

Title: Plastic Carrier Bags Charge IA No: DEFRA1809 Lead department or agency: DEFRA Other departments or agencies:	Impact Assessment (IA)		
	Date: 09/02/2015		
	Stage: Final		
	Source of intervention: Domestic		
	Type of measure: Secondary legislation		
	Contact for enquiries: Laura Denison Tom Bradbury		
Summary: Intervention and Options		RPC Opinion: GREEN	

Cost of Preferred (or more likely) Option				
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANCB on 2009 prices)	In scope of One-In, Measure qualifies as Two-Out?	
£782.33m	£1738.15m	£ -154.19m	Yes	Zero Net Cost

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

Over 7 billion single-use plastic bags (SUPB) were given out in England by supermarkets alone in 2012. The vast majority are given away free at the point of sale, with the cost of bags hidden in the price of goods, so consumers are not incentivised to limit their use to a socially desirable level. There are also negative externalities associated with SUPB such as the costs of littered bags and the greenhouse gas emissions associated with their production. Government intervention is required to tackle these externalities and bring the costs to consumers of SUPB more in line with the costs to society. Requiring consumers to pay upfront for each bag they use has been shown to cut consumption dramatically, by around 80% in Wales.

What are the policy objectives and the intended effects?

The policy objective is to reduce the number of SUPB used and disposed of in England, to be achieved through the introduction of a mandatory 5p charge paid by consumers at point of sale in large retailers. Even after accounting for substitution effects (e.g. increased bin liner use), reduced SUPB consumption is expected to reduce litter, greenhouse gas (GHG) emissions, resource use, waste generation and the associated costs of waste treatment. There will be no net cost to business from the policy as retailers will be able to retain a portion of the proceeds of the charge to cover their costs. The remainder of the proceeds is expected to benefit charities.

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

The three options considered in this IA are a 'do nothing' scenario, the introduction of a mandatory minimum 5p charge for SUPB by all retailers, or the introduction of a charge by large retailers only. The introduction of a charge by large retailers only is the preferred option as it is government policy to avoid imposing new regulatory requirements on SMEs where possible. Under a voluntary agreement SUPB use by major retailers in the UK fell by 41% from 2006 to 2009, but then rose by 12% to 2012 on the 2009 level. Retailers have said that they are unwilling to participate in another voluntary agreement and that further reductions in SUPB use require government intervention. Wales and Northern Ireland have already introduced a mandatory 5p charge for SUPB, reducing use by 80% in Wales. Northern Ireland has cancelled a planned increase to 10p due to the effectiveness of the 5p charge.

Will the policy be reviewed? It will be reviewed. If applicable, set review date: 10/2020

Does implementation go beyond minimum EU requirements?			N/A		
Are any of these organisations in scope? If Micros not exempted set out reason in Evidence Base.	Micro No	< 20 No	SmallNo	MediumNo	Large Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)			Traded: -1.29m	Non-traded:	

I have read the Impact Assessment and I am satisfied that (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.

Signed by the responsible:

Dan Rogerson

Date: 10 December 2014

Summary: Analysis & Evidence

Policy Option 1

Description: Introduce a mandatory minimum 5p charge for single-use plastic bags in all retailers

FULL ECONOMIC ASSESSMENT

Price Base Year 2014	PV Base Year 2015	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: £846.52m	High: £1322.17m	Best Estimate: £1085.82m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£16.1m	£216.8m	£1856.3m
High	£16.1m	£231.7m	£1983.2m
Best Estimate	£16.1m	£224.5m	£1922.2m

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

Retailers incur costs (£66m) but can retain a share of the proceeds of the charge to cover these (retailers would be encouraged to donate the remainder to charity). SMEs would be likely to retain all of the charge, resulting in a net benefit to business. Enforcement costs to government would be £7m. Consumers incur costs of £281m for new 'bags for life', £53m for extra bin liners, £67m for VAT on those bags (transfer) and £1,179m for the 5p charge itself (transfer). VAT to government also falls.

Other key non-monetised costs by 'main affected groups' Consumers will be inconvenienced by not having access to 'free' bags, but this will be mitigated by behavioural responses to the charge, i.e. increased re-use of bags.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	£334.2m	£2829.7m
High	0	£375.3m	£3178.5m
Best Estimate	0	£355.2m	£3008.0m

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

Businesses see resource savings of £1,352m (PV) from reduced demand for SUPB and pay £270m less VAT (a transfer). These savings should be passed on to consumers, who experience a net benefit overall. The net proceeds of the charge (£685m) should benefit charities. Fewer SUPB in the waste stream benefits local authorities through reduced waste management costs (£43m) and reduced litter costs (£78m) after allowing for substitution between bags. There are carbon savings of £18m.

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

A major non-monetised benefit would be the reduced disamenity impact of litter as there are likely to be fewer littered SUPB in urban and rural areas. There are also likely to be benefits to wildlife in the marine and terrestrial environment with less damage to organisms from fewer littered bags or pieces of bags.

Key assumptions/sensitivities/risks

Discount rate (%) 3.5

The key uncertainties among the assumptions are around the extent of any switch to paper bags by retailers and the number of bags currently being used by SMEs. Variations in these assumptions give rise to the high and low scenarios presented above. Other sensitivities explored in the sensitivity analysis include trends in supermarket bag use, the cost of bags to retailers, the level of 'bag for life' use after the charge, and consumer SUPB use after the charge.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: £5.8m	Benefits: £207.0m	Net: £201.2m	Yes	Zero net cost

Summary: Analysis & Evidence

Policy Option 2

Description: Introduce a mandatory minimum 5p charge for single-use plastic bags in large retailers only (preferred option)

FULL ECONOMIC ASSESSMENT

Price Base Year 2014	PV Base Year 2015	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: £709.90m	High: £854.87m	Best Estimate: £782.33m

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£12.1m	£174.0m	£1489.3m
High	£12.1m	£176.1m	£1506.3m
Best Estimate	£12.1m	£175.0m	£1497.6m

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

Retailers will incur costs of £26m (PV over 10 years) but can retain a portion of the proceeds of the charge to cover these. Enforcement costs to government are £4m (PV over 10 years). Consumers incur costs of £260 m for new 'bags for life', £39m for extra bin liners, £60m for VAT on those bags (a transfer) and £907m for the 5p charge itself (a transfer, some of which benefits charities). VAT to government also falls.

Other key non-monetised costs by 'main affected groups' Consumers will be inconvenienced by reduced access to 'free' bags, but this will be mitigated by behavioural responses to the charge, i.e. increased re-use of bags.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0	£262.0m	£2216.2m
High	0	£277.1m	£2344.1m
Best Estimate	0	£269.5m	£2280.0m

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

Large retailers see resource savings of £1,009m (PV) from reduced demand for SUPB and pay £202 m less VAT (a transfer). These savings should be passed on to consumers, who nevertheless experience a net cost overall because without the fall in hidden cost from SMEs, the total reduction in hidden cost is not enough to outweigh the additional costs of the charge that consumers face (mainly supermarket bags for life and the cost of the charge itself). Waste management, litter and carbon costs also fall.

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

A major non-monetised benefit will be the reduced disamenity impact of litter as there are likely to be fewer littered SUPB in urban and rural areas. There are also likely to be benefits to wildlife in the marine and terrestrial environment with less damage to organisms from fewer littered bags or pieces of bags.

Key assumptions/sensitivities/risks

Discount rate (%) 3.5

The key uncertainties among the assumptions are around the extent of any switch to paper bags by retailers. Variations in this assumption give rise to the high and low scenarios presented above. Other sensitivities explored in the sensitivity analysis include trends in supermarket bag use, the cost of bags to retailers, the level of 'bag for life' use after the charge, and consumer SUPB use after the charge.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			In scope of OITO?	Measure qualifies as
Costs: £2.3m	Benefits: £156.5m	Net: £154.2m	Yes	Zero net cost

Impact Assessment: Single-Use Plastic Bag Charge for England

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Executive summary

This Impact Assessment (IA) is concerned with the introduction of a mandatory 5p charge for single-use plastic carrier bags (SUPB) paid by consumers in large retailers in England. The policy was announced by the Deputy Prime Minister in September 2013 and will come into effect in October 2015.

The problem under consideration is that because SUPB are currently given away free at the point of sale, with the cost of bags hidden in the price of goods, consumers are not incentivised to limit their consumption to a socially desirable level. Over 7 billion single-use plastic carrier bags (SUPB) were given out in England by supermarkets alone in 2012, or 133 per person, and this figure has been rising since 2010. There are negative externalities (costs on third parties) associated with SUPB such as the costs of littered bags and the greenhouse gases (GHG) emitted and non-renewable resources used in their production. These factors provide a rationale for government intervention to reduce SUPB consumption to a more socially desirable level.

A 5p charge for each bag purchased, paid by consumers at point of sale in large retailers (option 2), is the preferred option since experience in other countries, such as Wales, shows that a charge at this level has a dramatic impact on the level of SUPB consumption, reducing it by around 80% in supermarkets. Introducing a mandatory 5p charge for SUPB distributed by large retailers in England is likely to lead to a similar reduction in bag use in those shops. The option of making the charge mandatory for all retailers (option 1) is also considered and although we expect it to yield a higher net present value and benefit to business, it is rejected as the Government policy is to avoid imposing regulatory burdens on small businesses where possible.

This IA assesses the likely impacts of the introduction of a mandatory charge for SUPB on the environment, consumers, waste management authorities, retailers and government. In order to estimate these impacts it is necessary to establish the total number of each type of bag used by retailers now, and to estimate what would be likely to happen in the baseline scenario (with no charge) and after the introduction of a charge (for all retailers or large retailers only). While the use of bags for life (BFL; bags designed for multiple re-use), paper bags and bin liners is expected to increase with a charge for SUPB, the calculations in the evidence base show that the overall impact is likely to be positive for the environment and waste management authorities. Depending on the scope of the charge, it could be positive for consumers.

Reduced SUPB consumption is expected to have benefits through reductions in litter and its associated costs of clean-up and disposal. There will also be benefits from a reduction in the quantity of waste generated and the associated cost of treatment. These first two effects will bring financial savings mainly to local authorities but there will also be non-monetised benefits to communities from fewer littered bags. There will be environmental benefits in terms of avoided GHG emissions and resource savings since fewer bags will need to be produced.

The calculations in the evidence base show that if the charge applies to all retailers there is likely to be a positive net impact on consumers as the fall in the cost of SUPB hidden in shopping bills passed on by retailers (due to fewer bags being used) outweighs the extra costs from the charge (including the 5p charge paid for the remaining SUPB that are used and the cost of additional BFL and bin liners). If the charge applies only to large retailers, there is a net cost to consumers as the reduction in hidden cost is smaller (as consumers continue to pay for SUPB used in SMES through their shopping bills) and this is outweighed by the extra costs from the charge. While two of the extra costs to consumers from the charge – the charge itself and the cost of extra bin liners – are proportionately smaller in option 2 compared to option 1 (due to

the narrower scope of the charge), the additional cost of BFL is largely unchanged between the two options because very few BFL are sold in SMEs.

There will be costs to government from the implementation and enforcement costs associated with any charge. There will be no net cost to business as while retailers will incur administrative, monitoring and reporting costs from introducing a charge, they will be able to retain a portion of the proceeds of the charge to cover these. This takes the form of a transfer from consumers which entirely offsets the costs to business. Retailers experience a direct benefit from the reduced cost of providing bags, which they are expected to pass-through to consumers. Since the former is a direct impact on business and the latter is considered indirect (because it is a form of pass-through), the EANCB figures show a large net benefit to business for options 1 and 2. For the purposes of the EANCB the revenue from the charge is counted in the first instance as a direct benefit to business while the subsequent donation to charity is an indirect cost, further increasing the direct benefit to business of the policy as measured under the EANCB.

In the economic analysis for this Impact Assessment though, the fall in cost of stocking bags benefits consumers only as all savings are assumed to be passed through by retailers. If SMEs were included in the charge, they would be likely to retain a greater proportion of the charge than necessary to cover their costs, increasing the benefit to business of option 1. Large retailers are expected to enter a voluntary agreement and donate the proceeds of the charge, less their reasonable administrative costs, to charitable causes as happened in Wales. In the economic analysis for this IA, charities therefore benefit from the net proceeds of the charge (there is effectively a transfer from consumers to charities via retailers), unlike in the calculation of the EANCB where all proceeds of the charge count as a direct benefit to business.

There will also be a change in VAT revenue for the exchequer, as although VAT is paid on the charge, this is to a greater or lesser extent offset by changes in VAT arising from changes in the number of bags sold, especially the fall in VAT due to fewer SUPB used. Changes in VAT are transfers between groups, with no overall impact on society, so they cancel each other out in the calculation of the NPV figure.

Overall the monetised benefits are likely to be greater than the monetised costs from introducing a charge, as shown by the positive net present value figures for both options.

Summary table of impacts (over 10 years; in PV terms with 2015 base year; 2014 prices; £m)

Group/type of impact	Option 1 – all retailers included			Option 2 – SMEs excluded		
	Economic impacts (benefit of option 1 over baseline)	Transfer payments (sum to zero)	Net impact on group (where economic impact)	Economic impacts (benefit of option 2 over baseline)	Transfer payments (sum to zero)	Net impact on group (where economic impact)
CO ₂ e	18			13		
Consumer			43			-55
change in hidden cost	1,352			1,009		
change in cost of BFL	-281			-260		
change in cost of bin liners	-53			-39		
new cost of charge						
change in VAT on 'hidden' bags		-1,179			-907	
change in VAT on BFL & bin liners		270			202	
Litter		-67			-60	
Litter	78			59		
Waste management	43			30		
Recyclate revenue	1			1		
Retailers	-66	298	232	-26	26	0
Government (implementation/enforcement authorities)	-7			-4		
Government (Exchequer)			-8			9
new VAT on charge		196			151	
change in VAT on 'hidden' bags		-270			-202	
change in VAT on BFL & bin liners		67			60	
Charities		685			730	
Gross costs			1,923			1,498
Gross benefits			3,008			2,281
Net Present Value			1,086			782

N.B. For both options, savings to retailers from stocking fewer bags are assumed to be passed through to consumers and the economic impact on retailers is equal to implementation and reporting costs. Option 2 shows a zero net cost to business as retailers receive a transfer equal to their implementation and reporting costs by retaining the appropriate share of proceeds from the charge. As option 1 assumes that SMEs retain all of the charge if they are included, there is a net benefit to business. The OITO methodology for calculating EANCBS figures is different – see section 6.1. Transfer payments are distributional impacts, with the cost of the charge to consumers (£1179m in option 1 and £907m in option 2) being equal to the sum of the transfer to retailers, charities and new VAT on the charge in each option. Gross costs and benefits in this table include economic impacts and transfer payments and correspond to the best estimates of present value total costs and benefits from the summary sheets. Some errors may be present due to rounding

1. Problem under consideration and rationale for intervention.

In 2012 over 7 billion single-use plastic bags (SUPB)¹ were issued to customers by major supermarkets in England, with an estimated 13 billion given out by all retailers.² The vast majority of SUPB are currently given away free at the point of sale, with the cost of bags hidden in the price of goods. Since price signals are not transmitted to market actors, consumers are not directly confronted with the cost of bags and there is little incentive for them to limit their consumption to an economically efficient level (apart from the loyalty card reward schemes which are optional). In addition, there are negative externalities associated with SUPB, i.e. costs which do not fall directly on shoppers or retailers, such as the disamenity³ (eyesore) impact of littered bags and the greenhouse gas (GHG) emissions and non-renewable resource use associated with their production. Plastic bags are made from non-renewable resources (e.g. oil) which have an 'option value' that is not reflected in market prices since future generations will value the option of using e.g. oil reserves in the future. These externalities and market failures result in the costs of SUPB to society being greater than the costs to private actors, resulting in a level of consumption (at 133 per person per year for supermarket bags alone) above that which would be socially desirable.⁴

Voluntary agreements with retailers have resulted in significant reductions in SUPB use. The first of two voluntary agreements between the UK Government and 21 supermarkets and high street retailers reduced the environmental impact of carrier bags by 40% between 2006 and 2008, exceeding the 25% target. Signatories encouraged reuse of carrier bags (for example through loyalty card reward schemes), increased recycled content and reduced the weight of their carrier bags, amongst other measures. The second agreement, between the Government and the UK's leading supermarkets, represented by the British Retail Consortium (BRC), achieved a 48% reduction in numbers of bags distributed between 2006 and 2009 (narrowly missing the 50% target).⁵ Latest figures suggest that the fall was 41% due to the inclusion of an extra supermarket.⁶ SUPB use in the UK rose by 12% to 2012 on the 2009 level. Retailers have said that they are unwilling to participate in another voluntary agreement and that further reductions in SUPB use require government intervention. There is a coordination problem as although supermarkets can charge for bags voluntarily, there is a perceived risk that those who implement a charge first will see customers switch to competitors.

Government intervention is required to address the externalities from SUPB by bringing the costs to consumers more in line with the costs to society and resolving the coordination problem among retailers by taking away the competitive disadvantage of not supplying bags and moving the sector to a new, lower cost operating environment. Economic theory suggests that market based instruments, which change or introduce prices for goods, tend to be more economically efficient than measures to restrict or ban the consumption of goods. Also, retailers are opposed to a ban or quantitative restrictions on bag use. Experience in other countries (e.g. Wales⁷) suggests that requiring consumers to pay a charge for each bag they use at the point of sale has a dramatic impact on the level of consumption through changes in shopper behaviour. Many consumers prefer to avoid paying for SUPB and instead bring their own bags with them for re-use when shopping, particularly when shopping in supermarkets.

¹ This terminology is used throughout but re-use of 'single-use' bags, especially as bin liners, is considered in the analysis.

² See evidence base and <http://www.wrap.org.uk/content/wrap-publishes-new-figures-carrier-bag-use>

³ Here disamenity impacts refer mainly to the negative social and psychological impacts of litter in the local environment which come about due to litter being perceived as undesirable.

⁴ The socially optimal level would be where the marginal social cost of consumption is equal to the marginal social benefit, i.e. at the level where the extra cost to society of an additional bag being used is equal to the benefit it brings society.

⁵ <http://www.wrap.org.uk/content/new-figures-show-single-use-carrier-bags-cut-48>

⁶ <http://www.wrap.org.uk/content/wrap-publishes-new-figures-carrier-bag-use>

⁷ <http://www.wrap.org.uk/content/wrap-publishes-new-figures-carrier-bag-use>

Five pence per bag has been chosen as the proposed mandatory minimum charge because experience in Wales has shown this to be a sufficient disincentive for SUPB use (with consumption falling by 80% in supermarkets). Wales initially proposed a charge at the level of 7p per bag in its consultation but reduced this to 5p after taking responses into consideration.⁸ Northern Ireland introduced a mandatory charge at the 5p per bag level and cancelled a planned increase to 10p due to the effectiveness of the 5p charge. Scotland has announced its intention to introduce a 5p charge in October 2015. It is desirable to ensure consistency with other parts of the UK by introducing a 5p charge in England.

Efforts to monetise the external social cost of SUPB have arrived at figures in a range of 5-7p per bag after considering the costs of GHG, air pollution and water pollution in production; and the costs of littering and improper recycling in disposal.⁹ Neither of the studies attempt to monetise the disamenity impact of littered bags or the cost of damage to marine wildlife from littered bags. A new study would be needed to establish the total external social costs of SUPB in monetary terms, but this would not be proportionate given the effectiveness of a 5p charge in Wales and the need to ensure consistency across the UK.

2. Policy objective

The policy objective is a reduction in the number of single use plastic carrier bags used and disposed of in England. Plastic carrier bags currently distributed free at point of sale (e.g. shop check outs) are the focus, with thinner, smaller bags for fresh produce (meat, vegetables, etc), paper bags and bags for life (BFL) out of scope. Bags for fresh produce are not included for hygiene reasons and to avoid food waste. Paper bags make up a small proportion of overall bag use and are not included as the policy is targeted at plastic bags. BFL are out of scope as the policy aims to encourage the re-use of bags, including BFL. There are no single-use plastic bags currently available that are genuinely biodegradable and all existing plastic biodegradable bags will be included in the charge.

An overriding Government priority is avoiding the imposition of regulatory requirements on small businesses where possible. As a result, SMEs will not be required to introduce a charge for SUPB, but they may choose to do so if they wish, as they can anyway. Hence the preferred option is option 2, where only large retailers are required to charge for SUPB. We acknowledge that option 1 has the higher NPV and greater benefit to business.

Since there will always be a need for some single-use carrier bags, Defra is promoting the development of a new standard for biodegradable bags that has fewer environmental impacts across its whole lifecycle, from production to disposal. Once the development of the new standard is complete an exemption for biodegradable bags will be introduced, but this will be covered by a separate impact assessment.

Reduced bag consumption is expected to have benefits through reduced litter and environmental benefits through GHG and resource savings since fewer bags will need to be produced. There will also be benefits from a reduction in the quantity of waste generated and the associated cost of treatment. The calculations in the evidence base show that if the charge

⁸ <http://www.bbc.co.uk/news/uk-wales-11669176>

⁹ The 2012 Wales IA estimates the total external social cost to be 7p per bag in addition to the private cost of 2p per bag. This is driven by an overestimation of GHG emissions per bag through a misunderstanding of the EA Life Cycle Assessment study. The 2013 Scotland IA estimates the total social external cost to be 5p per bag. Both studies use a higher carbon price than prevails currently.

<http://wales.gov.uk/docs/desh/publications/100604carrier-bag-charge-regulatory-impact-assessment-en.pdf>

<http://www.scotland.gov.uk/Resource/0042/00429421.pdf>

applies to all retailers there is likely to be a net positive impact on consumers as the fall in the cost of SUPB hidden in shopping bills passed on by retailers (due to fewer bags being used) outweighs the extra costs from the charge (including the 5p charge paid for the remaining SUPB that are used, the cost of additional BFL and bin liners). If the charge applies only to large retailers, there is a net cost to consumers as the reduction in hidden cost is smaller (as consumers continue to pay for SUPB used in SMES through their shopping bills) and this is outweighed by the extra costs from the charge. While two of the extra costs to consumers from the charge – the charge itself and the cost of extra bin liners – are proportionately smaller in option 2 compared to option 1 (due to the narrower scope of the charge), the additional cost of BFL is largely unchanged between the two options because very few BFL are sold in SMEs.

Charities will also benefit as retailers will be encouraged to donate revenue from the charge to charitable causes, less their administrative costs and VAT. Information published on the websites of all the major UK supermarkets operating in Wales shows the willingness of retailers to participate in this arrangement.¹⁰ Because retailers will be able to reclaim their costs from introducing and administering the charge, there will be no net cost to business overall.

Negotiations are ongoing in the European Union about a potential amendment to the Packaging Directive which would require Member States to reduce their SUPB consumption. The introduction of a charge for SUPB in England would contribute to the achievement of any target at the UK level but a charge applied to all retailers would be more likely to ensure compliance.

This is a Final Impact Assessment, without a formal consultation stage though informed by informal consultation and a Call for Evidence. The Call for Evidence asked questions about the design and implementation of the charge and evidence on current bag use. 185 responses were received and, wherever possible, evidence that was submitted is used in this Impact Assessment.

3. Description of options considered

Baseline (Option 0): do nothing scenario. In this scenario, consumption of SUPB remains at high levels and consumers continue to pay indirectly for bags through their shopping bills. The costs to society of littered bags and emissions from bag production are largely unchanged.

Option 1: Introduce a charge for SUPB in England for all retailers.

Under this option a mandatory minimum 5p charge at point of sale would be introduced for all SUPB in England in October 2015. This would apply to all retailers regardless of size but microbusinesses¹¹ would be exempt from the monitoring and reporting requirements. Re-usable 'bags for life' and paper bags would not be included in the charge.

Option 2: Introduce a charge for SUPB in England for large retailers only, i.e. those with more than 250 employees (preferred option).

It is proposed that a mandatory minimum 5p charge at point of sale will be introduced for all SUPB used in shops operated by large retailers in England in October 2015. SMEs would not be affected. Re-usable 'bags for life' and paper bags will not be included in the charge.

¹⁰ Correct in May 2014

¹¹ Defined as those businesses with fewer than 10 employees

4. Analysis of options

4.1 Baseline

This section establishes the baseline, or counterfactual, i.e. the most likely scenario in the absence of a charge. The costs and benefits of the other options will be assessed in relation to the baseline. It is necessary to estimate current levels of bag use, what changes would be likely to occur in the absence of a charge and the associated costs and benefits. The annex sets out the evidence base on current and potential future carrier bag use in England and describes the assumptions made for the purposes of the analysis where data was unavailable. Evidence on bag use is drawn from a range of sources including responses to Defra's call for evidence on the plastic bags charge, WRAP¹² data and impact assessments from other nations. The results are presented in table 1.

SUPB use is estimated for all types of retailer as this is the main focus of the policy. Bags for life are also considered to establish the extent to which the likely increase in their use following a charge offsets the benefits of reduced SUPB use. Paper bag use is estimated because some increase in their use is expected as they are exempt from the charge. Finally, sales of bin liners are likely to rise after the introduction of a charge so their current usage patterns are considered.

Sections 4.1.1 to 4.1.5 assess the costs to society of this baseline scenario of carrier bag use, considering in turn greenhouse gas emissions and resource use, consumer costs, litter costs, waste management costs and recycle revenue. Non-monetised costs and benefits are discussed in each section where they have been identified. Sections 4.2 and 4.3 assess the impacts of options 1 and 2 respectively, measuring the likely changes in comparison to the baseline scenario.

Depending on the outcome of EU negotiations, it is possible that option 0 would result in the UK failing to comply with the Packaging Directive and facing infraction proceedings. For example if the EU required significant reductions in bag use based on post-2009 levels (i.e. after the UK's major reductions in bag use occurred) the UK would struggle to meet any possible targets without a mandatory charge for SUPB, as retailers have declined to participate in further voluntary agreements.

Table 1: Bag use in England in baseline (millions of bags)

TABLE 1 - baseline bag use (m)											
Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Supermarket SUPB in England	7,492	7,642	7,795	7,951	8,110	8,272	8,437	8,606	8,778	8,954	82,037
High street SUPB in England	2,472	2,472	2,472	2,472	2,472	2,472	2,472	2,472	2,472	2,472	24,719
SME SUPB in England	3,455	3,455	3,455	3,455	3,455	3,455	3,455	3,455	3,455	3,455	34,550
TOTAL SUPB England	13,419	13,569	13,722	13,878	14,037	14,199	14,364	14,533	14,705	14,881	141,306
PE BFL supermarket England	321	321	321	321	321	321	321	321	321	321	3,208
Other BFL supermarket England	18	18	18	18	18	18	18	18	18	18	182
PE BFL High street England	138	138	138	138	138	138	138	138	138	138	1,376
Other BFL High street England	8	8	8	8	8	8	8	8	8	8	78
SME PE BFL	35	35	35	35	35	35	35	35	35	35	353
Paper bags on high street	291	291	291	291	291	291	291	291	291	291	2,908
SME paper bags	35	35	35	35	35	35	35	35	35	35	353
Bin liners sold in England	795	795	795	795	795	795	795	795	795	795	7,954

¹² WRAP (Waste and Resources Action Programme) is Defra's principal delivery body for the provision of advice and technical and financial support on waste reduction and resource efficiency in England (www.wrap.org.uk)

4.1.1. GHG emissions and resource use in baseline

Table 2 –GHG emissions in baseline

BASELINE	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
(£m)											
Supermarket SUPB	0.53	0.56	0.59	0.64	0.71	0.77	1.95	3.16	4.43	5.75	19.1
High street SUPB	0.17	0.18	0.19	0.20	0.22	0.23	0.57	0.91	1.25	1.59	5.5
SME SUPB	0.24	0.25	0.26	0.28	0.30	0.32	0.80	1.27	1.74	2.22	7.7
PE BFL Supermarket	0.01	0.02	0.02	0.02	0.02	0.02	0.05	0.08	0.11	0.14	0.5
Other BFL Supermarket	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.02	0.02	0.1
PE BFL High Street	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.05	0.06	0.2
Other BFL High Street	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.0
SME PE BFL	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.1
Paper	0.10	0.11	0.11	0.12	0.13	0.13	0.33	0.53	0.73	0.93	3.21
Bin liners	0.06	0.06	0.06	0.07	0.07	0.08	0.19	0.31	0.42	0.53	1.9
TOTAL (£m)	1.13	1.18	1.23	1.34	1.45	1.58	3.93	6.32	8.76	11.25	38
Total discounted	1.13	1.14	1.15	1.21	1.27	1.33	3.19	4.97	6.65	8.26	30.29
TOTAL (tonnes CO ₂ e)	0.31	0.31	0.31	0.32	0.32	0.32	0.33	0.33	0.33	0.34	3.22

Table 2 shows the monetised GHG emissions emitted in the baseline scenario for each type of bag, based on the number of each type of bag used, the emissions per bag and the traded price of carbon. The total GHG emissions are also shown, both monetised and non-monetised. Note that the sharp increase in monetised emissions from 2021 is due to changes in the carbon price. Most of the emissions from plastic bags occur in the production and raw material extraction stages of their life-cycle, which largely occur overseas.

The global warming potential (GWP) of the baseline scenario is calculated based on the lifecycle greenhouse gas (GHG) emissions for each type of bag in the Environment Agency's 2011 study.¹³ The EA study presents GHG figures in CO₂ equivalent terms for each type of bag based on a comparable 'functional unit', i.e. carrying one month's shopping (483 items) home. For example 82.14 single-use bags are required to fulfil this function, with associated emissions of 1.578 kg CO₂e (assuming 40% are re-used as bin liners), while 60.68 bags for life fulfil the same function, with emissions of 1.385 kg CO₂e if each bag for life is re-used 5 times. Emissions have been calculated on a per bag basis by dividing the emissions per functional unit by the number of bags needed to fulfil the function (e.g. for SUPB, 1.578/82.14= 0.0192, so emissions are 19.2g CO₂e per bag). The CO₂ factor for SUPB assumes no recycled content in the bags, and although this is no longer a reasonable assumption, EA sensitivity analysis shows that recycling SUPB has little effect on their GHG impact but SUPB made with recycled plastic are likely to have a lower GHG impact (see sensitivities section of this IA).

The EA calculate the lifecycle GHG emissions for each bag type based on a number of scenarios of re-use. Here, the figure for SUPB which assumes 40.3% are re-used as bin liners will be used (reflecting 2005 survey data from WRAP).¹⁴ Paper bags are assumed to be used only once, as EA suggest is the case, resulting in a GWP of 5.523 kg CO₂e per functional unit (85.0g per bag). Bags classified as PE by WRAP reporting are taken to correspond to LDPE bags in the EA report. 'Other' bags under WRAP reporting are predominantly woven PP but the closest corresponding category in the EA report is non-woven PP, so all 'other' BFL are

¹³ Environment Agency (2011) Life cycle assessment of supermarket carrier bags: a review of the bags available in 2006 <http://www.environment-agency.gov.uk/research/library/publications/129364.aspx>

¹⁴ The characteristics of SUPB (i.e. weight, GHG emissions per bag, cost etc.) are assumed to be the same for all retailers in the absence of more detailed evidence. If high street bags were generally thicker than supermarket bags, this would result in the benefits of options 1 and 2 being understated.

assigned the GHG factors of non-woven PP bags.¹⁵ All BFL are assumed to be re-used nine times in the absence of a charge, as suggested by survey data from Scotland.¹⁶ Following the EA report, the GHG benefits of re-use are accounted for by dividing the GWP of a bag with no re-use by the number of re-uses. This gives a GWP of 0.769 kg CO₂e per functional unit (13g per bag) for PE BFL and 2.390 kg CO₂e (36g per bag) for 'other' BFL.

The life cycle stages considered are the extraction/production of raw materials, bag production processes, transportation, recycling and avoided products from re-use, and end-of-life/waste processes. Plastic bags are mostly imported from Asia with 70-90% of emissions over their life cycle arising in the extraction and production of raw materials and bag manufacturing processes.¹⁷ Government guidance is that where emissions occur overseas, the traded price of carbon should be used, so the GHG impact of the bags used in the baseline is monetised using DECC's September 2013 update of the short-term traded carbon values to be used for UK public policy appraisal.¹⁸ Table 2 presents the carbon costs of the baseline scenario for each type of bag affected by the policy.

The introduction of the charge will also affect resource use, which can be assessed independently of GHG impacts even though the two are closely linked. Plastic bags are made from non-renewable resources (e.g. oil) which have an 'option value' that is not reflected in market prices since future generations will value the option of using e.g. oil reserves in the future. Resource use can be measured by proxy in terms of the total weight of the bags used, though this does not capture all resources used in the production of the bags. The total weight of bags used is calculated as the number of each type of bag multiplied by the average weight, with results shown in table 3. For SUPB, the average weight is taken as 7.5g which is the average supermarket bag weight from 2009-2012.¹⁹ Bin liner weight is the average of pedal and swing bin liner weights from the WRAP study of Welsh bin liner usage, i.e. 8.3g.²⁰ Other weights are taken from the EA's life cycle analysis study, i.e. 55.2g for paper bags, 34.94g for PE BFL and 115.83g for PP BFL.

Table 3 – weight of materials used in baseline

Weight (tonnes)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
BASELINE											
SUPB (HDPE)	100,643	101,767	102,913	104,082	105,275	106,491	107,732	108,998	110,289	111,606	1,059,797
PE BFL	17,248	17,248	17,248	17,248	17,248	17,248	17,248	17,248	17,248	17,248	172,478
Other BFL (mostly PP)	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016	30,165
Bin liners (HDPE/PE)	6,602	6,602	6,602	6,602	6,602	6,602	6,602	6,602	6,602	6,602	66,018
TOTAL plastic bag weight	127,509	128,633	129,779	130,948	132,141	133,358	134,598	135,864	137,155	138,472	1,328,457
Paper	17,999	17,999	17,999	17,999	17,999	17,999	17,999	17,999	17,999	17,999	179,992

¹⁵ This is justified because of the similar weights per unit of material as found on wholesale bag websites, e.g.

<http://www.promotionbag.co.uk/products/>

¹⁶ 2.4% of 5402 shoppers in Scotland were observed to buy new BFL, while 21.5% re-used BFL. This gives an approximate re-use rate of 9.

http://www.zerowastescotland.org.uk/sites/files/wrap/Carrier%20bag%20behavioural%20report_SCOTLAND_FINAL%20V5%2018%207%2013%20v3.pdf p.84-85

¹⁷ EA Life cycle analysis

¹⁸

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/254083/2013_main_appraisal_guidance.pdf p.17

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/240095/short-term_traded_carbon_values_used_for_UK_policy_appraisal_2013_FINAL_URN.pdf

¹⁹ Calculated as total SUPB weight divided by total number of SUPB

<http://www.wrap.org.uk/content/wrap-publishes-new-figures-carrier-bag-use>

²⁰ <http://www.wrap.org.uk/sites/files/wrap/Effect%20of%20charging%20for%20carrier%20bags%20on%20bin-bag%20sales%20in%20Wales.pdf>

4.1.2. Consumer costs in baseline

Table 4 – costs to consumers in baseline

BASILINE	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Hidden cost supermarket SUPB	145	148	151	154	157	160	163	166	170	173	1,584
Hidden cost high street SUPB	48	48	48	48	48	48	48	48	48	48	477
Hidden cost SME SUPB	67	67	67	67	67	67	67	67	67	67	667
Hidden cost of high street paper bags	79	79	79	79	79	79	79	79	79	79	788
Hidden cost of SME paper bags	10	10	10	10	10	10	10	10	10	10	96
total hidden cost	347	350	353	356	359	363	366	369	372	376	3,612
total hidden cost less VAT	290	292	294	297	300	302	305	307	310	313	3,010
VAT on hidden cost	58	58	59	59	60	60	61	61	62	63	602
Cost of PE BFL supermarket	28	28	28	28	28	28	28	28	28	28	278
Cost of other BFL supermarket	5	5	5	5	5	5	5	5	5	5	52
Cost of PE BFL high street	12	12	12	12	12	12	12	12	12	12	119
Cost of other BFL high street	2	2	2	2	2	2	2	2	2	2	23
Cost of PE BFL SME	3	3	3	3	3	3	3	3	3	3	31
Cost of bin liners	34	34	34	34	34	34	34	34	34	34	342
cost of bfl and bin liners	85	85	85	85	85	85	85	85	85	85	846
cost of bfl and bin liners less VAT	70	70	70	70	70	70	70	70	70	70	705
VAT on BFL/bin liners	14	14	14	14	14	14	14	14	14	14	141
Total cost in baseline	432	435	438	441	444	447	450	454	457	460	4,458
Total cost in baseline less VAT	360	362	365	367	370	373	375	378	381	384	3,715
VAT in baseline	72	72	73	73	74	75	75	76	76	77	743
Total cost in baseline less VAT PV	360	350	341	331	322	314	305	297	289	281	3,191

Table 4 shows the costs to consumers in the baseline based on the number of each type of bag, the cost per bag and the degree of 'pass through' by retailers where costs are hidden. Costs are calculated with and without VAT, as changes in tax revenue resulting from the policy transfer income between groups (e.g. consumers and government) but have no net impact on society.

It is assumed that retailers currently pass on 100% of the costs of bags to consumers as a 'hidden cost' in the price of goods. This is because the total revenue received by retailers ultimately comes from till receipts (and therefore customers' shopping bills) which must cover not only the cost of goods but all operational costs such as labour costs, rental of premises, and carrier bags.

No information was provided in response to the Call for Evidence on the private cost per bag of SUPB or paper bags. The 2005 IA for Scotland found an average cost to retailers of £0.007 per bag, or £0.009 in 2014 prices.²¹ This reflects wholesale prices listed by providers found on the internet of £0.01-0.02 for plain bags.²² It is likely that most retailers have access to prices at the bottom of this range for their bespoke, branded bags (through bulk buy discounts), so the figure used for the analysis is £0.009 (uprated from the 2005 IA for Scotland). The Impact Assessments for bag charges in Scotland and Wales used a private cost of £0.02 per bag including storage and transport costs (i.e. storage and transport costs were estimated to be £0.01 per bag on top of a cost per bag of £0.01).²³ In the absence of other evidence on storage, transport and administrative costs these are assumed to be £0.01 per bag and the total private

²¹ <http://www.scotland.gov.uk/Resource/Doc/57346/0016899.pdf> p.33 states that SUPB cost £7.51 per 1000 bags for retailers.

The Treasury GDP deflator has been used throughout <https://www.gov.uk/government/publications/gdp-deflators-at-market-prices-and-money-gdp-march-2013>

²² <http://www.carrierbagshop.co.uk/plastic-carrier-bags/vest-plastic-carrier-bags/product/324/PL-VESTBLUE/RecycledBlueVestStylePlasticCarrierBags.aspx>

²³ <http://www.scotland.gov.uk/Resource/0042/00429421.pdf>
<http://wales.gov.uk/docs/desh/publications/100604carrier-bag-charge-regulatory-impact-assessment-en.pdf>

cost £0.019 per bag. The total cost to consumers of SUPB is the number given out by supermarkets, high street retailers and SMEs multiplied by the cost per bag (£0.019), multiplied by the degree of current pass through to consumers (100%). The effect of assuming different SUPB prices for retailers is explored in the sensitivity analysis.

The cost of paper bags is also assumed to be ultimately borne by consumers, with private cost estimates drawn from the 2005 IA for Scotland of £0.16369 per bag, or £0.20295 after accounting for inflation. Paper bags are around 7 times heavier than SUPB so their storage and transport costs are assumed to be larger by a factor of 7, i.e. £0.07 per bag. The overall private cost of a paper bag is therefore assumed to be £0.27, and the total cost to consumers of paper bags is this figure multiplied by the number given out by retailers, multiplied by the degree of pass through (100%).

The prices of PE BFL were taken from responses to the Call for Evidence in 2013, with supermarkets reporting a range of £0.05 to £0.12. In the absence of further information a simple average was taken (£0.085) and uprated for 2014 prices. No data were available from supermarkets on the price of 'other' BFL so an estimate was made based on the relative weight of non-woven PP bags compared to PE BFL (non-woven PP bags are 3.4 times heavier), i.e. £0.29 after uprating for 2014 prices. These figures are assumed to include transport costs as BFL are not 'hidden' purchases in the same way as SUPB and paper bags, since they are knowingly purchased at the till by shoppers. The total cost to consumers of each type of BFL is the number purchased multiplied by the average price.

It is necessary to estimate the cost to consumers of bin liners before the charge to be able to estimate the extra cost of bin liners to consumers after the charge when they no longer have access to 'free' SUPB. WRAP research on the impacts of the charge in Wales included data on the number of different types of bin liners sold and total sales value, allowing a price per bag to be deduced. The private cost of bin liners is taken as the average price of those bin liners that were affected by the charge in Wales (swing and pedal bin liners) uprated for 2014, which is £0.04 per bag. The total cost to consumers is simply this figure multiplied by the number sold in England.

4.1.3. Litter costs in baseline

Table 5 – litter costs in baseline

£m	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
BASELINE - litter costs											
SUPB											
Fishing Industry	0.58	0.59	0.59	0.60	0.61	0.61	0.62	0.63	0.64	0.64	6.12
Marine litter cost to harbours	0.19	0.19	0.19	0.20	0.20	0.20	0.20	0.20	0.21	0.21	1.99
Cost of rescuing vessels	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.13	0.13	0.13	1.25
Street Cleansing (LAs)	13.14	13.29	13.44	13.59	13.74	13.90	14.06	14.23	14.39	14.56	138.35
Highways agency	0.41	0.41	0.41	0.42	0.42	0.43	0.43	0.44	0.44	0.45	4.26
Network rail	0.10	0.10	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	1.09
TOTAL SUPB	14.54	14.70	14.87	15.03	15.21	15.38	15.56	15.74	15.92	16.11	153.06
PAPER											
Street Cleansing (LAs)	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	1.52	15.19
Highways agency	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.20
Network rail	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.05
TOTAL PAPER	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	1.54	15.44
TOTAL	16.09	16.25	16.41	16.58	16.75	16.92	17.10	17.28	17.47	17.66	168.50
PV	16.09	15.70	15.32	14.95	14.60	14.25	13.91	13.58	13.26	12.95	144.62

Table 5 shows the costs of litter in the baseline for each type of bag, based on the total cost of litter in each context and the proportion of litter accounted for by each type of bag in that context.

Littering of plastic bags has associated costs including those associated with clean-up in urban and rural areas and impacts in the marine environment. The largest of these which is readily monetised is the cost to Local Authorities of litter. Local Authorities in England spent £833.392m on 'street cleansing (not chargeable to Highways)' in 2012-13.²⁴ This covers street cleaning, sweeping and removal of litter and refuse from land, litter bins, etc in public areas (including shopping centres and towpaths); collection of illegally fly-tipped rubbish; removal of dead animals; removal of abandoned vehicles which do not constitute a traffic hazard; cleansing of foreshores (a part of which will involve clearing litter) and graffiti removal.²⁵ It has not been possible to obtain a breakdown of costs by activity, so it has simply been assumed that 70% of the street cleansing costs are associated with litter since LAs have an ongoing legal duty to keep their relevant land clear of litter and refuse on a daily, fortnightly or monthly basis (depending on the intensity of use of the land) and therefore this activity is likely to account for the majority of the total costs, whereas the other activities covered by this budget line are to some extent ad hoc or seasonal.²⁶ The effect of assuming a higher and lower figure is explored in the sensitivity analysis. WRAP analysis of the composition of municipal solid waste in Wales in 2010 found that 2.14% of litter by weight was made up of plastic carrier bags.²⁷ The cost to Local Authorities of cleaning up littered SUPB in 2014 is calculated as the cost for 2012-13 uprated for 2014-15, multiplied by 70% (i.e. the share of street cleaning costs associated with litter), multiplied by 2.14%. For subsequent years the resulting figure increases in the same proportion as the quantity of SUPB given out by retailers (i.e. 1.1% initially). The costs of disposal of litter in the waste stream are considered in the next section.

The Highways Agency spent £9.021m clearing up and disposing of litter from UK roadsides in 2011/12.²⁸ Plastic bags are a higher proportion of litter by roadsides since they are liable to blow in the wind and do not decompose, unlike other roadside litter.²⁹ The 2013 LEQSE survey found that supermarket bags and other retail bags affect 3.5% and 6.5% of all sites surveyed respectively, whereas the figures were 5% and 9% for main roads and 7% and 10% for rural roads. Assuming they make up 5% by weight of roadside litter, the total cost of clearing highways of litter in 2014 is the cost for 2011/12 uprated for 2014/15, multiplied by 5% and then scaled down for England. This is assumed to increase in subsequent years in the same proportion as the quantity of SUPB given out by retailers.

In 2011 Network Rail spent £2.3m clearing litter and rubbish from railway land.³⁰ If plastic bags are again assumed to make up 5% of litter on railways, the total cost of clearing railways of litter in 2014 is the cost for 2011/12 uprated for 2014/15, multiplied by 5% and then scaled down for England. This is assumed to increase in subsequent years in the same proportion as the quantity of SUPB given out by retailers.

Plastic bags are likely to account for a larger share of litter at sea than on land, probably because plastic breaks down more slowly than other materials in water. Plastic bags and bottles

²⁴ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/261876/RO_Final_Outturn_2012-13_Statistical_Release.pdf

²⁵ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/229942/RO_2012-13_RO5_notes.pdf

²⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/218806/cop-litter.pdf

²⁷ Page 54, www.wlga.gov.uk/download.php?id=3525&l=1

²⁸ http://assets.highways.gov.uk/freedom-of-information/disclosure-log/Litter-picking-on-the-Highways-Agency-network-678644/CRS_678644_Response%20letter.pdf

²⁹ http://www.keepbritaintidy.org/Documents/Files/KBT%20Network/KBT_LEQSE_report_2013_webFINAL.pdf

³⁰ <http://www2.keepbritaintidy.org/News/Default.aspx?newsID=1033>

accounted for more than 70% of litter collected along European coasts in one study and in another study cigarette butts, plastic bags and food containers accounted for 40% of the debris.³¹ No figure exists for plastic bags alone, so it is assumed that 10% of marine litter is made up of plastic bags.³²

The fishing industry incurs costs from marine litter, estimated at between €11.7 million and €13 million for Scotland in 2010.³³ The fishing industry in England was about half the size of that of Scotland in 2010³⁴ so the midpoint of that range has been halved, multiplied by the average exchange rate in 2010,³⁵ and uprated for 2014 prices, resulting in a figure of £5.8m for England in 2014. The cost of plastic bags to the English fishing industry in 2014 is calculated as 10% of £5.8m. This is assumed to increase in subsequent years in the same proportion as the quantity of SUPB given out by retailers.

The cost to UK harbours of marine litter in 2010 was €2.4m,³⁶ which after conversion to £, uprating to 2014 prices, adjusting for England's population share and applying the % of marine litter accounted for by plastic bags (10%) results in an estimated cost to English harbours of plastic bag litter of £0.19m in 2014. This is assumed to increase in subsequent years in the same proportion as the quantity of SUPB given out by retailers.

The cost to the Royal National Lifeboat Institution (RNLI) of rescuing vessels with fouled propellers was around €1.5m in 2010 across the UK. After conversion to £, uprating to 2014 prices, adjusting for England's population share and applying the % of marine litter accounted for by plastic bags (10%), this equates to an estimated cost of plastic bags to rescue authorities in England in 2014 of £0.12m. This is assumed to increase in subsequent years in the same proportion as the quantity of SUPB given out by retailers.

It was not possible to monetise many of the economic impacts of littered plastic bags. In the marine environment these include ingestion and entanglement of wildlife resulting in physical damage and possibly death, damage to benthic environments (e.g. the ocean floor) and loss of biodiversity and ecosystem function.³⁷ Plastic bags, fragments of plastic bags and the toxic chemicals they contain pose a threat throughout the marine food web, including to humans.³⁸ The disamenity impact of littered plastic bags in rural, urban, coastal and marine areas has not been monetised but studies suggest that litter is a high priority factor in local environmental quality.³⁹ Litter has been associated with negative impacts on property values, mental health, crime, road traffic accidents, wildfires, punctures and the presence of rats and vermin.⁴⁰ These

³¹ Mouat et al (2010) pp. 6-7

<http://www.kimointernational.org/WebData/Files/Marine%20Litter/Economic%20Impacts%20of%20Marine%20Litter%20Low%20Res.pdf>

³² The term "marine litter" tends to be used to refer to any man-made material which is loose in the marine area. Not all this material would necessarily be considered "litter" on land. For example, figures for "marine litter" can include lost/discarded fishing gear or other equipment, or material (including very small plastic particles) which has reached the sea through the water treatment process, as well as material dropped from boats or by people using the beach.

³³ Mouat et al 2010

³⁴ <http://www.marinemanagement.org.uk/fisheries/statistics/documents/ukseafish/2011/final.pdf>

³⁵ €1=£0.86. Mouat et al do not state the exchange rate they used to turn figures from pounds to euros

³⁶ Mouat et al 2010

³⁷ Mouat et al 2010

³⁸ Engler, R.E. (2012) "The Complex Interaction between Marine Debris and Toxic Chemicals in the Ocean", *Environmental Science and Technology*, 46, pp. 12302–12315

<http://water.epa.gov/type/oceb/marinedebris/upload/The-Complex-Interaction-between-MD-and-Toxic-Chemicals-in-the-Ocean.pdf>

³⁹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/226561/pb14015-valuing-local-environment.pdf

http://randd.defra.gov.uk/Document.aspx?Document=9854_LEQFinal.pdf

⁴⁰ <http://www.zerowastescotland.org.uk/sites/files/wrap/Indirect%20Costs%20of%20Litter%20-%20Final%20Report.pdf>

have not been considered for lack of evidence on the strength of the effects of litter and plastic bags in particular. Experimental research finds that when people observe that others have violated a social norm, for example by the presence of litter, they are more likely to violate other norms or rules, which causes disorder to spread.⁴¹

Paper bags are assumed to only be a litter problem on land, as at sea they will break down rapidly. This is evidenced by the lack of paper bag litter found on beaches.⁴² There is no compositional analysis of litter on streets that has paper bags as a separate category. While fast food litter is a prominent form of litter, it is not clear what proportion of this is paper bags as opposed to, for example, cardboard food boxes and greaseproof paper. Given that paper bags are such a small proportion of total bags used (around 2.5%) it is assumed that they make up 0.25% of litter since this seems reasonable. Using the same approach as before the costs to Local Authorities, the Highways Agency and Network Rail of littered paper bags were calculated

Since BFL tend to be re-used it is assumed that they will be disposed of in the household waste stream.⁴³

4.1.4. Waste management costs in baseline

Table 6 – Waste management costs in baseline

£m	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
BASILINE											
Supermarket SUPB	5.2	5.3	5.4	5.5	5.6	5.8	5.9	6.0	6.1	6.2	57.0
High street SUPB	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	17.2
SME SUPB	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	24.0
Paper bags	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	59.1
PE BFL supermarket	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	10.4
Other BFL supermarket	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.0
PE BFL high street	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.5
Other BFL high street	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.8
PE BFL SME	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.1
Bin liners	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	4.0
Total	17.5	17.6	17.7	17.8	18.0	18.1	18.2	18.3	18.4	18.5	180.2
PV	17.5	17.0	16.6	16.1	15.6	15.2	14.8	14.4	14.0	13.6	154.8

Table 6 shows the waste management cost of each type of bag in the absence of a charge based on the number of bags and the average cost of disposal per bag, which is in turn based on the weight of each type of bag and the method and cost of disposal.

Changes in the quantities of different types of bags entering the waste stream will affect the costs to local authorities of managing household waste. There is little data available on the recycling rate of plastic carrier bags, mainly as it is a subset of plastic film for which there is also little data available. The PlasFlow 2017 report estimates the recycling rate for 'mixed plastics',

⁴¹ <http://www.sciencemag.org/content/322/5908/1681.abstract>

⁴² <http://www.mcsuk.org/downloads/pollution/beachwatch/latest2011/Methods%20&%20Results%20BW10.pdf>

⁴³ While BFL could be disposed of in stores if consumers took BFL back to retailers for free replacement, evidence suggests that virtually no shoppers do this. 0.1% of Welsh shoppers and 0% of Scottish shoppers were observed to bring BFL back to stores for free replacement (p.85)
http://www.zerowastescotland.org.uk/sites/files/wrap/Carrier%20bag%20behavioural%20report_SCOTLAND_FINAL%20V5%2018%207%2013%20v3.pdf

which is composed of Pots, Tubs and Trays (PTT) and consumer film, to be 10%.⁴⁴ The report states that there was no information available on the split between PTT and consumer film collected for recycling, but that “mixed plastics are considered to be mostly PTTs” and “it is likely that by 2017 more consumer film will be collected”. For the purposes of this analysis it has been assumed that 10% of plastic carrier bags are recycled in every year over the 10 year period. WRAP report that there is no reliable data on the tonnage of plastic carrier bags recycled via front of store (FOS) recycling points as opposed to kerbside collections, but that it is likely to be in the region of 2000-3000 tonnes per year (2-3% of total weight of SUPB used per year). 7% of mixed plastics are recycled through ‘bring’ points, according to the PlasFlow 2017 report. Since the costs of collection are not known for FOS points (according to WRAP), and because of the relatively low tonnages involved, it will be assumed that the kerbside collection and sorting costs apply to all recycled plastic carrier bags.

Although the percentage of household waste that is incinerated is increasing and now accounts for over 20% of municipal waste,⁴⁵ contracts for incineration are typically fixed quantity with a variable element.⁴⁶ The amount of variability depends on several factors, including the type of contract and whether the facility is owner managed or 3rd party. The current trend is for capacity to be taken up as soon as it becomes available as it is cheaper than landfill and therefore even this flexible element would be taken up immediately. It is therefore assumed that changes in levels of plastic bag waste impact on landfill costs rather than incineration costs. This is reflected in the analysis by assuming that no bags are incinerated in the baseline scenario and that all bags that aren’t recycled go to landfill, both before and after the charge. While this results in an overstatement of the costs of waste management in the baseline, it ensures that the change in waste management costs reflects reality. It is assumed that all littered bags go to landfill.

For PE and ‘other’ BFL, it is assumed that the recycling rate is the same as for single-use bags (i.e. 10%) and the remaining 90% are assumed to go to landfill. Bin liners are all assumed to go to landfill. The recycling rate for paper bags is assumed to be the same as the recycling rate for all waste paper, i.e. 84.8%.⁴⁷ The rest of paper bags (i.e. 15.2%) are assumed to go to landfill, including those disposed of as litter.

An average cost of disposal was calculated per tonne of each type of bag. The median landfill gate fee (£20/tonne) is taken from WRAP’s 2013 gate fees report.⁴⁸ The residual waste (‘black bag’) collection cost of £38.05 in 2011, is taken from the Packaging Recycling Targets IA.⁴⁹ Collection and sorting costs for household recycling are £338/t taken from WRAP.⁵⁰ The landfill tax is excluded from the calculation as it represents a transfer. All costs were uprated for 2014 prices. The average cost of disposal for each type of bag was calculated by multiplying the weight of each bag (in tonnes; see section 4.1.1) by the cost per tonne of each type of disposal method and the proportion of bags disposed of by that method. For example 90% of SUPB are sent to landfill which in 2014 costs £20.8/tonne (uprated gate fee) plus £40.3/tonne (uprated residual waste collection cost) and 10% are recycled at £377/tonne (uprated collection and sorting costs). An average bag weight of 7.5g was used based on WRAP data from 2009-

⁴⁴ <http://www.wrap.org.uk/sites/files/wrap/PlasFlow%202017%20Report.pdf>

⁴⁵ <https://www.gov.uk/government/statistical-data-sets/env19-local-authority-collected-waste-quarterly-tables>

⁴⁶ This information is based on information from the Waste Infrastructure team within Defra

⁴⁷ <https://www.gov.uk/government/policies/reducing-and-managing-waste/supporting-pages/package-waste-producer-responsibility-regimes>

⁴⁸ http://www.wrap.org.uk/sites/files/wrap/Gate_Fees_Report_2013_h%20%282%29.pdf

⁴⁹ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/82437/packaging-ia-120321.pdf

⁵⁰ A simple average is taken of the cost of co-mingled, two-stream and kerbside sort systems, including the additional cost of collecting plastic film.

<http://www.wrap.org.uk/sites/files/wrap/The%20Financial%20Costs%20of%20Collecting%20Mixed%20Plastics%20Packaging.pdf>

2012.⁵¹ Thus the average cost of disposal per bag is
 $0.0000075 \times [(90\% \times (20.8 + 40.3)) + (10\% \times (377))] = £0.000695$.

The cost of disposing of carrier bag waste in the baseline scenario is calculated for each type of bag as number of bags used multiplied by average cost of disposal per bag.

4.1.5. Recyclate revenue in baseline

Waste disposal authorities, or private companies contracted to provide waste disposal services, receive a revenue stream from the sale of sorted recovered materials. While sorted and baled HDPE plastic carrier bags have a relatively low value (around £25) per tonne, printed LDPE (i.e. PE BFL) sells at around £170 per tonne. Applying these prices and taking into account the proportion of bags recycled and the weight per bag, it is possible to estimate the size of this revenue stream.⁵² It is likely that this revenue is already accounted for in the analysis of waste management costs in the baseline, through the current level of recycling collection and sorting costs (which include MRF gate fees), and that the benefits of the baseline scenario are therefore overstated. Recyclate revenue is considered separately in the baseline to ensure that the analysis of the impact of each option takes account of changes in revenue streams from recovered materials. This is more straightforward than estimating how recycling collection and sorting cost per tonne might change in each option (these are assumed to remain constant).

Table 7 – Recyclate revenue in baseline

£m	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
BASELINE											
SUPB	0.25	0.25	0.26	0.26	0.26	0.27	0.27	0.27	0.28	0.28	2.6
PE BFL	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	2.9
Paper	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	9.2
TOTAL	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	14.7
PV	1.5	1.4	1.4	1.3	1.3	1.2	1.2	1.2	1.1	1.1	12.7

4.2. Option 1 costs and benefits: Introduce a charge for SUPB in England applicable to all retailers.

This section describes the impacts of option 1 compared to the baseline described above. Option 1 involves the introduction of a mandatory 5p charge for single-use bags paid by consumers in all retailers in England from October 2015, with microbusinesses exempt from the monitoring and reporting requirements. A non-monetised benefit of option 1 is that it would increase the likelihood of the UK avoiding infraction proceedings under EU law, since the introduction of a mandatory charge for SUPB in all retailers in England would be very likely to result in the UK complying with possibly stringent EU targets on reductions in carrier bag use under the Packaging Directive, which have been proposed.

In assessing the impacts of the charge it is necessary to make judgements about the likely change in bag usage following its introduction. The annex outlines the evidence base on how

⁵¹ Calculated as total weight of UK supermarket SUPB divided by total number of UK SUPB.

<http://www.wrap.org.uk/content/wrap-publishes-new-figures-carrier-bag-use>

⁵² <http://www.wrap.org.uk/content/merchant-prices-recovered-plastic-film>

<http://www.wrap.org.uk/content/prices-recovered-paper>

option 1 will affect all types of carrier bag use and the assumptions made for the purposes of the analysis where no evidence exists, with the results summarised in table 8. Sections 4.2.1 to 4.2.9 assess the costs to society of this scenario of carrier bag use, including distributional effects and the overall impact of the introduction of the charge.

Table 8 – bag use in option 1 (millions of bags)

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Supermarket SUPB in England	5,876	1,469	1,498	1,528	1,559	1,590	1,622	1,654	1,687	1,721	20,206
High street SUPB in England	2,039	742	742	742	742	742	742	742	742	742	8,714
SME SUPB in England	2,764	691	691	691	691	691	691	691	691	691	8,983
TOTAL SUPB England	10,680	2,902	2,931	2,961	2,992	3,023	3,055	3,087	3,120	3,154	37,903
PE BFL supermarket England	434	773	642	642	642	642	642	642	642	642	6,340
Other BFL supermarket England	27	19	19	19	19	19	19	19	19	19	195
PE BFL High street England	172	275	234	234	234	234	234	234	234	234	2,318
Other BFL High street England	12	8	8	8	8	8	8	8	8	8	86
SME PE BFL	48	85	71	71	71	71	71	71	71	71	697
Paper bags on high street	298	320	320	320	320	320	320	320	320	320	3,177
SME paper bags	36	39	39	39	39	39	39	39	39	39	385
Bin liners sold in England	843	984	984	984	984	984	984	984	984	984	9,699

4.2.1. GHG emissions and resource use impact of option 1

Table 9 –GHG emissions in option 1

OPTION 1	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
(£m)											
Supermarket SUPB	0.41	0.11	0.11	0.12	0.14	0.15	0.37	0.61	0.85	1.10	4.0
High street SUPB	0.14	0.05	0.06	0.06	0.06	0.07	0.17	0.27	0.37	0.48	1.7
SME SUPB	0.19	0.05	0.05	0.06	0.06	0.06	0.16	0.25	0.35	0.44	1.7
PE BFL Supermarket	0.04	0.07	0.06	0.06	0.07	0.07	0.18	0.28	0.38	0.49	1.7
Other BFL Supermarket	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.1
PE BFL High Street	0.01	0.02	0.02	0.02	0.02	0.03	0.06	0.10	0.14	0.18	0.6
Other BFL High Street	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.1
SME BFL	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.05	0.2
Paper	0.10	0.12	0.12	0.13	0.14	0.15	0.37	0.58	0.80	1.02	3.5
Bin liners	0.06	0.07	0.08	0.08	0.09	0.10	0.24	0.38	0.52	0.66	2.3
TOTAL (£m)	0.98	0.51	0.51	0.55	0.59	0.64	1.59	2.54	3.51	4.48	16
Total discounted	0.98	0.49	0.48	0.50	0.52	0.54	1.29	2.00	2.67	3.29	13
TOTAL (tonnes CO2e)	0.27	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	1.46
CHANGE IN CO2e (£m)	0.15	0.67	0.72	0.79	0.86	0.94	2.34	3.77	5.25	6.77	22.26
CHANGE IN CO2e PV	0.15	0.65	0.68	0.71	0.75	0.79	1.90	2.97	3.99	4.97	17.54
CHANGE IN CO2e (t)	0.04	0.18	0.18	0.19	0.19	0.19	0.19	0.20	0.20	0.20	1.77

The GHG factors in the baseline are unchanged except for BFL, as survey data from Wales suggests that after the introduction of the charge there, consumers re-used their BFL around five times on average.⁵³ These GHG factors were applied to the bag use estimates for option 1 outlined above, and monetised as before.

⁵³ 9.5% of 4884 shoppers in Wales were observed to buy new BFL, while 44.2% re-used a BFL. This gives an approximate re-use rate of 5.

http://www.zerowastescotland.org.uk/sites/files/wrap/Carrier%20bag%20behavioural%20report_SCOTLAND_FINAL%20V5%2018%207%2013%20v3.pdf p.84-85

The introduction of the charge will cause a reduction in resources used to produce SUPB and an increase in resources used to produce BFL, bin liners and paper bags. Table 10 shows that there is an overall fall in plastic used (by 604,241 tonnes), and an increase in paper used (by 16,649 tonnes). If the production of 1 tonne of polyethylene (HDPE or LDPE) requires 2 tonnes of oil, option 1 will result in a saving of 1.2m tonnes of oil.⁵⁴ The non-renewable resources saved from the averted production of bags may be redeployed to more socially useful activities or left in the ground for future use.

Table 10 – weight of bags used in option 1

Weight (tonnes)											
OPTION 1	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
SUPB (HDPE)	80,097	21,762	21,983	22,207	22,437	22,670	22,909	23,152	23,400	23,654	284,271
PE BFL	22,835	39,596	33,054	33,054	33,054	33,054	33,054	33,054	33,054	33,054	326,860
Other BFL (mostly PP)	4,456	3,125	3,125	3,125	3,125	3,125	3,125	3,125	3,125	3,125	32,582
Bin liners (HDPE)	6,993	8,168	8,168	8,168	8,168	8,168	8,168	8,168	8,168	8,168	80,503
Paper	18,449	19,799	19,799	19,799	19,799	19,799	19,799	19,799	19,799	19,799	196,641
Reduction in plastic use compared to baseline	13,128	55,981	63,450	64,395	65,358	66,341	67,343	68,365	69,408	70,472	604,241
Increase in paper use compared to baseline	450	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	16,649

4.2.2. Consumer impact of option 1

The prices of bags are expected to remain constant under option 1. The impact on consumers of the charge is the change in hidden cost of supermarket SUPB and high street plastic and paper bags, increased expenditure on bin liners and bags for life, and the cost of the actual charge on the SUPB that are used. The EA calculated that 82.14 SUPB or 60.68 PE BFL are required to carry one month's shopping (483 items) from the supermarket to the home. After the introduction of the charge, carrying this shopping in SUPB (at 5p each) will cost £4.11, whereas using PE BFL (at an average price of 8.5p) would cost £5.16 if none were re-used, or £1.03 if each is re-used 5 times as surveys suggest. The reduction in SUPB use is equal to 948m months' worth of shopping, but the increase in BFL sales is equal to 67m months with no re-use, 335m months with five re-uses or 670m months with ten re-uses. The switch to BFL is a way for consumers to minimise the cost of the charge so the additional cost incurred from the purchase of BFL is a direct impact of the charge. While consumers could reduce costs further by taking BFL back to retailers for free replacement where this is offered, evidence suggests that virtually no shoppers do this.⁵⁵

It is assumed that all savings to retailers from stocking fewer plastic bags are passed through to consumers via lower prices, which is justified by the competitive nature of the retail sector. No evidence was found from Wales (supermarkets may set prices at the UK level) or other jurisdictions which have introduced a charge about the degree of pass through of cost savings. The retail sector in the UK is "extremely competitive" according to BIS⁵⁶ which would suggest that competitive pressures will cause retailers to pass on any cost savings to consumers through lower prices (e.g. special offers) in order to attract and retain customers, thus maximising market share and ultimately profit. This is evidenced by the approach taken by

⁵⁴ Page 29, 'European Commission Impact Assessment accompanying the Proposal for a Directive Of The European Parliament And Of The Council amending Directive 94/62/EC on packaging and packaging waste to reduce the consumption of lightweight plastic carrier bags'. Brussels, 4.11.2013. SWD(2013) 444.

⁵⁵ 0.1% of Welsh shoppers and 0% of Scottish shoppers were observed to bring BFL back to stores for free replacement. See p.85

http://www.zerowastescotland.org.uk/sites/files/wrap/Carrier%20bag%20behavioural%20report_SCOTLAND_FINAL%20V5%2018%207%2013%20v3.pdf

⁵⁶ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/252383/bis-13-1204-a-strategy-for-future-retail-industry-and-government-delivering-in-partnership.pdf

'discount' retailers Lidl and Aldi, who already charge customers for single-use bags. On its website Aldi states that charging for shopping bags leads to operational savings which result in savings to customers "by avoiding adding the cost of bags to our prices".⁵⁷ Lidl has a similar statement on its website.⁵⁸ Smaller shops are usually in direct or indirect competition with larger retailers and are therefore also likely to pass through cost savings to consumers in order to maintain competitive prices. The relaxation of this assumption for SMEs is explored in the sensitivity analysis.

A cost of the policy that it has not been possible to monetise is the 'disutility', or inconvenience, to consumers from no longer having access to 'free' SUPB. Consumers must value this at less than 5p per bag since that level of charge has been shown to reduce consumption dramatically. However the shape of the demand curve (which shows consumers' 'willingness to pay' for bags and therefore the benefit they derive from them) is unknown so it is not clear what proportion of consumers value access to 'free' SUPB at, for example, 4.9p per bag as opposed to 0.1p per bag. An economic valuation study would be required to estimate the distribution of consumer valuations and the degree to which it is skewed towards the top or bottom of the range. This has not been judged necessary because the aim of the policy is to encourage behavioural change so that consumers become accustomed to re-using bags. Evidence from Wales shows that the introduction of the charge there changed consumer behaviour towards re-use (bringing own bags to shops) while support for the charge rose after its introduction from 59% to 70%⁵⁹.

Table 11 – costs to consumers in option 1

⁵⁷ <https://www.aldi.us/en/services/bags/>

⁵⁸ http://www.lidl.co.uk/cps/rde/www_lidl_uk/hs.xsl/1901.htm

⁵⁹ <http://www.cardiff.ac.uk/archi/images/working%20papers/WSA-Working-Paper01-2012.pdf>

OPTION 1 (£m)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Hidden cost supermarket SUPB	113	28	29	30	30	31	31	32	33	33	390
Hidden cost high street SUPB	39	14	14	14	14	14	14	14	14	14	168
Hidden cost SME SUPB	53	13	13	13	13	13	13	13	13	13	173
Hidden cost of high street paper bags	81	87	87	87	87	87	87	87	87	87	861
Hidden cost of SME paper bags	10	11	11	11	11	11	11	11	11	11	104
total hidden cost	297	153	154	154	155	156	156	157	157	158	1,697
total hidden cost less VAT	247	128	128	129	129	130	130	131	131	132	1,414
VAT on hidden cost	49	26	26	26	26	26	26	26	26	26	283
Cost of PE BFL supermarket	38	67	56	56	56	56	56	56	56	56	550
Cost of other BFL supermarket	8	8	5	5	5	5	5	5	5	5	59
Cost of PE BFL high street	15	24	20	20	20	20	20	20	20	20	201
Cost of other BFL high street	3	3	2	2	2	2	2	2	2	2	26
Cost of PE BFL SME	4	7	6	6	6	6	6	6	6	6	60
Cost of bin liners	36	42	42	42	42	42	42	42	42	42	417
cost of bfl and bin liners	104	152	132	132	132	132	132	132	132	132	1,313
cost of bfl and bin liners less VAT	87	126	110	110	110	110	110	110	110	110	1,094
VAT on BFL/bin liners	17	25	22	22	22	22	22	22	22	22	219
TOTAL hidden, BFL and bin liner cost	401	305	286	287	287	288	288	289	290	290	3,010
TOTAL less VAT	334	254	238	239	239	240	240	241	241	242	2,509
VAT on total	67	51	48	48	48	48	48	48	48	48	502
TOTAL less VAT PV	334	246	222	215	209	202	195	189	183	177	2,173
Fall in hidden, BFL, bin liner cost (exc VAT)	26	108	127	129	131	133	135	137	139	142	1,206
PV	26	105	118	116	114	112	110	108	106	104	1,018
Fall in VAT (transfer)	5	22	25	26	26	27	27	27	28	28	241
PV	5	21	24	23	23	22	22	22	21	21	204
Cost to consumers of charge (transfer)	31	145	147	148	150	151	153	154	156	158	1,392
PV	31	140	137	134	130	127	124	121	118	116	1,179
NET IMPACT ON CONSUMERS	0	- 15	5	6	7	8	9	10	11	12	55
PV	0	- 15	5	6	6	7	7	8	9	9	43

4.2.3. Litter impact of option 1

While the number of plastic bags littered is likely to vary approximately in the same proportion as the number of bags used, some of the costs of cleaning litter may be fixed, or may not vary in direct proportion to the number of bags littered. For example, litter bins will still need to be emptied and litter pickers will still need to be employed to pick up other items of litter. However, it would be expected that as a new equilibrium of a lower level of litter is reached (with fewer bags used and disposed of, bins filling up more slowly etc.), this would largely translate into lower costs for authorities responsible for collecting litter. It is assumed that 80% of the change in bag use in any year results in lower costs from cleaning littered bags, i.e. a 1% fall in bag use results in a 0.8% fall in the cost of littered bags. There is no evidence to support a particular figure, so 80% is an assumption based on the reasoning that most but not all of the reduction in littered bags would result in reduced litter costs over a ten year period.

The impact on SUPB litter costs of option 1 is therefore arrived at by calculating the change in overall SUPB use resulting from the charge per year, multiplied by 80%, and applying this to the total cost of littered SUPB from the previous year. The same is done for paper.

Table 12 – Litter impact of option 1 (£m)

OPTION 1	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
SUPB	12.14	5.07	5.11	5.15	5.19	5.23	5.28	5.32	5.37	5.41	59.26
PAPER	1.57	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	1.67	16.58
TOTAL	13.71	6.73	6.77	6.82	6.86	6.90	6.94	6.99	7.04	7.08	75.84
PV	13.71	6.50	6.32	6.15	5.98	5.81	5.65	5.49	5.34	5.20	66.15
Impact on litter costs	2.37	9.51	9.64	9.76	9.89	10.02	10.16	10.29	10.43	10.57	109.24
PV	2.37	9.19	9.00	8.81	8.62	8.44	8.26	8.09	7.92	7.76	78.46

4.2.4. Waste management impact of option 1

The change in waste management costs resulting from the charge is calculated based on the changes in bag use outlined above and the same average costs of disposal as before.

Table 13 – waste management costs in option 1 (£m)

Option 1	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Supermarket SUPB	4.1	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.2	14.0
High street SUPB	1.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.1
SME SUPB	1.9	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.2
Paper bags	6.1	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	6.5	64.6
PE BFL supermarket	1.4	2.5	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	20.5
Other BFL supermarket	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
PE BFL high street	0.6	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	7.5
Other BFL high street	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.9
PE BFL SME	0.2	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.3
Bin liners	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.9
Total	16.4	13.0	12.4	12.4	12.4	12.5	12.5	12.5	12.5	12.6	129.2
Total (discounted)	16.4	12.5	11.6	11.2	10.8	10.5	10.2	9.8	9.5	9.2	111.8
IMPACT ON WASTE MGMT COSTS (saving)											
SAVING	1.1	4.6	5.3	5.4	5.5	5.6	5.7	5.8	5.9	6.0	51.0
discounted	1.1	4.5	5.0	4.9	4.8	4.7	4.6	4.6	4.5	4.4	43.0

4.2.5. Recyclate revenue impact of option 1

The change in patterns of bag usage will have an impact on the types of plastic being recycled and thus the revenue received by waste disposal authorities for their recyclate. The new revenue is calculated in the same way as in the baseline but with new figures for estimated bag use after the introduction of the charge. As can be seen in the table, the effect of the fall in recycled SUPB is offset by the increase in BFL because of the higher price received per tonne of LDPE film as compared to HDPE film. It is not clear who this extra revenue will accrue to because of the range of contractual arrangements in place between Local Authorities and their waste disposal service providers. While newer contracts have negative gate fees, i.e. local authorities receive income from Materials Recovery Facilities for the household waste sent for recycling, most local authorities pay a positive gate fee. This suggests that the change in Recyclate revenue will bring benefits to private waste service providers, it could translate into lower waste management costs for local authorities.

Table 14 – Recyclate revenue in option 1

OPTION 1	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
SUPB	0.20	0.05	0.05	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.7
PE BFL	0.4	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	5.6
Paper	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	10.0
TOTAL	1.53	1.73	1.62	1.62	1.63	1.63	1.63	1.63	1.63	1.63	16.3
PV	1.53	1.68	1.52	1.47	1.42	1.37	1.32	1.28	1.24	1.19	14.0
CHANGE IN RECYCLATE REVENUE											
INCREASE	0.07	0.27	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	1.5
PV	0.07	0.26	0.15	0.14	0.13	0.13	0.12	0.11	0.11	0.10	1.3

4.2.6. Retailer cost of option 1

Table 15 – retailer cost of option 1

£m	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Option 1											
Admin cost (per retail outlet basis)											
Large retailers	0.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	16.9
PV	0.5	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	14.3
SMEs	1.1	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	41.5
PV	1.1	4.3	4.2	4.0	3.9	3.8	3.6	3.5	3.4	3.3	35.2
Transition costs (large retailers)	12.1	-	-	-	-	-	-	-	-	-	12.1
Transition costs (SMEs)	4.0	-	-	-	-	-	-	-	-	-	4.0
Total transition cost	16.1	-	-	-	-	-	-	-	-	-	16.1
TOTAL COST	17.7	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	6.3	74.4
TOTAL PV	17.7	6.1	5.9	5.7	5.5	5.3	5.1	5.0	4.8	4.6	65.6
Revenue retained by SMEs	8.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	319.6
Revenue retained by large retailers	12.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	28.9
TOTAL	21.2	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	36.4	348.5
PV	21.2	35.1	34.0	32.8	31.7	30.6	29.6	28.6	27.6	26.7	297.9
Net impact on SMEs	3.5	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	274.1
Net impact on large retailers	-	-	-	-	-	-	-	-	-	-	-
Net impact on business	3.5	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	30.1	274.1
PV	3.5	29.1	28.1	27.1	26.2	25.3	24.5	23.6	22.8	22.1	232.2

Table 15 shows the total impact of the charge on each type of retailer and business overall. This consists of transition costs from reorganising store checkouts and systems so that consumers pay 5p for each bag they use; and ongoing costs which result from the requirement to report on bag use and how the proceeds of the charge are used. All retailers will be able to claim back their actual administrative costs from the proceeds of the charge and be encouraged to donate the rest to charity, as occurred in Wales under a similar voluntary agreement. SMEs are expected to keep a greater proportion of the proceeds of the charge than necessary to cover their costs – here it is assumed that they keep all the proceeds of the charge.

Retailers will incur costs from the time and resources needed to introduce a charging system for SUPB and collect and report information on the revenue generated, which is a negative economic impact of the charge. There will then be a compensating transfer from the proceeds of the charge, effectively from consumers to retailers.

Retailers did not provide quantitative information in response to Defra's Call for Evidence on the administrative costs of the charge in England on a per store or per bag basis. Impact

assessments for bags charges in other nations of the UK have used the figure of £80 per large retail outlet for keeping and publishing annual returns, and £90 per small-medium sized retail outlet.⁶⁰ The number of retail outlets in England was around 236,361 in 2013,⁶¹ of which 8% are estimated to be operated by large retailers and the rest by SMEs.⁶² BIS estimate that 81% of SMEs were microbusinesses at the start of 2013 and would therefore be exempt from monitoring and reporting requirements under option 1.⁶³ After uprating for 2014 prices and multiplying by the number of stores operated by each type of retailer (and required to monitor and report), an annual cost estimate on a 'per retail outlet' basis is estimated for each type of retailer.

There will also be one-off costs associated with the introduction of the charge, in terms of familiarisation costs and transition costs to change till and stocking systems. In the Call for Evidence, Defra asked retailers to provide information on these costs but there were not enough detailed responses to make general estimates for the whole sector. One leading supermarket estimated that changes to checkouts would cost £4m, but it is not clear the extent to which other supermarkets would incur comparable costs due to differences in store sizes and business model.

Familiarisation and transition costs are estimated on a per retail outlet basis. We have estimated the familiarisation cost (the time necessary to read, understand and implement the auditing and reporting requirements) at 1 hour of a retail assistant's time per retail outlet and 0.5 hours of an IT professional time to alter systems. This has been judged appropriate because introducing the charge for SUPB will be functionally similar to adding a new product line, which is common for large retailers. The median hourly pay (including overheads) of these employees was £6.86 and £16.64 respectively in 2005, or £8.50 and £20.35 in 2014 prices.⁶⁴ Multiplying by the number of stores gives a familiarisation cost of £4.06m for SMEs and £0.35m for large retailers. A 2005 Impact Assessment for Scotland remains the only source to have provided transition costs on a per store basis, hence they are used here. Transition costs for reorganising checkouts and staff training were estimated at £500 per store for large retailers,⁶⁵ which is uprated for 2015 prices and multiplied by the number of such stores (i.e. 8% of 236,361 or 18,909) giving a total of £11.7m. This is added to the familiarisation costs for large retailers. SMEs are not expected to incur costs from reorganising checkout systems.⁶⁶

This analysis does not consider any extra profit made by retailers on increased sales of BFL. In response to the Call for Evidence one supermarket noted that cost price for their BFL including production, distribution and VAT is 6p. Since sale prices range from 5-12 p it is likely that some retailers are making profit on BFL sales so will benefit from the charge since BFL sales will increase.

This section does not consider the saving to retailers from stocking fewer SUPB as a result of the charge. This benefit is assumed to be passed through to consumers due to the competitive nature of the retail sector, as discussed in section 4.2.2.

⁶⁰ Wales IA p. 40

⁶¹ There were 281,930 stores in the UK in 2013 (<http://www.retailresearch.org/retail2018.php>) which is scaled down for England's share of the UK population (83.84%)

⁶² Wales IA p.40

⁶³ Communication with BIS (based on BIS' Business Population Estimates)

⁶⁴ <http://www.berr.gov.uk/files/file44505.pdf>

⁶⁵ <http://archive.scottish.parliament.uk/business/committees/environment/papers-05/rap05-28.pdf> p.29

⁶⁶ In a response to the call for evidence, a representative of SMEs stated that "if the scheme is revised to include small retailers we do not envisage our members facing any financial burden from the scheme".

4.2.7. Government cost of option 1

There will be costs to government associated with implementing and enforcing the charge. It is proposed that Local Authorities, via Trading Standards Officers (TSOs), are responsible for enforcing the charge, as happens in Wales. The costs of enforcement in Wales were found to be £60,000 in the first 17 months after the charge was introduced.⁶⁷ This covered the cost involved in responding to complaints and requests for advice from consumers and businesses and carrying out enforcement contacts including investigations, inspections and test purchases. The monitoring and enforcement costs are relatively low because the charge for bags is accepted by the public, few complaints are received, and local authorities prioritise their activities based on risk so are not proactive in carrying out inspections. Approximately 50% of contacts were with respect to SMEs. Scaling the 17 month figure from Wales for a one year period, uprating for 2014 prices, and adjusting for the England's population size compared to Wales, gives a figure of £0.8m.

Table 16 – Government cost of option 1

Option 1	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Annual enforcement costs	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	7.8
Transition cost	0.04	0	0	0	0	0	0	0	0	0	0.04
TOTAL	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	7.8
TOTAL PV	0.8	0.8	0.7	0.7	0.7	0.7	0.6	0.6	0.6	0.6	6.7

4.2.8. Revenue raised in option 1

Table 17 – revenue raised by the charge

£m	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
BASELINE	0	0	0	0	0	0	0	0	0	0	0
£m											
Option 1	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Gross revenue from charge	30.8	145.1	146.6	148.0	149.6	151.1	152.7	154.3	156.0	157.7	1,391.92
VAT	5.1	24.2	24.4	24.7	24.9	25.2	25.5	25.7	26.0	26.3	231.99
Large retailer costs	12.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	28.94
Retained by SMEs	8.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	319.59
Net revenue from charge	4.47	84.53	85.75	87.00	88.27	89.57	90.90	92.25	93.63	95.04	811.41
Net revenue from charge (PV)	4.47	81.67	80.05	78.47	76.93	75.42	73.95	72.51	71.10	69.73	684.29

Table 17 shows the revenue raised by the charge, which is not a direct economic impact of the policy (i.e. it is not included in the total net present value figure) because it is effectively a transfer from consumers to retailers, the exchequer and charities, the latter being the intended recipients of the net revenue from the charge. The gross revenue from the charge is already counted as a cost to consumers in the preceding analysis.

The gross revenue from the charge is simply the anticipated number of SUPB still used after the charge is introduced, multiplied by 5p. VAT is paid at the standard rate of 20% on the charge, i.e. 16.67% of the gross revenue figure goes to the exchequer as VAT. The cost to large retailers (calculated above) is also deducted from the gross revenue figure. SMEs are assumed to retain all of the proceeds of the charge, resulting in a net benefit to those businesses since

⁶⁷ Information provided by TSOs and Local Authorities in Wales

the proceeds of the charge are likely to be greater than implementation costs. It is anticipated that large retailers will enter a voluntary agreement to donate the net revenue from the charge to charities as happened in Wales. All retailers (apart from microbusinesses) will be required to report publicly (e.g. via a website or shop window) on what happens to the gross revenue from the charge.

The charge will also affect the exchequer by changing the numbers of each type of bag used and thus the total VAT paid. Table 18 below shows that there is a fall in revenue overall from VAT on bags. This is based on the private cost of bags as outlined above multiplied by the number of bags in each scenario.

Table 18 – impact of option 1 on the exchequer

VAT from bags (£m)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
OPTION 0											
SUPB	43.2	43.7	44.2	44.7	45.2	45.7	46.2	46.8	47.3	47.9	454.8
PE BFL	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	71.4
Other BFL	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	12.5
Bin liners	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	57.0
Paper	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	147.2
TOTAL	72.0	72.5	73.0	73.5	74.0	74.5	75.0	75.6	76.1	76.7	742.9
PV	72.0	70.0	68.1	66.3	64.5	62.7	61.1	59.4	57.8	56.3	638.2
OPTION 1											
SUPB	34.4	9.3	9.4	9.5	9.6	9.7	9.8	9.9	10.0	10.2	122.0
PE BFL	9.5	16.4	13.7	13.7	13.7	13.7	13.7	13.7	13.7	13.7	135.3
Other BFL	1.8	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	13.5
Bin liners	6.0	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	69.5
Paper	15.1	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	16.2	160.9
TOTAL	66.8	50.3	47.7	47.8	47.9	48.0	48.1	48.2	48.3	48.4	501.2
PV	66.8	48.6	44.5	43.1	41.7	40.4	39.1	37.9	36.7	35.5	434.1
VAT from charge in option 1	5.1	24.2	24.4	24.7	24.9	25.2	25.5	25.7	26.0	26.3	232.0
PV	5.1	23.4	22.8	22.3	21.7	21.2	20.7	20.2	19.7	19.3	196.4
Change in VAT from bags sold	- 5.20	- 22.21	- 25.32	- 25.72	- 26.14	- 26.56	- 26.99	- 27.43	- 27.87	- 28.33	- 241.8
PV	- 5.20	- 21.46	- 23.63	- 23.20	- 22.78	- 22.36	- 21.95	- 21.56	- 21.17	- 20.79	- 204.1
NET IMPACT ON EXCHEQUER	- 0.08	1.97	- 0.89	- 1.05	- 1.21	- 1.37	- 1.53	- 1.70	- 1.87	- 2.05	- 9.8
PV	- 0.08	1.90	- 0.83	- 0.94	- 1.05	- 1.15	- 1.25	- 1.34	- 1.42	- 1.50	- 7.7

4.2.9. Net present value of option 1

The net present value of the policy is £1,086m, indicating that the benefits to society of option 1 outweigh the costs.

Table 19 – Summary of impacts, option 1 (over 10 years; in PV terms with 2015 base year; 2014 prices; £m)

Group/type of impact	Option 1 – all retailers included		
	Economic impacts (benefit of option 1 over baseline)	Transfer payments (sum to zero)	Net impact on group (where differs from economic impact)
CO ₂ e	18		
Consumer			43
change in hidden cost	1,352		
change in cost of BFL	-281		
change in cost of bin liners	-53		
new cost of charge		-1,179	
change in VAT on 'hidden' bags		270	
change in VAT on BFL & bin liners		-67	
Litter	78		
Waste management	43		
Recyclate revenue	1		
Retailers	-66	298	232
Government (implementation/enforcement authorities)	-7		
Government (Exchequer)			-8
new VAT on charge		196	
change in VAT on 'hidden' bags		-270	
change in VAT on BFL & bin liners		67	
Charities		685	
Gross costs	1923		
Gross benefits	3,008		
Net Present Value	1,086		

N.B. Savings to retailers from stocking fewer bags are assumed to be passed through to consumers. The economic impact on retailers is therefore equal to implementation and reporting costs. The table shows a net benefit to business as it is assumed that SMEs retain all of the charge. Transfer payments are distributional impacts, with the cost of the charge to consumers (£1179m) being equal to the sum of the transfer to retailers, charities and VAT on the charge in each option. Totals for gross costs and benefits in this table correspond to the best estimates of present value total costs and benefits from the summary sheets. Where the breakdown does not sum to the totals, this is due to rounding.

The analysis of option 1 ignores any benefits to the UK paper bag industry which would increase output and employment in the event of an increased use of paper bags by retailers, since the greater volume and weight of paper bags means they are less likely to be imported than SUPB.

4.3. Option 2 costs and benefits

Option 2 is the introduction of a mandatory minimum 5p charge for bags paid by consumers in large retailers only, with SMEs able to choose whether to give away bags free at point of sale or to charge. This section outlines the likely impacts of the policy in this form.

A non-monetised benefit of option 2 is that it would increase the likelihood of the UK avoiding infringement proceedings under EU law. With SMEs excluded from the charge in England, however, the UK may fail to meet EU targets on reductions in carrier bag use if they are towards the higher end of the range currently under negotiation.

The annex outlines the evidence base on how option 2 will affect all types of carrier bag use, summarised in table 20. Sections 4.3.1 to 4.3.9 assess the costs to society of this option, distributional effects and the overall impact on society.

Table 20 – bag use in option 2 (millions of bags)

TABLE 20 - Option 2 bag use (m)											
Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Supermarket SUPB in England	5,876	1,469	1,498	1,528	1,559	1,590	1,622	1,654	1,687	1,721	20,206
High street SUPB in England	2,039	742	742	742	742	742	742	742	742	742	8,714
SME SUPB in England	3,455	3,455	3,455	3,455	3,455	3,455	3,455	3,455	3,455	3,455	34,550
TOTAL SUPB England	11,371	5,666	5,695	5,725	5,756	5,787	5,819	5,851	5,884	5,918	63,470
PE BFL supermarket England	434	773	642	642	642	642	642	642	642	642	6,340
Other BFL supermarket England	27	19	19	19	19	19	19	19	19	19	195
PE BFL High street England	172	275	234	234	234	234	234	234	234	234	2,318
Other BFL High street England	12	8	8	8	8	8	8	8	8	8	86
SME PE BFL	35	35	35	35	35	35	35	35	35	35	353
Paper bags on high street	298	320	320	320	320	320	320	320	320	320	3,177
SME paper bags	35	35	35	35	35	35	35	35	35	35	353
Bin liners sold in England	830	933	933	933	933	933	933	933	933	933	9,228

4.3.1. GHG emissions and resource use impact of option 2

The GHG and resource use impacts of option 2 are calculated in the same way as in option 0, except with the bag numbers as set out in table 20.

Table 21 – GHG emissions in option 2

OPTION 2	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
(£m)											
Supermarket SUPB	0.41	0.11	0.11	0.12	0.14	0.15	0.37	0.61	0.85	1.10	4.0
High street SUPB	0.14	0.05	0.06	0.06	0.06	0.07	0.17	0.27	0.37	0.48	1.7
SME SUPB	0.24	0.25	0.26	0.28	0.30	0.32	0.80	1.27	1.74	2.22	7.7
PE BFL Supermarket	0.04	0.07	0.06	0.06	0.07	0.07	0.18	0.28	0.38	0.49	1.7
Other BFL Supermarket	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.03	0.04	0.1
PE BFL High Street	0.01	0.02	0.02	0.02	0.02	0.03	0.06	0.10	0.14	0.18	0.6
Other BFL High Street	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.1
SME BFL	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.02	0.03	0.1
Paper	0.10	0.11	0.12	0.13	0.14	0.15	0.36	0.58	0.79	1.01	3.5
Bin liners	0.06	0.07	0.07	0.08	0.08	0.09	0.23	0.36	0.49	0.63	2.2
TOTAL (£m)	1.03	0.70	0.71	0.77	0.82	0.89	2.20	3.52	4.85	6.19	22
Total discounted	1.03	0.68	0.66	0.69	0.72	0.75	1.79	2.77	3.68	4.54	17
TOTAL (tonnes CO2e)	0.28	0.19	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.19	2
CHANGE IN CO2e (£m)	0.10	0.48	0.52	0.57	0.63	0.69	1.72	2.80	3.91	5.07	16.50
CHANGE IN CO2e PV	0.10	0.46	0.49	0.52	0.55	0.58	1.40	2.20	2.97	3.72	12.99
CHANGE IN CO2e (tonnes)	0.03	0.13	0.13	0.14	0.14	0.14	0.14	0.15	0.15	0.15	1.29

Table 22 – weight of bags used in option 2

Weight (tonnes)											
OPTION 2	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
SUPB (HDPE)	85,279	42,492	42,713	42,937	43,167	43,400	43,639	43,882	44,130	44,384	476,024
PE BFL	22,401	37,860	31,822	31,822	31,822	31,822	31,822	31,822	31,822	31,822	314,834
Other BFL (mostly PP)	4,456	3,125	3,125	3,125	3,125	3,125	3,125	3,125	3,125	3,125	32,582
Bin liners (HDPE)	6,888	7,745	7,745	7,745	7,745	7,745	7,745	7,745	7,745	7,745	76,592
Paper	18,401	19,605	19,605	19,605	19,605	19,605	19,605	19,605	19,605	19,605	194,841
Reduction in plastic use compared to baseline	8,486	37,411	44,375	45,319	46,283	47,265	48,268	49,290	50,333	51,396	428,425
Increase in paper use compared to baseline	401	1,605	1,605	1,605	1,605	1,605	1,605	1,605	1,605	1,605	14,849

4.3.2. Consumer impact of option 2

The consumer impact of option 2 is calculated in the same way as in option 0, except with bag numbers as set out in table 20. The cost to consumers of the charge is calculated based on the number of bags given out by large retailers after the introduction of the charge.

Table 23 – costs to consumers in option 2

OPTION 2 (£m)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Hidden cost supermarket SUPB	113	28	29	30	30	31	31	32	33	33	390
Hidden cost high street SUPB	39	14	14	14	14	14	14	14	14	14	168
Hidden cost SME SUPB	67	67	67	67	67	67	67	67	67	67	667
Hidden cost of high street paper bags	81	87	87	87	87	87	87	87	87	87	861
Hidden cost of SME paper bags	10	10	10	10	10	10	10	10	10	10	96
total hidden cost	310	206	206	207	207	208	209	209	210	210	2,182
total hidden cost less VAT	258	171	172	172	173	173	174	174	175	175	1,818
VAT on hidden cost	52	34	34	34	35	35	35	35	35	35	364
Cost of PE BFL supermarket	38	67	56	56	56	56	56	56	56	56	550
Cost of other BFL supermarket	8	8	5	5	5	5	5	5	5	5	59
Cost of PE BFL high street	15	24	20	20	20	20	20	20	20	20	201
Cost of other BFL high street	3	3	2	2	2	2	2	2	2	2	26
Cost of PE BFL SME	3	3	3	3	3	3	3	3	3	3	31
Cost of bin liners	36	40	40	40	40	40	40	40	40	40	397
cost of bfl and bin liners	102	145	127	127	127	127	127	127	127	127	1,263
cost of bfl and bin liners less VAT	85	121	106	106	106	106	106	106	106	106	1,053
VAT on BFL/bin liners	17	24	21	21	21	21	21	21	21	21	211
TOTAL hidden, BFL and bin liner cost	412	351	333	334	334	335	336	336	337	337	3,445
TOTAL less VAT	344	292	278	278	279	279	280	280	281	281	2,871
VAT on total	69	58	56	56	56	56	56	56	56	56	574
TOTAL less VAT PV	344	283	259	251	243	235	227	220	213	206	2,481
Fall in hidden, BFL, bin liner cost (exc VAT)	16	70	87	89	91	93	96	98	100	102	844
PV	16	68	81	81	80	79	78	77	76	75	710
Fall in VAT (transfer)	3	14	17	18	18	19	19	20	20	20	169
PV	3.29	13.53	16.29	16.11	15.92	15.74	15.56	15.38	15.20	15.02	142
Cost to consumers of charge (transfer)	22	111	112	113	115	117	118	120	121	123	1,072
PV	22	107	105	102	100	98	96	94	92	90	907
NET IMPACT ON CONSUMERS	-2	-26	-7	-6	-5	-4	-3	-2	-1	0	- 60
PV	-2	-26	-7	-6	-5	-4	-3	-2	-1	0	- 55

4.3.3. Litter impact of option 2

The litter impact of option 2 is calculated in the same way as for option 1.

Table 24 – Litter impact of option 2 (£m)

OPTION 2	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
SUPB	12.74	7.62	7.66	7.69	7.72	7.75	7.79	7.82	7.86	7.89	82.54
PAPER	1.57	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	16.46
TOTAL	14.31	9.28	9.31	9.34	9.37	9.41	9.44	9.48	9.51	9.55	98.99
TOTAL discounted	14.31	8.96	8.69	8.43	8.17	7.92	7.68	7.45	7.22	7.01	85.83
Impact on litter costs	1.78	6.97	7.10	7.24	7.38	7.52	7.66	7.81	7.96	8.11	85.96
PV	1.78	6.73	6.63	6.53	6.43	6.33	6.23	6.14	6.04	5.95	58.78

4.3.4. Waste Management impact of option 2

The waste management impact of option 2 is calculated in the same way as for option 1.

Table 25 – waste management costs in option 2 (£m)

Option 2	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Supermarket SUPB	4.1	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.2	14.0
High street SUPB	1.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	6.1
SME SUPB	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	24.0
Paper bags	6.0	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	64.0
PE BFL supermarket	1.4	2.5	2.1	2.1	2.1	2.1	2.1	2.1	2.1	2.1	20.5
Other BFL supermarket	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	2.1
PE BFL high street	0.6	0.9	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	7.5
Other BFL high street	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.9
PE BFL SME	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	1.1
Bin liners	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.7
Total	16.9	14.7	14.1	14.1	14.2	14.2	14.2	14.2	14.2	14.3	145.0
Total (discounted)	16.9	14.2	13.2	12.7	12.3	11.9	11.6	11.2	10.8	10.5	125.2
IMPACT ON WASTE MGMT COSTS (saving)											
SAVING	0.7	3.0	3.6	3.7	3.8	3.9	4.0	4.1	4.2	4.3	35.2
PV	0.7	2.9	3.4	3.3	3.3	3.3	3.2	3.2	3.2	3.1	29.6

4.3.5. Recyclate revenue impact of option 2

The recyclate revenue impact of option 2 is calculated in the same way as for option 1.

Table 26 – Recyclate revenue in option 2

OPTION 2	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
SUPB	0.21	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	1.19
PE BFL	0.4	0.6	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.35
Paper	0.9	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9.91
TOTAL	1.53	1.75	1.65	1.65	1.65	1.65	1.65	1.65	1.65	1.65	16.46
PV	1.53	1.69	1.54	1.48	1.43	1.39	1.34	1.30	1.25	1.21	14.16
CHANGE IN RECYCLATE REVENUE											
INCREASE	0.07	0.28	0.18	0.18	0.17	0.17	0.17	0.17	0.16	0.16	1.72
PV	0.07	0.27	0.17	0.16	0.15	0.14	0.14	0.13	0.12	0.12	1.48

4.3.6. Retailer cost of option 2

There are no costs to SMEs in option 2, while large retailers experience the same costs as in option 1.

Table 27 – retailer cost of option 2

£m												
Option 2	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL	
Admin cost (per retail outlet basis)												
Large retailers	0.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	16.9	
PV	0.5	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	14.3	
SMEs	-	-	-	-	-	-	-	-	-	-	-	
Transition costs (large retailers)	12.1	-	-	-	-	-	-	-	-	-	12.1	
Transition costs (SMEs)	-	-	-	-	-	-	-	-	-	-	-	
Total transition cost	12.1	-	-	-	-	-	-	-	-	-	12.1	
TOTAL COST	12.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	28.9	
TOTAL PV	12.5	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	26.4	
Revenue retained by large retailers	12.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	28.9	
PV	12.5	1.8	1.7	1.6	1.6	1.5	1.5	1.4	1.4	1.3	26.4	
Net impact on large retailers	0	0	0	0	0	0	0	0	0	0	0	
Net impact on business	0	0	0	0	0	0	0	0	0	0	0	

4.3.7. Government cost of option 2

Although approximately half of enforcement activity in Wales related to SMEs and the other half to large retailers, it is unlikely that ongoing costs will be half those in option 1, as TSOs will probably receive queries about why SMEs are not charging for bags. An ongoing cost to enforcement authorities of £0.5m per year has been assumed (compared to £0.8m in option 1).

Transition costs to government, primarily the provision of training to TSOs, are expected to be the same in option 2 as in option 1.

Table 28 – Government cost of option 2

Option 2	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
Annual enforcement costs	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0
Transition cost	0.04	0	0	0	0	0	0	0	0	0	0.04
TOTAL	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0
TOTAL PV	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	4.3

4.3.8. Revenue raised in option 2

Table 29 – revenue raised in option 2

£m												
	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL	
BASELINE	0	0	0	0	0	0	0	0	0	0	0	
£m												
Option 2	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL	
Gross revenue from charge	22.1	110.5	112.0	113.5	115.0	116.6	118.2	119.8	121.5	123.1	1,072.34	
VAT	3.7	18.4	18.7	18.9	19.2	19.4	19.7	20.0	20.2	20.5	178.72	
Large retailer costs	12.5	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	28.94	
Net revenue from charge	5.91	90.29	91.51	92.76	94.03	95.33	96.66	98.01	99.39	100.79	864.68	
Net revenue from charge (PV)	5.91	87.23	85.43	83.66	81.94	80.27	78.63	77.03	75.48	73.96	729.54	

Table 30 – impact of option 2 on the exchequer

VAT from bags (£m)	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	TOTAL
OPTION 0											
SUPB	43.2	43.7	44.2	44.7	45.2	45.7	46.2	46.8	47.3	47.9	454.8
PE BFL	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	7.1	71.4
Other BFL	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	12.5
Bin liners	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	5.7	57.0
Paper	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	14.7	147.2
TOTAL	72.0	72.5	73.0	73.5	74.0	74.5	75.0	75.6	76.1	76.7	742.9
PV	72.0	70.0	68.1	66.3	64.5	62.7	61.1	59.4	57.8	56.3	638.2
OPTION 2											
SUPB	36.6	18.2	18.3	18.4	18.5	18.6	18.7	18.8	18.9	19.0	204.3
PE BFL	9.3	15.7	13.2	13.2	13.2	13.2	13.2	13.2	13.2	13.2	130.3
Other BFL	1.8	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	13.5
Bin liners	5.9	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	6.7	66.2
Paper	15.1	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	16.0	159.4
TOTAL	68.7	57.9	55.5	55.6	55.7	55.8	55.9	56.0	56.1	56.2	573.6
PV	68.7	56.0	51.8	50.2	48.6	47.0	45.5	44.0	42.6	41.3	495.7
VAT from charge in option 2	3.7	18.4	18.7	18.9	19.2	19.4	19.7	20.0	20.2	20.5	178.7
PV	3.7	17.8	17.4	17.1	16.7	16.4	16.0	15.7	15.4	15.1	151.2
Change in VAT from bags sold	-3.3	-14.6	-17.5	-17.9	-18.3	-18.7	-19.1	-19.6	-20.0	-20.5	-169.3
PV	-3.3	-14.1	-16.3	-16.1	-15.9	-15.7	-15.6	-15.4	-15.2	-15.0	-142.6
NET IMPACT ON EXCHEQUER	0.4	3.9	1.2	1.1	0.9	0.7	0.6	0.4	0.2	0.1	9.4
PV	0.4	3.7	1.1	1.0	0.8	0.6	0.5	0.3	0.2	0.0	8.6

4.3.9. Net present value of option 2

The net present value of the policy is £782m, indicating that the benefits to society of option 2 outweigh the costs.

Table 31 – Summary of impacts, option 2 (over 10 years; in PV terms with 2015 base year; 2014 prices; £m)

Group/type of impact	Option 2 – SMEs excluded		
	Economic impacts (benefit of option 2 over baseline)	Transfer payments (sum to zero)	Net impact on group (where differs from economic impact)
CO ₂ e	13		
Consumer			-55
change in hidden cost	1,009		
change in cost of BFL	-260		
change in cost of bin liners	-39		
new cost of charge		-907	
change in VAT on 'hidden' bags		202	
change in VAT on BFL & bin liners		-60	
Litter	59		
Waste management	30		
Recyclate revenue	1		
Retailers	-26	26	0
Government (implementation/enforcement authorities)	-4		
Government (Exchequer)			10
new VAT on charge		151	
change in VAT on 'hidden' bags		-202	
change in VAT on BFL & bin liners		60	
Charities		730	
Gross costs		1,498	
Gross benefits		2,281	
Net Present Value		782	

N.B. Savings to retailers from stocking fewer bags are assumed to be passed through to consumers. The economic impact on retailers is therefore equal to implementation and reporting costs. The table shows a zero net cost to business as retailers receive a transfer equal to their implementation and reporting costs by retaining the appropriate share of proceeds from the charge. Transfer payments are distributional impacts, with the cost of the charge to consumers (£907m) being equal to the sum of the transfer to retailers, charities and VAT on the charge in each option. Totals for gross costs and benefits in this table correspond to the best estimates of present value total costs and benefits from the summary sheets. Where the breakdown does not sum to the total, this is due to rounding.

4.4. Summary and discussion of options

Both options represent a net benefit to society compared to the do nothing scenario. The monetised benefits of option 1 are greater than those of option 2 because by including all retailers in the charge, SUPB use falls by a greater extent. This results in greater falls in costs to the environment, waste management costs and litter costs. Since there is not such a large fall in hidden cost if SMEs are excluded from the charge, there is a net cost to consumers under option 2. Gross costs to business are smaller under option 2 than under option 1 as SMEs do not face implementation or ongoing costs. For this reason option 2 is the preferred option as the Government is committed to avoiding the imposition of burdens on small businesses wherever possible.

5. Risks, assumptions and sensitivities

The following table lists the key assumptions in the analysis. These have been selected from the many other assumptions used based on their potential to alter the NPV of the policy and the degree of confidence in them. The assumptions listed are those where there is less evidence available and some judgement has been necessary to arrive at an estimate, and those which have a greater impact on the NPV. The final NPV is highly sensitive to changes in these key assumptions.

Assumption	Central estimate	Rationale (see text for full explanation)	Low estimate (effect on NPV in option 1; effect on NPV in option 2; main affected group)	High estimate (effect on NPV in option 1; effect on NPV in option 2; main affected group)
% increase in supermarket SUPB use (without charge and after its introduction)	2%	Based on trends in supermarket SUPB use and supermarket sales growth	0% (-£141m; -£142m; consumers)	4% (+£165m; +£165m : consumers)
Number of bags on high street in UK	3,499m (85% SUPB, 10% paper, 5% BFL)	Based on WRAP data from 2008 and Retail Week data	3000m (-£28m; -£16m; consumers)	4000m (+£28m; +£16m consumers)
Number of bags given out by SMEs in England	3,526m	Based on SME share of total turnover in retail sector (27%), assumes same bag intensity (bag per £ turnover)	3000m (-£50m; +£1m; consumers)	4000m (+£46m; -£1m consumers)
Recycled content of SUPB	0%	Assumption made by EA in life-cycle analysis		50% (-£10m; -£8m; GHG impact) ⁶⁸
Retailer pass through to consumers of cost of SUPB	100% for all retailers	Based on competitive nature of retail sector	75% for SMEs (-£86m; no change; consumers)	
Cost of SUPB to retailers	1.9p for all retailers	AEA 2005 report and IAs for Scotland and Wales	1.5p for large retailers, 1.9p for SMEs (-£237m; -£237m; consumers)	1.9p for large retailers, 2.3 for SMEs (+£67m; no change; consumers)
% of LA street cleaning costs associated with litter	70%	Based on list of activities covered in 'street cleaning' and an estimate of share of litter	50% (-£20m; -£15m; litter)	90% (+£20m; +£15m; litter)

⁶⁸ Assuming that SUPB made from 50% recycled materials produce half the GHG emissions, i.e. the GHG emissions per SUPB is half the figure in the main analysis.

Level at which PE BFL use settles after charge introduced	100% higher than pre-charge level for supermarkets (and SMEs in option 1), 70% for high street	Based on initial observed increase in Welsh supermarkets and judgement that this will fall after an initial spike	60% higher for supermarkets (and SMEs in option 1), 40% for high street (+£92m; +£85m; consumers)	141% higher for supermarkets (and SMEs in option 1), i.e. flat after initial spike. 100% for high street (-£94m; -£86m; consumers)
Increase in paper bag use (high street; and SMEs in option 1)	10% (for high street and SMEs in option 1; just high street in option 2)	Based on anecdotal evidence from Ireland that there was some switch to paper; and judgement that only a small switch is likely due to the extra cost of paper bags	0% (+£63m; +£56m; consumers)	20% for high street and SMEs in option 1; just high street in option 2 (-£63m; -£56m; consumers)
Retailer costs	£66m in option 1; £26m in option 2 (PV) over 10 years	Based on average of per bag and per retail outlet estimates of monitoring/reporting costs; and estimate of transition costs	£50m in option 1; £20m in option 2 (i.e. 25% lower) (+16m; +£7m; charities) N.B. still no net cost to business	£85m in option 1; £33m in option 2 (i.e. 25% higher) (-£16m; -£7m; charities) N.B. still no net cost to business
Fall in SME SUPB use	80% in option 1; 0% in option 2	No evidence – assumed to be same as in supermarkets in option 1	70% in option 1; 0% in option 2 (-£49m; no change; consumers)	90% in option 1; 0% in option 2 (+£49m; no change; consumers)
Fall in supermarket SUPB use	80%	Reliable data from UK supermarkets in Wales (via WRAP)	75% (-£56m; -£56m; consumers)	85% (+£56m; +£56m; consumers)
Fall in high street SUPB use	70%	Welsh government data for some kinds of high street store	60% (-£35m; -£35m; consumers)	80% (+£35; +£35m; consumers)
Donation to charity by retailers	100% of net proceeds of charge	Based on supermarket behaviour in Wales	75% of net proceeds of charge (£0m; £0m; charities/retailers)	

The most uncertain assumptions are the extent to which retailers offer paper bags instead of plastic bags; and the number of bags given out by SMEs, since it is likely that smaller shops give out a different quantity of bags than larger stores per unit of turnover, but it is not obvious which direction this would go. The high and low estimates for these two assumptions are used to construct a range around the central scenario for option 1 which is presented in the summary sheets. The low NPV scenario consists of a 20% increase in paper bags and 3000m bags used by SMEs, the high NPV scenario consists of a 0% increase in paper bag use and 4000m bags

used by SMEs. For option 2, with SMEs excluded, just the switch to paper bags on the high street is used for the high and low scenarios.

The final sensitivity covered in the table (the extent to which retailers donate the proceeds of the charge to charities) has no effect on the NPV as it has purely distributional impacts – if retailers donate less than 100% of the net proceeds of the charge to charities, retailers benefit at the expense of charities.

It is likely that SMEs will retain a greater proportion of the charge than necessary to cover their implementation and administrative costs, and in the analysis it is assumed that they keep all of the proceeds of the charge. If they were to donate some of the charge to charity, revenue to charity from the charge would increase.

The main analysis assumes that retailers pass through 100% of their resource saving to consumers through lower prices, which is based on the competitive nature of the retail sector (see section 4.2.2). If this were not the case and retailers did not pass through the saving to consumers, the sensitivity analysis shows that benefits to consumers would be reduced. Corresponding to this would be an increase in profit margins for retailers.

6. Impact on business

6.1 OITO classification

The charge is designed such that there would be no net cost to business in either option 1 or option 2. All retailers are able to retain a proportion of the proceeds of the charge in order to cover their administrative, monitoring and reporting costs. Retailers are encouraged to donate the remainder of the revenue to charity, and there is likely to be a voluntary agreement among large retailers to this effect as exists in Wales where all supermarkets have shown a willingness to donate all net proceeds to charity.

As the introduction of the mandatory charge for bags is a regulatory requirement on business, the policy is in scope of the 'One-in, Two-out' (OITO) rule and qualifies as a 'Zero Net Cost' measure because it is regulatory and the direct incremental benefit to business is equal to or exceeds the direct incremental cost to business. Both options show a significant net benefit to business in EANCB terms when the guidance of the Better Regulation Framework Manual is followed. This is because while the saving to retailers from stocking fewer bags after the introduction of a mandatory charge is a direct impact on business, the expected pass through to consumers is considered an indirect impact.⁶⁹ Similarly the revenue from the charge collected by retailers is considered a direct benefit to business, while the expected donation to charity is an indirect impact according to the methodology. In the economic analysis of each option it is assumed that all savings from stocking fewer bags benefit consumers and the net proceeds of the charge from large retailers benefit charities. There is an additional benefit to business in option 1 because SMEs are assumed to keep all of the charge.

For option 1, the EANCB figure given in the summary sheet is based on transitional and monitoring costs to retailers (£66m) set against benefits from the revenue received from the charge (£983m, which includes the revenue retained by retailers (£298m) and the amount donated to charity (£685m) in the summary table) and reduced cost of stocking bags (£1,352m; listed as a benefit to consumers in the summary table). This gives a net cost to business of -

⁶⁹ A direct impact on business is "an impact that can be identified as resulting directly from the implementation of the measure" (paragraph 1.9.32 in BR manual), while 'Other forms of pass-through should also be excluded for the calculation of the EANCB (e.g. expected price increases)' (para 1.9.44 in BR manual).

https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/211981/bis-13-1038-better-regulation-framework-manual-guidance-for-officials.pdf

£2,268m (i.e. a benefit), which is divided by the annuity rate for a 10 year period (8.6), deflated into 2009 prices and discounted to 2010 to give an EANCB in 2009 prices and 2010 base year of -£201m.⁷⁰

For option 2, the EANCB figure given in the summary sheet is based on costs to retailers (£26m) set against benefits from the revenue received from the charge (£756m, which includes the revenue retained by retailers (£26m) and the amount donated to charity (£730m) in the summary table) and reduced cost of stocking bags (£1,009m; listed as a benefit to consumers in the summary table). This gives a net cost to business of -£1,738m (again, a benefit), which is divided by the annuity rate for a 10 year period (8.6), deflated into 2009 prices and discounted to 2010 to give an EANCB in 2009 prices and 2010 base year of -£154 m.⁷¹

6.2 Costs and benefits to business

Costs to retailers were estimated in the preceding analysis for each option. Retailers will incur costs from the time and resources needed to introduce a charging system for SUPB and collect and report information on the revenue generated. The ongoing costs to business were estimated in section 4.3.6 above, at around £1-2m per year for option 2. One off transition costs to change till and stocking systems were estimated to be around £12m. There will be a compensating transfer from the proceeds of the charge, effectively from consumers to retailers, to offset these costs after they have been incurred.

This analysis does not consider any extra profit made by retailers on increased sales of BFL. In response to the Call for Evidence one supermarket noted that cost price for their BFL including production, distribution and VAT is 6p. Since sale prices range from 5-12 p it is likely that some retailers are making profit on BFL sales so will benefit from the charge since BFL sales will increase.

It is assumed that retailers do not lose out in any other way from distributing fewer plastic bags, for example by losing a means of advertising. This is reasonable given the way that 'free' SUPB became standard in the retail sector, after their initial introduction by 'first movers' was imitated by competitors. It is considered that by denying any retailer the competitive advantage of offering free bags, no individual retailer is losing out. Offering 'free' SUPB can be seen as a zero sum game from which neither individual retailers nor the sector as a whole benefits after they have initially been introduced and are seen as normal. There is also the consideration that through the increased sales of branded BFL, retailers will gain another means of advertising comparable to that previously provided by SUPB.

7. Employment impacts

In most cases carrier bags are imported from Asia: conventional SUPB and BFL are produced in China, Indonesia, Malaysia or Turkey.⁷² The production of polymers for these bags normally occurs in the same region. Another source reported that 90% of plastic carrier bags used in the UK are imported from East Asia.⁷³

⁷⁰ For further details see BIS IA calculator

<https://www.gov.uk/government/publications/impact-assessment-calculator--3>

⁷¹ For further details see BIS IA calculator

<https://www.gov.uk/government/publications/impact-assessment-calculator--3>

⁷² EA Lifecycle analysis 2011

⁷³ AEA 2005 IA for Scotland

Since most SUPB are imported from overseas, the reduction in SUPB use will have a limited impact on UK industry and the level of employment. The charge will create opportunities for BFL, bin liner and paper bag manufacturers. Unlike plastic bags, most paper bags used in the UK are made in the UK.⁷⁴ Most of the bin liners produced in the UK are manufactured in England⁷⁵ but no evidence was found in the Call for Evidence or elsewhere about where the majority of pedal and swing bin liners used in the UK are produced. It seems likely that these thinner gauge bin liners (as opposed to heavier refuse sacks made from recycled plastic in the UK) would largely be produced overseas and imported into the UK, as with plastic carrier bags.

The 2005 IA for Scotland estimated that there were 15–20 plastic manufacturers, importers and distributors in Scotland, most of which were SMEs. Information at the UK level was not available and no quantitative information was received in answer to the question in the Call for Evidence on where bags are produced. A representative of the packaging industry stated that production takes place “mainly overseas” but that “a number of UK manufacturers still exist”. It would not be proportionate to carry out a full assessment of the employment impacts of the policy as Green Book guidance is that appraisals should focus primarily on the impact on the UK economy.

8. Small and Micro Business Assessment

When the Government announced in September 2013 its intention to introduce a charge for SUPB, it stated that small retailers would be exempt from the charge. In response to the Call for Evidence several representatives of small retailers, namely the Association of Convenience Stores and the National Federation of Retail Newsagents, argued against the exemption on the grounds that it would deprive small businesses of the financial savings gained from having to purchase and stock fewer plastic bags and being able to recover the costs of those that were used. Additionally the British Retail Consortium argued against the SME exemption as it would not result in a level playing field since many SMEs (especially franchises) are in direct competition with larger retailers on high streets. In addition a franchise retailer described three of their stores all operating under three different models which might be treated differently under the proposals.

Larger retailers also argued against the SME exemption on the grounds that it would result in major differences in design between the charge in different parts of the UK (Wales and Northern Ireland have included all retailers in their charges). The EAC also called on the Government to include SMEs in the charge.

On the other hand, responses from some small organisations and the Charity Retail Association welcomed the exemption on the basis that setting up charging schemes would put a disproportionate administrative burden on small organisations. In separate discussions, the Federation of Small Businesses has supported the exemption on the same grounds.

There is an EU proposal on measures to reduce plastic bag distribution. It is possible that targets could be set under these proposals. If the EU sets very ambitious targets for reductions in SUPB use (for example an 80% reduction on 2010 levels), the exemption of SMEs in England could make it difficult for the UK as a whole to achieve the target.

After listening to these various arguments the Government has opted to exclude SMEs from the charge, hence option 2 is the preferred option. This reflects the Government’s commitment to avoid imposing regulatory burdens on small businesses where possible.

⁷⁴ Unpublished WRAP note on industry structure of plastic bags.

⁷⁵ AEA 2005 IA for Scotland.

9. Summary and implementation plan

Option 2 is the preferred option because it is likely to bring a net benefit to society based on the costs and benefits that could be monetised in this appraisal, and because it most upholds the Government's commitment to avoid imposing regulatory burdens on small businesses.

Introducing a mandatory 5p charge for SUPB in large retailers in England is likely to reduce single-use plastic bag use by 70-80% in those stores, and while the use of BFL, paper bags and bin liners is expected to increase, it is likely that the overall impact will be less greenhouse gas emissions, reduced costs of clearing litter, reduced waste management costs and increased revenue from recyclates. There will be negative impacts on consumers, government and retailers, but the latter will be offset by the ability of retailers to reclaim their administrative, monitoring and reporting costs from the charge so there is no net cost to business. Charities will benefit from the charge as retailers will be encouraged to donate remaining proceeds from the charge to charitable causes as happened in Wales. The net present value of option 2 is £782m, indicating that the benefits to society outweigh the costs.

The impacts of the introduction of the 5p charge for SUPB will be closely monitored and the policy will be formally reviewed after five years. That period of time will allow for enough data collection to judge if there have been any unacceptable unintended effects, such as a large scale substitution towards paper bags or BFL without sufficient re-use, in which case the design and scope of the policy could be changed as necessary. Monitoring will take place through ongoing data collection by WRAP through participating supermarkets, and potentially a monitoring portal in England whereby retailers would submit information on bag use, their administrative costs, the VAT paid on bags and any donations made to charity.

Annex – Bag use in baseline, option 1 and option 2

Bag use in baseline

SUPB use in baseline

Data on SUPB use in supermarkets in England is collected annually by WRAP, with the latest data released in July 2013 covering the three years to 2012.⁷⁶ WRAP data covers 7 major supermarkets: Asda (including ex-Netto stores), Co-operative Group, Marks & Spencer (M&S), Morrison's, Sainsbury's Supermarkets Ltd, Tesco and Waitrose which together account for over 86% of spending in the grocery market.⁷⁷ The total bag use reported by these retailers is taken as the total for all supermarkets, because around half of the rest of the market (7% of the total grocery market) consists of retailers who already charge for bags (Lidl and Aldi) and whose bag use is therefore unlikely to be affected by the policy.

Recent data from supermarkets on bag use, and trends in the retail sector more generally, suggest supermarket SUPB use is likely to rise by around 2% per year in the absence of a charge. Voluntary agreements by retailers contributed to a 41% reduction in UK supermarket SUPB use from 2006-2009. In England however there was a 7.6% increase in supermarket SUPB use from 2010-2011 and a 4.2% increase from 2011-2012. It is not clear whether this upturn in bag use would continue absent a charge (and if the rate of increase would continue to

⁷⁶ <http://www.wrap.org.uk/content/wrap-publishes-new-figures-carrier-bag-use>

⁷⁷ All of the retailers cooperating with WRAP (apart from M&S which is not listed) account for 86.4% <http://www.kamcity.com/namnews/asp/newsarticle.asp?newsid=72946> M&S is likely to account for a further 3% and already charges for bags. <http://www.telegraph.co.uk/finance/newsbysector/retailandconsumer/10403348/Should-MandS-give-up-on-clothes-and-focus-on-food.html>

slow), or whether it is a rebound following the dramatic falls between 2006 and 2010 which would be followed by stabilisation. However, trends in the supermarket sector are towards greater numbers of convenience type stores rather than large out-of-town supermarkets.⁷⁸ Consumers visiting these types of stores may be less likely to plan their shops since they are 'topping up' rather than doing a weekly shop, potentially increasing SUPB use. Turnover and sales for the major supermarkets as a whole have consistently risen year on year and this trend is expected to continue, albeit at a slower rate than previously, with sales growth among large supermarkets set to grow at around 1.6% per year to 2018.⁷⁹ Consequently a 2% annual increase in supermarket SUPB use has been assumed for the baseline. The effect of assuming a higher and lower figure is explored in the sensitivity analysis.

Recent data on carrier bag use by high street retailers is not readily available, and no information was provided in response to Defra's call for evidence, but a point estimate can be made based on data from the 2006-2008 voluntary agreement and market share data, with this figure unchanged in the baseline due to trends in high street shopping. In the current analysis 'high street' retailers encompasses all large retailers apart from supermarkets. The estimate in table 1 has been arrived at based on data published in 2009 by WRAP after the voluntary agreement with retailers which indicates that carrier bag use by participating high street and supermarket retailers was 9.9 billion in 2008, while latest estimates of supermarket bag use in 2008 was 8.6 billion. That leaves 1.3 billion used by the participating high street retailers.⁸⁰ The high street retailers participating in the agreement accounted for 37% of the value of non-supermarket sales of the top 50 UK retailers,⁸¹ so it is estimated that all high street retailers used 3.5 billion bags. This is scaled down by England's share of UK population size. 85% of these are assumed to be SUPB, with 10% assumed to be paper and 5% bags for life (see below). It is assumed that the number of bags used per £1 spent is the same in all high street retailers. There is no evidence on whether high street bag use is increasing or decreasing, but given falling shop numbers as retail shifts online, an upward trend seems unlikely.⁸² The number of high street SUPB is therefore projected to remain constant in the baseline. The effect of assuming a higher and lower number of high street bags in the UK is explored in the sensitivity analysis.

Data on SUPB use by SMEs is also not readily available, and no information was provided in response to Defra's call for evidence, but again an estimate is made based on the available evidence. ONS data from 2008-2012 suggests that SMEs account for around 27% of turnover in the retail trade industry.⁸³ It is assumed that the number of bags used per £1 spent does not vary systematically with the size of retailer as no evidence was found on this issue, either from the Call for Evidence or elsewhere. The number of SUPB given out by high street and supermarket retailers in England was thus assumed to be 73% of the total, and the number of bags given out by SMEs was calculated as 27% of this new total, resulting in a figure of 3.5 billion. 1% are assumed to be paper and another 1% BFL (see below) and the remaining 98% are taken to be SUPB. Changes to the assumptions around SME bag use are explored in the sensitivity analysis. Given lack of evidence on trends in SME SUPB use, and also the aforementioned ongoing shift from in-store shopping to online, the SME SUPB use is assumed to remain flat in the baseline.

⁷⁸ <http://www.euromonitor.com/grocery-retailers-in-the-united-kingdom/report>

⁷⁹ In 2013 large supermarkets, superstores and hypermarkets accounted for sales of £74.1bn which is set to grow by 8.2% to £80.1bn by 2018. This is assumed to take account of population growth.

<http://www.theguardian.com/business/2013/sep/12/uk-online-grocery-sales-forecast-to-double-retail-shakeup>

⁸⁰ <http://www.wrap.org.uk/content/retailers-exceed-carrier-bag-reduction-target>

⁸¹ <http://www.retail-week.com/property/top-50-uk-retailers-2009/5011196.article#>

⁸² <http://www.retailresearch.org/retail2018.php>

⁸³ ONS ABS data, acquired through private communication

Paper bag use in baseline

For the purposes of this analysis it is assumed that no paper bags are given out by supermarkets in the baseline scenario. The number of paper carrier bags given out in the UK in 2012 by the 7 supermarkets that cooperate with WRAP was 2.2 million, i.e. 0.03% of total bag use, while in 2009 and 2010 the figure was zero.⁸⁴

In responding to the Government's Call for Evidence, an industry body representing retail SMEs stated that only 7 out of 2200 small stores (0.3%) captured in its survey gave paper bags to customers. It is assumed that 1% of SME bags are made from paper as there are some notable franchises which classify as SMEs that use paper bags.⁸⁵

Evidence on the scale of paper bag use by high street retailers is not readily available but it has been assumed for this analysis that 10% of bags given out by high street retailers are made from paper, and that this figure remains constant in the baseline. A 2005 study for the Scottish Executive reported that after consultation with the British Retail Consortium (BRC; trade association for the retail industry) it was estimated that "paper bag consumption is about 5% of all plastic carrier bag consumption".⁸⁶ Since virtually no paper bags are used by supermarkets and the 2005 study specifies that "paper bags are normally used in the non-food retail sector", the 5% figure is interpreted to apply to high street retailers only rather than all retailers, i.e. to mean that 5% of carrier bags on the high street are made from paper. Although non-food retailers, e.g. high street fashion outlets, may be the biggest users of paper bags, there is also likely to be some use of paper bags by food retailers. Of the retailers who participated in WRAP's 2008 voluntary agreement on carrier bags, eight non-grocery retailers reported on paper bag use. Between them they used 712 million bags of which 165 million (i.e. 23%) were paper, however the share of paper bags varied between 0.04% for one retailer and 72% for another.⁸⁷ Due to the terms of the voluntary agreement WRAP are not able to identify individual retailers, but they did stress that the eight retailers who reported on their paper bag use in 2008 are "in no way a representative sample of the non-grocery retail sector". Taking into account the lack of robust and representative evidence in this area, it is assumed that 10% of bags given out by high street retailers are made from paper and that this figure remains constant in the baseline.

BFL use in baseline

The seven supermarkets cooperating with WRAP publish data on the annual sales of 'bags for life' (BFL), which are designed for multiple use. In 2012, 408 million were used in the UK according to WRAP.⁸⁸ An estimate for England was made by scaling the UK figure for 2010 by population size (i.e. 83.8%). 2010 was chosen because in 2011 Wales introduced a charge for single-use carrier bags which led to a 120-130% increase in BFL use there, changing the distribution between UK nations. Unpublished WRAP data shows that in 2012, 95% of BFL in supermarkets were PE (polyethylene), 3% were woven PP (polypropylene) with the final 2% mostly an unidentified 'other' material.⁸⁹ In the baseline 95% of BFL are assumed to be PE and 5% are 'other' materials with GHG factors and prices as described above. Although supermarket BFL use in the UK grew by 65% from 2006 to 2009, coinciding with voluntary agreements on bag use with supermarkets, from 2010 to 2012 UK BFL use grew by only 0.5%. Over the same period use of BFL in Wales increased by 120-130%, suggesting that BFL use in

⁸⁴ Communication with WRAP

⁸⁵ For example, McDonalds operates on a franchise basis so its outlets would be classified as SMEs.

⁸⁶ <http://www.scotland.gov.uk/Resource/Doc/57346/0016899.pdf> p. 19

⁸⁷ Communication with WRAP 17/01/2014

⁸⁸ <http://www.wrap.org.uk/content/wrap-publishes-new-figures-carrier-bag-use>

⁸⁹ Communication with WRAP 17/12/2014

the rest of the UK fell.⁹⁰ However due to anticipated growth in supermarket sales over the next ten years it seems unlikely that supermarket BFL use in England will continue to fall, so it is assumed that in the absence of a charge for SUPB in England, PE BFL usage remains at the 2010 level for the period of analysis. Other BFL use in supermarkets has also fallen in recent years, but again is assumed to remain constant in the baseline due to anticipated supermarket sales growth.

Bags for life are also sold by some high street stores, though representative data is more difficult to find than for supermarkets. Communication with WRAP revealed that 8 non-grocery retailers participating in the 2008 voluntary agreement provided data on BFL, with 44% of their bags classified as BFL. This is much higher than the corresponding figure of 5% for supermarkets because WRAP define any bag above 25 microns in gauge as a BFL. The charge in England may follow the Welsh example and define a BFL as either above 49 microns in gauge or a bag designed for multiple re-use (i.e. it is purchased by the customer and returnable to the seller from whom it was purchased to be replaced free of charge). Around half of the high street 'bags for life' were less than 50 microns according to WRAP, and there is no information available about the extent to which they were intended for re-use and replaced free of charge by retailers. It therefore seems likely that most of these bags would be categorised as single-use bags under the regulations. As mentioned there is no suggestion that the 8 non-grocery retailers for whom data is available are representative of high street retailers. Consequently it is assumed that 5% of high street bags are BFL, i.e. the same share as in supermarkets. No data was available on the types of BFL used on the high street, so the same split is assumed as that for supermarket retailers, i.e. 95% are PE and 5% are 'other'.

Defra's Call for Evidence returned no overall estimates of BFL use by SMEs, and responses by individual retailers and trade associations (including one representing franchises) suggested very low levels of use by SMEs. A trade association for small retailers carried out a survey of 2200 stores, finding that 1.9 million BFL were sold by a member with around 300 stores, 2000 BFL in another 1300 stores, with a number of other stores selling around 200 each. Although 56% of respondents sell BFL, many said they sell very few in a given year. It is assumed for the purposes of the analysis that 1% of SME bags are BFL and that all are PE.

Bin liner use in baseline

SUPB are known to be used for waste disposal as alternatives to purpose-made bin liners, so it is possible that the charge could have an impact on bin liner sales. A WRAP study on the effect of the Welsh bags charge on bin liner sales contains data on bin liner sales for the UK.⁹¹ Sales of two types of bin bag were affected by the charge according to the WRAP analysis - swing and pedal bin liners. After the introduction of the Welsh charge 968m of these bin liners were sold in the UK in the year from June 2012 to June 2013. WRAP estimate that 11m extra bin liners were sold in Wales over 2012 following the introduction of the charge compared to a constructed counterfactual scenario without a charge. Therefore around 957m bin liners were sold per year in the UK before the Welsh charge, or 795m in England after scaling. For the purposes of analysis this is assumed to remain constant for the duration of the baseline due to lack of evidence on long term trends in bin liner use.

Bag use in option 1

⁹⁰ Welsh share of UK population is around 5%, as was its share of SUPB use in 2010, so if this reflects the Welsh share of UK BFL it would have been 20m in 2010. If that figure increased by 130% to 2012 it would be 46m. BFL use in the UK was 406m in 2010, 416m in 2011 and 408m in 2012, suggesting BFL use in the rest of the UK fell.

⁹¹ <http://www.wrap.org.uk/sites/files/wrap/Effect%20of%20charging%20for%20carrier%20bags%20on%20bin-bag%20sales%20in%20Wales.pdf>

SUPB use in option 1

Evidence from Wales shows that the introduction of a charge there caused a reduction in supermarket SUPB use by 81% from 2010 to 2012, the first full year before and after the introduction of the charge. Since for supermarkets the charge is the same in England and Wales there is no reason to believe the results will be any different between the nations. When Marks and Spencer introduced a 5p charge for bags they also experienced a reduction in bag use by 80%.⁹²

It is assumed that from October 2015 supermarket SUPB use falls by 80% compared to 2014 levels and that in 2016 SUPB use is 80% lower than in 2014. From 2017 SUPB use is assumed to rise by 2% per annum, as in the baseline (due to anticipated supermarket sales growth and expansion of convenience store numbers).

On the high street the fall in bag use is expected to be slightly smaller than in supermarkets as visits to high street stores not be as planned compared to, for example, weekly trips to the supermarket, and because there is evidence that people take branded high street bags not only out of convenience but for status reasons too. In Wales, there were reductions in bag use of 68-75% in fashion stores, 95% in home improvement stores, 45% in the food service sector and 85% in telecommunications stores.⁹³ Since paper bags are included in the charge in Wales, these figures are likely to include reductions in paper bag use. In the absence of further information on what proportion of the retail sector the Welsh figures cover, it is assumed that high street bag use in England falls by 70% (i.e. by less than in supermarkets and around the middle of the range of the Welsh figures) in the last three months of 2015 and that high street bag use in 2016 is 70% lower than in 2014. In following years bag use is assumed to remain at 2016 levels on the high street, as in the baseline scenario (due to falling high street shop numbers and the move to online shopping).

No evidence was available from Wales specifically on changes in SME bag use patterns. It is assumed that SME bag use falls by the same amount as in supermarkets, i.e. 80%. SME bag use therefore falls by 80% in the last three months of 2015 and in 2016 is 80% lower than in 2014. In following years bag use is assumed to remain at 2016 levels, as in the baseline scenario (due to the move to online shopping).

The effect of assuming a different level of reduction in SUPB use after the introduction of the charge in supermarkets, high street and SME stores is explored in the sensitivity analysis.

Paper bag use in option 1

It appears unlikely that paper bag use will increase significantly following the introduction of a charge on plastic carrier bags. Paper bags are around twenty times more expensive owing to their greater weight and size compared to plastic bags (see above). Ireland exempted paper bags from its charge on carrier bags (introduced in 2002) and there is little robust evidence of a large scale switch to 'free' paper bags being given out by retailers.⁹⁴ However there is anecdotal evidence of some retailers starting to offer 'free' paper bags. In the absence of any estimate of the scale of the switch, it will be assumed that paper bag use among high street stores and in SMEs increases by 10% after the introduction of the charge. The potential impact of a larger-

⁹² <http://www.theguardian.com/money/2009/apr/30/plastic-bags-reuse>

⁹³

http://wales.gov.uk/topics/environmentcountryside/epg/waste_recycling/substance/carrierbags/reduction/?lang=en

⁹⁴ The most popular tax in Europe? Lessons from the Irish plastic bags levy (2006)

https://wiki.umn.edu/pub/ESPM3241W/S12TopicSummaryTeamFour/Lessons_from_Irish_Plastic_bag_levvy.pdf

scale switch to paper bags by the retail industry, and of no switch at all, will be explored in the sensitivity analysis.

BFL use in option 1

Demand for bags for life designed for multiple re-use is expected to increase following the introduction of a charge on single-use bags. WRAP reported that in Wales, BFL sales in supermarkets rose by 130% following the charge. This was an average across classes of BFL, with PE BFL sales increasing by 141% from 2010-2012 while other BFL sales increased by 47% from 2010-2011 but only by 3% from 2010-2012. It is expected that BFL sales would increase sharply following the introduction of the charge but then fall somewhat as people re-use their stock of BFL and replace worn out ones as necessary. In England it is assumed that PE BFL use increases by 141% in the three months affected by the charge in 2015, and that use in 2016 is 141% higher than in 2014. In the following years, use is assumed to remain constant, at a level 100% higher than in 2014. Other supermarket BFL are assumed to increase in sales by 47% in 2015 compared to 2014 levels and in 2016 be 3% higher than in 2014 (as in Wales), and remain at this level in subsequent years.

There is no data available on change in BFL use on the high street in Wales. Since the drop in SUPB use was smaller in high street shops than in supermarkets, and because not all high street shops currently sell BFL, it is expected that the increase in BFL use will be lower than in supermarkets. It is assumed that PE BFL use on the high street in England increases by 100% in the three months affected by the charge in 2015, and that use in 2016 is 100% higher than in 2014. In the following years, use is assumed to remain constant, at a level 70% higher than in 2014. Other high street BFL are assumed to increase in sales by 50% in 2015 compared to 2014 levels and in 2016 be 5% higher than in 2014, and remain at this level in subsequent years (based on trends in 'other' BFL sales in Welsh supermarkets after the introduction of a charge).

PE BFL use in SMEs is assumed to increase by the same amount as in supermarkets, i.e. by 141% in the three months affected by the charge in 2015. Use in 2016 is 141% higher than in 2014 and in the following years use is assumed to remain constant at a level 100% higher than in 2014. The effect of assuming a different level of BFL use after the introduction of the charge in supermarkets, high street and SME stores is explored in the sensitivity analysis.

Bin liner use in option 1

Since a large proportion of 'single-use' plastic bags are re-used as bin liners, it is anticipated that bin liner sales will increase following the introduction of the charge. WRAP conducted research on this effect in Wales after a charge for bags was introduced there.⁹⁵ That study estimated that 11.1 million extra bin liners were sold in Wales after the charge was introduced, with impacts restricted to swing and pedal bin liners (there was no change in sales of refuse sacks or nappy sacks). 968 million pedal and swing bin liners were sold in the UK from June 2012 to June 2013, which suggests that before the charge was introduced in Wales the UK figure was 957 million. If per capita bin liner use in Wales before the charge was the same as the UK average, Wales consumed 4.85% (Wales' share of UK population) of these, or 46 million. The 11 million uplift thus represents a 23.7% increase in bin liner use in Wales. Bin liner sales in England are assumed to increase by the same percentage as in Wales (23.7%) in the three months affected by the charge in 2015, and use in 2016 is assumed to be 23.7% higher than in 2014. In the following years, use is assumed to remain constant at the 2016 level.

⁹⁵ <http://www.wrap.org.uk/node/18514>

Option 2

SUPB use in option 2

For large retailers, i.e supermarkets and high street shops, the analysis is as per option 1.

For SMEs, it is assumed that there is no fall in SUPB use. While SMEs will be free to introduce a charge for bags if they want to (as they are now), evidence suggests that this will not occur on a significant scale. The fact that some SME trade associations have argued for their inclusion in the charge implies that they will not introduce a charge voluntarily. In response to the Call for Evidence one small retailer stated that since customers will assume that small shops should not charge for bags, it will be difficult to justify any charge to customers. SME retailers may also be concerned that if they voluntarily introduce a charge for bags they will put themselves at a competitive disadvantage with respect to other SMEs since consumers may shop elsewhere. This is the 'first mover' problem which option 1 addresses by requiring all retailers to charge for SUPB, creating a new equilibrium.

The effect of assuming a different level of reduction in SUPB use after the introduction of the charge in supermarkets, high street and SME stores is explored in the sensitivity analysis.

Paper bag use in option 2

For large retailers the analysis is as per option 1, i.e. paper bag use among high street stores increases by 10%. Paper bag use by SMEs is unchanged, i.e. the same as the baseline scenario.

BFL use in option 2

For large retailers the analysis is as per option 1, while SME BFL use is unchanged from the baseline.

Bin liner use in option 2

Bin liner use increased by 23.7% in Wales where all retailers were included in the charge. Since SMEs were estimated to account for 27% of SUPB use in England in 2012, and large retailers for 73%, it is assumed in option 2 that bin liner use increases by 73% of 23.7%, i.e. 17.3%. This figure is used in the same way as in option 1, i.e. use increases in 2015 and 2016 and then remains flat.