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Welsh Government

Regulatory Impact Assessment

Regulatory Impact of Options to Increase Workplace Recycling in Wales

Statutory Instruments under Part IV of the Environment (Wales) Act 2016 and the Waste (Wales) Measure 2010

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Mae'r ddogfen yma hefyd ar gael yn Gymraeg.

This document is also available in Welsh.

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1.0 Introduction

- 1.1 The Environment (Wales) Act 2016 amends the Environmental Protection Act 1990 to provide the Welsh Ministers with the powers to:
- Require the occupiers of non-domestic premises to present specified recyclable waste streams separately for collection
 - Require waste collectors such as waste management companies and local authorities to collect specified recyclable waste streams from non-domestic premises by way of separate collection
 - Require those who subsequently handle the separated recyclable waste streams to not mix them, including with other waste streams.
- 1.2 The Act also amends the Waste (Wales) Measure 2010 in order to confer the power to ban specified kinds of waste from incineration. The Act also bans the disposal of food waste to public sewer from non-domestic premises in Wales, subject to a commencement order.
- 1.3 The Waste (Wales) Measure 2010 ('the Measure') provides the Welsh Ministers with the power to ban specified kinds of waste from landfill.
- 1.4 Welsh Ministers are laying regulations ('the Regulations') under the above provisions and to commence the ban on the disposal of food waste to sewer. The Regulations will thus require:
- waste producers in non-domestic premises (including businesses and the public and third sectors) to present their specified recyclable waste streams separately for collection
 - separate collection of specified recyclable wastes streams from non-domestic premises (including business and public and third sector premises)
 - no mixing of the separated recyclable waste streams
- and:
- ban the disposal of specified kinds of waste in landfill
 - ban the incineration of specified kinds of waste
 - ban the disposal of food waste to sewer from non-domestic premises (including business, and public and third sectors).
- 1.5 The purpose of making the regulations is to drive up levels of high quality recycling, food waste treatment and reduce disposal to landfill by businesses and the public and third sectors, to end the incineration of specified recyclable or recoverable waste streams, reduce carbon emissions, provide additional jobs and investment in the materials supply chain.
- 1.6 The increased capture of high-quality recycling is a key objective of the Welsh Government. It will make a major contribution to 'building a stronger, greener economy as we make maximum progress towards decarbonisation' which is a

crucial aspect of the Programme for Government and vital in delivering the Well-being Goals.

- 1.7 It is predicted that the increased recycling from the introduction of regulations will lead to significant savings to the Welsh economy and increased employment and investment in the sector.
- 1.8 The waste management sector is a significant economic sector. The Office for National Statistics dataset 'Environmental goods and services sector (EGSS) estimates' reports that waste management activities in the UK accounted for output of £16.1 billion, gross value added of £6.0 billion and 106,800 FTE jobs in 2020.¹
- 1.9 The 2022 WRAP report 'Levelling up through a more circular economy'² identified a potential GVA gain to the Welsh economy of up to almost £3.8 billion and up to nearly 28,000 additional jobs through a transformational approach to delivering a circular economy in Wales.
- 1.10 The Regulations will drive the development of more consistent waste collection services, with the modelling undertaken for this RIA predicting that they will reduce the costs borne by many waste producers.
- 1.11 The Regulations are critical to greening the economy and the Circular Economy in Wales. Without them, there will be no framework to drive change in the waste recycling sector and deliver the jobs, investment and resource security the sector can provide.
- 1.12 Bringing forward the Regulations under the above powers also supports key Welsh Government goals, including:
 - Beyond Recycling, the circular economy strategy for Wales.
 - The resource efficiency commitments in the Programme for Government, manufacturing action plan (A Manufacturing Future for Wales), Wales Procurement Policy Statement 2021, innovation strategy (Wales Innovates: Creating a Stronger, Fairer, Greener Wales), and Net Zero Wales Carbon Budget 2 (2021-25).
 - The Well-being of Future Generations (Wales) Act 2015, in particular regarding the aims of a prosperous, resilient and globally responsible Wales, and the national milestone of 'Wales will use only its fair share of the world's resources by 2050'.
 - The Carbon budget and targets set under Part 2 of the Environment (Wales) Act 2016.
 - The Economic Action Plan goals for sustainable economic growth.
 - Stronger, Fairer, Greener Wales: Net Zero Skills Action Plan.

¹ Office for National Statistics (2023) *Environmental goods and services sector (EGSS) estimates*, available here: <https://www.ons.gov.uk/economy/environmentalaccounts/datasets/ukenvironmentalgoodsandservicessectoregss/estimates> Data drawn from "by activity" tables.

² WRAP (2022) *Levelling up through a more circular economy*, available here:

https://wrap.org.uk/sites/default/files/2022-06/LEVELLING%20UP%20THROUGH%20A%20MORE%20CIRCULAR%20ECONOMY_2.pdf

- The Natural Resources Policy for Wales, in particular the aims of increasing resource efficiency and moving towards a more circular economy.
- Wales' delivery of the United Nations Sustainable Development Goals, for example goal 12 'Ensure sustainable consumption and production patterns' and its associated targets.

1.13 The costs and benefits for each of the options set out in this Regulatory Impact Assessment (RIA) have been assessed relative to a baseline "business as usual" scenario that reflects the current situation, including Landfill Disposals Tax and current legislative requirements.

1.14 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, where necessary, the modelling conducted for the previous Regulatory Impact Assessment of similar policy measures published on 23 September 2019.

1.15 The RIA builds on previous work carried out in the development of the provisions of Part IV of the Environment (Wales) Act 2016 ("the Act"). The options are constructed around the previous preferred option detailed in the Explanatory Memorandum for the Act³ and passed by the National Assembly for Wales.

³ Welsh Government (2016) Environment (Wales) Bill: Explanatory Memorandum Incorporating the Regulatory Impact Assessment and Explanatory Notes available here:
<http://www.senedd.assembly.wales/documents/s48090/Revised%20Explanatory%20Memorandum.pdf>

2.0 Options Analysis

- 2.1 For the purpose of this RIA, the impact of three options has been assessed against a baseline scenario (Option 1). The analysis presents a best estimate of costs and benefits based upon the currently available information.
- 2.2 For the purpose of modelling, the appraisal period covers ten years (2024 to 2033), with the options commencing in 2024. Where modelling for an individual year is presented for illustrative purposes, 2029 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'.
- 2.3 All options including the baseline scenario (Option 1), include the effects of the introduction of a deposit return scheme (DRS) for glass, metal and plastic beverage containers commencing in 2025.
- 2.4 The analysis looks at impacts on “local units” of producers of waste from non-domestic premises. This language is borrowed from the Office for National Statistics (ONS) UK Business Counts dataset.⁴ ONS explains that “Local Units are individual sites that belong to an Enterprise” – so an individual branch of a chain of stores would be a “local unit”, while the chain as a whole might be an “enterprise”. Local unit data has been selected because it is likely that each local unit will need its own waste collection services.
- 2.5 The HM Treasury central discount rate of 3.5% has been used to calculate the net present value (NPV) figures within the modelling.
- 2.6 The details of this modelling, including the assumptions underpinning it, are contained in the report “Update of Regulatory Impact Assessment – BPTS Regulations” by Eunomia Research & Consulting⁵.
- 2.7 Unless otherwise stated, cost figures have been rounded to the nearest £100,000, recycling tonnages are rounded to the nearest 10,000 tonnes and CO₂ and NO₂ emissions are rounded to the nearest 1,000 tonnes. Some of the totals in the tables may not sum due to the rounding.
- 2.8 Based on the analysis, the preferred option of the Welsh Government is Option 3 (explained below).

Option 1: Business as usual: Rely on existing mechanisms

- 2.9 Option 1 is the baseline against which costs and benefits are assessed. It includes extant legislative requirements (for example, the requirements of the Waste (England and Wales) Regulations 2011 (as amended)), the Welsh Landfill Disposals Tax and a DRS commencing in 2025.

⁴ Office for National Statistics (2023) UK Business Counts available at <https://www.nomisweb.co.uk/sources/ukbc>

⁵ Eunomia Research & Consulting (2023) *Update of Regulatory Impact Assessment – BPTS Regs (August 2023)*

Option 2: Low Level of Separation, Separate Collection, Ban on the Disposal of Food Waste to Sewer, Ban on Specified Kinds of Waste to Incineration and Landfill

- 2.10 This option requires the occupiers of non-domestic premises (including the business, public and third sectors) to present specified recyclable waste streams for collection.
- 2.11 The specified materials are: food, paper, card, plastic, cartons and similar, metal, glass, unsold small waste electrical and electronic equipment (WEEE) and unsold textiles.
- 2.12 Under this option, the materials could be presented in the following streams, although additional source separation would be permissible:
- food produced by premises producing more than 5kg/week;
 - co-mingled paper, card, glass, metal, plastic, cartons and similar;
 - unsold small WEEE;
 - unsold textiles.
- 2.13 Those that collect these waste materials (for example, waste management companies and local authorities) would be required as a minimum to collect materials in the following streams, provided that this met with the minimum requirements of the Waste (England and Wales) Regulations 2011 (as amended).
- food collected from premises producing more than 5kg/week;
 - paper, card, glass, metal, plastic, cartons and similar;
 - unsold small WEEE;
 - unsold textiles.
- 2.14 A requirement to separate all small WEEE and all textiles will be phased in up to two and up to three years respectively, after the coming into force date and is not included in this RIA.
- 2.15 The disposal of food waste to sewer from non-domestic premises in Wales would be prohibited.
- 2.16 The incineration of materials separately collected for the purpose of preparing for re-use or recycling of the specified materials would be banned.
- 2.17 The landfilling of separated recyclable loads of the specified materials would be banned. In addition to the above materials, all wood waste would be banned from landfill in Wales.

Option 3: Moderate Level of Separation, Separate Collection, Ban on the Disposal of Food Waste to Sewer, Ban on Specified Kinds of Waste to Incineration and Landfill

- 2.18 This option requires the occupiers of non-domestic premises (including business and the public and third sector) to present specified recyclable waste streams for collection.
- 2.19 The specified materials are: food, paper, card, plastic, cartons and similar, metal, glass, unsold small waste electrical and electronic equipment (WEEE) and unsold textiles.
- 2.20 Under this option, the materials could be presented in the following streams, although additional source separation would be permissible:
- food produced by premises producing more than 5kg/week;
 - paper, card;
 - glass;
 - metal, plastic, cartons and similar;
 - unsold small WEEE;
 - unsold textiles.
- 2.21 Those that collect these waste materials (for example, waste management companies and local authorities) would be required as a minimum to collect materials in the following streams:
- food collected from premises producing more than 5kg/week;
 - paper, card;
 - glass;
 - metal, plastic, cartons and similar;
 - unsold small WEEE;
 - unsold textiles.
- 2.22 The requirement to separate all small WEEE and all textiles will be phased in up to two and up to three years respectively, after the coming into force date and is not included in this RIA.
- 2.23 The disposal of food waste to sewer from non-domestic premises in Wales would be prohibited.
- 2.24 The incineration of separated recyclable loads of the specified materials would be banned.
- 2.25 The landfilling of separated recyclable loads of the specified materials would be banned. In addition to the above materials, all wood waste would be banned from landfill in Wales.

Option 4: High Level of Separation, Separate Collection, Ban on the Disposal of Food Waste to Sewer, Ban on Specified Kinds of Waste to Incineration and Landfill

- 2.26 This option requires the occupiers of non-domestic premises (including business and the public and third sectors) to present specified recyclable wastes for collection.

- 2.27 The specified materials are: food, paper, card, plastic, cartons and similar, metal, glass, unsold small waste electrical and electronic equipment (WEEE) and unsold textiles.
- 2.28 Under this option all of the dry recyclables would be presented separately, in the streams shown below:
- food produced by premises producing more than 5kg/week;
 - paper;
 - card;
 - glass;
 - metal;
 - plastic, cartons and similar;
 - unsold small WEEE;
 - unsold textiles.
- 2.29 Those that collect these waste materials (for example, waste management companies and local authorities) would be required as a minimum to collect materials in the following streams:
- food collected from premises producing more than 5kg/week;
 - paper;
 - card;
 - glass;
 - metal;
 - plastic, cartons and similar;
 - unsold small WEEE;
 - unsold textiles.
- 2.30 The requirement to separate all small WEEE and textiles would be phased in up to two and up to three years respectively, after the coming into force date and is not included in this RIA.
- 2.31 The disposal of food waste to sewer from non-domestic premises in Wales would be prohibited.
- 2.32 The incineration of separated recyclable loads of the specified materials would be banned.
- 2.33 The landfilling of separated recyclable loads of the specified materials would be banned. In addition to the above materials, all wood waste would be banned from landfill in Wales.

3.0 Costs and Benefits

- 3.1 As noted in Section 1, above, the analysis is primarily based on modelling carried out by Eunomia Research & Consulting Ltd⁶ on behalf of the Welsh Government. The modelling assumed for each option that the policy is fully enacted by 2024, following making of the statutory instruments in 2023.
- 3.2 The modelling analysed the expected effect of the options on the waste management behaviour of occupiers of non-domestic premises and the impact the requirements would have on waste management logistics and costs.
- 3.3 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 (waste producers). Thus, these costs will apply in part to waste producers rather than the waste industry.
- 3.4 The modelling has been carried out using the best available data, including the latest survey of industrial and commercial waste arisings in Wales,⁷ compositional data gathered by WRAP and ONS data on the business population of Wales.⁸ 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.
- While the survey of commercial and industrial waste was conducted to a good standard, it is less reliable than the data available regarding waste collected by local authorities, which is based on direct measurement of the waste that is collected. It also predates the COVID 19 pandemic, which affected patterns of commercial activity and therefore of waste generation. While Eunomia made adjustments to account for changes that are likely to have occurred since the survey, reflecting changes in total waste generation in Wales and changes in the business population, there is uncertainty about the current arisings of waste from non-domestic premises in Wales and how it is managed.
 - Waste from non-domestic premises is collected by a large number of different waste collectors, including major national businesses, smaller regional and local businesses and local authorities who compete with one another for customers. The source-separated approaches to collections of waste from non-domestic premises that are proposed in Options 3 and 4 are not currently commonplace, and a great deal of recyclable material is

⁶ <https://www.eunomia.co.uk>

⁷ Natural Resources Wales (2021) *Survey of Industrial and Commercial Waste Generated in Wales 2018*, available here: <https://naturalresources.wales/media/693534/survey-of-commercial-and-industrial-waste-generated-in-wales-2018.pdf>

⁸ Office for National Statistics (2022) *UK Business Counts* available here: <https://www.nomisweb.co.uk/sources/ukbc>

currently collected co-mingled. While waste collectors have considered how they will comply with the Regulations, the approach taken by each collector will depend on what is most efficient locally, given the customer base that each collector is able to maintain in a particular area. Local authority collectors may be able to co-collect non-domestic waste with household waste; some collectors may find it is possible to collect two or more streams of recycling on a single, multi-compartment vehicle. For modelling purposes, Eunomia has assumed that collections will have to be carried out on dedicated collection rounds using vehicles with only one compartment, which represents a “worst case scenario” for efficiency.

- The value of recyclable materials and the costs of treating residual waste and food waste can vary over time depending on market conditions.
- The Welsh Government and the other governments of the UK nations are introducing Extended Producer Responsibility for household packaging waste (pEPR) in 2025. Producers of packaging will be required to meet the costs of collecting sufficient material to meet escalating recycling targets. While pEPR will initially apply only to household waste, the targets apply across all packaging waste, and the governments have indicated that they may seek to extend pEPR to waste from non-domestic premises following a review in 2026 or 2027. The introduction of pEPR would mean that the costs of collecting and managing packaging waste would no longer be met by the occupiers of non-domestic premises that generate waste but instead by the producers that place the waste on the market. This would significantly change where costs are borne within non-household waste management.

3.5 The costs for each option are presented below.

Option 1: Do Nothing: Rely on existing mechanisms

Introduction

3.6 As this option proposes no change, there are no additional financial costs associated with it (though there will be ongoing costs and benefits not realised).

Environmental Costs

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

- Emissions of greenhouse gases (expressed as CO₂e equivalent)
- Levels of NO₂ pollution
- Tonnes of recycling
- Monetised environmental impacts

The costs are shown below.

Table 1: Option 1 – Environmental Impacts, 10 Year 2024 to 2033

	Option 1 Impacts
Tonnes CO ₂ e	1,813,000
Tonnes NO ₂	3,700
Tonnes recycling	6,130,000
Monetised Environmental NPV	£227,900,000

Landfill Disposals Tax and Fuel Duty

3.8 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: Option 1 – Landfill Disposals Tax and Fuel Duty, 10 Year NPV 2024 to 2033

	Option 1 Costs
Landfill Disposals Tax and Fuel Duty	£339,800

Recyclate Quality

3.9 This option has the least likelihood of providing high quality recyclate. This is due to the cross contamination of material streams and the subsequent difficulty in separating them out in a material recycling facility. High quality recyclate is more likely to be used in higher value manufacturing processes, thus producing greater environmental benefits.

Employment

3.10 The modelling predicts this option will sustain an average of 1,798 jobs in the waste management sector from 2024-33.

Costs to the Main Sectors

3.11 The costs to the different sectors are presented below in Table 3 and summarised in Table 4.

Costs to Waste Producers

3.12 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.

- 3.13 Producers of food waste disposing of food waste to sewer will also incur the capital and operating costs of food waste treatment technologies such as maceration.
- 3.14 The costs consist of:
- Annualised capital cost
 - Electricity
 - Water use
 - Sewerage charge
 - Maintenance
- 3.15 The costs are estimated, for all users, to be £6.7 million NPV over ten years. The costs to waste producers disposing of food waste to sewer are discussed in more detail in Option 2, below.

Costs and Benefits to Waste Management Businesses

- 3.16 Although there are no additional costs to waste management businesses in this option, there are ongoing costs and unrealised benefits. These include:
- Costs of waste collection (residual and recycling/recovery)
 - Disposal/processing of residual waste
 - Materials revenue
 - Landfill Disposals Tax and Fuel Duty

Table 3: Option 1 – Breakdown of Financial Costs to Waste Management Businesses

	Financial costs to waste management businesses, £m (2024 to 2033 NPV)
Infrastructure transitional costs	£0
On-going administrative costs	£0
Waste collections (recycling & residual)	£673.0
Residual waste processing/disposal	£794.0
Materials revenue (net of processing)	£175.3
Landfill Disposals Tax and Fuel Duty	£339.8
NET FINANCIAL COST	£1,982.1

- 3.17 In a properly functioning competitive market these costs will be passed on to the customer (waste producers). Thus, these costs will apply in part to waste producers rather than the waste industry.

Costs to Sewerage Authorities

- 3.18 Under this option, food waste will continue to be discharged to sewer. There will therefore be costs incurred by the sewerage authorities.
- 3.19 Under this option, 10 year NPV costs of £38 million are estimated to fall to the sewerage authorities. The costs result from the modelled cost of treatment of macerated food waste within the sewerage system, taking into account the

energy generation benefit from anaerobic digestion of sewage sludge and the additional treatment costs of specifically treating the food waste.

3.20 The costs relate to:

- Sewer pumping
- AD costs – both the additional costs of the equipment and benefits from additional electricity generation
- Secondary sewage treatment

3.21 It is widely assumed that a high proportion of sewer blockages result from, or are significantly contributed to, by macerated food waste in the sewerage system. The costs of dealing with blockages and their consequences has therefore been modelled, but has not been included in the central case due to the difficulty in attributing this type of incident solely to food waste.

3.22 The cost is estimated to be £3.2 million per year, equating to an estimated £238/tonne of food waste. These costs are not passed on specifically to the waste producers using the units and would be expected to be spread across all water customers. The costs can be attributed to use of macerators only, as the other two food waste treatment technologies modelled (enzymic digesters and dewatering systems) produce a discharge more similar to normal sewage discharge, which is not anticipated to cause issues of this nature.

Cost to Welsh Government

3.23 No additional costs accrue to Welsh Government under this option.

Costs to Natural Resources Wales

3.24 No additional costs accrue to Natural Resources Wales under this option.

Costs to Local Authorities

3.25 No additional costs accrue to local authorities under this option.

Option 1: Summary Table – 10 Year NPV

3.26 Table 4, below, summarises the costs and benefits to the main sectors of Option 1, profiled from 2024 to 2033. Avoided Landfill Disposals Tax and Fuel Duty is a transfer payment and is therefore excluded from the 'Net Cost' calculation.

Table 4: Option 1 Summary Table - 10 Year NPV (rounded to nearest £100,000)

	Costs (£m)
Financial costs	
Welsh Government	
Transitional costs	£0
On-going administrative costs	£0
NRW	
Transitional costs	£0
On-going administrative costs	£0
Local Authority	
Transitional costs	£0
On-going administrative costs	£0
All Waste Producers	
Transitional costs	£0
On-going administrative costs	£0
Opex / capex (food to sewer)	£6.7
Waste Management Businesses*	
Infrastructure Transitional costs	£0
On-going administrative costs	£0
Waste collections (recycling & residual)	£673.0
Residual waste processing/disposal	£794.0
Materials revenue (net of processing)	£175.3
Landfill Disposals Tax and Fuel Duty	£339.8
Sewerage Authorities	
Water treatment costs	£38.0
Monetised Environmental Costs	
All environmental costs	£227.9
Total Cost	£2,254.6
Total Cost (ex LDT and Fuel Duty)**	£1,914.8
Total Welsh Government	£0.0
Total NRW	£0.0
Total Local Authority	£0.0
Total All Waste Producers	£6.7
Total Waste Management Businesses*	£1,982.1
Total Sewerage Authorities	£38.0

* 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.

** 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 waste producers, but is an income to the Welsh Government and thus neutral within the overall costs and benefits of the system.

Option 2: Low Level of Separation, Separate Collection, Ban on the Disposal of Food Waste to Sewer, Ban on Specified Kinds of Waste to Incineration and Landfill

Introduction

- 3.27 This option has less likelihood of providing high quality recyclate than the preferred option (Option 3, below). This is due to the cross contamination of material streams and the subsequent difficulty in separating them out in a material recycling facility.
- 3.28 Modelling carried out for the Welsh Government estimates that, although Option 2 would capture a similar amount of recycled material to Option 3 (below), as this material would be of lower quality it would be less likely to be suited for closed loop recycling. The extent of benefits realised in terms of the economy and the environment would thus be smaller.

Environmental Impacts

- 3.29 For the analysis, a range of environmental impacts were modelled, including:
- Emissions of greenhouse gases (expressed as CO₂ equivalent)
 - Levels of NO₂ pollution
 - Tonnes recycling
 - Monetised environmental impacts
- 3.30 The calculation of monetised environmental benefits is detailed in the supporting Eunomia study.
- 3.31 The impacts are shown below:

Table 5: Option 2, Environmental Impacts, 10 Year 2024 to 2033

	Option 2 Impacts	Impacts relative to Option 1 (Baseline)
Tonnes CO ₂ e	781,000	-1,032,000
Tonnes NO ₂	500	-3,100
Tonnes recycling	8,410,000	2,270,000
Monetised Environmental NPV	£210,100,000	-£17,800,000

- 3.32 The implementation of this option would result in environmental benefits above the baseline (Option 1). The benefits are due to the modelled switch of recyclable material from the residual waste stream to the recycling waste stream. Reductions in CO₂e and NO₂ emissions are predicted from the increase in recycled materials and decrease in residual waste disposal (and in the case of CO₂e) residual waste processing. The reductions are observed despite increased emissions from recyclate processing and onward transport costs (and in the case of NO₂) recyclate collection.

Landfill Disposals Tax and Fuel Duty

3.33 Table 6 shows the modelled estimate of Landfill Disposals Tax revenue as a result of the landfilling of materials and Fuel Duty and the comparison of this with Option 1. The increase in recycling and reduction in residual waste in this option is expected to result in lower LDT payments.

Table 6: Option 2, Landfill Disposals Tax and Fuel Duty, 10 Year NPV 2024 to 2033

	Option 2 Costs	Costs relative to Option 1 (Baseline)
Landfill Disposals Tax and Fuel Duty	£229.3m	-£110.5m

Recyclate Quality

3.34 Other than Option 1, this option has the least likelihood of providing high quality recyclate. Presenting recyclable waste materials together for collection means that the materials have to be subsequently separated, which results in cross contamination by the different material types. High quality recyclate is more likely to be used in higher value manufacturing processes, thus producing greater environmental benefits.

Employment

3.35 The modelling predicts Option 2 would sustain an average of 2,272 jobs in the waste management sector during the period 2024-33, 473 jobs more than would be sustained in the baseline (Option 1). This option would lead to significant increased employment.

3.36 To consider the Well-being and Future Generations Act further, both GVA per hour worked and percentage of businesses that are innovation driven were considered. Previous work⁹ has shown that although the data does not provide an indication of the GVA per hour worked, it does predict that GVA is expected to increase as overall levels of recycling increase.

Costs to the Main Sectors

3.37 The costs to the different sectors are discussed below and summarised in Table 18.

Costs to Waste Producers

3.38 In addition to commercial and industrial premises, non-domestic premises also includes those occupied by public sector institutions and charities. Waste services are provided in a competitive market, with the costs of waste

⁹ Eunomia (2016) A Resourceful Future – Expanding the UK Economy, Final Report for Suez, September 2016

management being incurred primarily by waste producers. The scale of costs or cost savings to the producers depends in part on factors such as market competition and innovation to drive down costs to customers, the waste producers' awareness of the services available and their response to increased costs of residual waste management. Where the policy measures envisaged would result in additional costs to waste management companies in the first instance, it should be anticipated that these will effectively be recharged to waste producers subject to competition between service providers.

- 3.39 The waste management sector involves private sector collectors and treatment providers, and local authority waste collectors. The modelling has assumed that the changes resulting from the policy interventions will not result in a change to the way that the waste market allocates costs. Thus, for the purposes of estimating the costs to waste producers 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).
- 3.40 For the purpose of modelling, waste producers may thus incur costs in two areas:
- Transitional costs related to changes in practice
 - Ongoing costs or savings related to the collection of their waste materials passed on by the waste management sector.
- 3.41 Transitional costs are expected to be incurred in the following areas:
- Training and awareness
 - Modifying internal procedures and guidance
 - Implementing a new bin system
 - Organising a new collection system
- 3.42 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).
- 3.43 It has also been assumed that the effort required by employees to sort their waste into the separate co-mingled and food bins would be negligible and that the time this action requires would not be significant enough to result in an additional cost.
- 3.44 The transitional costs on waste producers of this option are presented below, these transitional costs are incurred in the first two years.

Table 7: Option 2: Forecast Transitional Costs for Waste Producers (Co-mingled) (rounded to nearest £1,000)

Activity	Year 1 (£)	Year 2 (£)	10 Year Total (NPV £)
Attending Seminars	10,000	0	10,000
New Guidelines	751,000	0	751,000

Organising New Bin System	0	1,347,000	1,302,000
Organising New Collection System	0	3,978,000	3,843,000
Total (£)	761,000	5,325,000	5,906,000

3.45 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 (as detailed below) 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

3.46 shown in Table 8.

Table 8: Option 2 - Weekly Financial and Administrative Cost Impact per local unit of recyclate collection - 2029 (£), (negative values represent a saving)

Regulatory Scenario	Local Unit Size Band (Employees)						
	0-4	5-9	10-19	20-49	50-99	100-249	250+
Option 1 (Baseline)	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Option 2	£5.10	£1.27	-£2.38	-£6.36	-£8.66	-£18.30	-£392.91

3.47 Option 2 gives rise to savings above the baseline on overall waste management costs for the larger local units (over 10 employees) and a small additional cost to smaller local units. This pattern arises because the administrative costs incurred by local units of different sizes differ to a smaller degree than the potential savings from additional recycling. Large local units make bigger savings due to benefiting from reduced waste management costs over a greater quantity of waste.

3.48 Option 2 is less costly than the preferred option (Option 3) for local units with 4 employees or less, with larger local units making lower savings than Option 3. This is because, though waste producers incur lower administration under Option 2, the overall savings to waste management businesses of this option (as described below), expected to be passed on to the waste producer, are not as great as those resulting from Option 3. However, the costs shown for smaller local units assume that these local units occupy their own individual premises. In many cases, micro-businesses will occupy shared spaces where waste is managed centrally, and will incur lower costs than those modelled.

3.49 In order to examine whether local units producing large amounts of food waste might be impacted, the modelling also examined the impact on businesses in the accommodation and food services sector. The results are shown in Table 9, below:

Table 9: Option 2 - Weekly Financial and Administrative Cost Impact per Local Unit of recycle collection - Accommodation and Food Service Activities only – 2029 (£), (negative values represent a saving)

Regulatory Scenario	Local Unit Size Band (Employees)						
	0-4	5-9	10-19	20-49	50-99	100-249	250+
Option 1 (Baseline)	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Option 2	£1.15	-£2.06	-£10.09	-£17.62	-£16.23	-£43.95	-£2,605.85

3.50 The relatively large amount of waste produced by local units in this sector means that the savings that are able to be realised are potentially greater than for local units in general. As a result, the waste management costs associated with nearly all local units fall under this option. The smallest local units incur a small additional cost.

3.51 The savings for the local units for this option are lower than those resulting from the preferred option (Option 3).

Costs to Waste Producers Disposing of Food Waste to Sewer

3.52 Food waste is typically treated prior to being discharged to sewer. There are a number of different technologies used to carry out treatment. The Welsh Government is not at this time intending to exempt food waste treated by any of these technologies from the ban on the disposal of food waste to sewer. The impacts of these technologies are considered individually in the Appendix to this document.

3.53 As food waste is required to be presented separately for collection in Options 2, 3 and 4, the costs and savings to waste producers currently disposing of food waste to sewer are the same for each of the options.

3.54 There is little data available with regard to the current use of the different treatment technologies. No new data emerged through the previous consultation on these proposals, or through further research.

3.55 The sectors where the technologies are most prevalent are, as would be expected, those which include a number of food producing businesses or public-sector organisations:

- Accommodation and food service activities (i.e. restaurants, hotels)
- Education (i.e. schools, colleges and universities)
- Human health and social work activities (i.e. hospitals)

3.56 Following discussion with industry, Eunomia confirmed that relatively little data was available on the prevalence of the technologies in the hospitality sector as a whole. Estimates given by stakeholders in respect of penetration suggested that they were used in between a third and three quarters of food

businesses. However, feedback from Environmental Health Officers - who inspect the majority of these premises - indicated that the units are rarely encountered in their inspections, suggesting relatively low levels of penetration under current market conditions. Feedback from public sector bodies indicates that there is variety of treatments in use and no consistent pattern of service delivery for food waste treatment.

- 3.57 An overview of food waste treatment in Health Boards across Wales suggests that around a third of food waste produced by hospitals is disposed of to sewer. However, in anticipation of the introduction of legislation under Part 4 of the Act, it appears that some organisations are choosing to introduce food waste collections, rather than investing in food waste to sewer units that are at risk of being banned.
- 3.58 Under the ban, waste producers currently using these technologies will be required to cease using the practice and present their food waste separately for collection. The most likely waste management route for separately collected food waste is anaerobic digestion (AD). This is therefore the route used as a comparison to evaluate the costs of switching from the current practice.
- 3.59 Table 10 shows the financial costs per tonne of food waste to waste producers currently disposing of food waste to sewer of introducing the food waste to sewer ban; the table shows the breakdown of results for each technology option. Related to this, Table 11 shows the annual cost per local unit for larger local units treating 46 tonnes of food waste per year.
- 3.60 These results suggest there will be a net financial cost to the larger food waste producers arising from the ban of food waste disposed to sewer. Data on the capex and opex for the food waste disposal units suggests that the net cost to local units arising from the use of these units is lower than the cost of food waste collections. The financial cost increase to larger local units using these technologies of switching from disposal to sewer to a food waste collection service is modelled as between £17 and £64 per tonne, depending on the treatment technology used. Eunomia took a relatively conservative approach in respect of calculating the financial costs to local unit of source segregated food waste collection schemes. Actual costs may therefore be lower than those shown. Furthermore, smaller local units using these methods for treating their waste will see their costs decrease if they switch to a separate food waste collection system, as is discussed subsequently in this section.

Table 10: Food Waste to Sewer Ban – Financial Results to Larger Waste Producers

	£ per tonne of food waste			
	Macerator	De-waterer	Enzyme Digester	Waste AD
Annualised Capital Cost – FWD	£2.47	£23.08	£28.33	
Electricity FWD	£6.00	£0.37		
Water FWD	£24.00	£7.92		
Combined Opex (Water/ Electricity)			£13.77	
Sewerage Charge	£24.00	£7.39		
Maintenance	£0.00	£28.00	£28.49	
AD Treatment Costs		£36.11		£35.65
AD Transport Costs		£0.00		£84.70
Total	£56.47	£102.86	£70.60	£120.35

Table 11: Financial Cost per Local Unit per Year – Larger Local Unit

	£ per local unit per year			
	Macerator	De-waterer	Enzyme Digester	Waste AD
Impact per Waste Producer per Year	£2,576.40	£4,693.18	£3,221.02	£5,491.07
Notes: Based on local units producing 46 tonnes a year of food waste. This is a large amount of waste, equating to around 3,000 litres per week, reflecting the fact that waste producers most likely to have incurred the capital costs of installing food waste to sewer technologies are those generating a large amount of such waste.				

- 3.61 Costs are anticipated to be higher for the de-waterer and the enzyme digester than for the macerators due to the higher capital cost and maintenance charges, although there are some cost savings in respect of water use in comparison to the use of macerators. The extent to which maintenance costs may be incurred was unclear, particularly for the de-waterers, where no direct feedback from unit users was available.
- 3.62 As was indicated above, there is some uncertainty regarding the amount of food waste that may be treated annually by waste producers using these units. Eunomia’s assumptions have been developed following discussion with industry, taking into account the maximum capacity of these units. Given the capital cost of investing in these units, take-up is anticipated to be greatest in the larger local units. Smaller local units using these units may see their costs decrease as a result of the switch to source segregated food waste collections. In this respect, Table 12 shows the annual costs for local units

producing 20 tonnes of waste a year; at this point, the waste to AD option is the cheapest for local units.

Table 12: Financial Cost per Local Unit per Year – Smaller Local Unit

	£ per waste producer per year			
	Macerator	De-waterer	Enzyme Digester	Waste AD
Impact per Waste producer per Year	£2,423.10	£2,866.46	£2,869.17	£2,416.07
Notes: Based on businesses producing 20 tonnes a year of food waste				

3.63 Leading on from this, Table 13 shows the thresholds – defined here in terms of the amount of food waste generated in tonnes per year – where the total cost of switching from disposal to sewer to a separate food waste collection is equivalent to that of each of the food waste to sewer technologies. The threshold varies for each of the technologies (dewatering being the most expensive, and the macerator being the cheapest). From this, it can be seen that local units producing 20 tonnes a year and using a macerator will see no increase in cost as a result of the ban. For those using de-waterers (which have higher costs), the impact will be cost-neutral for local units producing 29 tonnes per year.

3.64 Thus, local units producing less than these food waste tonnages will see a saving.

Table 13: Waste Generation – Thresholds for Cost Savings

	Macerator	De-waterer	Enzyme digester
Threshold for cost neutrality – tonnes per year of food waste generated	20	29	24

3.65 Based on data from StatsWales, Eunomia has calculated that the average turnover of local units within the size band of 20 – 49 employees is £2.21 million – further suggesting that, for these businesses, the *additional cost* of taking up a food waste collection (in comparison to the use of a macerator) would equate to around 0.1% of annual turnover.

Costs and Benefits to Waste Management Businesses

3.66 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.

3.67 The costs to waste management businesses are included within Table 14, but are ultimately passed to the waste producer.

3.68 Although the waste management industry continues to incur costs under this option, its costs are lower than in the baseline.

3.69 Costs include:

- Infrastructure costs
- On-going administrative costs
- Costs of Waste Collection (Residual and recycling/recovery)

The benefits include:

- Disposal/Processing of residual waste
- Materials Revenue
- Landfill Disposals Tax

3.70 In a properly functioning, competitive market the costs and costs savings would be expected to be passed on to the customer (waste producers). Thus, the net costs and benefits will be accrued by waste producers rather than the waste industry. The net costs described below are thus attributed to waste producers for the purpose of calculating waste producer costs and savings.

Table 14: Option 2 – Breakdown of Financial Costs to Waste Management Businesses

	Financial costs to waste management businesses (2024 to 2033) (NPV £m)	Costs above Option 1 (Baseline) (NPV £m)
Infrastructure Transitional costs	£0.0	£0.0
On-going administrative costs	£60.7	£60.7
Waste collections (recycling & residual)	£737.0	£64.0
Residual waste processing/disposal	£580.2	-£213.8
Materials revenue (net of processing)	£222.3	£47.0
Landfill Disposals Tax and Fuel Duty	£229.3	-£110.5
NET FINANCIAL COST	£1,829.4	-£152.6

Infrastructure Transitional Costs

3.71 The infrastructure transitional costs are the financial costs of upgrading and/or building new waste transfer stations under the options. As this option requires a low level of segregation it is not predicted that any significant additional investment in new infrastructure would be required.

Administrative Costs

3.72 Table 15 shows the ongoing administrative costs as a result of the requirement to collect the specified materials co-mingled as required by this option. The majority (88%) of this cost is accounted for by the requirement for

additional driving and loading staff. Just under 12% is accounted for by the requirements for operational changes such as updating collection routes and amending driver timetables.

Table 15: Administrative costs to waste management businesses – Option 2 (rounded to nearest £1,000)

Activity	Year 1 (£)	Year 2 (£)	Sum of Years 3 – 10 (£)	10 Year Total (NPV £)
Waste Collection and Processing				
Attending Seminars	5,000	0		5,000
New Guidelines	242,000	0		242,000
Operational Changes	0	7,253,000		7,007,000
Additional Staff: Drivers and Loaders	0	2,737,000	61,359,000	53,379,000
Landfill and Incineration				
Attending Meetings	1,000	1,000		1,000
New Guidelines	15,000	15,000		30,000
Total	263,000	10,006,000	61,359,000	60,664,000

Other Costs

3.73 As shown in Table 14, in addition to the administrative costs, further costs are incurred by the waste management industry:

- in waste collection, as an increased number of vehicles and containers will be required to deliver this option, and
- Materials revenue (net of processing), as more material is sent to a MRF and the cost of sorting the material per tonne is higher than the material revenue received per tonne.

3.74 However, this is predicted to be offset by:

- A decrease in the amount of residual waste processing and disposal costs from waste facilities.
- A reduction in Landfill Disposal Tax paid by waste management companies as a result of diversion of material from landfill from the implementation of this option.

3.75 The net impact is a saving 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 saving onto waste producers.

- 3.76 Though collection costs and administration costs are lower for this option than for the preferred option (Option 3), the overall cost saving to waste management businesses is lower. This is primarily because of increased sorting costs from the co-mingling of recycle streams.

Manufacturers and Suppliers of Food Waste Disposal Technologies

- 3.77 The Welsh Government and Eunomia have met with manufacturers and suppliers of food waste disposal units and their representative bodies. From the meetings it is understood that for the majority of these businesses, the supply of treatment units for the purposes of disposal to sewer in Wales represent a small part of the businesses output and therefore this cost has not been quantified. While the actual cost is not known, discussions with the businesses concerned suggest that the cost is expected to be minimal.

Costs to Sewerage Authorities

- 3.78 Under this option there are no costs to the sewerage authorities, as there is no discharge of food waste to sewer from commercial premises in Wales. However, the authorities are estimated to save £44million in waste water treatment costs through the avoidance of treatment of food waste. This figure does not include the potential additional saving of £32.2million over 10 years from dealing with blockages and the consequent issues.

Costs to Welsh Government

- 3.79 The costs to the Welsh Government are presented below in Table 16.
- 3.80 The modelling has costed for the Welsh Government to undertake the following tasks:
- Marketing
 - Training.

Table 16: Option 2 – Breakdown of Financial Costs to Welsh Government (rounded to nearest £1000)

	Financial costs to Welsh Government, (£) (2024 to 2033)
Marketing (requirement to sort)	950,000
Conducting training workshops & organising information campaigns (requirement to sort)	1,000
Marketing (ban to sewer)	50,000
Marketing and meetings (Landfill and incineration bans)	1,000
Total Cost	1,002,000

Costs to Natural Resources Wales (NRW)

- 3.81 NRW is forecast to take on regulatory costs of £4.5 million NPV over 10 years, The cost per year was provided by NRW and includes staff costs, training, equipment and travel and subsistence.
- 3.82 It is expected that any additional costs of regulation and enforcement will ultimately be met by the Welsh Government, but for the purposes of modelling have been attributed to NRW.

Costs to Local Authorities

- 3.83 There are not expected to be any significant additional costs or benefits to local authorities in terms of waste collection to householders from this option as these are outside the scope of the changes. In any case, Welsh local authorities must already meet the separate collection requirements of the Waste (England and Wales) Regulations (as amended) and already provide a separate food waste collection service. Local authorities must also collect a high proportion of recyclable materials separately in order to meet the existing statutory recycling targets set under the provisions of the Waste (Wales) Measure 2010.
- 3.84 There should be no increase in costs with regard to local authority collection of non-domestic waste as this service is 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).
- 3.85 It is the intention of the Welsh Government that local authority environmental health teams will enforce the ban on the disposal of food waste to sewer from non-domestic premises. The costs arising from this include, and are shown in Table 17, below:
- **Modifying procedures and guidance.**
 - **Conducting inspections:** The frequency of inspections from environmental health officers will vary depending on the type of premises being inspected, with the frequency being dependent on the risks to public health posed by each business. While some very low risk businesses may not be inspected, a high-risk premise could be inspected every 6 months. It has been assumed that 1% of food waste producing sites will receive an additional inspection that focusses on assessing the correct implementation the ban. Each inspection is assumed to be part of a pre-existing environmental health inspection carried out by one local authority inspector.
- 3.86 The training and guideline updates are expected to occur within the first year (2024) and inspections are expected to begin in year 2 once businesses have had time to update their procedures.

**Table 17: Costs to Local Authorities for Food Waste to Sewer Ban 2024-2033
(rounded to nearest £100)**

Actor	Activity	Year 1 (£)	Year 2 (£)	10 Year Total (NPV £)
Local Authorities	Updating Guidelines	12,000	0	12,000
	Inspections	0	51,800	425,300
Total Costs to Local Authorities (£)		12,000	51,800	437,700

3.87 Though certain incinerator or co-incinerator appliances could be regulated by local authorities, no such appliances are currently in operation in Wales. As such, restrictions on the incineration of materials are not expected to have an administrative impact on local authorities.

Summary Table – Option 2

3.88 Table 18 summarises the costs and benefits to the main sectors of the implementation of Option 2, profiled from 2024 to 2033. Avoided Landfill Disposals Tax and Fuel Duty is a transfer payment and is therefore excluded from the 'Net Cost' calculation.

Table 18: Option 2 Summary Table - 10 Year NPV (rounded to nearest £100,000)

	Costs (£m)	Costs compared to Baseline (Option 1) (£m)
Financial costs		
Welsh Government		
Transitional costs	£1.0	£1.0
NRW		
Transitional costs	£0.0	£0.0
On-going administrative costs	£4.5	£4.5
Local Authority		
Transitional costs	£0.0	£0.0
On-going administrative costs	£0.4	£0.4
All Waste Producers		
Transitional costs	£5.9	£5.9
On-going administrative costs	£0.0	£0.0
Opex / capex (food to sewer)	£0.0	-£6.7
Waste Management Businesses*		
Infrastructure Transitional costs	£0.0	£0.0
On-going administrative costs	£60.7	£60.7
Waste collections (recycling & residual)	£737.0	£64.0
Residual waste processing/disposal	£580.2	-£213.8
Materials revenue (net of processing)	£222.3	£47.0
Landfill Disposals Tax and Fuel Duty	£229.3	-£110.5
Sewerage Authorities		
Water treatment costs	£0.0	-£38.0
Monetised Environmental Costs		
All environmental costs	£210.1	-£17.8
Total Cost	£2,051.3	-£203.2
Total Cost (ex LDT and FD)**	£1,822.0	-£92.7
Total Welsh Government	£1.0	£1.0
Total NRW	£4.5	£4.5
Total Local Authority	£0.4	£0.4
Total All Waste Producers	£5.9	-£0.8

Total Waste Management Businesses *	£1,829.4	-£152.6
Total Sewerage Authorities	£0.0	-£38.0

* 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.

** 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 waste producers, but is an income to the Welsh government and thus neutral within the overall costs and benefits of the system.

Option 3: Medium Level of Separation, Separate Collection, Ban on the Disposal of Food Waste to Sewer, Ban on Specified Kinds of Waste to Incineration and Landfill

Introduction

- 3.89 This option is likely to yield high quality, high value recycling. This is because keeping the materials separate results in a less contaminated material than that resulting from co-mingled collections, such as required by Option 2.
- 3.90 Modelling carried out for the Welsh Government estimates that, although this option will yield a similar amount of recycled material to Option 2, the material produced by this option is of higher quality, incurs lower sorting costs and is more likely to be suited to closed loop recycling. The extent of benefits realised in terms of the economy and the environment would thus be higher.

Environmental Impacts

- 3.91 For the analysis, a range of environmental impacts were modelled, including:
- Emissions of greenhouse gases (expressed as CO₂e equivalent)
 - Levels of NO₂ pollution
 - Tonnes recycling
 - Monetised environmental impacts
- 3.92 The calculation of monetised environmental benefits is detailed in the supporting Eonomia study.
- 3.93 The impacts are shown below:

Table 19: Option 3, Environmental Impacts, 10 Year 2024 to 2033

	Option 3 Impacts	Impacts above Option 1 (Baseline)
Tonnes CO ₂ e	515,000	-1,298,000
Tonnes NO ₂	-1,600	-5,200
Tonnes recycling	8,450,000	2,310,000
Monetised Environmental NPV	-£106,000,000	-£121,900,000

- 3.94 The implementation of this option would result in environmental benefits above the baseline (Option 1). The benefits are due to the modelled switch of recyclable material from the residual waste stream to the recycling waste stream. Reductions in CO₂e and NO₂ emissions are mainly predicted from the increase in recycled materials, decrease in residual waste disposal (and in the case of CO₂e) residual waste processing and reduction in onward transport costs. The reductions are observed despite increased emissions from recycle processing and (in the case of NO₂) recycle collection. In the event that the waste sector moves towards the use of battery electric or hydrogen powered vehicles in the course of the period covered by the RIA, the

environmental impacts associated with additional collection vehicles would reduce; but due to the uncertainty of the timing of this transition, it has been assumed for the purposes of the modelling that diesel vehicles continue to predominate.

- 3.95 Though impacted by the increase in emissions from increased vehicles required for recycle collection, this option outperforms Option 2 due to:
- Higher amount of recycled materials and associated carbon benefits
 - Lower recycling processing costs due to reduced need to separate materials
 - Lower levels of residual waste disposal
 - Decreased onward transport.

Landfill Disposals Tax and Fuel Duty

- 3.96 Table 20 shows the modelled estimate of Landfill Disposals Tax revenue as a result of the landfilling of materials and Fuel Duty and the comparison of this with Option 1.

Table 20: Option 3, Landfill Disposals Tax and Fuel Duty, 10 Year NPV 2024 to 2033

	Option 3 Costs	Costs relative to Option 1 (Baseline)
Landfill Disposals Tax and Fuel Duty	£255,800,000	-£84,000,000

Recyclate Quality

- 3.97 This option has a high likelihood of providing high quality recyclate. This is because keeping materials separate for collection (other than those that can be easily separated to a high quality) minimises the levels of cross contamination of materials. High quality recyclate is more likely to be used in higher value manufacturing processes, thus producing greater environmental benefits.

- 3.98 The option is also predicted to produce a higher volume of recyclate than Option 4, thus achieving higher material revenues.

Employment

- 3.99 The modelling predicted Option 3 would sustain an average of 2,582 jobs in the waste management sector during the period 2024-33, 784 jobs more than would be sustained in the baseline (Option1) and more than in Option 2. This option would lead to significant increased employment.

- 3.100 To consider the Well-being and Future Generations Act further, both GVA per hour worked and percentage of businesses that are innovation driven were considered. Previous work⁹ has shown that, although the data does not

provide an indication of the GVA per hour worked, it does predict that GVA is expected to increase as overall levels of recycling increase.

Costs to the Main Sectors

3.101 The costs to the different sectors are discussed below and summarised in Table 26.

Costs to Waste Producers

3.102 As described in Option 2, above, waste producers may incur costs in two areas – transitional costs related to changes in practice and ongoing costs (or savings) related to the collection of their waste materials from the waste management sector.

3.103 Transitional costs are expected to be incurred in the following areas:

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

3.104 It is expected that more waste producers will need to update their guidelines and bin systems than with Option 2, as it will require different arrangements for a greater range of waste producers than Option 2. However, it has been assumed that the time and effort required to sort waste into separate bins would not be significant enough to result in any additional costs. The total costs are shown in Table 21 demonstrating an increased impact on waste producers under this option than in Option 2.

Table 21: Option 3: Forecast Administrative Costs for Waste Producers (Moderate Separation) (rounded to nearest £1,000)

Activity	Year 1 (£)	Year 2 (£)	10 Year Total (NPV £)
Attending Seminars	15,000	0	15,000
New Guidelines	1,783,000	0	1,783,000
Organising New Bin System	0	3,200,000	3,091,000
Organising New Collection System	0	9,447,000	9,128,000
Total (£)	1,798,000	12,647,000	14,018,000

3.105 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 unit (number of employees). The results are shown in Table 22.

Table 22: Option 3 - Weekly Financial and Administrative Cost Impact per local unit of recyclate collection (2029) (£), (negative values indicate a saving)

Regulatory Scenario	Local Unit Size Band (Employees)						
	0-4	5-9	10-19	20-49	50-99	100-249	250+
Option 1 (Baseline)	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Option 3	£11.40	-£1.51	-£16.28	-£37.38	-£61.61	-£168.73	-£492.55

3.106 Option 3 gives rise to savings above the baseline on overall waste management costs for local units with more than 5 employees and a small additional cost to businesses with 4 or fewer employees. This pattern arises because the administrative costs incurred by local units of different sizes are similar; but large local units make bigger savings due to benefiting from reduced waste management costs over a greater quantity of waste.

3.107 Option 3 provides the greatest savings of all the options for waste producers with between 5 and 249 employees. It is more costly than Option 2 for local units with 0-4 employees and provides less savings than Option 4 for local units with more than 250 employees. The option is more costly than Option 2 to smaller local units because the administrative costs (above) are proportionally higher for this option than the savings expected to be passed on to the businesses by their waste collector. However, the costs shown for smaller local units assume that these local units occupy their own individual premises. In many cases, micro-businesses will occupy shared spaces where waste is managed centrally, and will incur lower costs than those modelled.

3.108 In order to examine whether local units producing large amounts of food waste might be impacted, the modelling also examined the impact on accommodation and food services. The results are shown in Table 23, below:

Table 23: Option 3 - Weekly Financial and Administrative Cost Impact per Local Unit of recyclate collection - Accommodation and Food Service Activities only (2029) (£), (negative values indicate a saving)

Regulatory Scenario	Local Unit Size Band (Employees)						
	0-4	5-9	10-19	20-49	50-99	100-249	250+
Option 1 (Baseline)	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Option 3	£2.50	-£8.59	-£40.69	-£79.46	-£134.47	-£463.63	-£3,282.85

3.109 The relatively large amount of waste produced by businesses in this sector means that the savings that could be realised are potentially greater than for businesses in general. As a result, the waste management costs associated

with nearly all businesses fall under this option. There is a slight cost for the smallest local units with less than 4 employees.

3.110 As in the core results, Option 3 provides the greatest savings of all the options for local units with between 5 and 249 employees. It is marginally more costly than Option 2 for local units with 0-4 employees and provides less savings than Option 4 for local units with more than 250 employees. The option is more costly than option 2 to smaller local units because the administrative costs (above) are proportionally higher for this option than the savings expected to be passed on to the businesses by their waste collector.

Costs to Businesses Disposing of Food Waste to Sewer

3.111 The costs to businesses currently disposing of food waste to sewer are as presented for Option 2.

Costs and Benefits to Waste Management Businesses

3.112 As with Option 2, though the waste management industry is expected to experience an overall benefit from this option (see paragraph 3.118, below), it will be expected to experience some costs.

3.113 Costs include:

- Infrastructure costs
- On-going administrative costs
- Costs of waste collection (residual and recycling/recovery)
- Disposal/processing of residual waste
- Landfill Disposals Tax and Fuel Duty

3.114 In a properly functioning, competitive market the costs and cost savings would be expected to be passed on to the customer (waste producers). Thus, the net costs and benefits will be accrued by waste producers rather than the waste industry. The net costs described below are thus attributed to waste producers for the purpose of calculating waste producer costs and savings in paragraphs 3.102 to 3.110 above.

Table 24: Option 3 – Breakdown of Financial Costs to Waste Management Businesses

	Financial costs to waste management businesses (2024 to 2033) (NPV £m)	Costs above Option 1 (Baseline) (NPV £m)
Infrastructure Transitional costs	£100.4	£100.4
On-going administrative costs	£164.0	£164.0
Waste collections (recycling & residual)	£959.2	£286.3
Residual waste processing/disposal	£575.7	-£218.2
Materials revenue (net of processing)	-£197.4	-£372.7

Landfill Disposals Tax and Fuel Duty	£255.8	-£84.0
NET FINANCIAL COST	£1,857.7	-£124.3

Infrastructure Transitional Costs

3.115 The infrastructure transitional costs, as shown in Table 24, are the financial costs of upgrading and/or building new waste transfer stations under the options. As this option will require an increase in the number of streams collected by some waste management businesses, it is estimated that 59 transfer stations would require 2 new bays and 14 transfer stations would need to be replaced.

Administrative Costs

3.116 Table 25 shows the ongoing administrative costs as a result of the requirement to collect the specified materials in three streams, as required by this option. The majority (79%) of this cost is accounted for by the requirement for additional driving and loading staff, as shown in Table 25. 20% is accounted for by the requirements for operational changes such as updating collection routes and amending driver timetables.

Table 25: Option 3 - Administrative costs to waste management businesses – Option 3 (rounded to nearest £1,000)

Activity	Year 1 (£)	Year 2 (£)	Sum of Years 3 – 10 (£)	10 Year Total (NPV £)
Waste Collection and Processing				
Attending Seminars	10,000	0		10,000
New Guidelines	1,148,000	0		1,148,000
Operational Changes	0	34,450,000		33,285,000
Additional Staff: Drivers and Loaders	0	6,641,000	148,868,000	129,508,000
Landfill and Incineration				
Attending Meetings	1,000	1,000		1,000
New Guidelines	15,000	15,000		30,000
Total	1,174,000	41,107,000	148,868,000	163,982,000

Other Costs

- 3.117 As shown in Table 24, in addition to the administrative costs, further costs are incurred by the waste management industry in waste collection, as an increased number of vehicles and containers will be required to deliver this option. However, this is predicted to be offset by:
- A decrease in the amount of residual waste processing and disposal costs from waste facilities.
 - An increase in the materials revenue (net of processing) received by the waste management industry due to reduced processing costs.
 - A reduction in Landfill Disposals Tax paid by waste management companies as a result of diversion of material from landfill from the implementation of this option.
- 3.118 The net impact is a saving to waste management businesses over the ten-year appraisal period. However, as noted above, it is anticipated that competitive forces will result in waste management businesses passing much of this cost-saving onto waste producers.
- 3.119 Though the infrastructure, administration costs, waste collection and Landfill Disposals Tax and Fuel Duty costs are higher for this option than for option 2, they are offset by the higher material revenue net of sorting resulting from the recyclate being collected with higher levels of source segregation. This results in a higher saving above the baseline than Option 2.
- 3.120 Option 3 is also predicted to provide lower costs or higher savings than Option 4 under all headings, except material revenues net of sorting costs, since there are some sorting costs in Option 3 that are not required in Option 4.

Manufacturers and Suppliers of Food Waste Disposal Technologies

- 3.121 The impact on the manufacturers and suppliers of food waste disposal units is assumed to be the same as under Option 2.

Costs to Sewerage Authorities

- 3.122 As with Options 2 and 4, there are no costs to the sewerage authorities from this option, as there is no discharge of food waste to sewer from commercial premises in Wales. The savings are as presented for Option 2. The authorities are estimated to save £44m in waste water treatment costs through the avoidance of treatment of food waste. This figure does not include the potential addition saving of £32.2m over ten years from dealing with blockages and the consequent issues. These sums could otherwise be re-invested in water or sewerage infrastructure or services.

Costs to Welsh Government

- 3.123 The cost to the Welsh Government under this option is as presented for Option 2, with a total cost of £1.0 million NPV over 10 years.

Costs to Natural Resources Wales

3.124 The cost to NRW is assumed to be the same as detailed in Option 2, with a total cost of £4.5 million NPV over 10 years.

Costs to Local Authorities

3.125 The cost to local authorities is as presented in Option 2, with a total cost of £426,000 NPV over 10 years associated with the duty to regulate the ban on the disposal of food waste to sewer.

Summary Table – Option 3

3.126 Table 26, below, summarises the costs and benefits to the main sectors of the implementation of Option 3, profiled from 2024 to 2033. Avoided Landfill Disposals Tax and Fuel Duty is a transfer payment and is therefore excluded from the 'Net Cost' calculation.

Table 26: Option 3 - Summary Table - 10 Year NPV (rounded to nearest £100,000)

	Costs (£m)	Costs compared to Baseline (Option1) (£m)
Financial costs		
Welsh Government		
Transitional costs	£1.0	£1.0
NRW		
Transitional costs	£0.0	£0.0
On-going administrative costs	£4.5	£4.5
Local Authority		
Transitional costs	£0.0	£0.0
On-going administrative costs	£0.4	£0.4
All Waste Producers		
Transitional costs	£14.0	£14.0
On-going administrative costs	£0.0	£0.0
Opex / capex (food to sewer)	£0.0	-£6.7
Waste Management Businesses*		
Infrastructure Transitional costs	£100.4	£100.4
On-going administrative costs	£164.0	£164.0
Waste collections (recycling & residual)	£959.2	£286.3
Residual waste processing/disposal	£575.7	-£218.2
Materials revenue (net of processing)	-£197.4	-£372.7
Landfill Disposals Tax and Fuel Duty	£255.8	-£84.0
Sewerage Authorities		
Water treatment costs	£0.0	-£38.0
Monetised Environmental Costs		
All environmental costs	-£106.0	-£121.9
Total Cost	£1,983.7	-£270.9
Total Cost (ex LDT and Fuel Duty)**	£1,727.9	-£186.9

Total Welsh Government	£1.0	£1.0
Total NRW	£4.5	£4.5
Total Local Authority	£0.4	£0.4
Total All Waste Producers	£14.0	£7.3
Total Waste Management Businesses*	£1,857.7	-£124.3
Total Sewerage Authorities	£0.0	-£38.0

* 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.

** 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 waste producers, but is an income to the Welsh government and thus neutral within the overall costs and benefits of the system.

Option 4: High Level of Separation, Separate Collection, Ban on the Disposal of Food Waste to Sewer, Ban on Specified Kinds of Waste to Incineration and Landfill

Introduction

- 3.127 The option has highest overall costs of the options (including Option 1, the baseline) in the main because of higher transitional costs for waste producers and the waste management sector and higher administrative and waste collection costs.
- 3.128 This option is likely to yield high quality, high value recycling. This is because keeping the materials separate results in a less contaminated material than that resulting from co-mingled collections such as required by Option 2.
- 3.129 However, in terms of environmental costs, though benefitting from lower recycling processing costs and onward transport costs than Option 3, it is estimated to be outperformed by Option 3 due to:
- Higher collection costs
 - Lower amount of recycled materials (due to a slightly lower compliance with this more costly scheme) and associated carbon benefits

Environmental Impacts

- 3.130 For the analysis, a range of environmental impacts were modelled, including:
- Emissions of greenhouse gases (expressed as CO₂e equivalent)
 - Levels of NO₂ pollution
 - Tonnes of recycling
 - Monetised environmental impacts

3.131 The impacts are shown below:

Table 27: Option 4, Environmental Impacts, 10 Year 2024 to 2033

	Option 4 Impacts	Impacts above Option 1 (Baseline)
Tonnes CO ₂ e	553,000	-1,259,000
Tonnes NO ₂	-1,000	-4,700
Tonnes recycling	8,360,000	2,230,000
Monetised Environmental NPV	£116,300,000	-£111,600,000

- 3.132 The implementation of this option would result in environmental benefits above the baseline (Option 1).
- 3.133 The benefits are due to the modelled switch of recyclable material from the residual waste stream to the recycling waste stream. Reductions in CO₂e and NO₂ emissions are mainly predicted from the increase in recycled materials, decrease in residual waste disposal (and in the case of CO₂e) residual waste and recycle processing and reduction in onward transport costs. The

reductions are observed despite increased emissions resulting from recyclate collection. In the event that the waste sector moves towards the use of battery electric or hydrogen powered vehicles in the course of the period covered by the RIA, the environmental impacts associated with additional collection vehicles would reduce; but due to the uncertainty of the timing of this transition, it has been assumed for the purposes of the modelling that diesel vehicles continue to predominate.

3.134 Though benefitting from lower recycling processing costs and onward transport costs than Option 3, it is outperformed by Option 3, in the main due to higher collection costs of collecting additional material streams. In addition, Eunomia predicts a lesser amount of recyclate estimated to be collected at the higher level of segregation, as there would be a higher risk of non-compliance, should a five stream dry recyclate system be introduced.

Landfill Disposals Tax and Fuel Duty

3.135 The modelling estimates a reduction in Landfill Disposals Tax revenue and Fuel Duty NPV over 10 years as a result of diversion of material from landfill as a result of the implementation of this option.

Table 28: Option 4, Landfill Disposals Tax and Fuel Duty, 10 Year NPV 2024 to 2033

	Option 4 Costs	Costs relative to Option 1 (Baseline)
Landfill Disposals Tax and Fuel Duty	£293,800,000	−£45,900,000

Recyclate Quality

3.136 This option has a high likelihood of providing high quality recyclate that requires relatively little subsequent sorting. This is because keeping materials separate for collection minimises the levels of cross contamination of materials.

Employment

3.137 The modelling predicted Option 4 would sustain an average of 2,923 jobs in the waste management sector during the period 2024-33, 1,125 jobs more than would be sustained in the baseline (Option 1) and the highest of all the options. This option would lead to significant increased employment.

3.138 To consider the Well-being and Future Generations Act further, both GVA per hour worked and percentage of businesses that are innovation driven were considered. Eunomia report that previous work⁹ has shown that although the data does not provide an indication of the GVA per hour worked, it does predict that GVA is expected to increase as overall levels of recycling increase.

Costs to the Main Sectors

3.139 The costs to the different sectors are presented below and summarised in Table 34.

Costs to Waste Producers

3.140 As described in Option 2 above, waste producers may incur costs in two areas – transitional costs related to changes in practice and ongoing costs (or savings) related to the collection of their waste materials from the waste management sector.

3.141 Transitional costs are expected to be incurred in the following areas:

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

3.142 Under this option there is a slight jump in the forecast costs for waste producers, especially in regards to organising new bin systems. It has been assumed that, although most waste producers are likely to have some recycling, very few will currently have the five separate recycling bins for paper, card, glass, metals, and plastics. Although a similar assumption was made for Option 3, the key difference here is that it has also been assumed that, unlike the previous options, the necessary implementation time will be longer as the new bin system would be more complex and harder to implement.

3.143 However, similarly to the previous two options, it has been assumed that the time and effort required to sort waste into separate bins by the employees of waste producing organisations would not be significant enough to result in any additional administrative costs.

3.144 The forecast total costs to waste producers under the high separation policy is shown in Table 29.

Table 29: Option 4 - Administrative Costs for Waste Producers (rounded to nearest £1,000)

Activity	Year 1 (£)	Year 2 (£)	10 Year Total NPV (£)
Attending Seminars	21,000	0	21,000
New Guidelines	1,783,000	0	1,783,000
Organising New Bin System	0	6,399,000	6,183,000
Organising New Collection System	0	9,447,000	9,128,000
Total (£)	1,803,000	15,847,000	17,114,000

3.145 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 (number of employees). The results are shown in Table 30.

Table 30: Option 4 - Weekly Financial and Administrative Cost Impact per local unit of recyclate collection - 2029 (£), (negative values represent a saving)

Regulatory Scenario	Local Unit Size Band (Employees)						
	0-4	5-9	10-19	20-49	50-99	100-249	250+
Option 1 (Baseline)	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Option 4	£20.83	£10.37	-£1.01	-£20.70	-£44.00	-£151.70	-£1,130.99

3.146 Option 4 gives rise to savings on overall waste management costs for the local units with more than 10 employees and is the most costly of all the options for local units with 9 employees or fewer. This pattern arises because the administrative costs incurred by local units of different sizes are similar; but large local units make bigger savings due to benefiting from reduced waste management costs over a greater quantity of waste. This is the only option that models an additional cost for local units with 5-9 employees.

3.147 The option is the most costly than other options to the smallest local units because the administrative costs (above) are proportionally higher for this option than the savings expected to be passed on to the local units by their waste collector.

3.148 In order to examine whether local units producing large amounts of food waste might be impacted, the modelling also examined the impact on accommodation and food services. The results are shown in Table 31.

Table 31: Option 4 - Weekly Financial and Administrative Cost Impact per Local Unit of recyclate collection - Accommodation and Food Service Activities only – 2029 (£), (negative values represent a saving)

Regulatory Scenario	Local Unit Size Band (Employees)						
	0-4	5-9	10-19	20-49	50-99	100-249	250+
Option 1 (Baseline)	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Option 4	£12.04	£3.42	-£26.03	-£63.27	-£117.69	-£450.46	-£7,287.00

3.149 The relatively large amount of waste produced by businesses in this sector means that the savings that are able to be realised are potentially greater than

for businesses in general. As a result, the waste management costs compared to the main results associated with all local units fall under this option.

3.150 The savings for this option are generally lower than those resulting from the preferred option (Option 3) but higher than those predicted for Option 2.

Costs to Waste Producers Disposing of Food Waste to Sewer

3.151 The costs to waste producers currently disposing of food waste to sewer are as presented for Option 2.

Costs and Benefits to Waste Management Businesses

3.152 The waste management industry includes waste collection companies, 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.

3.153 Local authorities also have a duty (under the Environment Protection Act 1990) to collect commercial waste on request. However, this is operated on a full cost recovery basis and thus there are no costs arising to Local Authorities.

3.154 As with Option 2, though the waste management industry is expected to experience an overall benefit from this option, it will be expected to experience some costs.

3.155 Costs include:

- Infrastructure costs
- On-going administrative costs
- Costs of waste collection (residual and recycling/recovery)
- Disposal/Processing of residual waste
- Landfill Disposals Tax and Fuel Duty

3.156 In a properly functioning, competitive market the costs and cost savings would be expected to be passed on to the customer (waste producers). Thus, the net costs and benefits will be accrued by waste producers rather than the waste industry. The net costs described below are thus attributed to waste producers for the purpose of calculating waste producer costs and savings.

Table 32: Option 4 – Breakdown of Financial Costs to Waste Management Businesses

	Financial costs to waste management businesses (2024 to 2033) (NPV £m)	Costs above Option 1 (Baseline) (NPV £m)
Infrastructure Transitional costs	£254.2	£254.2
On-going administrative costs	£256.6	£256.6

	Financial costs to waste management businesses (2024 to 2033) (NPV £m)	Costs above Option 1 (Baseline) (NPV £m)
Waste collections (recycling & residual)	£1,220.7	£547.7
Residual waste processing/disposal	£584.9	-£209.1
Materials revenue (net of processing)	-£279.5	-£454.8
Landfill Disposals Tax and Fuel Duty	£293.8	-£45.9
NET FINANCIAL COST	£2,330.7	£348.7

Infrastructure Transitional Costs

3.157 The infrastructure transitional costs, as shown in Table 32 are the financial costs of upgrading and/or building new waste transfer stations under the options. As this option will require an increase in the number of streams collected by some waste management businesses, it is estimated that 37 transfer stations would require 3 new bays and 36 transfer stations would need to be replaced.

Administrative Costs

3.158 Table 33 shows the ongoing administrative costs as a result of the requirement to collect the specified materials in five streams, as required by this option. The majority (86%) of this cost is accounted for by the requirement for additional driving and loading staff, as shown in Table 33. 14% is accounted for by the requirements for operational changes such as updating collection routes and amending driver timetables.

Table 33: Administrative costs to waste management businesses – Option 4 (rounded to nearest £1,000)

Activity	Year 1 (£)	Year 2 (£)	Years 3 – 10 (£)	10 Year Total (NPV £)
Waste Collection and Processing				
Attending Seminars	15,000	0		15,000
New Guidelines	1,209,000	0		1,209,000
Operational Changes	0	36,263,000		35,036,000
Additional Staff: Drivers and Loaders	0	11,299,000	253,279,000	220,341,000
Landfill and Incineration				
Attending Meetings	1,000	1,000		1,000

New Guidelines	15,000	15,000		30,000
Total	1,240,000	47,578,000	253,279,000	256,633,000

Other Costs

3.159 As shown in Table 32, in addition to the administrative costs, further costs are incurred by the waste management industry in the area of waste collection as an increased number of vehicles and containers will be required to deliver this option. However, this is predicted to be offset by:

- A decrease in the amount of residual waste processing and disposal costs from waste facilities.
- An increase in the materials revenue (net of processing) received by the waste management industry from recycled due to minimal sorting costs being required.
- A reduction in Landfill Disposals Tax paid by waste management companies as a result of diversion of material from landfill from the implementation of this option.

3.160 The net impact is an additional cost to waste management businesses over the ten-year appraisal period. However, as noted above, it is anticipated that competitive forces will result in waste management businesses passing at least some of this cost onto waste producers.

Costs to Sewerage Authorities

3.161 As with Options 3 and 4, there are no costs to the sewerage authorities from this option, as there is no discharge of food waste to sewer from commercial premises in Wales. The savings are as presented for Option 2. The authorities are estimated to save £44.0m in waste water treatment costs through the avoidance of treatment of food waste. This figure does not include the potential addition saving of £32.2m over ten years from dealing with blockages and the consequent issues. These sums could otherwise be re-invested in water or sewerage infrastructure or services.

Costs to Welsh Government

3.162 The costs to the Welsh Government under this option are as presented for Option 2, with a total cost of £1.0 million NPV over 10 years.

Costs to Natural Resources Wales

3.163 The cost to NRW is assumed to be the same as detailed in Option 2, with a total cost of £4.5 million NPV over 10 years.

Costs to Local Authorities

3.164 The cost to local authorities is as presented in Option 2, with a total cost of £426,000 NPV over 10 years associated with the duty to regulate the ban on the disposal of food waste to sewer.

Summary Table – Option 4

3.165 Table 34, below, summarises the costs and benefits to the main sectors of the implementation of Option 4, profiled from 2024 to 2033. Avoided Landfill Disposals Tax and Fuel Duty is a transfer payment and is therefore excluded from the 'Net Cost' calculation.

Table 34: Option 4 - Summary Table - 10 Year NPV (rounded to nearest £100,000)

	Costs (NPV £m)	Costs compared to Baseline (Option 1) (NPV £m)
Financial costs		
Welsh Government		
Transitional costs	£1.0	£1.0
NRW		
Transitional costs	£0.0	£0.0
On-going administrative costs	£4.5	£4.5
Local Authority		
Transitional costs	£0.0	£0.0
On-going administrative costs	£0.4	£0.4
All Waste Producers		
Transitional costs	£17.1	£17.1
On-going administrative costs	£0.0	£0.0
Opex / capex (food to sewer)	£0.0	-£6.7
Waste Management Businesses*		
Infrastructure Transitional costs	£254.2	£254.2
On-going administrative costs	£256.6	£256.6
Waste collections (recycling & residual)	£1,220.7	£547.7
Residual waste processing/disposal	£584.9	-£209.1
Materials revenue (net of processing)	-£279.5	-£454.8
Landfill Disposals Tax and Fuel Duty	£293.8	-£45.9
Sewerage Authorities		
Water treatment costs	£0.0	-£38.0
Monetised Environmental Costs		
All environmental costs	£1161.3	-£111.6
Total Cost	£2,470.1	£215.5
Total Cost (ex LDT and Fuel Duty)**	£2,176.2	£261.4

Total Welsh Government	£1.0	£1.0
Total NRW	£4.5	£4.5
Total Local Authority	£0.4	£0.4
Total All Waste Producers	£17.1	£10.4
Total Waste Management Businesses *	£2,330.7	£348.7
Total Sewerage Authorities	£0.0	-£38.0

* 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.

** 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 waste producers, but is an income to the Welsh Government and thus neutral within the overall costs and benefits of the system.

4.0 Consideration of Exemptions

- 4.1 The Welsh Government has considered exemptions from the requirements in three 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;
 - An exemption for the ban on the disposal of food waste to sewer for waste treated by specified treatment technologies.
- 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

- 4.3 The Welsh Government asked Eunomia to consider the impacts of applying a de minimis threshold to the requirements to separately present waste. Eunomia considered two scenarios:
- A de minimis to the separate presentation of all specified materials based on a waste producer's size (number of employees);
 - A de minimis to the separate presentation of food waste based on weight of food waste produced by the waste producer, similar to that applied in Scotland and Northern Ireland.

De minimis based on local unit size

- 4.4 The impact of excluding all local units with 0-4 employees from the separate presentation of specified recyclable materials was considered. This would have the overall effect of exempting the 64% of local units that have fewer than five employees.
- 4.5 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 Regulation that arises from local units with 0-4 employees would be similar to the 12% of overall arisings.
- 4.6 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.¹⁰

¹⁰ Statistics for Wales (2023) Size Analysis of Active Businesses in Wales, 2022, p13, available at: <https://www.gov.wales/sites/default/files/statistics-and-research/2023-06/size-analysis-businesses-2022-655.pdf>

4.7 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 240,430 enterprises with 0-9 employees in 2022 was £20.3 billion.¹¹ Their average annual turnover was thus £84,436. For comparison, the estimated cost of implementation of Option 3 for micro-producers of non-domestic waste was £11.40 per week, or £593 per year. This equates to 0.7% of the calculated turnover.

High Level Costs

4.8 The high-level costs are summarised in Table 35, which shows the impact on the options of applying of implementing the regulatory options with a de minimis threshold of 5 employees.

Table 35: Impact of 0-4 Employee De minimis Exemption on Local Units – 10 Year NPV (2024-2033) (£M)

	Financial Cost	Monetised Environmental Cost	Additional Administrative Costs	Total
Option 2	-£64.6	£20.9	-£51.1	-£94.8
Option 3	-£157.2	£33.1	-£101.4	-£225.6
Option 4	-£316.0	£29.4	-£156.4	-£417.0

4.9 The results show the impact that exempting these smaller entities makes to the options. They predict that an exemption would reduce both financial costs and administrative costs for all the options compared with applying the policy to all producers of non-domestic municipal waste.

4.10 This is partially offset by an increase in the overall environmental costs of waste management for all the options, due to a decrease in the amount of recyclate produced by the exempted waste producers (resulting in higher waste management costs and associated environmental impacts). For all the options, the environmental cost is outweighed by the financial and administrative benefits and thus results in an increased whole system benefit.

4.11 It should be noted that these modelled results assume that costs for the exempt waste producers would remain exactly as they are today. In practice, this would be unlikely to be the case. Exempting micro-businesses would result in waste collectors needing to operate two different dry recycling collection systems, one for larger waste producers and one for micro-businesses. While some might specialise in one or other collection model, it would nevertheless be likely to reduce the efficiency of both collection systems, as vehicles would have to travel greater distances between

¹¹ Statistics for Wales (2023) Size Analysis of Active Businesses in Wales, 2022, p2, available at: <https://www.gov.wales/sites/default/files/statistics-and-research/2023-06/size-analysis-businesses-2022-655.pdf>

collections. The effect of an exemption would therefore be likely to be an increase in costs for all waste producers. While micro-businesses would not incur food waste collection costs, the costs of these services for larger waste producers would be higher, again due to the impact on collection logistics.

- 4.12 For the preferred option, Option 3, the net impact of introducing the exemption is an increase in the whole system benefit of £226 million NPV over 10 years. However, this includes a £33m reduction in environmental benefits, which is further discussed below.

Environmental Costs and Benefits

- 4.13 Table 36 shows the environmental impacts under each policy option resulting from an exemption for local units employing 0-4 people. The exemption would result in a lower environmental benefit for each option, as less waste is recycled and commensurately smaller benefits are thus achieved. The exception to this is that applying the exemption to Option 4 would result in lower NO₂ emissions, due to the impacts of reduced collection vehicle movements.

Table 36: Environmental Impacts 2024-2033

	Impact of exemption on policy options		
	Option 2	Option 3	Option 4
Tonnes CO ₂ e	137,346	173,668	163,773
Tonnes NO ₂	131	130	-150
Tonnes recycling	-354,195	-372,643	-344,731
Monetised Environmental Costs £ NPV	£20,873,317	£33,114,379	£29,415,107

Costs to Waste Producers

- 4.14 As highlighted in Section 3.0, smaller producers of non-household municipal waste (especially those with 0-4 employees) incur an increase in costs under all options. Removing the requirement on these waste producers to source segregate their wastes would avoid these costs being incurred.

Costs to Other Actors

- 4.15 An exemption for producers of non-household municipal waste with 0-4 employees would result in a modelled saving for waste management businesses, as micro-sized waste producers produce less of each material each week. Because a substantial part of the cost of collections is associated with sending a vehicle to a particular location rather than managing the waste that is collected, and waste producers will generally want containers emptied quite frequently, the cost of managing a tonne of waste arising from a micro-sized waste producer will generally be greater than for a tonne from a larger waste producer. This effect is magnified if more streams have to be collected separately.

- 4.16 However, for an exemption to be implemented, it would necessitate two different recycling collection systems having to operate across Wales – a three or five stream recycling system for larger waste producers alongside a co-mingled model for micro-sized waste producers. This would lead to inefficiencies and potentially some additional costs, as discussed in 4.11. It is therefore unlikely that an exemption for micro-sized producers would deliver the full financial saving to waste collectors that the model suggests, due to the reduced efficiency of dry recycling collections.
- 4.17 The costs and savings to the waste industry are expected to be passed on to their customers (waste producers), depending on the competitiveness of the market.
- 4.18 The persistence of co-mingled dry recycling collections for micro-sized waste producers would make it more challenging to secure high levels of compliance amongst larger waste producers. The availability of co-mingled collections would make it possible for larger producers to attempt to obtain these services and waste collectors may be tempted to offer them. In order to offset this effect, greater effort would be required on the part of Natural Resources Wales; and thus despite the significant reduction in the number of waste producers whose compliance would need to be checked, the exemption would allow little scope to reduce regulatory costs because of the heightened risk of undetected non-compliance.
- 4.19 Cost impacts to other actors would be expected to be minimal and have not been included for the purpose of modelling.

Exemption to the requirement to separately present food waste to waste producers producing <5kg of food waste

- 4.20 In Scotland¹² and Northern Ireland¹³ a requirement for businesses to source-separate food waste has already been implemented. In both cases a de minimis threshold has been applied.
- 4.21 In Scotland, the requirement is limited to “food businesses”, defined as “an undertaking, whether for profit or not, and whether public or private, carrying out any activity related to the processing, distribution, preparation or sale of food.” For its first year, the requirement was limited to food businesses that produced in excess of 50kg of food waste per week; it then extended to businesses producing in excess of 5kg per week. Businesses in rural areas and food waste originating from international transport are exempted from the requirement.
- 4.22 In Northern Ireland, the requirement is also limited to food businesses (similarly defined), and applies only to businesses producing in excess of 5kg of food waste per week.

¹² HM Government (2012) The Waste (Scotland) Regulations

¹³ HM Government (2015) The Food Waste Regulations (Northern Ireland) 2015, 2015 No. 14

- 4.23 There is no detailed post-implementation data through which to analyse the impact of the de minimis threshold, or the policy more widely.
- 4.24 Interviews conducted for the previous RIA study revealed some diversity of views regarding the value of the de minimis thresholds. One respondent thought that the majority of the boost in food waste collections in Scotland had occurred as a result of focusing on large, willing food waste producers; bringing in smaller producers who were less willing to comply had resulted in higher levels of contamination (principally packaging), which was problematic for AD plants and had taken time and effort to improve. Another said that the phased approach had been helpful in managing enforcement and had provided time for food waste treatment capacity to develop; but that the 5kg de minimis risked making enforcement more difficult because it enabled some businesses to claim they produced very little waste, or disposed of it through redistribution. They added that it could usefully be dispensed with, as no food business would realistically produce so little food waste. It was also suggested that the rural exemption was unfortunately allowing some very large food businesses to avoid having a food waste collection, even when it was logistically and economically feasible for them to receive one.
- 4.25 Although many non-food businesses will produce more than 5kg of food waste per week, respondents generally concurred with what they perceived to be the Scottish policy of focussing on businesses' major waste streams.
- 4.26 It was not possible to model the impact of this exemption on the policy as data on waste arisings at this level of detail was not available; however, it is anticipated that exempting such waste producers would impact a small proportion of the food waste stream while exempting those producers that may face disproportionately large cost for the collection of a relatively low weight of food waste.

Consideration

- 4.27 It is estimated that the exemption of waste producers with 0-4 employees would exempt 64% of waste producers. It would result in a reduction in the financial and administrative costs borne by such producers, and the overall financial and administrative costs of the policy. However, the extent of the saving is difficult to quantify because it would substantially affect the wider efficiency of services offered to both micro-sized and larger waste producers.
- 4.28 The exemption would have several negative consequences:
- As a direct result of exempting some waste producers from the requirements, it would result in less material being collected for recycling.
 - Because less material would be captured for recycling, it would result in:
 - An increased risk that the 65% municipal waste recycling target contained in the Waste (England and Wales) Regulations 2020 is not achieved;
 - An increased risk that packaging producers are unable to meet their statutory packaging recycling targets;

- Fewer carbon emissions savings; and
- A reduction in the societal benefits, such as job creation, resulting from the measures.
- It would create a need for two different collection systems to operate, which would:
 - Reduce economies of scale for each collection system;
 - Make the policy more difficult to enforce; and
 - Reduce consistency in recycling collections across Wales, leading to the increased risk of confusion for staff and visitors to non-domestic premises.
- Reduce the overall environmental benefits of the policy.

4.29 The Welsh Government considers that several factors may act as barriers to micro-sized waste producers complying with the regulations, or doing so at the lowest possible cost. These barriers are:

- Financial – costs for waste collection and bin provision;
- Contractual – finding the best contractor for waste collection;
- Space for segregation of waste on the premises;
- Engaging staff to segregate waste.

4.30 The Welsh Government is therefore bringing in ways to address these barriers to mitigate the costs that the policy might impose on micro-sized waste producers. Measures include:

- Support to micro-businesses to: identify good practice in material separation and bin location suitable for different premises; recommend approaches to procurement; provide training resources to help upskill staff; and provide advice on how to optimise the system to minimise costs. This will include:
 - Developing business-facing support tools with Business Wales, Food and Drink Wales and WRAP Cymru, including continuing current work with WRAP Cymru to develop online tools to help businesses optimise and rationalise their waste collection services.
 - Providing advice on how to review waste containment needs and maximise recycling to mitigate against cost increases, as recycling services have a lower cost than residual waste services.
- Provision of advice on collaborative procurement to create opportunities for waste producers in the same geographic location such as a high street, business estate or shopping centre, to work together to procure waste management services.
 - Where small waste producers occupy shared premises, they may already benefit from using services procured by facilities management companies who have the experience and clout to procure cost efficient services.
 - In other circumstances, joint procurement might involve neighbouring businesses agreeing to share containers under a joint contract, helping achieve economies of scale.
 - WRAP Cymru will prepare and disseminate guidance to encourage more small businesses to identify joint procurement arrangements, if a demand for this guidance is demonstrated.

- Business Improvement Districts, or WRAP Cymru, could look to co-ordinate procurement over a wider area such as an entire town centre.
- Co-collection of household and non-domestic waste: Some local authorities, especially in rural Wales, already co-collect household and non-domestic waste on the same collection round, which can offer a low-cost way to provide micro-businesses with services. The Welsh Government will encourage other authorities to consider providing co-collection services to micro-sized waste producers situated within or close to residential areas.
 - This could help increase access to services and improve the economies of scale to reduce costs.
 - Accounting for the costs and data of the different material flows will be important in ensuring that waste is adequately tracked and accounted for.
 - Combined collections of both non-household municipal waste and household waste might also offer environmental benefits such as fewer waste disposal journeys along streets where there are both homes and non-household municipal waste producers.
 - However, a small number of councils in Wales operate a single stream co-mingled recycling service in their household collection services, and so co-collection of separated waste streams from non-domestic premises would not be possible. .
- Working with Local Authorities to provide more local authority recycling centres as drop off sites (or bring sites) for non-domestic waste could increase the convenience and reduce the cost for micro-businesses:
 - Recycling centres could be developed for micro-businesses to drop off good quality dry recycling (subject to a charge if necessary).
 - Some local authorities in Wales (e.g. Cardiff Council¹⁴, Carmarthenshire County Council¹⁵, Merthyr Tydfil County Borough Council¹⁶) already operate facilities at their recycling centres for producers of non-domestic waste.
- Financial incentives: Other planned measures could have the effect of reducing the overall cost of waste services for waste producers.
 - While Packaging Extended Producer Responsibility will be limited in the first instance to household waste when it is introduced in 2025, the Welsh Government and other UK nation governments propose to review the application of Packaging Extended Producer Responsibility to non-domestic waste within two years of implementation. This could result in non-domestic waste producers that produce packaging waste receiving a financial incentive/rebate on recycling collections, reducing the costs they incur.

¹⁴ Cardiff Council, *Commercial Recycling Centre* Webpage accessed 16/08/2023 available here: <https://www.cardiff.gov.uk/ENG/resident/Rubbish-and-recycling/recycling-centres/commercial-recycling-centre/Pages/default.aspx>

¹⁵ Carmarthenshire County Council, *Business Waste Commercial Recycling Centre*. Webpage accessed 17/08/2023. Available here: <https://www.carmarthenshire.gov.wales/home/business/business-waste/>

¹⁶ Merthyr Tydfil County Borough Council, *Trade Recycling Acceptance at Dowlais HWRC Only*. Webpage accessed 16/08/2023. Available here: <https://www.merthyr.gov.uk/resident/bins-and-recycling/household-waste-and-recycling-centres/trade-recycling-acceptance-at-dowlais-hwrc-only/>

- In the meantime, the Packaging Recovery Note and Packaging Export Recovery Note system will continue to provide a level of price support for recyclable materials, from which non-domestic waste producers will benefit, especially if their recyclables prove to be needed to meet recycling targets.
- The Welsh Government will encourage the introduction of Packaging Extended Producer Responsibility for non-domestic waste as soon as practicable.

- 4.31 Having weighed these considerations, the Welsh Government is of the view that introducing an exemption for all micro producers of non-domestic waste is not desirable, that the financial impacts should be relatively short term (particularly due to Packaging Extended Producer Responsibility) and can be mitigated through the means described above.
- 4.32 The exemption for businesses producing less than 5kg of food waste, though difficult to quantify in terms of impact, has been successfully introduced in Scotland and Northern Ireland and is in the view of the Welsh Government appropriate for occupiers of non-domestic premises who produce small amounts of such waste and that may have to pay a disproportionate amount for its collection.

Conclusion

- 4.33 The Welsh Government therefore proposes to exempt occupiers of non-domestic premises that produce less than 5kg of food waste from the requirement to present food waste separately for collection.

Consideration of a Rural Exemption to the Provisions

- 4.34 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.
- 4.35 Eunomia has therefore modelled the impacts of the options on the costs and benefits of the options in rural areas, to assess the impact of the options in such areas which might be multiplied as a result of more materials being separately collected. The areas covered are based on the local authority areas classified as rural.
- 4.36 **Error! Reference source not found.**³⁷ shows the net present value of the implementation of the options in these areas.

High Level Costs

- 4.37 Table 37 shows the contribution that applying the requirement to sort and separately collect non-domestic waste produced in rural areas makes to the

options. Options 2 and 3 are predicted to result in financial and environmental benefits, though both will result in additional administrative costs to businesses as systems are changed. Both Options 2 and 3 result in overall, whole system benefits. Though Option 4 results in an environmental benefit, it is outweighed by the financial and administrative costs and results in a whole system cost.

Table 37: Requirement to Sort – Costs above Baseline Rural Areas – 10 Year NPV (2024-2033) (£M)

	Financial Cost above baseline	Monetised Environmental Cost above baseline	Additional Administrative Costs	Total
Option 2	-£18.0	-£75.3	£26.4	-£66.9
Option 3	-£6.1	-£105.2	£67.0	-£44.3
Option 4	£139.0	-£99.6	£101.9	£141.2

4.38 The same figures also illustrate the costs and benefits of exempting the premises as the costs and benefits will not be incurred in the event that premises in these local authority areas were exempted. Thus, for Option 3 (the preferred option), such an exemption would result in an overall reduction in benefit of the policy of £44 million NPV over 10 years.

Environmental Costs

4.39 Table 38 shows the environmental impacts to the policy options of an exemption for occupiers of rural non-domestic premises. The exemption would result in a lower environmental benefit for each option, as less waste would be recycled and commensurately smaller benefits are thus achieved.

Table 38: Environmental Impacts 2024-2033

	Impact of exemption on policy options		
	Option 2	Option 3	Option 4
Tonnes CO ₂ e	2726,000	437,000	421,000
Tonnes NO ₂	575	927	676
Tonnes recycling	-640,667	-877,397	-637,171
Monetised Environmental Costs £M NPV	75	105	100

Costs to Waste Producing Businesses

4.40 Eunomia also considered the costs to businesses in rural areas. As in the main body of this report, the cost to businesses are the sum of the administrative costs to the businesses resulting from the change in collection system added to the costs or savings to waste management companies which are assumed to be passed to the customer (the waste producer).

4.41 As with the costs across Wales, the costs in rural areas differ depending on the size of the entity affected, as shown in Table 39. Again, the smallest entities incur a cost. For larger local units, the costs of managing their waste are expected to decrease. The different mix of activities conducted by local units (and therefore waste arisings) found in rural areas, with far fewer industrial premises, gives rise to different specific costs and savings for local units in rural areas than for producers of non-domestic Waste across Wales. Nevertheless, results follow broadly the same pattern, in that smaller local units are more likely to incur costs and larger local units are more likely to benefit from savings.

Table 39: Weekly Financial and Administrative Cost Impact per Rural Local Unit – 2029 (£)

Regulatory Scenario	Local Unit Size Band						
	0-4	5-9	10-19	20-49	50-99	100-249	250+
Option 1 (Baseline)	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Option 2	£5.98	£0.56	-£4.19	-£10.77	-£12.40	-£21.99	-£1,359.53
Option 3	£13.65	-£2.19	-£19.23	-£41.93	-£61.37	-£129.63	-£696.37
Option 4	£25.53	£12.77	£0.30	-£20.70	-£39.12	-£108.54	-£2,263.10

4.42 A key difference is that there are rather fewer larger occupiers of non-domestic premises in rural areas. Nevertheless, the aggregation of the small level of additional costs experienced by the large number of rural microbusinesses is offset by the savings achieved by larger occupiers of non-domestic premises.

4.43 Table 40 shows the difference between the costs estimated to be experienced by occupiers of non-domestic premises in rural local authority areas and the average costs or savings estimated to be experienced by occupiers of non-domestic premises across all local authority areas in Wales.

Table 40: Weekly Financial and Administrative Cost Impact per Local Unit – 2029 (£) - Difference between rural local units and all Wales local units

Regulatory Scenario	Local Unit Size Band						
	0-4	5-9	10-19	20-49	50-99	100-249	250+
Option 1 (Baseline)	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00	£0.00
Option 2	£0.88	-£0.72	-£1.81	-£4.41	-£3.73	-£3.69	-£966.62
Option 3	£2.25	-£0.68	-£2.95	-£4.55	£0.24	£39.11	-£203.81
Option 4	£4.69	£2.40	£1.31	£0.00	£4.87	£43.16	-£1,132.11

- 4.44 For the preferred option (Option 3), the estimated difference in cost per local unit are not significantly higher or lower than for the average cost per local unit across Wales, with the smallest occupiers of non-domestic premises experiencing around £2/week higher prices than those experienced by the average entity of the same size.

Costs to Other Actors

- 4.45 Waste management businesses would be predicted to make savings, as the costs of collecting from smaller waste producers cost proportionately more than collecting from larger waste producers. However, the costs and savings to the waste industry are expected to be passed on to their customers (waste producers) subject to competition.
- 4.46 Cost impacts to other actors would be expected to be minimal and have not been included for the purpose of modelling.

Conclusion

- 4.47 Eunomia's modelling estimates that for the preferred option (Option 3), 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. On the basis of this, the Welsh Government is of the view that, for the preferred option (Option 3) it is not appropriate to provide for an exemption to the requirement to sort for occupiers of non-domestic premises in rural areas.

Consideration of the exemption of food waste treated by different treatment technologies from the ban on the disposal of food waste to sewer

- 4.48 It is the policy of the Welsh Government to divert food waste from the residual (black bag) waste stream to anaerobic digestion for energy recovery and the production of high quality fertiliser. Policies are already in place to deliver this outcome for household waste. However, it was identified prior to the Environment (Wales) Act 2016 that there were insufficient drivers in place for occupiers of non-domestic premises. Thus, regulations to be brought under the Act will require occupiers of non-domestic premises to present food (and other recyclable materials) separately for collection and for the waste to be separately collected by the waste management companies and local authorities who collect the waste. The food waste will be banned from incineration and landfill, thus strongly influencing the switch to anaerobic digestion in line with Welsh Government policy.

- 4.49 Along with food waste currently disposed of in the residual waste stream, it has been estimated¹⁷ that 19,000 tonnes of food waste is disposed of to sewer in the commercial sector, based on the use in the Welsh hospitality sector, and 2,000 tonnes in the public sector. It is the policy of the Welsh Government that this waste be sent to anaerobic digestion for the purposes of energy generation and nutrient recovery (via the production of high quality fertiliser). For this reason, the Welsh Government banned the disposal of food waste to sewer (subject to Commencement Order) in the Environment (Wales) Act 2016.
- 4.50 Food waste disposed to sewer would be normally expected to be treated prior to its disposal to prevent blockages, though regardless of this maceration is linked to fat build up and blockages within the sewerage network. There are three main treatment technologies used in this area:
- Macerator – the food waste is mixed with water and finely chopped and washed to sewer.
 - Dewatering – the food waste is first macerated, then compacted to remove the liquids (the bulk of food being water). The liquid (which contains food particles) is disposed of to sewer, while the remaining dry fraction is recovered or disposed of by other means (e.g. anaerobic digestion, composting, incineration or landfill).
 - Enzymic Digester – the food waste is broken down by strong enzymes and the resulting “grey water” disposed of to sewer.
- 4.51 The technologies are mostly used by catering type establishments to dispose of with their food waste. Some public sector premises, such as hospitals, prisons and schools, use the technologies for the same purpose.
- 4.52 During the development and passage of the Act, a number of manufacturers and suppliers of the above technologies expressed concerns regarding the ban.
- 4.53 The Welsh Government therefore requested Eunomia to estimate the costs and benefits of exempting food waste treated by any the three technologies from the ban. In doing this, Eunomia considered previous work undertaken on the impacts of the different technologies.
- 4.54 For this Regulatory Impact Assessment, Eunomia reviewed whether there had been any significant change in the evidence regarding food waste to sewer technologies, whether regarding their environmental impact or their market penetration. It was concluded that there had been no substantive change and

¹⁷ Eunomia Research & Consulting (2013) *Additional Policy Options Analysis for Welsh Government: Costs and Benefits of Extending Waste Framework Directive requirements, Waste Treatment Restrictions, Requirement to Sort and a Ban on the Disposal of Food Waste to Sewer (May 2013)*
<https://gweddill.gov.wales/docs/desh/publications/131021additional-waste-policy-options-en.pdf>

that the previous assessment remained a reasonable basis on which to proceed.

Market Penetration of Technologies

4.55 There is very little published data available on the penetration of commercial food waste disposal (FWD) units by sector (or as a whole). Therefore, the assumptions used are based on information evidence provided by stakeholder interviews.

4.56 The sectors where FWD units are most prevalent are those which include a number of food producing businesses or public-sector organisations:

- Accommodation and food service activities (i.e. restaurants, hotels)
- Education (i.e. schools, colleges and universities)
- Human health and social work activities (i.e. hospitals)

Discussion with industry confirmed that relatively little data was available on the prevalence of the units in the hospitality sector as a whole. Estimates given by stakeholders in respect of FWD unit penetration suggested that between a third and three quarters of food businesses were using these units. However, feedback from Environmental Health Officers - who inspect the majority of these premises - has indicated that the units are rarely encountered in their inspections, suggesting relatively low levels of penetration. Feedback from public sector bodies indicates that there is variety of treatments in use and no consistent pattern of service delivery for food waste treatment

4.57 An overview of food waste treatment in Health Boards across Wales suggested that around a third of food waste produced by hospitals is disposed of via a FWD unit.

4.58 Furthermore, in anticipation of the Part 4 of the Environmental Act, it appears that some organisations are choosing to introduce food waste collections, rather than investing in food waste to sewer units which are at risk of being banned.

Modelling Work

4.59 Eunomia liaised closely with the impacted companies to inform the consideration of the costs and benefits of a ban and to assess the case for exemptions. It has assessed each technology against the central case for separate presentation of food waste, followed by its collection and recovery at an anaerobic digestion facility. Eunomia has also considered previous work, including a piece of work funded by Mechline which assessed the case for exemptions from a ban.

4.60 Overall, the conclusions of the work submitted by Mechline are broadly similar to those that can be drawn from Eunomia's modelling. The main difference is

that the contractor, Ricardo AEA made an assessment of practicability. The case is that some institutions, such as hospitals and prisons, do not wish to segregate food waste for collection due to perceived logistical constraints (such as convenience or simplicity for staff) or for security reasons (to restrict vehicle movements). Mechline have funded work to support this which concluded that the most practical system was the Mechline system (enzymic digestors), followed by maceration and dewatering (after which a liquid containing particles of food is discharged to sewer).

Case for Exempting the Technologies

- 4.61 Welsh Government's central case for banning the disposal of food waste to sewer from non-domestic premises is that it requires the food waste for the recovery of energy and nutrients (via the production of fertiliser) at anaerobic digestion facilities. The overall environmental impacts of exempting food waste treated by individual technologies are therefore the primary factors the Welsh Government has considered when assessing the appropriateness of such exemptions. However, other factors have also been assessed, such as the broader societal and financial impacts for different levels of market penetration, and costs to occupiers of non-domestic premises where possible.
- 4.62 The case for and against exempting any of the food waste treated by any of the individual technologies is summarised below. A scenario in which food waste treated by each individual technology is exempted has been assessed against a central case or baseline scenario in which the disposal of food waste from non-domestic premises to sewers is banned.

Food waste treated by macerator

- 4.63 Macerators are the most widespread of the three technologies. For the purpose of modelling, Eunomia assumed units being used in between 2,404 and 7,391 businesses and public sector premises, should the food waste treated by the technology be exempted from the ban. Though their market penetration is estimated to be low, it is higher than the other food waste treatment technologies and the overall impacts of exempting food waste treated by macerator are therefore proportionally larger than for food waste treated by the other technologies.
- 4.64 All food waste treated by a macerator only system would normally be disposed of to sewer.

Environmental Cost

- 4.65 Though there is some energy and nutrient recovery resulting from maceration (via sewage treatment) this is much lower than with the central case. Crucially there is therefore a net climate change cost to using the technology to treat food waste. Both the CO₂e and NO₂ arisings are higher and monetised environmental costs are also increased.

- 4.66 There is therefore a strong environmental case for not exempting food waste treated by macerators from the ban.

Financial Cost

- 4.67 There may be cost increases to any occupier of non-domestic premises currently using this technology producing more than 20 tonnes of waste per year. Cost increases to these entities of switching to the central case (separate food waste collection) are estimated to be around £60/tonne. Smaller entities will see savings from switching from the technology as the capital and maintenance costs of the equipment become increasingly significant for treatment of lower tonnages of food waste.
- 4.68 The most significant financial costs associated with macerators relate to the cost to the water industry of treating the food waste via the sewage system, amounting to £301 per tonne of food waste, equivalent to £13k for each waste producer using a macerator. These costs will ultimately be borne by all water service customers in Wales, including householders.
- 4.69 A further potential financial impact is the cost of treating blockages arising as a result of food waste sent to the sewage system using macerators. The analysis suggests the cost to the water sector of treating these blockages is estimated at £189 per tonne of food waste.
- 4.70 If these cost savings are combined with the financial benefit arising from the reduced need to treat food waste via the water treatment system, the policy of banning food waste treated by macerators from disposal of food waste to sewer is estimated to result in a cost saving to the Welsh water industry of £8.3 million in the central case. This figure does not include the potential additional saving of £32.2 million over 10 years from dealing with blockages and the consequent issues.

Social Cost

- 4.71 The overall cost to society of exempting waste treated by a technology is equal to the monetised environmental costs plus the financial costs. It is estimated the social costs of exempting food waste treated using macerators from the ban at £32 million to £97 million over a ten year period, dependent on the level of market penetration.

Consideration

- 4.72 Considered against the central case for banning the disposal of food waste to sewer (energy generation and production of high quality fertiliser), there is no case to exempt food waste treated by maceration from the ban.

- 4.73 Though larger occupiers of non-domestic premises currently using this technology would experience potential cost increases they are unlikely to be significant. For example, Eunomia estimates local units within the size band 20 to 49 employees would experience cost increases of 0.1% of annual turnover. Eunomia report that occupiers of non-domestic premises are already moving away from this technology as they are aware the ban on disposal of food waste to sewer may impact them.
- 4.74 The costs to the water industry of exempting food waste treated by this technology would be high.

Conclusion

- 4.75 The Welsh Government is of the view that there is not a sufficient environmental case to exempt food waste treated in this manner from the ban.

Food waste treated by enzymic digester

- 4.76 As the market penetration is currently low, the overall impacts of exempting food waste treated by enzymic digester are therefore proportionally smaller than for food waste treated by maceration. For the purpose of modelling, Eunomia assumed units being used in between 60 and 185 businesses and public sector premises, should the food waste treated by the technology be exempted from the ban.
- 4.77 All food waste treated by an enzymic digester (other than non-digestible items such as bones) would normally be disposed of to sewer.

Environmental Cost

- 4.78 Though there may be a small amount of energy and nutrient recovery resulting from enzymic digestion (via sewage treatment) this is much lower than with the central case. There is therefore a net climate change cost to using the technology to treat food waste. The monetised environmental costs of exemption are worse than the central case. The CO_{2e} and NO₂ arisings are also worse than the central case.
- 4.79 There is therefore no environmental case for exempting food waste treated by enzymic digestors from the ban.

Financial Cost

- 4.80 There may be cost increases to any occupier of non-domestic premises currently using this technology producing greater than 24 tonnes of waste per year. Cost increases to these entities of switching to the central case are estimated to be around £50 /tonne. Smaller entities will see savings from switching from the technology as the capital and maintenance costs of the

equipment become increasingly significant for treatment of lower tonnages of food waste.

- 4.81 There are no anticipated additional costs to the water companies should food waste treated by this technology be exempted as the food waste is digested into a liquid prior to its disposal to sewer.

Social Cost

- 4.82 The overall cost to society of exempting food waste treated by a technology is equal to the monetised environmental costs plus the financial costs. Eunomia has estimated the social costs of exempting food waste treated by enzyme digesters from the ban at between £164,000 and £494,000 over a ten year period, depending on the resultant level of market penetration. This because the financial costs to occupiers of non-domestic premises of using separate collection systems are estimated as higher than the monetised environmental benefits.

Consideration

- 4.83 Considered against the central case for banning the disposal of food waste to sewer (with energy generation and production of high quality fertiliser from the anaerobic digestion of separated food waste thereby delivering key carbon and other pollution reduction benefits), there is no case to exempt food waste treated by enzyme digestion from the ban.
- 4.84 Though larger occupiers of non-domestic premises currently using this technology would experience potential cost increases they are unlikely to be significant. For example, local units within the size band 20 to 49 employees are estimated to experience cost increases of 0.1% of annual turnover. Eunomia report that occupiers of non-domestic premises are already moving away from this technology as they are aware the ban on disposal of food waste to sewer may impact them.
- 4.85 The overall social costs present a net cost if the food waste treated by the technology is not exempted. However, this cost is relatively low.

Conclusion

- 4.86 The Welsh Government is of the view that there is not a sufficient environmental case to exempt food waste treated in this manner from the ban.

Food waste treated by dewatering

- 4.87 As market penetration is currently low, the overall impacts of exempting food waste treated by dewaterer are therefore proportionally smaller than for food waste treated by maceration. For the purpose of modelling, Eunomia assumed units being used in between 541 and 1663 businesses and public

sector premises, should the food waste treated by the technology be exempted from the ban.

- 4.88 The solid fraction after dewatering is not sent to sewer and would be recovered at an AD plant or a separate composting unit also sold by the company (the liquid fraction would be disposed of to sewer). The waste management destination of the solid fraction has a significant impact on the environmental performance of the unit when compared against the Welsh Government's preferred option of separate collection and anaerobic digestion of food waste. This is because composting the solid output does not recover energy and may require energy input, thereby giving a worse CO_{2e} emissions outcome than if the material were sent to anaerobic digestion.

Environmental Cost

- 4.89 If the solid output were sent to AD, there would be a net climate change benefit over the central case. Both the CO_{2e} arisings and the monetised environment costs are better than in the central case, and some of the nutrients would also be recovered within the AD process. However, NO₂ arisings are worse than in the central case.
- 4.90 However, if the solid output were processed using an on-site composting unit and then spread on land, there would be net climate change cost compared to the central case, as no energy would be recovered from the waste. This cost would be increased if energy for heating the composting unit were required in colder weather. The nutrients in the solid fraction would also be recovered via the composting unit.

Financial Cost

- 4.91 There may be cost increases to any occupier of non-domestic premises currently using this technology producing greater than 29 tonnes of waste per year. Cost increases to these entities of switching to the central case are estimated to be around £20 /tonne. Smaller entities will see savings from switching from the technology as the capital and maintenance costs of the equipment become increasingly significant for treatment of lower tonnages of food waste.
- 4.92 There are no anticipated additional costs to the water companies should food waste treated by this technology be exempted as the food waste is digested into a liquid prior to its disposal to sewer, thus breaking down fats and other solids.

Social Cost

- 4.93 The overall cost to society of exempting food waste treated by a technology is equal to the monetised environmental costs plus the financial costs. Eunomia has estimated the social costs of exempting food waste treated using

dewaterers from the ban at £614,000 to £10 million over a ten year period, depending upon the destination of the solid output and the level of market penetration resulting from an exemption. This because the financial costs to occupiers of non-domestic premises of using separate collection systems for both solid waste destinations modelled are estimated as higher than the monetised environmental benefits.

Consideration

- 4.94 Considered against the central case for banning the disposal of food waste to sewer (energy generation and production of high quality fertiliser), the grounds for exempting food waste treated by dewatering from the ban on disposal to sewer are dependent on the destination of the solid output of the process.
- 4.95 The overall social costs present a net cost if the food waste treated by the technology is not exempted. However, this cost is relatively low.
- 4.96 Though larger occupiers of non-domestic premises currently using this technology would experience potential cost increases they are unlikely to be significant. For example, Eunomia estimates local units within the size band 20 to 49 employees would experience cost increases of 0.1% of annual turnover. Eunomia report that occupiers of non-domestic premises are already moving away from this technology as they are aware the ban on disposal of food waste to sewer may impact them.

Conclusion

- 4.97 As it is not practical to mandate the waste management route for this material, the Welsh Government is of the view that there is not a sufficient environmental case to exempt food waste treated in this manner from the ban.

5.0 Summary and Preferred Option

- 5.1 A summary of the high level and environmental costs and benefits of each of the options is shown in **Error! Reference source not found.** and discussed below.
- 5.2 Table 41 shows the impact of each option and also the impact relative to Option 1 (baseline). Negative values represent a financial saving, a reduction in emissions or a reduction in recycling. Within each line on the table (apart from recycling), the smaller or most negative value indicates the best option, as it shows a reduction in emissions or costs. For recycling, the higher number shows the best option. These costs, along with the costs and benefits to the main actors, are discussed in detail in Section 3.

Table 41: Summary of Options – Main Impacts

	Option 1	Option 2		Option 3		Option 4	
	Impact	Impact	Relative to Option 1	Impact	Relative to Option 1	Impact	Relative to Option 1
CO ₂ e (M tonnes)	1.8	0.8	-1.0	0.5	-1.3	0.6	-1.3
NO ₂ (tonnes)	3,665	517	-3,148	-1,559	-5,224	-1,044	-4,709
Recycling (M tonnes)	6.13	8.41	2.27	8.45	2.31	8.36	2.23
Environmental NPV (£M)	£227.9	£210.1	-£17.8	£106.0	-£121.9	£116.3	-£111.6
Total cost* (£M)	£1,914.8	£1,822.0	-£92.7	£1,727.9	-£186.9	£2,176.2	£261.4

*Excludes Landfill Disposals Tax and Fuel Duty

- 5.3 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.

Option 1

- 5.4 This option is the baseline against which Options 2, 3 and 4 are measured. As this option proposes no change, there are no additional financial costs associated with it, although there will be ongoing costs and benefits not realised.
- 5.5 In terms of overall costs, this option is more expensive than Option 2 or Option 3 (the Welsh Government's preferred option).
- 5.6 Failure to act will mean that waste producers are not provided with a quality recycling service - potentially recyclable materials will continue to be sent to landfill or incineration facilities. There will be no consequent decrease in dependence on primary material resources and or improvement to resource security.

- 5.7 It is the worst performing of all the options environmentally and carries considerable risk to the sustainability of businesses and the public and third sectors in Wales.

Option 2

- 5.8 This option performs second in terms of high-level costs and is more expensive than Option 3.
- 5.9 Environmentally, it outperforms Option 1 due to higher levels of recycling and reduced residual waste. Despite providing an increase in recycling tonnage, it is unlikely to provide the high-quality recycling resulting from the preferred option (Option 3, below). This is due to the lower quality, more contaminated material resulting from co-mingled collections. This material also requires an expensive sorting process. The extent of benefits realised in terms of the economy and the environment would thus be smaller.
- 5.10 The lower quality material resulting from co-mingled collections is more likely to be exported, and less likely to be used by Welsh/UK manufacturers than the material collected in Options 3 or 4.

Option 3

- 5.11 This is the preferred option of the Welsh Government.
- 5.12 This option performs the best in terms of high-level costs.
- 5.13 This option is also the best environmentally and brings considerable economic benefit. Though it is predicted that Option 2 would produce a similar amount of recycled material, Option 3 is predicted to produce higher quality materials, requiring less processing. This is because keeping the materials separate results in less contaminated material than that resulting from co-mingled collections such as required by Option 2 and avoids the need for such significant levels of sorting. The extent of benefits realised in terms of the economy and the environment are thus higher.

Option 4

- 5.14 This option has the highest overall costs of all the options (including Option 1), in the main because of higher transitional costs for waste producers and the waste management sector and higher administrative and waste collection costs.
- 5.15 This option is likely to provide high quality, high value recycling. This is because keeping the materials separate results in a less contaminated material than that resulting from co-mingled collections, such as required by Option 2.
- 5.16 However, in terms of environmental costs, though benefitting from lower recycling processing costs and onward transport costs than Option 3, it is

estimated to be outperformed by Option 3, in the main due to higher collection costs of collecting additional material streams.

Exemptions

- 5.17 The Welsh Government has considered exemptions from the requirements in three 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;
 - An exemption for the ban on the disposal of food waste to sewer for waste treated by specified treatment technologies.

An analysis of each of these is provided in the appendix to this report.

De minimis threshold for non-domestic waste producers

- 5.18 It is estimated that the exemption of businesses with 0-4 employees would exempt 64% of businesses, which are responsible for 12% of non-domestic municipal waste, and result in a reduction in overall financial and administrative costs for all options.
- 5.19 However, it would adversely impact on the environmental benefits of the policy. As a direct result of exempting some waste producers from the requirements, it would result in less material being collected for recycling, which would increase the risk that statutory recycling targets are not achieved and 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 Regulations. The Welsh Government is thus of the view introducing such an exemption is not desirable.
- 5.20 The exemption for non-domestic premises producing less than 5kg of food waste/week, though difficult to quantify in terms of impact, has been successfully introduced in Scotland and Northern Ireland and is in the view of the Welsh Government appropriate for occupiers of non-domestic premises who produce small amounts of such waste and that may have to pay a disproportionate amount for its collection.
- 5.21 The Welsh Government therefore proposes to exempt non-domestic premises producing less than 5kg of food waste/week from the requirement to present food waste separately for collection.
- 5.22 Collectors of waste (for example, waste management companies and local authorities) would be exempt from the requirement to collect food waste by means of separate collection from such premises.

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

- 5.23 Eunomia's modelling estimates that, for the preferred option (Option 3), the introduction of the policy would not incur significantly higher costs for rural occupiers of non-domestic premises than non-rural ones. On the other hand, exempting rural premises from the requirement would result in a reduction in environmental benefits, and less consistency in recycling collections. On the basis of this, the Welsh Government is of the view that, for the preferred option (Option 3), it is not appropriate to provide for an exemption to the requirement to sort for non-domestic premises in rural areas.

Exemption for the ban on the disposal of food waste to sewer for waste treated by specified treatment technologies

- 5.24 It is the policy of the Welsh Government to divert food waste from the residual (black bag) waste stream or other forms of disposal to anaerobic digestion for the recovery of energy and nutrients (via the production of high quality fertiliser). The overall environmental impacts of exempting food waste treated by individual technologies are therefore the primary factors the Welsh Government has considered when assessing the appropriateness of such exemptions. However, other factors have also been assessed, such as broader societal and financial impacts for different levels of market penetration, and costs to occupiers of non-domestic premises where possible. Also, the generation of renewable energy and the production of fertilizer have important economic benefits that are not created by the counter option.
- 5.25 Eunomia carried out modelling for the previous 2019 RIA, which took into account previous work undertaken in this area. This found that there was no adequate justification to exempt food waste treated by any of the technologies assessed from the ban on the disposal of food waste to sewer.
- 5.26 Eunomia reviewed the modelling in 2023 to examine whether any substantive change may have occurred since the previous work was carried out that might lead to a different result. However, the environmental and practical disbenefits of the food waste to sewer technologies are largely inherent to the design and function of these disposal routes. It was therefore concluded that it was highly unlikely that the outcome of the previous analysis would have changed.
- 5.27 The Welsh Government does not therefore intend to introduce an exemption for food waste from non-domestic premises treated by any technologies prior to its disposal to sewer.