19**	**20-49**	**50-99**	**100-249**	**250+**
Additional sWEEE	£0.27	£0.13	£0.06	-£0.29	-£0.62	-£2.40	-£31.59

2.25 The transitional costs are estimated, for all waste producers, to be £3.2 million NPV over ten years.

Costs and Benefits to Welsh Government

2.26 The costs to the Welsh Government are presented below in
2.27 Table 7.

2.28 The modelling has costed for the Welsh Government to undertake the following tasks:

- Marketing
- Training.

Table 7: Breakdown of Financial Costs to Welsh Government (rounded to nearest £100)

Activity	Year 1 (£)	Year 2 (£)	Sum of Years 3 – 10 (£)	10 Year Total (NPV £)
Welsh Government – Additional sWEEE Costs				
Marketing (requirement to sort sWEEE)	120,000	50,000	0	168,300

Conducting training workshops & organising information campaigns (requirement to sort)	200	0	0	200
Total Cost (£)	**120,200**	**50,000**	**0**	**168,500**

Costs and Benefits to Natural Resources Wales

2.29 It is expected that the regulation and enforcement costs already incurred by NRW in implementing the Waste Separation Requirements (Wales) Regulations 2023 will be sufficient to also cover the inclusion of sWEEE, so no additional costs have been assumed.

Costs and Benefits to Local Authorities

2.30 There is assumed to be a small cost to local authorities from implementing, changing or operating booking systems at household recycling centres (HRCs), to allow them to accept sWEEE from non-domestic premises. Discussions with WRAP and local authorities indicated that authorities have sufficient reception arrangements in place to enable the small amount of commercial sWEEE to be identified and directed appropriately, and for any necessary checks regarding appointments and waste carrier licenses to be made.

Table 8: Breakdown of Financial Costs to Local Authorities (rounded to nearest £100)

Activity	Year 1 (£)	Year 2 (£)	Sum of Years 3 – 10 (£)	10 Year Total (NPV £)
Local Authority – Additional sWEEE Costs				
Booking systems	134,000	10,000	60,000	210,100

2.31 No other costs are assumed and local authority collection of non-domestic waste service should be operated on a full cost recovery basis (though some costs or benefits may be passed to local authorities from waste management companies, depending on which suppliers of commercial waste services businesses decide to use).

Costs and Benefits: Summary Table – 10 Year NPV

2.32 Table 9, below, summarises the costs and benefits to the main sectors of the sWEEE proposals. Avoided Landfill Disposals Tax and Fuel Duty are transfer payments and therefore a total cost without these transfers is also presented.

Table 9: Impact of sWEEE Summary Table - 10 Year NPV (rounded to nearest £100,000)

	Additional sWEEE Costs (£m)
Welsh Government	
Transitional costs	£0.2
On-going administrative costs	£0.0
NRW	
Transitional costs	£0.0
On-going administrative costs	£0.0
Local Authority	
Transitional costs	£0.0
On-going administrative costs	£0.2
All Waste Producers	
Transitional costs	£3.2
On-going administrative costs	£0.0
Waste Management Businesses	
Infrastructure Transitional costs	£0.0
On-going administrative costs	£4.1
Waste collections (recycling & residual)	£10.4
Residual waste processing/disposal	-£4.6
Materials revenue (net of processing)	-£8.0
Landfill Disposals Tax and Fuel Duty*	-£0.3
Monetised Environmental Costs	
All environmental costs	-£1.9

Total Cost	£3.3
Total Cost (ex LDT and Fuel Duty)**	£3.6

Total Welsh Government	£0.2
Total NRW	£0.0
Total Local Authority	£0.2
Total All Waste Producers	£3.2
Total Waste Management Businesses*	£1.6

Costs in this table attributed in this table to waste management companies are in practice expected to be passed to waste producers. However, for the purposes of this table they are attributed to waste management businesses.

* Landfill Disposals Tax will be directed to Welsh Government and Fuel Duty to UK Government

** This calculation excludes taxes, as taxes function simply as transfers between different entities rather than as a net overall cost – an increase in the total Landfill Disposals Tax paid is a cost to Welsh businesses but is an income to the Welsh government and thus neutral within the overall costs and benefits of the system.

3.0 Other Wider Impacts

3.1 In addition to the impacts discussed above, the policy is expected to have a range of wider beneficial impacts. However, after detailed consideration, it was concluded that the impacts were insufficiently certain and/or insufficiently quantifiable to be included within the main cost-benefit analysis. Nevertheless, some of the impacts are potentially significant and merit discussion.

Impact on Recycling Performance

3.2 Many of the benefits of the policy arise due to the increase in non-domestic sWEEE recycling that it is expected to deliver – although the increase in recycling rate was not itself a monetizable benefit. The modelling carried out as part of this impact assessment included estimates of the improvement in non-domestic sWEEE recycling and overall non-domestic municipal waste recycling over the appraisal period, in comparison with the baseline position resulting from the introduction of the Workplace Recycling Regulations. The expected changes are:

- Non-domestic sWEEE recycling rate increases from 15.6% to 74.6%
- Overall non-domestic recycling rate increases from 62.9% to 63.3%

Fires from lithium-ion batteries

3.3 It is widely reported that WEEE (especially sWEEE items that contain lithium ion batteries) placed in residual waste stream, and thus subject to compaction during the collection process, is a cause of waste fires. There is no consistent method of estimating the proportion of waste fires that are attributable to lithium ion batteries rather than other causes. Different estimates have been made of the number of fires across the UK that are attributable to lithium ion batteries, ranging from 200[8] (average for 2014-2019) to 1,200[9] (2023) per year. Recent estimates have been higher, but there is no consistent methodology for gathering data on waste fires, making it difficult to determine whether the problem is increasing. It has been estimated that almost two thirds of the lithium ion batteries thrown away by UK adults were embedded in WEEE.[10] This would almost exclusively be sWEEE, due to the impracticality of disposing of larger WEEE items in the residual waste stream.

3.4 The total economic and environmental cost of waste fires was estimated at £158m in 2021, with an average cost of £786,000. The great majority of costs were found to be economic costs to waste management companies, although 5% were assessed to be environmental costs and 1.5% social costs. The cost of each fire varies depending on the extent of the damage that it causes.

[8] Eunomia Research & Consulting Ltd (2021) *Cutting Lithium-ion Battery Fires in the Waste Industry*. Report for Environmental Services Association. Available at: https://www.circularonline.co.uk/wp-content/uploads/2021/01/Waste-Fires-Caused-by-Li-ion-Batteries_v3.0.pdf
[9] Dennis, P (2024) Over 1,200 battery fires in bin lorries and waste sites last year. *Circular*. Available at: https://www.circularonline.co.uk/news/over-1200-battery-fires-in-bin-lorries-and-waste-sites-last-year/
[10] Dennis, P (2024) Over 1,200 battery fires in bin lorries and waste sites last year. Circular. Available at: https://www.circularonline.co.uk/news/over-1200-battery-fires-in-bin-lorries-and-waste-sites-last-year/

Eunomia's 2021 study introduced a categorisation system that grouped fires into four levels of damage costs.

Table 10: Categorisation of Waste Fires

Fire Severity Category	% of Total Fires Estimated	Cost per Fire (£mil)	Annual number of waste fires attributed to Li-ion batteries	Estimated Annual Cost (£mil)
1	0.8%	£3.8	1.7	£6.6
2	5%	£1.8	10.4	£19.0
3	73%	£0.9	147.5	£128.6
4	21%	£0.1	41.8	£3.8
Total			**201**	**£158.0**

3.5 The available research does not break down fires by the UK nation in which they occur, the frequency with which the arise in household and non-household waste, or the proportion that occur in residual waste. However:

- if it is assumed that fires are broadly proportionate to population, Wales would experience approximately 4.5% of the UK total, or between 9.2 and 55.6 per year.
- If fires occur principally in residual waste and are as likely (per tonne) in household and non-household waste, then comparing Statistics Wales' figures for residual household waste in 2023/24 (531,839 tonnes) and the 2023 estimate of municipal non-household waste modelled as part of this RIA (825,714 tonnes) would imply that 60.8% of fires would occur in non-household residual waste. This would suggest between 5.6 and 33.8 fires each year arising in non-household waste in Wales, of which two thirds would be attributable to sWEEE.

3.6 The policy would significantly reduce the proportion of non-household sWEEE that is placed in the residual waste stream, but it would not eliminate it. It is not clear whether there would be a linear decrease in the incidence of waste fires as a result of this reduction (i.e. fires would reduce in direct proportion to the reduction in sWEEE in the residual waste). However, the policy is expected to result in approximately a 75% decrease in the amount of sWEEE in residual non-household waste. If a linear decrease was to be achieved, and no corresponding reduction in loose battery disposal in residual waste occurred, the policy would avoid between 2.6 and 15.9 fires per year. If it is assumed that each avoided fire has the average costs, this would result in a potential saving of between £2.1m and £12.5m per year.

3.7 Whilst these calculations are highly speculative and the range of potential impacts is very wide, it is likely that the policy will have some beneficial impact on the number of waste fires, and that any such benefit may result in quite substantial savings.

Precious Metals and Critical Raw Materials

3.8 The production of many small electrical items requires the use of precious metals such as gold, silver and platinum and critical raw materials (CRMs). CRMs are defined in the UK Critical Minerals Strategy as materials that are "vitally important" to the UK economy but which are also subject to "major risks to their security of supply".[11] Relevant examples include lithium, cobalt, magnesium and tin.

3.9 The separate collection of sWEEE creates the opportunity for valuable resources to be recovered from this waste stream, although there is a need for investment in reprocessing capability to maximise the potential benefits.[12] The UK Critical Minerals Strategy identifies recovery and recycling of CRMs as a key step towards improving security of supply.

3.10 The extraction of precious metals from circuit boards is already taking place in Wales. The Royal Mint has opened a facility at Llantrisant where it has the capacity to extract hundreds of kilogrammes of gold from up to 4,000 tonnes of circuit boards each year, sourced from small and large WEEE from within the UK.[13]

3.11 At present, techniques to extract CRMs from sWEEE are less well developed. However, investments are being made in new facilities that will require feedstock to enable them to operate. For example, GAP and DEScycle have recently secured investment to develop a facility in Gateshead in the North East of England that will extract copper, palladium and gold from circuit boards.[14] Previously, an EU LIFE funded partnership between Re-Tek UK, Enscape Consulting and the University of West of Scotland trialled the collection and lab scale recovery of cobalt, gold and silver from WEEE.[15] Similarly, a trial was conducted by, Axion Recycling, E3 Recycling and the Industrial Technology Research Institute (ITRI) to recover cobalt, antimony, tantalum, platinum group metals, gold and silver from printed circuit boards.[16]

3.12 These developments and trials demonstrate the technical feasibility and growing economic case for recovery of CRMs from sWEEE, which would be supported by increased supply of sWEEE for recycling.

3.13 There is also a security of supply case for greater recycling of precious metals and CRMs from sWEEE. Substantial deposits of CRMs and precious metals are found in a limited range of locations. The UK government found that, for

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[11] HM Government (2023) *Resilience for the Future: The UK's Critical Minerals Strategy*. Available at: https://www.gov.uk/government/publications/uk-critical-mineral-strategy/resilience-for-the-future-the-uks-critical-minerals-strategy

[12] Material Focus (2021) Recovering critical raw materials from waste electricals. Available at: https://www.materialfocus.org.uk/report-and-research/waste-electricals-towards-a-circular-economy-v2/

[13] Makortoff, K (2024) Royal Mint opens factory in south Wales to recover gold from e-waste. *The Guardian*. Available at: https://www.theguardian.com/uk-news/article/2024/aug/07/royal-mint-opens-factory-in-south-wales-to-recover-gold-from-e-waste

[14] DEScycle (2024) *£10.2m Series A Funding*. Available at: https://www.descycle.com/news/series-a

[15] Hursthouse, A. (2018) WEEE collection and CRM recovery trials: piloting a holistic approach for Scotland, Global NEST Journal, 20(4). Available at: https://doi.org/10.30955/gnj.002643

[16] Innovate UK (2018) Recovering value from circuit boards. Available at: https://iuk-business-connect.org.uk/news/recovering-value-from-circuit-boards/

each of the 18 CRMs identified in its critical minerals strategy, "the top three producer countries control between 73 and 98 percent of total global production" and that "China is the biggest producer of 12 out of the 18 minerals".[17] This gives rise to issues around security of supply.

3.14 Further, the process of extracting CRMs can be labour and energy intensive, and has the potential to be environmentally damaging, both to human health and to biodiversity. Mining can use a large amount of water, and mining waste often contains toxic chemicals like cyanide, mercury, arsenic, lead and zinc, which can pollute soil and waterways. Mining can also often encroach on protected natural areas, with the direct impact of mining being exacerbated by other accompanying activities such as agriculture, logging, and poaching.[18] These problems can give rise to particular concerns when mining takes place in countries where environmental and labour protections are weak.

3.15 The policy supports the UK Critical Minerals Strategy and has the potential to reduce Wales's reliance on virgin CRMs and precious metals. However, the need for new investment to enable a wider range of CRMs to be recovered from sWEEE, the relatively small tonnage of material affected by the policy, uncertainty regarding the composition of the sWEEE that may be captured, and the complex supply chains within which CRMs are traded means that it is difficult to make a reliable estimate of the supply chain benefits or the specific environmental harms avoided as a result of the policy.

Waste impacts

3.16 The export of waste electronics that are not suitable for reuse outside the OECD is prohibited. The sWEEE affected by the policy is material that is likely to be sent for disposal within the UK if not recycled. It would therefore be subject to UK waste legislation and should cause minimal impacts to biodiversity and human health in the UK as a result of disposal.

3.17 When sWEEE enters the environment, it can leach a wide range of potentially toxic chemicals. The impacts of these chemicals are diverse and may affect both human health and the wider biosphere.[19]

3.18 However, the policy is likely to give rise to cheaper and more easily accessible sWEEE collections for the occupiers of non-domestic premises. This may reduce any incentive to dispose of waste containing sWEEE irresponsibly.

3.19 WEEE contains poly- and perfluoroalkyl substances (PFAS). These are a large group of synthetic organofluorine chemicals that have been widely used

[17] HM Government (2023) *Resilience for the Future: The UK's Critical Minerals Strategy*. Available at: https://www.gov.uk/government/publications/uk-critical-mineral-strategy/resilience-for-the-future-the-uks-critical-minerals-strategy

[18] PBL Netherlands Environmental Assessment Agency (2024) *Environmental impacts of extraction and processing of raw materials for the energy transition*. Available at: https://www.pbl.nl/system/files/document/2024-02/PBL-2024-Environmental-impacts-of-extraction-and-processing-of-raw-materials-for-the-energy-transition-5364.pdf

[19] See, for example, Ankit et al (2021) *Electronic waste and their leachates impact on human health and environment: Global ecological threat and management*. Environmental Technology & Innovation Vol 24. Available at: https://www.sciencedirect.com/science/article/pii/S2352186421006970

since the 1940s. Due to the strength of the molecular bonds in these chemicals, PFAS can resist chemical attack and withstand high temperatures and are sometimes referred to as 'forever chemicals'. The impacts of these chemicals on the environment and human health is not yet well understood, but a recent study by the Environment Agency identified landfill sites as amongst the types of land use giving rise to the highest potential risk as a source of PFAS.[20] Treating landfill leachate to remove PFAS is difficult, although most can be destroyed through municipal waste incineration. Reducing the amount of PFAS entering the residual waste stream (and especially landfill) through the diversion of sWEEE into recycling may help to reduce the escape of these chemicals into the UK environment.

Consistency of recycling behaviour

3.20 Across Wales, many local authorities make arrangements to allow householders to recycle sWEEE alongside their other recycling at home; and all allow recycling of sWEEE at household recycling centres. Nevertheless, not all household sWEEE is diverted from residual waste.

3.21 It is widely considered that consistency in what can be recycled in different local authority areas can help people to become familiar with what can and can't be recycled, and to separate recyclables more reliably.[21] This may also be the case when greater consistency is achieved between what is recyclable at work and at home - one of the key objectives of the reforms introduced through The Waste Separation Requirements (Wales) Regulations 2023. England has also recently legislated to ensure that there is consistency between the list of materials that businesses and households are expected to recycle partly for this reason.

3.22 It is therefore reasonable to assume that the introduction of a requirement to separate non-household sWEEE for recycling may be mutually reinforcing with Welsh local authorities' efforts to encourage householders to separate sWEEE for recycling. However, there does not appear to be an evidence base that would enable this impact to be quantified in this RIA.

Wider jobs impact

3.23 As indicated above, the policy is expected to create 91 additional jobs across Wales, principally in waste collection. However, this represents a relatively conservative approach and may not reflect the full extent of the jobs that may be created as a result of the policy.

3.24 For example, a larger and more reliable supply of sWEEE for dismantling in Wales may lead to WEEE reprocessors to increase employment at their

[20] Environment Agency (2021) *Poly- and perfluoroalkyl substances (PFAS): sources, pathways and environmental data*. Available at: https://assets.publishing.service.gov.uk/media/611e31fbd3bf7f63b19cea2d/Poly-_and_perfluoroalkyl_substances_-sources_pathways_and_environmental_data_-_report.pdf

[21] See, for example, WRAP (2016) *Supporting evidence and analysis: The case for greater consistency in household recycling*. Available at: https://www.wrap.ngo/sites/default/files/2020-08/WRAP-consistency-supporting-evidence.pdf

established sites or to consider investing in additional sites in parts of Wales that are not well served at present. At a greater remove, it may support the growth or retention of jobs in industries that rely on the supply of materials extracted from the additional sWEEE that would be recycled.

3.25 In turn, the jobs generated directly or indirectly by the policy will have wider social benefits. For example, according to Public Health England, being in employment has the following health benefits:

- *employment is generally the most important means of obtaining adequate economic resources, which are essential for material wellbeing and full participation in today's society*
- *work meets important psychosocial needs in societies where employment is the norm*
- *work is central to individual identity, social roles and social status*
- *employment and socio-economic status are the main drivers of social gradients in health*[22]

3.26 It is therefore likely that there would be benefits associated with the additional employment opportunities created by the policy that are not fully quantified in the RIA.

4.0 Consideration of Exemptions

4.1 The Welsh Government has considered exemptions from the requirements in two areas:

- A de minimis threshold for producers of non-domestic municipal waste, below which the requirement to present waste for collection would not apply;
- An exemption to the requirement to present waste separately for producers of non-domestic municipal waste in rural areas;

4.2 An analysis of the case for these exemptions and the Welsh Government's conclusions are provided below.

Consideration of de minimis provision to the requirement for producers of non-domestic municipal waste to present waste separately

De minimis based on local unit size

4.3 The impact of excluding all local units with 0-4 employees from the policy was considered. This would have the overall effect of exempting the 64% of local units that have fewer than five employees.

[22] Public Health England (2014) *Increasing employment opportunities and improving workplace health.* Available at: https://assets.publishing.service.gov.uk/media/5a7eecf2ed915d74e6227559/Review5_Employment_health_inequalities.pdf

4.4 These 64,570 premises are responsible for 12% of non-domestic municipal waste arisings. While detailed breakdowns of arisings of different materials cannot be given for local units of different sizes, it is likely that the proportion of the non-domestic municipal wastes directly affected by the policy that arises from local units with 0-4 employees would be similar to the 12% of overall arisings.

4.5 The Welsh Government does not publish data on employment that is broken down to the same level of detail that is found in the data used elsewhere in this impact assessment. However, the number of people employed in micro-businesses in Wales is substantial. The Welsh Government estimates that in 2022, 34.4% of jobs are in organisations with 0-9 employees.[23]

4.6 The Welsh Government does not publish data on turnover that is broken down to the same level of detail that is found in the data used elsewhere in this impact assessment. However, the total turnover of the 234,600 enterprises with 0-9 employees in 2023 was £21.8 billion.[24] Their average annual turnover was thus £92,924. For comparison, the estimated cost of implementing the policy for micro-producers of non-domestic waste was between £0.13 (5-9 size band) and £0.27 (0-4 size band) a week, or £6.61-£13.96 per year.

4.7 Unlike materials such as food waste, sWEEE has the potential to be stored for an extended period of time without giving rise to disamenity effects. Smaller businesses that produce little sWEEE can therefore have very infrequent collections, whilst still complying with the policy. While the costs attributed to small businesses assume some collection costs, a business could avoid these by taking their sWEEE to household recycling centres (HRCs) rather than arranging for collections – though it would still need to pay any charge for the handling of the material as business waste by the local authority.

4.8 However, exempting these premises would adversely affect the environmental benefits of the policy. As a direct result of exempting some waste producers from the requirements, less material would be collected for recycling, which would result in fewer carbon emissions savings. It would also result in a reduction in the societal benefits, such as job creation, resulting from the measures. It would also not help improve the consistency of recycling collections across Wales, and the resulting logistical inefficiencies would lead to increased costs both for the exempted waste producers and those that remained subject to the policy. The Welsh Government is thus of the view introducing such an exemption is not desirable. This aligned with the conclusion reached in the Regulatory Impact of Options to Increase Workplace Recycling in Wales (2023).

[23] Statistics for Wales (2024) Size Analysis of Active Businesses in Wales, 2023, p13, available at: https://www.gov.wales/sites/default/files/statistics-and-research/2023-12/size-analysis-of-active-businesses-in-wales-2023-165.pdf

[24] Statistics for Wales (2024) Size Analysis of Active Businesses in Wales, 2023, p2, available at: https://www.gov.wales/sites/default/files/statistics-and-research/2023-12/size-analysis-of-active-businesses-in-wales-2023-165.pdf

Exemption to the requirement to present waste separately for producers of non-domestic municipal waste in rural areas

4.9 Wales has large rural areas, where there are a larger proportion of small businesses and greater distances between towns. These factors are generally expected to give rise to greater waste management costs, which could be increased as a result of more materials being separately collected.

4.10 However, similarly to small businesses, rural businesses do have the option to store sWEEE for longer periods to reduce the frequency of collection, and the option to use HRCs where disposal of non-domestic is permitted.

4.11 Based on Eunomia's previous modelling of the Workplace Recycling Regulations: Regulatory Impact of Options to Increase Workplace Recycling in Wales (2023); the introduction of the policy would not incur significantly higher costs for rural local units than non-rural. On the other hand, exempting rural non-domestic premises from the requirement would result in a reduction in environmental benefits. Some 43% of businesses in Wales are in areas that are classified as rural. On the basis of this, the Welsh Government is of the view that, for the policy it is not appropriate to provide for an exemption to the requirement to sort for occupiers of non-domestic premises in rural areas. There was no evidence within this review to suggest the case would be different for the separate collection of sWEEE and therefore the same conclusion was drawn.

5.0 Summary

5.1 A summary of the high-level environmental costs and benefits of the policy is shown in Table and discussed below.

5.2 The table shows the impact of the policy and also the cumulative impact of the package of reforms collectively known as the Workplace Recycling Regulations. The negative values for CO_{2e} and NO_2 represent a reduction in emissions. Negative values in the Environmental cost and Total cost rows of the table represent a net benefit.

Table 11: Summary of Policy – Main Impacts

	sWEEE Regulations	2023 Regulations**	2023 Regulations Revised (Differential) ***	Cumulative impact (sWEEE + 2023 Regulations Revised)
CO_{2e} (tonnes)	-7,400	-1,298,000	600	-1,304,800
NO_2 (tonnes)	-6	-5,224	14	-5,216
Recycling (tonnes)	38,000	2,313,000	-53,000	2,298,000
Environmental cost NPV (£M)	-£1.9	-£121.9	0.6	-£123.2
Total 10 year NPV cost* (£M)	**£3.6**	**-£186.9**	**-£11.29**	**-£194.60**

CO_{2e} is rounded to the nearest 100, recycling to the nearest 1,000

*Excludes Landfill Disposals Tax and Fuel Duty
** Table 19, Regulatory Impact of Options to Increase Workplace Recycling in Wales
*** Small amendments were made as agreed with Welsh Government to reflect NRW administrative costs and the amount of sWEEE in the baseline

5.3 There is a small difference between the baseline used in this modelling and the baseline used in the original impact assessment for the 2023 Regulations. This arose due to the collection of additional evidence regarding the current situation regarding sWEEE collections and a review of recent data on sWEEE recycling, which was not material in the context of the previous analysis.

5.4 A summary of the Welsh Government's considerations regarding potential exemptions from the requirements is also included below and discussed in detail in Section 4.

Exemptions

5.5 The Welsh Government has considered exemptions from the requirements in two areas:

- A de minimis threshold for producers of non-domestic waste, below which the requirement to present waste for collection would not apply;
- An exemption to the requirement to present waste separately for non-domestic waste producers in rural areas;

These were considered qualitatively and by relying on the previous modelling analysis undertaken and decided to not be desirable based upon their resulting in less material being collected for recycling, which would result in fewer carbon emissions savings. They would also result in a reduction in the societal benefits, such as job creation, resulting from the measures. They would also not help improve the consistency of recycling collections across Wales, and the resulting logistical inefficiencies would lead to increased costs both for the exempted waste producers and those that remained subject to the Regulations. The Welsh Government is thus of the view introducing such exemptions is not desirable.

6.0 Conclusion

6.1 The proposed change requires non-domestic premises to segregate sWEEE and deliver it either to a local authority Household Recycling Centre that accepts non-domestic sWEEE, a private drop-off/take-back site, or arrange separate collection by a licensed waste carrier. With sWEEE being defined as any electrical item less than 50 centimetres on its longest edge, excluding the cable.

6.2 The modelling used shows costs are attributed to waste collectors. This category includes local authority collections of waste from non-domestic premises under their duty (under the Environmental Protection Act 1990) to collect commercial waste on request. However, within a properly functioning

competitive market, waste collectors (including local authorities) will pass their costs on to the customer (non-domestic property waste producers). Thus, these costs will apply in part to waste producers rather than the waste industry.

6.3 The costs in the model include, On-going administrative costs, Costs of Waste Collection (Residual and recycling/recovery) and Landfill Disposals Tax. With the benefits included Disposal/Processing of residual waste and Materials Revenue.

6.4 To conclude the overall impact of the wider package of Workplace Recycling Reforms (the 2023 Regulations) is overwhelmingly positive, modelled to deliver an overall net benefit of £198.2 million net present value (NPV) over 10 years, based on revised assumptions. The phased introduction of this element of the reforms is modelled to have a net cost of £3.6M NPV over 10 years (noting that avoided costs due to lithium-ion fires have not been included in the model). This means there is a cumulative net benefit of £194.6 million net present value (NPV) over 10 years from the combined package of measures.

6.5 In addition, the sWEEE element of these reforms is expected to reduce CO_2e by 7,437 tonnes, reduce NO2 by 6 tonnes and increase recycling by 37,757 tonnes over 10 years. The policy will also bring significant wider benefits, particularly in relation to the avoidance of fires. Given the environmental benefits and the significant wider benefits identified (not costed into the model) the Welsh Government intends to proceed with the planned legislative update already consulted on to bring in the new requirement to separate sWEEE as previously committed to.