

Title: Impact Assessment on the proposal to ban the supply of single-use plastic plates and cutlery to the end user in England IA No: Defra/Env/187 RPC Reference No: Lead department or agency: Department for Environment, Food and Rural Affairs (Defra) Other departments or agencies: N/A	Impact Assessment (IA)			
	Date: 21/04/2023			
	Stage: Final stage			
	Source of intervention: Domestic			
	Type of measure: Secondary legislation			
Contact for enquiries: Louisa Fenocchi or Daniel Edwards				

Summary: Intervention and Options	RPC Opinion: Green
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Cost of Preferred Option (2019 prices, 2020 present value)			
Total Net Present Value -£77.3m	Business Net Present Value -£78.0m	Net cost to business per year £9.1m	Business Impact Target Status Qualifying provision?
			Qualifying provision

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

Single-use plates and cutlery are not commonly recycled or re-used and cause multiple negative environmental externalities, particularly when they are discarded incorrectly.¹ These include harm to marine environments, cost to local authorities and visual pollution. As these items are not commonly recycled in the UK² even if disposed of correctly, it is likely they will end up being incinerated at end of life³, generating additional greenhouse gas emissions in addition to those released during production. These negative externalities are experienced across society and are not accounted for within the market price of the items. Government intervention could shift the single-use plates and cutlery market to reusable or plastic-free alternatives that impose fewer externalities, and to ensure the change and environmental benefits are sustained into the future.

What are the policy objectives and the intended effects?

The key objective is to reduce the volume of plastic entering the natural environment, to reduce the global harm imposed by plastic pollution. This will help protect our environment for future generations, improve environmental quality and reduce harms to human health and biodiversity. The intervention will contribute to the Government's 25 Year Environmental Plan commitment to eliminate avoidable plastic waste by 2042. The ban may encourage businesses in England to invest in environmentally friendly alternatives to plastic. The ban may encourage increased use of re-usable alternatives to the single-use plastic items. The ban may help to reduce the amount of non-renewable resources used to produce the banned items.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option

Several options have been considered, including taxes/charges, subsidies and information campaigns. Our final stage analysis is focussed on two central options: 'do nothing' (option 0), and a ban on the supply (option 1, preferred). A ban would have the maximum impact in reducing the social and environmental costs of single-use plastic plates and cutlery and averts the currently unquantified risk posed by the items when they escape into the environment. The impacts of a ban are proportionate to secure the environmental benefits without major costs. The current trend in the market for single-use cutlery is to move away from plastic towards alternative materials; however, this change is not happening at a sufficient speed or scale. For plates, there has been a slower shift away. When considering alternative options such as information and education, request only options, subsidies, and taxation and charges, we have drawn on Defra's previous work on single-use plastic items. Alternative options, both regulatory and non-regulatory, were ruled out in favour of a ban, in order to maximise the environmental and social benefits from reduced single-use plastic plates and cutlery consumption and ensure these benefits are realised as soon as possible.

Will the policy be reviewed? It will be reviewed. If applicable, set review date: 5 years post implementation				
Is this measure likely to impact on international trade and investment?		Yes		
Are any of these organisations in scope?	Micro Yes	Small Yes	Medium Yes	Large Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (million tonnes CO ₂ equivalent)		-0.0022 Mt CO ₂ e		

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

1 Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)
 2 WRAP (2021) [Eliminating Problem Plastics](#)
 3 Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

Signed by the responsible Minister:

Rebecca Pow

Date: 23 May 2023

Summary: Analysis & Evidence

Policy Option 1

Description: Ban on the supply of single-use plates and cutlery in England

FULL ECONOMIC ASSESSMENT

Price Base Year 2020	PV Base Year 2023	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -£167.1	High: -£46.8	Best Estimate: -£91.0

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	30.3	2.9	56.0
High	121.0	5.8	172.3
Best Estimate	60.5	4.3	98.1

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

The largest cost is due capital investment costs incurred by producers from adapting production processes. Another large cost is due to the wholesale price of wooden cutlery being greater than the wholesale price of single-use plastic cutlery. This is a direct cost to businesses.⁴ Businesses will also incur familiarisation costs and additional fuel costs, as a result of alternative material items being heavier than plastic equivalents. Producers will incur a loss of profits from no longer producing single-use plastic plates and cutlery. There are environmental costs which arise when alternative material items are sent to landfill, as biodegradable waste produces methane when undergoing anaerobic degradation in landfill. Enforcement costs to the public sector have also been included.

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

Some consumers may lose out if they prefer using single-use plastic plates and cutlery rather than items made from paper or wood. Consumption of single-use plastic plates is still relatively high, despite paper alternatives being cheaper, suggesting a non-price factor that consumers value in plastic plates. The policy may lead to a fall in the demand or supply of single-use items altogether in favour of reusable items which may be made from more durable plastic. However, alternatives meant to be used multiple times may continue to be used only once before disposal. Wholesalers of the banned items may incur some costs, particularly during the transition to alternative material items.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0	0.6	5.1
High	0.0	1.1	9.2
Best Estimate	0.0	0.8	7.1

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

As paper and wood decompose at a much faster rate than plastic, we expect to see a reduction in the presence of litter on beaches, reducing clean up costs for beaches. A similar fall in the presence of litter is also expected terrestrially on streets and green spaces. Cleaner beaches, streets and green spaces are highly valued by the public. Single-use plates and cutlery from alternative materials, assumed to be paper and wood respectively, are less carbon intensive in production⁵ and when incinerated⁶ than plastic, and can be more easily recycled, resulting in environmental savings.

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

There are benefits which have not been proportionate to monetise. Single-use plastic plates and cutlery contribute to marine litter which impacts wildlife as materials can entangle or be ingested by wildlife, causing injury and loss of life to marine animals.⁷ Plastic breaks down slowly over time and can persist as microplastics for a substantial period of time. Microplastic ingestion by animals has been shown to reduce food consumption and therefore energy levels in animal life⁸ and can be passed along the foodchain to other animals and humans. Preliminary studies have indicated that microplastics negatively impact human health but the scale of this harm is currently unquantified.⁹

4 Regulatory Policy Committee (2019) [Business Impact Target specific issues: direct versus](#)

5 BEIS, Greenhouse Gas Reporting Conversion Factors

6 WRAP (2021) [Carbon Waste and Resources Metric](#)

7 Kühn, S., Bravo Rebollo, E.L., van Franeker, J.A. (2015). [Deleterious Effects of Litter on Marine Life](#). In: Bergmann, M., Gutow, L., Klages, M. (eds) [Marine Anthropogenic Litter](#).

8 University of Exeter (2014) [The Impact of Microplastics on Marine Life](#)

9 World Health Organisation (2019) [Microplastics in Drinking Water](#)

Cox et al (2019) [Human consumption of microplastics](#)

Key assumptions/sensitivities/risks	Discount rate (%)	3.5%
<p>Due to existing industry commitments, we assume the majority of retailers will move away from single-use plates and cutlery, regardless of the ban. We assume an annual 5 percentage point reduction in single-use plastic cutlery market share and a 1 percentage point reduction in single-use plastic plates. We assume paper will be the replacement material for plates, and wood for cutlery, based on market data and recent trends. Costs may fall if prices of non-plastic single-use plates and cutlery fall as scale of production increases.</p>		

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: 10.7	Benefits: 0.0	Net: 10.7	45.3

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Problem under Consideration

Plastic production predominantly depends on finite fossil fuels and as such uses non-renewable resources.

Single-use plastic plates and cutlery are environmentally damaging, especially to marine environments.¹⁰

Littering of these items negatively impacts wellbeing¹¹ and generates clean-up costs to local authorities. It is estimated that UK municipalities spend approximately £15.8m each year to remove all forms of beach litter.¹² Single-use plastic plates and cutlery are often littered in parks and public spaces; these items can then be transferred to the marine environment through sewerage and storm drainage. This contributes to the global marine plastic problem, damaging the marine environment and posing a risk to wildlife - 80% of terrestrial plastic litter ends up in the marine environment.¹³ Single-use plastic plates and cutlery can also be littered directly into the marine environment by marine users and visitors to coastal areas. The Marine Conservation Society's Great British Beach Clean 2022 indicates plastic/polystyrene pieces are the most frequently counted litter item on UK beaches.¹⁴ Another study by the European Environment Agency found plastic and polystyrene pieces to be the second most commonly littered items across Europe's marine environments¹⁵. It is estimated that there are over 150 million tonnes of plastic in the world's oceans¹⁶; furthermore, by 2050, it is predicted that oceans will contain more plastic than fish (by weight) if no action is taken to curb the flow of plastic into waterways.¹⁷ Estimates also suggest that every year 1,000,000 birds and over 100,000 sea mammals die from entanglement in marine litter in the North Pacific alone, a rate that appears to be increasing.^{18,19}

At end of life, single-use plastic plates and cutlery are often disposed of in ways that don't lead to the best environmental outcomes. These items are lightweight and predominantly used in restaurants, pubs, fast food outlets, workplaces, or at parties. As a result, they are typically discarded to general waste or littered rather than recycled due to the effort required to segregate and clean them. Even if plastic cutlery items are placed in recycling bins, their small size means that they are more likely to fall between recycling machinery and are therefore unlikely to be recycled.²⁰ Meanwhile, if they have not been cleaned effectively plastic plates will be contaminated and can therefore not be recycled, instead being disposed of in landfill or incineration. Current estimates suggest that only 10% of single-use plastic plates and cutlery are recycled upon disposal²¹.

Single-use plastic cutlery is typically made of a polymer called polypropylene; single-use plastic plates are made of either polypropylene or polystyrene. Polypropylene is widely considered one of the most

10 Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

11 Lorenc, T., Petticrew, M., Whitehead, M. *et al* (2013) [Fear of crime and the environment: systematic review of UK qualitative evidence](#). *BMC Public Health* **13**, 496

12 Mouat, Lozano, Bateson (2010) [Economic Impacts of Marine Litter](#). Figure based on exchange rate of £1 = EUR 1.14

13 Eunomia (2016) [Plastics in the Marine Environment](#)

14 [Marine Conservation Society: The Great British Clean](#)

15 European Environment Agency [Citizen's collect plastic and data to protect Europe's marine environment](#)

16 Science Daily (2015) [An ocean of plastic: Magnitude of plastic waste going into the ocean calculated](#)

17 Ellen MacArthur Foundation (2017) [The New Plastics Economy: Rethinking the Future of Plastics and Catalysing Action](#)

18 Thompson, R.C., *et al.* (2009) [Plastics, the environment and human health: current consensus and future trends](#). *Philosophical Transactions of the Royal Society B: Biological Sciences*

19. [Mouat, Lozano, Bateson \(2010\) Economic Impacts of Marine Litter](#).

20 Forbes (2019) <https://www.forbes.com/sites/lauratennenbaum/2019/07/16/plastic-cutlery-is-terrible-for-the-environment-and-we-dont-need-to-have-it-delivered/?sh=2ffc914019>

21 Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#) and Defra (2021) [Statistics on waste managed by local authorities in England in 2020/21](#).

versatile plastics and is used in many different applications. Its characteristics include a high melting point, resistance to cracking and stress even when flexed. It also does not react with water, detergents, or acids so it won't break down easily. Plastic production depends on finite fossil fuels and is associated with the use of non-renewable resources and additional greenhouse gas emissions.

Plastic-free single-use alternative items are already established in their respective markets. For example, wooden cutlery and paper plates are widely used products²² which cause little change in consumer experience while reducing environmental impacts.

Rationale for Intervention

There is a market failure due to the market price of single-use plastic plates and cutlery not accounting for any of the negative impacts of production and disposal, therefore creating a negative externality. As such, businesses and end-consumers are not currently incentivised to limit their use or to switch to items made of less environmentally harmful materials. Intervention is required to ensure a full shift in the plates and cutlery market away from single-use plastic. This will maximise the associated environmental benefits and ensure these benefits are realised as soon as possible and maintained into the future.

As discussed, single-use plastic plates and cutlery are not commonly recycled, and therefore, at end-of-life, most are either incinerated for energy (releasing carbon dioxide emissions) or sent to landfill where they do not degrade.²³ In addition, some single-use plastic plates or cutlery are disposed of incorrectly as litter²⁴ which costs public money to clean up²⁵ and imposes other costs on society including visual pollution and environmental harm. Littered single-use plastic plates and cutlery also pose a risk to wildlife – either in their full form or when broken into smaller particles, including microplastics – they can easily entangle or be ingested by aquatic life if they enter the water system and/or marine environment. Microplastics transfer up the food chain and studies are beginning to identify the harm they can cause humans.^{26 2728}

Single use plates and cutlery are estimated to make up 0.03% and 0.01% of all beach litter respectively²⁹ based on item volume. These items are being targeted for a ban as opposed to other beach litter items because they are one of the most prevalent plastics in freshwater and ocean environments^{30 31} and clear, readily available alternative material substitutes exist. These substitutes are paper and wood equivalents for single-use, or reusable options.³² Alternative materials decompose quicker – in terrestrial environments, paper is estimated to decompose in 4 to 6 weeks³³. This faster decomposition of alternative materials means a ban on single-use plastic plates and cutlery will reduce the risk of harm to animal life and lead to amenity benefits resulting from cleaner beach and terrestrial environments and reduced coastal clean-up costs to LA's. Items made from paper and

22 Valpak (2022) unpublished

23 Ellen MacArthur Foundation (2017) [The New Plastics Economy: Rethinking the Future of Plastics and Catalysing Action](#)

24 WRAP (2022) [Eliminating Problem Plastics](#)

25 Government Office for Science [Foresight Future of the Sea](#)

26 Fleury, J.B. and Baulin V.A (2021) ['Microplastics destabilise lipid membranes by mechanical stretching'](#).

27 Goodman et al. [2021 Exposure of Human Lung Cells to Polystyrene Microplastics Significantly Retards Cell Proliferation and Triggers Morphological Changes](#)

28 UNEP (2018) Single-use plastics – A roadmap to sustainability

29 Resource Futures (2018), using Nelms et al. (2017) [Marine anthropogenic litter on British beaches: A 10-year nationwide assessment using citizen science data.](#)

30

City to Sea [The most polluting single use plastic items](#)

31 Ocean Conservancy and ICC (2022) [Connect + Collect 2022 Report](#)

32 Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

33 Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

wood are less carbon intensive to manufacture and incinerate than plastic, causing less environmental damage in terms of greenhouse gas emissions.^{34 35}

Market data³⁶ show that the share of plates and cutlery made from single-use plastic has been declining over time. A major voluntary approach to reducing plastics is occurring through the UK Plastics Pact. Pact members account for approximately two-thirds of the consumer packaging used in the UK. The UK Plastics Pact 2020-21 Annual Report showed that members had achieved a 46% reduction since 2018 in the plastic items they were targeting for elimination, which demonstrates the impact a voluntary approach can have. Although this is significant process, we want to move faster. There will be many businesses that aren't Plastics Pact members and aren't seeking to reduce their use of single-use plastics outside the Plastics Pact either.

Using market data, it is estimated that, in the absence of government intervention, plastic cutlery usage will continue to decrease, reaching 10% by 2028/29 and plateauing³⁷. The projected market share for plastic plates shows a slower shift away from plastic plates to 40% by 2032/33, in a no ban scenario.³⁸ These rates of decline would not maximise the environmental benefits from reduced use of these items. Government intervention, rather than reliance on voluntary action, is required to stem the flow of single-use plastic plates and cutlery faster and more widely. Intervention will correct the market failure arising from the multiple negative externalities and to reduce England's harmful and unnecessary plastic pollution. This will ensure that the environmental and social benefits of addressing these externalities are maximised and maintained into the future.

When considering alternative options such as information and education, request only options, subsidies, and taxation and charges, we have drawn on Defra's previous work on single-use plastic items. Alternative options, both regulatory and non-regulatory, were ruled out in favour of a ban, in order to maximise the environmental and social benefits from reduced single-use plastic plates and cutlery consumption and ensure these benefits are realised as soon as possible. A ban allows for a maximum reduction in pollution for the minimum cost to business and society. Due to evidence indicating the harmful effects these single-use plastics have on animals, humans, and the environment and also the scientific uncertainty about the extent of the lifetimes of these single use plastics we are adopting the precautionary principle and thus a ban is the preferred option.

Policy Objective

In the 25 Year Environment Plan,³⁹ the Government set out its ambition to help protect our environment for future generations, improve environmental quality, and reduce harm to human health and marine life.

It gives a clear direction related to plastics:

- To eliminate avoidable plastic waste by the end of 2042 and a target to reduce significantly and where possible prevent all kinds of marine plastic pollution;

³⁴ A tonne of wood and paper release approximately 233 kgCO₂e and 354 kgCO₂e per tonne of material used during production, whereas comparative values for polypropylene and polystyrene measure at 1875 kgCO₂e and 2306 kgCO₂e per tonne, WRAP data
³⁵ Paper releases carbon emissions when landfilled, although the carbon savings of paper (as opposed to plastic) production and incineration outweigh the costs of the landfill emissions. These costs and benefits are shown in Table 1.

³⁶ Valpak (unpublished), 2022

³⁷ Plastic cutlery use is unlikely to decline to 0% without government intervention, with some businesses continuing use due to inertia or potentially higher cost of alternatives.

³⁸ Valpak (unpublished), 2022 and Defra assumptions.

³⁹ [A Green Future: Our 25 Year Plan to Improve the Environment](#)

This ambition was followed by the publication of the Resource and Waste Strategy. The strategy shows how we will both prevent and better manage waste by moving to a more circular economy.⁴⁰ In the Environmental Improvement Plan 2023, the first revision of the 25 Year Environment Plan, we set an interim target, which will allow us to track our progress against the 2042 commitment. By 31 January 2028, we will reduce residual municipal plastic waste produced by person by 45%. This is equivalent to a 45% reduction from 2019 levels.

To help meet this ambition, the Government intends to ban the most harmful plastic products where there is a clear case for it and alternatives exist. Bans on the manufacture and sale of rinse-off personal care products containing plastic microbeads are already in place⁴¹. Restrictions on the supply to the end user of single-use plastic drinking straws and single-use plastic-stemmed cotton buds and a prohibition on the supply of drinks stirrers came into force in October 2020.⁴²

Some organisations have already made strides to reduce their single-use plastic usage. For example, the NHS delisted plastic straws and stirrers ahead of the pledged date and are now focusing on phasing out single-use plastic cutlery and plates, single-use cups made of expanded polystyrene and oxo-degradable plastics.⁴³ Furthermore, as of January 2020, IKEA have removed all single-use plastic products, including plates and cutlery.⁴⁴

Although out of scope of this analysis, the policy will also complement our wider proposals to tackle plastic pollution, and especially those associated with plastic packaging waste. In addition to plastic straws, stirrers, and cotton buds, which we have already banned, we are also enacting bans on the supply of plastic balloon sticks as well as food and drinks containers made from expanded polystyrene.

Plastic packaging waste accounts for nearly half of all plastic waste generated in the UK.⁴⁵ The plastic packaging tax⁴⁶ and our proposals to reform the packaging waste regulations will ensure that plastic packaging is designed to be recyclable and make more use of recycled content. Introducing greater consistency in household and business recycling collections across England will help the public recycle more and increase the amount of plastic that is collected and made available for recycling. Additionally, introducing a Deposit Return Scheme⁴⁷ will substantially increase recycling rates for plastic drinks containers, providing a high-quality stream of recyclable material which can be fed back into the production of new plastic products.

Together with other measures, the ban will help reduce the flow of these items to the ocean from English sources. It should also drive behaviour change, by stimulating businesses and consumers to reconsider their use of single-use plastic items in favour of more sustainable material choices or reusable alternatives.⁴⁸

40 [Our Waste, Our Resources: A Strategy for England](#)

41 [The Environmental Protection \(Microbeads\) \(England\) Regulations 2017 \(legislation.gov.uk\)](#)

42 [Straws, cotton buds and drink stirrers ban: rules for businesses in England](#)

43 <https://www.supplychain.nhs.uk/news-article/supporting-pledge-to-reduce-plastic-waste-in-hospital-canteens/>

44 <https://about.ikea.com/en/sustainability/healthy-and-sustainable-living/eliminating-single-use-plastics>

45 WRAP (2019) [Plastics Market Situation report 2019](#)

46 <https://www.gov.uk/guidance/check-if-you-need-to-register-for-plastic-packaging-tax>

47 [Introduction of a deposit return scheme in England, Wales and Northern Ireland - GOV.UK \(www.gov.uk\)](#)

48 Adeyanju, G.C., Augustine, T.M., Volkmann, S. *et al.* (2021) [Effectiveness of intervention on behaviour change against use of non-biodegradable plastic bags: a systematic review. *Discov Sustain* 2, 13](#) see for similar rationale in regard to plastic bags

Changes made to this Impact Assessment following the consultation

- The implementation date for the bans has been changed from April 2023 to October 2023. This later implementation date has slightly reduced the benefits and some costs of the policy during the appraisal period.
- We have improved the rationale for policy intervention to clarify the specific problems being addressed and why Government intervention is necessary to rectify these issues.
- We have redrafted the options section to justify why alternative options were not analysed at consultation stage, and why these options, alongside the current market-based approach and voluntary action, would not be sufficient.
- We have strengthened our consumption estimates of single use plates and cutlery in England, based on recent market data Valpak compiled for Defra, which has reduced them from 5.38 billion to 3.42 billion combined⁴⁹.
- Previously we assumed that plastic plates made up 50% of single-use plates and plastic cutlery made up 90% of single-use plastic cutlery in 2018. Since consultation, we strengthened the evidence behind the counterfactual. Valpak compiled market data for Defra, which has informed the assumption of plastic plates contributing to 52% of all single use plates consumed in 2020, and plastic cutlery contributing to 40% of all single-use cutlery consumed in 2020. The market data has informed updated assumptions around decreasing market share under a no ban scenario. For plastic cutlery it is estimated that usage will decrease significantly regardless of government intervention. If the current rate of decrease continues, it is estimated that the market share of single-use plastic cutlery will fall to 5% by 2029. For plastic plates due to the data showing a slower decline, we have estimated that the market share will decline at a lower rate of 1% per year going from an approximate 50% market share in 2022/23 to 40% by 2032/33.

For the consumption and market share assumptions, we have significantly more confidence in the estimates provided by Valpak, compared to the estimates used at consultation stage. The consultation stage estimates relied on data and assumptions from interviewed stakeholders, as market research reports did not contain granular product level data⁵⁰. In contrast, Valpak provided comprehensive estimates using their Environmental Product Information Centre (EPIC) database.

- At consultation we used unit cost estimates informed by Resource Future's 2018 report.⁵¹ Resource Futures' estimates were based on online research from two websites, accessed in 2018. We have updated these cost estimates via desk-based research, using more recent data from a wider range of sources⁵², to improve accuracy.

⁴⁹ Valpak Single use plastic placed on the market report for Defra (unpublished), 2022

⁵⁰ Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

⁵¹ Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

⁵² Defra research based on a sample of products for sale from: Restaurant Supply Store, Kite Packaging, RR Packaging, Midpac, GreenFeel, The Party Experts, Onbuy, Cater 4 You, Amazon, Catering 24. Websites access in December 2021.

Unit cost estimates	Consultation stage	Final stage
Average plastic plates	£0.05	£0.04
Average paper plates	£0.10	£0.03
Average plastic cutlery	£0.01	£0.02
Average wooden cutlery	£0.02	£0.03

For single-use plates, the average cost of paper plates is lower than plastic and so we have modelled this as a net zero cost to business.

The changes in consumption, market share and unit cost estimates outlined above have lowered the alternative material costs from £90.6m to £23.2m across the 10-year appraisal period.

Additionally, we have also changed the following:

- Familiarisation costs have only been monetised once across the bans on single-use plastic plates and cutlery and EPS food and beverage containers to avoid double counting. They are included as a monetised cost in the EPS IA and as a non-monetised cost in this IA.
- The benefit of reduced litter in terrestrial settings has now been monetised.
- We have strengthened the end-of-life assumptions by considering non-household municipal waste treatment data to more accurately weight the proportions of single-use plastic waste that ends up in landfill vs incineration.
- We now assume a reactive method of enforcement.
- We have strengthened our analysis on producer impacts. This has involved adding two new monetised costs: the direct impact of profit loss for producers as a result of no longer producing single-use plastic plates and cutlery, and capital investment costs as a result of adapting production processes. Further details can be found in our Producer Impacts section.
- We have added an assessment on competition, trade and innovation and strengthened the equalities assessment using analysis of the consultation responses.
- We have strengthened the SaMBA, modelling scenarios of the use of the banned items by small and micro businesses and taking into account impacts on producers. We have also added an assessment on medium businesses.

Overall, the NPV has decreased from -£77.9m at consultation stage to £-77.3m and the Equivalent Annual Net Direct Cost to Business (EANDCB) has decreased from £9.4m to £9.1m (2019 prices, 2020 PV).

Options under consideration

The cost benefit assessment considers two options: the 'do-nothing' option and the option **to ban the supply of single-use plastic plates and cutlery in October 2023**. The latter is the preferred option because it is considered to be the most effective in reducing the social and environmental costs associated with these single-use items.

We have considered several alternative policy options. These have not been appraised as they would not eliminate these single-use plastic items at the desired speed or scale. Other interventions would

not create a level playing field or strengthen the market to innovate – this was highlighted in stakeholder discussions that were undertaken by Resource Futures.⁵³ Further, a ban on the supply of single-use plastic plates and cutlery will align with legislation on other single-use plastic items such as straws and stirrers.

Non-appraised options are listed in the section below.

Option 0: Do-nothing

The **do-nothing** option would allow single-use plastic plates and cutlery to continue being used with no restriction on supply. Some businesses are voluntarily moving away from single-use plastic plates and cutlery; this is factored into the do-nothing scenario.

Although there is currently a concerted voluntary reduction in single-use plastic plate and cutlery use, there will still be many such items that continue to be used and disposed of over the coming years. Furthermore, there is no guarantee that the current voluntary action will be sustained into the future, for example if current media and public attention on the issue does not persist. This means the environmental costs associated with single-use plastic plates and cutlery, such as risks to wildlife and the marine environment, may continue into the future even if voluntary action is successful at supplying plastic-free alternatives at scale without the support of government intervention.

Option 1: Implement a regulatory ban on the supply of single-use plastic plates to the end user and the supply of single-use cutlery, active from October 2023 (preferred)

This is the preferred option.

Businesses will be encouraged to source single-use plates and cutlery from non-plastic materials. This is expected to incur some costs in the case of cutlery, but a proportion of these will be mitigated by the current trend in the market to move away from single-use plastic items and the increasing availability of non-plastic alternatives. There will also be familiarisation costs to business in advance of the change in legislation.

The ban will foster an increased degree of consumer confidence that the products they use will not harm wildlife and the environment. It will also increase consumer awareness of the environmental harms single-use plastic products can cause when they are not correctly disposed of. The intervention is expected to increase wellbeing from reduced presence of litter and associated clean-up costs, as monetised later on in this document.

There is evidence that bans have effectively reduced the littering of targeted single-use plastics in the environment. For example, following the implementation of the San Francisco ban on polystyrene cups in 2007, their littering dropped by 34%. Similarly, following their 2011 ban in San Jose, plastic litter was reduced by 59% to 89%, depending on locations.⁵⁴

No exemptions are proposed under this ban as, unlike straws, we are not aware that any group of the public has an absolute requirement for single-use plastic plates and cutlery over plastic-free alternatives (e.g. for medical use). We tested this hypothesis in the consultation and no relevant

⁵³ Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

⁵⁴ [Do Plastic Bag Bans Work? - Scientific American](#)
As referenced in OECD (2021), [Preventing single-use plastic waste: implications of different policy approaches](#)

exemption requirements were flagged. Further considerations are also presented in our Equalities Assessment.

Consultation support for a ban: The public consultation⁵⁵ showed significant support for a ban on the supply to the end user of single-use plastic plates and cutlery, at 93% for each proposed type of item. Members of the public, respondents from NGOs and respondents from public bodies were the most supportive of the bans on single-use plastic plates, including bowls and trays (94%, 93%, 94%, respectively) and on single-use plastic cutlery (95%, 95%, 94%, respectively). Respondents from the manufacturing industry were least supportive of the policy proposals, with 67% supporting the ban on single-use plastic plates (including plastic bowls and plastic trays) and 69% supporting the ban on single-use plastic cutlery.

Non-appraised options

In the 25 Year Environment Plan, and reiterated in the Resources and Waste Strategy, we committed to eliminating all avoidable plastic waste throughout the lifetime of the plan. The impact plastic pollution has on our environment is well documented, and urgent action is required to stem the flow of these materials from into the natural world. The strategy outlines how we want to address this issue, taking action at each stage of the product lifecycle to reduce the amount of plastic we use, and reuse and recycle more of what we do. Alongside measures such as extended producer responsibility for packaging and a deposit return scheme for drinks containers, we believe that there are unnecessary and harmful uses of plastic which can be dealt with most effectively by introducing a ban as there are already viable non-plastic alternatives.

Tackling the issue of marine plastic pollution is not something which we can do in isolation. Other countries are taking similar action to reduce the use of plastic – the EU, for example, introduced a number of product bans, through Article 5 of Directive (EU) 2019/904, which had a transposition deadline of July 2021, including on single-use plastic plates and cutlery.⁵⁶ The Scottish Government have already consulted on implementing a ban on the supply of various single-use plastic items, including single-use plastic plates and cutlery.^{57 58} The Senedd has approved legislation to ban the supply of various single-use plastic items in Wales which will take effect in autumn 2023.⁵⁹

The following options have not been appraised as similar past legislation (such as the ban on single-use plastic straws buds and stirrers⁶⁰) has found that these would not reduce the impacts to the environment at the same speed and scale as a ban:

- **Information and education** – could be used to encourage firms and consumers to move away from single-use plastic plates and cutlery. However, there is evidence that consumers are already aware of the harms of single-use plastics. There have been multiple campaigns in recent times including the BBC's Blue Planet II series and the Daily Mail's "Break the Habit, Turn the Tide on Plastic and the Stir-Crazy" Campaign. The additional impact of further information on top of these campaigns is likely to be minimal and so may not be cost effective. Interventions to increase consumer awareness may succeed in improving people's knowledge about the negative environmental consequences of certain actions, but this knowledge will not gain motivational force if protecting the environment is not an important personal value.⁶¹
- **Request only option** – single-use plastic plates and cutlery could be made available by request only in all settings e.g., available only if a customer specifically asks for one, but the impacts in

55 [Consultation, Banning the supply of commonly littered single use plastic items](#)

56 European Commission, [Single-use plastics](#)

57 <https://www.legislation.gov.uk/ssi/2019/271/made>

58 <https://www.legislation.gov.uk/ssi/2021/410/contents/made>

59 [Wales at the forefront of UK action as Senedd says no to single-use plastics | GOV.WALES](#)

60 <https://www.gov.uk/government/news/start-of-ban-on-plastic-straws-stirrers-and-cotton-buds>

61 Bolderdijk JW, Gorsira M, Keizer K, Steg L (2013) [Values Determine the \(In\)Effectiveness of Informational Interventions in Promoting Pro-Environmental Behavior.](#)

reducing usage would be smaller and less certain than under a ban. It would also be more difficult for enforcement bodies to monitor.

- **Subsidies** – towards the development of alternative material products are not considered necessary. Substitutes already exist and are widely used.
- **A taxation or charge policy** – although this would likely be effective in reducing consumption, it would not be as effective as a ban. Another risk with a charge instead of a ban is that effectiveness reduces over time without further intervention. For example, in Ireland, plastic bag usage initially fell with the introduction of the first levy in 2002, but rose again five years post-levy, requiring the charge to be increased⁶². A ban avoids this risk and ensures that the desired impact is sustained.

Summary of Impacts and NPVs – Preferred Option

Table 1 below gives a summary of the monetised costs, benefits and total Net Present Value (NPV) estimates for the preferred option to ban single-use plastic plates and cutlery. We compare this to what we expect would happen if there were no government intervention (i.e., the ‘do nothing’ scenario). This is estimated over a ten-year appraisal period.

We have developed 3 different scenarios (low, central, high) to enable sensitivity analysis. This is to reflect data uncertainties and help investigate the significance of key assumptions used in the analysis.

The central NPV estimate is -£91.0m (2020 prices, 2023 present value). The largest benefit is from reduced incineration emissions as alternative material items are carbon neutral when incinerated, unlike plastic which produces carbon dioxide emissions. The largest monetised cost arises from capital investment costs incurred by producers caused by switching to producing alternative material items.

Table 1: 10-year net present value estimates for ban on single-use plastic plastic plates and cutlery (2020 prices, 2023 present value base year, millions)

		Low (worst-case)	Central	High (best-case)
Benefits	Disposal incineration emission benefit to society	£3.8	£5.1	£6.3
	Production emission savings to society	£1.0	£1.4	£1.7
	Beach well-being benefit to society	£0.2	£0.3	£0.5
	Reduced terrestrial litter benefit to society	£0.1	£0.3	£0.6
	Reduced coastal clean-up costs to LA's	£0.0	£0.0	£0.0
Costs	Wooden cutlery price costs to businesses	£29.0	£23.2	£17.4
	Paper plate price costs to businesses*	£0	£0	£0
	Capital investment cost	£121.0	£60.5	£30.3
	Producer profit loss	£2.9	£2.3	£1.8

⁶² Institute for European Environmental Policy

Fuel costs to businesses	£9.3	£4.9	£1.9
Fuel emission costs to society	£3.4	£1.8	£0.7
Disposal landfill emission cost to society	£5.1	£4.1	£3.1
Additional waste management costs to businesses	£1.1	£0.8	£0.6
Enforcement costs to LAs	£0.2	£0.2	£0.2
Additional waste management costs to LAs	£0.3	£0.2	£0.1
Total	-£167.1	-£91.0	-£46.8

**The costs of paper plates are lower than plastic. However we assume that businesses have chosen their present actions for good business reasons, so if government compels them to change then it must cause them some net cost (or at best be cost neutral). Therefore there may be a net loss, despite the alternatives for single-use plastic plates being cheaper. We cannot monetise this impact, thus, this impact is presented as a zero net cost.*

Further detail on Table 1 can be found in the benefits and costs sections. All figures are in 2020 prices. All NPV figures are in 2020 prices, unless stated otherwise. This was chosen as the standard price base years for consistency with the consultation stage IA.

Although the final NPV is negative, the ban remains the preferred option due to the non-monetised factors excluded from the NPV estimates. A key benefit which has not been monetised is the reduction in harm to natural environments and resulting societal benefits. We found this to be unquantifiable, with a recent UN report restating the challenge in quantifying this benefit due to a lack of comprehensive figures for all costs imposed by plastic litter⁶³. Although it has not been possible to monetise all these benefits, they are analysed in detail as non-monetised benefits below. Another consideration is that the monetised costs may fall significantly if the prices of alternative material plates and cutlery fall, which is possible due to economies of scale as the scale of production increases.

Key Assumptions and Methodology

Low/Central/High Scenarios

We have modelled three scenarios to account for uncertainties related to the cost assumptions, the number of single-use plastic plates and cutlery consumed in England and the market share of items from alternative materials.

The low NPV scenario (worst case) uses the low estimate for the total number of single-use plastic plates and cutlery used. It then applies the high costs and low benefits estimates to them. The high NPV scenario (best case) uses the largest estimate for the number of items used and applies the high benefits and low costs estimates.

The following sensitivities have also been incorporated into the NPV scenarios and are further explained in the sections on monetised costs and benefits:

- how long each item takes to decompose.
- the amount of time it takes businesses to familiarise themselves with the ban.
- the proportion of items that end up on beaches and streets as litter.

⁶³ UNEP (2021) 'From pollution to solution: A global assessment of marine litter and plastic pollution'

- and differing values in the literature placed on having cleaner beaches and streets.

Single-use plates and cutlery

Market data⁶⁴ shows that 721,544,241 disposable plates and 2,699,949,931 pieces of disposable cutlery were placed on the UK market per year between 2019 and 2020. To account for any shocks in use from Covid-19, we have used this average of items placed on the market in 2019 and 2020 as our central estimate. As a result of this uncertainty, we have modelled low and high estimates shown in table 2 below, these assume consumption to be 75% and 125% of the central estimate respectively.

Table 2: Single-use plate and cutlery consumption in the UK, in billions

	Plates	Cutlery	Total
Low	0.54	2.02	2.56
Central	0.72	2.70	3.42
High	0.90	3.37	4.27

Counterfactual

We have used sales data provided by Valpak (in a project for Defra carried out post-consultation)⁶⁵ to explore current trends in the single-use plates and cutlery market⁶⁶.

We assess the costs and benefits of the preferred option against what would have happened in the absence of the ban (i.e., the ‘do nothing’ scenario). By scaling down UK consumption to an England population⁶⁷, we have estimated in the central scenario that 0.6 billion single-use plates and 2.3 billion single-use items of cutlery are consumed in England each year – some of which are already made from alternative materials such as paper and wood.

It would be unrealistic to assume that the consumption of single-use plastic plates and cutlery will continue to be high under the ‘do nothing’ scenario. This is because the market has already begun to move away from plastic towards more sustainable materials. If assumed that plastic consumption remains high, it would likely overstate the value of the costs and benefits the ban would bring.

A significant number of businesses have already voluntarily switched to alternative material products, meaning a significant proportion of the market is already non-plastic. We have selected paper as the alternative material for plates, and wood for cutlery, as these are the most prevalent alternative materials in the current market⁶⁸. However, as technology develops, it is possible that other materials will become the dominant alternative, for example, bagasse or bamboo. This legislation could encourage further innovation in the market for alternative materials.

Valpak market data shows that plastic cutlery represented approximately 50% of all single-use cutlery consumed in 2019 and 2020, down from approximately 75% in 2017. This demonstrates a strong change in market share is already underway and is expected to continue under the no ban scenario. This change is driven largely by voluntary business action. One example of this is the UK Plastic Pact – under this, members, who are responsible for 85% of plastic packaging sold in UK

64 Valpak (unpublished), 2022

65 Valpak (unpublished), 2022

66 The forecasted trend is used to provide a conservative estimate of the impact of a ban in light of current voluntary action. However, it is important to note that the projected trends are speculative, and there is no guarantee that, in the absence of a ban, single-use plastic plate and cutlery usage will decrease by as much as predicted or would not rise again in the future. For example, this might happen if current public awareness and media attention on the issue is not sustained.

67 ONS 2020 population data

68 Valpak (unpublished), 2022

supermarkets, have pledged to take action to eliminate a number of single-use plastic items, including plates and cutlery.⁶⁹

Plastic Cutlery Counterfactual

We have extrapolated the cutlery market data trend to project that the plastic cutlery market share will reach 35% prior to implementation of the ban in 2023. In the absence of a ban, we project the plastic cutlery market share to continue to drop by 5 percentage points per year, until plateauing at 5% from 2029.

In the absence of a ban, some residual use of single-use plastic cutlery is likely to remain, with a small proportion of businesses continuing to use these items due to their lower cost or perceived benefit to consumers, or inertia in business purchasing decisions. This residual use in the absence of a ban was raised through multiple responses to our consultation and was flagged during Valpak's industry engagement as part of the market data project.

Residual use of the items in the absence of a ban results in the plateauing market share in the no ban scenario. We have modelled single-use plastic cutlery market share to plateau at 5% in 2029, staying at this level throughout the remainder of the appraisal period.

5% was judged to be the most appropriate estimate of the level at which the market share would plateau, considering industry views, market size and market structure (noting that the majority of current single-use plastic cutlery use is likely to be by small and micro businesses⁷⁰, who may be less inclined to switch in the absence of a ban).

The extrapolated market data resulted in a 5% single-use plastic cutlery market share in 2029, therefore 2029 was modelled as the start of the plateauing market share.

Single-use plastic cutlery and EPS containers market shares have been judged to have the same plateau level (5%) in a no ban scenario (see separate IA covering ban on single-use EPS food and beverage containers). Many of the end users of these items (e.g., takeaway shops) will provide demand for both items. Therefore, it follows that that a similar proportion of the market would continue to choose both single-use plastic items (EPS and cutlery) once others had switched to environmentally preferred alternatives, due to their lower cost – which is likely to be maintained. Single-use plastic cutlery is often part of a wider portfolio for producers/importers; therefore, these items may still be able to compete on price following declining demand, with fixed costs split over a wider product range. Though EPS production is more specialised, EPS items currently have a larger price difference compared to paper alternatives and would be likely to still compete on price, even if declining demand reduced economies of scale and increased production costs per item.

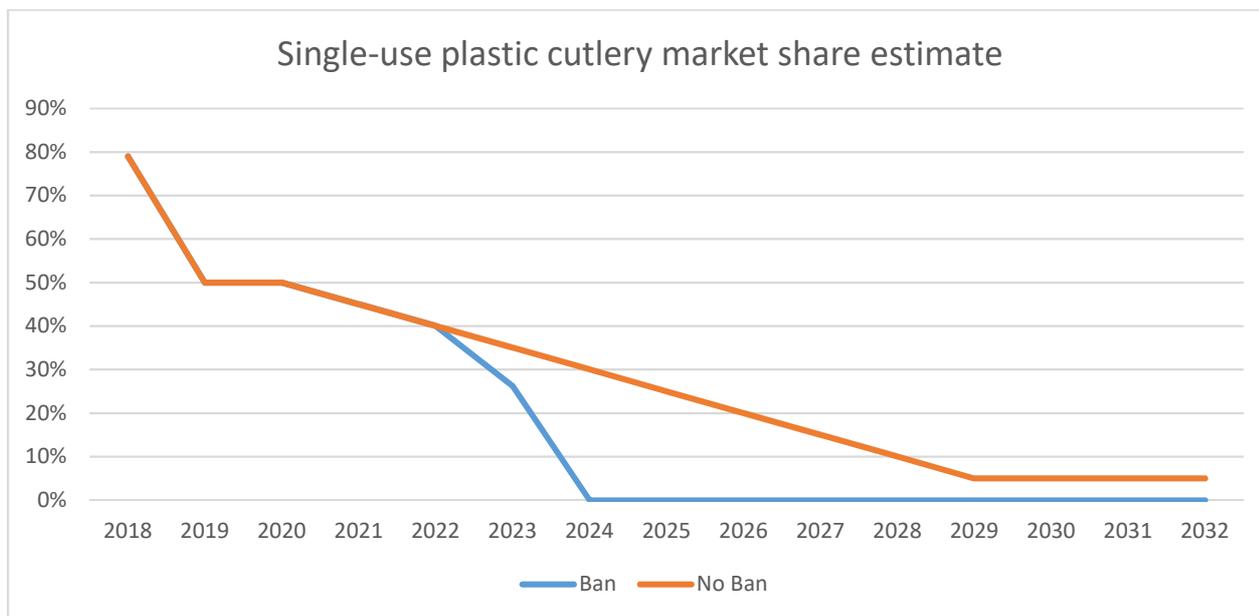
The cutlery counterfactual has been tested with an industry expert from the British Plastics Federation, who agrees the market share assumptions are reasonable. British Plastics Federation members have not been consulted on these assumptions.

The modelled **no ban scenario** for cutlery is compared to the **ban scenario** in Figure 1 below:

⁶⁹ WRAP (2020) [Tackle Flexible Plastic Packaging Now or Risk Missing UK Plastics Pact](#)

⁷⁰ Larger businesses are more likely to have already shifted away from these items than smaller businesses, confirmed through our engagement with UK Hospitality.

Figure 1: Scenario estimates of plastic share of the overall single-use cutlery market⁷¹



Source: Valpak data and Defra modelling

Plastic Plates Counterfactual

Valpak market data⁷² shows that 10% of single-use plates in 2020 were plastic, and 85% of single-use plates *mainly* consisted of paper. As single-use plates which are coated with plastic film but made primarily from another material are also in scope of the proposed ban, we assume that a half of the number of single-use plates primarily made from paper will be in scope of the policy⁷³. Therefore, the total market share of single-use plastic plates is estimated at 52% in 2020.

The trend to move away from plastic was less apparent with single-use plates in market data from 2017-2020. The market share of single-use plastic plates decreased from 52% in 2018 to 51% in 2019, though increased back to 52% in 2020. An explanation for this reversal in trend is that a shift towards paper may have been hindered by the shortage in supply of paper products in 2020 alongside increased demand from new markets. We have therefore extrapolated the 1 percentage point annual reduction seen from 2018 to 2019 to model the single-use plastic plates market share in the no ban scenario. Industry engagement has confirmed that while there is a shift in the market away from single-use plastic plates, this is at a slower rate than for the other items considered in this set of bans.

The plates counterfactual has been viewed by an industry expert from the British Plastics Federation, who agrees the market share assumptions are reasonable. British Plastics Federation members have not been consulted on these assumptions.

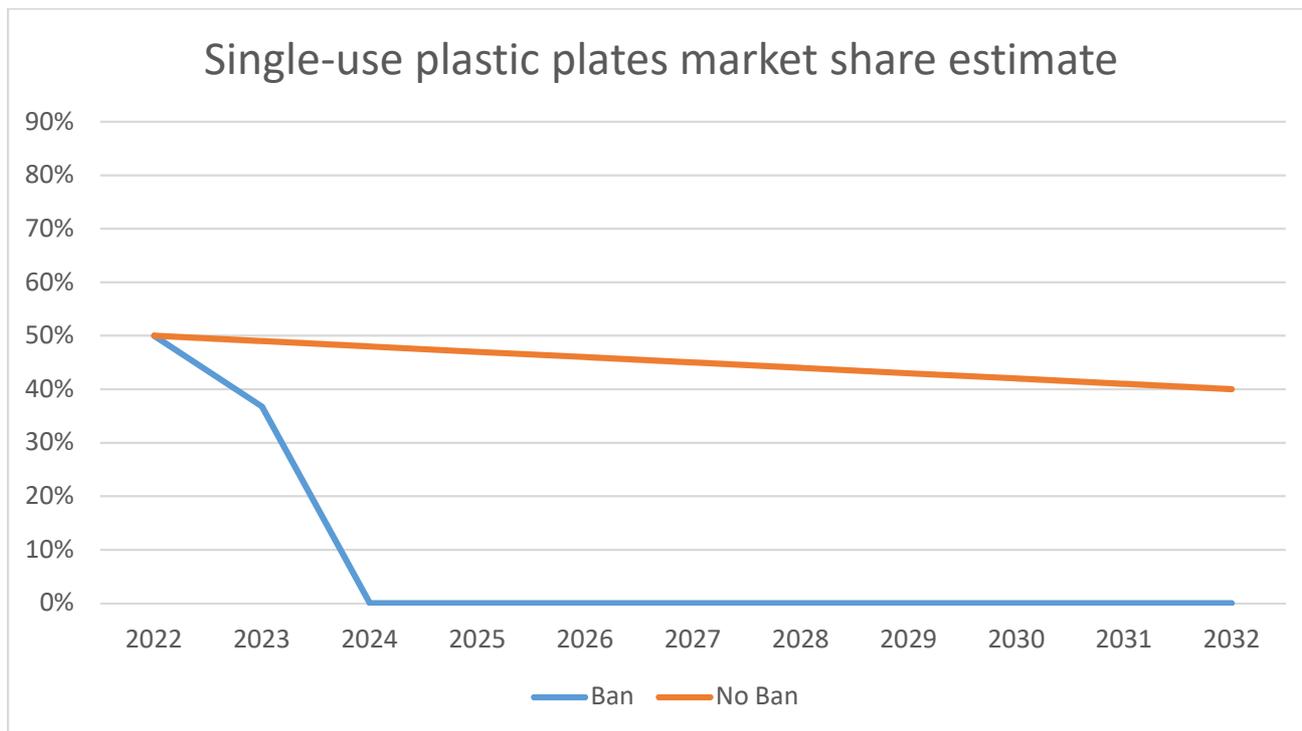
The modelled **no ban scenario** for plates is compared to the **ban scenario** in Figure 2 below:

⁷¹ Modelled no ban scenario assumes a shift from the 35% share of plastic for disposable cutlery use to a final base share of 5%, with the share reducing by 5 percentage points each year. Assumed to plateau at 5% in 2029.

⁷² Valpak (unpublished), 2022

⁷³ Assumption from desk-based research. 16 whole and retail websites selling single-use plates, last accessed in February 2023.

Figure 2: Scenario estimates of plastic share of the overall single-use plate market⁷⁴



For both plates and cutlery, total product sales (both plastic and non-plastic single-use products) are projected to increase in line with population growth (3%) each year under both the ban and no ban scenarios.

Market share estimates for the counterfactual charts above are calculated for whole calendar years. In 2023, the ban will be in place for 3 out of 12 months. Therefore, the 2023 market share for the ban scenarios are calculated as:

- Cutlery: (9 months * 40% market share) + (3 months * 0% market share) = 26.3%
- Plates: (9 months * 50% market share) + (3 months * 0% market share) = 36.8%

For cost and benefit calculations which include the total single-use plates or cutlery consumption figures⁷⁵, the impacts of the bans are calculated using the difference in market share of the banned items between the ban and no ban scenario. This is also adjusted to account for total market growth (in line with population). This results in the following profiles of market shares applied to these calculations:

Table 3: Profile of market shares, central scenario, cutlery⁷⁶

⁷⁴ Modelled no ban scenario assumes a shift from the 50% share of plastic for disposable plates use by 1 percentage point per year, to a final base share of 40% in 2032/33.

⁷⁵ Calculations are made using UK consumption figures, then totals are scaled down to England only.

⁷⁶ These percentages are the difference in consumption of single-use plastic cutlery between the ban and no ban scenario, relative to the 2.3 billion 2020 consumption estimate for all single-use cutlery. For example, in 2025 plastic cutlery consumption in the ban scenario is (29% * 2.3 billion) lower than in the no ban scenario and this is used to calculate the impact of the ban. These percentage differences are larger than the differences seen in Figure 1 due to the growth of the market as a whole.

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
9.6%	33.8%	29.0%	23.9%	18.4%	12.7%	6.5%	6.7%	6.9%	7.1%

Table 4: Profile of market shares, central scenario, plates⁷⁷

2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
13.4%	54.0%	54.5%	54.9%	55.3%	55.7%	56.1%	56.4%	56.8%	57.0%

Our methodology assumes that consumption of the banned single-use plastic items will be entirely replaced by consumption of alternative material single-use items. The ban may also encourage increased use of re-usable alternatives to the single-use plastic items, which if re-used enough times are likely to bring greater environmental benefits. There may be a small risk of re-usable alternatives being consumed as single-use items, though this is considered unlikely due to their higher price and the availability of plastic-free single-use items.

End of life assumptions

At end of life, disposal and recycling behaviours determine the environmental impacts associated with resource recovery and waste management. Based on Resource Futures research⁷⁸, local authority outturn data⁷⁹ and Defra modelling of non-household municipal waste treatment⁸⁰, it is assumed that the items will be disposed of in the following way:

Table 5: Plates end of life breakdown by material

	Plastic	Paper
Recycled	10%	10%
Incinerated	41.2%	36.6%
Landfill	48.3%	42.9%
Commercial composting	0%	10%
Terrestrial litter	0.5%	0.5%
Beach litter	0.0005%	0.000005%

Table 6: Cutlery end of life breakdown by material

	Plastic	Wood
Recycled	10%	0%
Incinerated	40.9%	36.4%
Landfill	48.0%	42.6%
Commercial composting	0%	20%

⁷⁷ These percentages are the difference in consumption of single-use plastic plates between the ban and no ban scenario, relative to the 0.6 billion 2020 consumption estimate for all single-use plates. For example, in 2025 plastic plate consumption in the ban scenario is (54.5% * 0.6 billion) lower than in the no ban scenario and this is used to calculate the impact of the ban. These percentage differences are larger than the differences seen in Figure 2 due to the growth of the market as a whole.

⁷⁸ Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

⁷⁹ Defra (2022) https://www.gov.uk/government/statistical-data-sets/env18-local-authority-collected-waste-annual-results-tables_

⁸⁰ Internal Defra modelling estimates that 64% of non-household municipal residual waste is sent to landfill.

Terrestrial litter	1.0%	1.0%
Beach litter	0.01%	0.0012%

It is assumed 20% of the waste from these items is managed by local authorities, with the remaining 80% managed by businesses⁸¹. These items are more likely to be used and disposed of within business premises than, for example, single-use food and beverage containers used mainly for takeaway purposes. We have applied this 20-80 weighting to the local authority outturn data and Defra modelling of non-household municipal waste treatment data, to estimate the proportion of these items sent to landfill vs incineration. Including non-household municipal waste treatment data within the calculation has increased the proportion of this waste assumed to be landfilled, compared to at consultation stage.

Summary of Monetised Costs

Enforcement Costs

Enforcement costs relate to the estimated additional burden to the 150 Trading Standards Authorities (TSAs) offices across England⁸² which will enforce the policy, using a reactive method.

As the ban will be enforced using a reactive method, compliant businesses will not face any enforcement-related costs. Non-compliant businesses will incur time related costs if they are inspected but these have not been monetised, as per RPC guidance.

The below assumptions and calculation of enforcement costs have been tested and agreed with the Association of Chief Trading Standards Officers.

Monetisation of enforcement costs

Because of the reactive enforcement approach targeting non-compliant businesses, we estimate that 0.25% of businesses in scope of the bans on single-use plastic plates and cutlery and EPS will be inspected. This reflects that many of the businesses in scope will have already shifted away from using the banned items. It is also based on the number of enforcement actions taken in the case of previous similar bans.

Engagement with the Association of Chief Trading Standards Officers (ACTSO) suggests that inspecting premises selling these items in the first instance will occupy 3.5 hours of an officer's time per year at a rate of £79.30 per hour.

We assume a 25% non-compliance rate following the initial visit (informed by ACTSO). Engagement with ACTSO suggests that inspecting premises selling these items in the second instance will occupy 7 hours of an officer's time per year at a rate of £79.30 per hour. We estimate the annual cost of legal action associated with non-compliance in the second instance to be £41k for both the bans on EPS and single-use plastic plates and cutlery (informed by ACTSO).

We also include in these calculations the cost of non-chargeable advice provided to businesses. We assume that on average, for each local authority, this will occupy 7 hours of an officer's time per year

⁸¹ Based on internal advice.

⁸² 22 TSA in Wales <https://www.tradingstandardswales.org.uk/about/>, 190 in England and 32 in Scotland based on number of Unitary Councils <https://lgiu.org/local-government-facts-and-figures-england/>, 5 Trading Standards Service offices in Northern Ireland <https://www.inputyouth.co.uk/tradingstandards.html>.

at a rate of £79.30 per hour, for both EPS and single-use plastic plates and cutlery products. We multiply this by the 150 local authorities in England to get a cost of £83k for the bans on EPS/P&C.

We have used the ratio of number of businesses in scope for each ban to apportion the enforcement costs between the EPS IA (155,923 businesses) and plates and cutlery IA (127,576 businesses). Since this cost is in 2023 prices, we then deflate it to 2020 as the standard price base year, before inputting this cost into the BIT calculator. For the plates and cutlery portion of the enforcement cost, this results in a present value cost of £0.2m over the 10-year appraisal period, incurred in the first three years of the policy.

Landfill Disposal Emissions Costs

Plastic-alternative products can result in environmental costs at the end of life. Paper and wooden items sent to landfill will emit more greenhouse gas emissions upon anaerobic decomposition than non-biodegradable plastic products. In our 'end-of-life' assumptions, we assume that a certain percentage of items are disposed of in landfill. The associated carbon emissions are reflected in the disposal landfill cost.

Monetisation of landfill disposal emissions cost

Table 5 and 6 show how single-use plates and cutlery are treated at end of life. The tables are used to estimate the difference in CO₂e emissions caused by the landfill disposal of the plastic and alternative material products. Polystyrene and polypropylene emit 0.009 tonnes CO₂e per tonne in landfill,⁸³ whereas wood and paper emit 0.828 and 1.042 tonnes CO₂e per tonne, respectively.⁸⁴ The difference in emissions is then multiplied by the central series carbon value in 2020 prices.⁸⁵

To calculate the landfill disposal emission cost caused by the ban we have then adjusted to account for market growth and the difference in market share of the banned items between the ban and no ban scenarios - see counterfactual section above. This results in a present value cost of £4.1m over the 10-year appraisal period.

Material Costs

Material cost is the additional cost to economic agents as a result of switching from plastic to alternative materials. On average, the unit price of single-use plastic cutlery is £0.02. The alternatives for plastic cutlery are more expensive at £0.03.⁸⁶ As per RPC guidance, these costs are treated as direct costs to business in the EANDCB calculation.⁸⁷ Retailers that sell plates and cutlery are expected to pass costs on to consumers in the higher prices charged. Hospitality businesses that choose to provide plates and cutlery free of charge alongside the purchase of food are expected to pass through these variable costs to consumers via general pricing structures, for example by slightly increasing the price of food. These indirect impacts have not been quantified as we do not have information on the price elasticity of single-use cutlery.

83 WRAP (2021) [Carbon Waste and Resources Metric](#)

84 WRAP (2021) [Carbon Waste and Resources Metric](#)

85 BEIS, [Valuing greenhouse gas emissions in policy appraisal](#)

86 Defra research based on a sample of products for sale from: Restaurant Supply Store, Kite Packaging, RR Packaging, Midpac, GreenFeel, The Party Experts, Onbuy, Cater 4 You, Amazon, Catering 24. Websites access in December 2021.

87 Regulatory Policy Committee, [Business Impact Target specific issues: direct versus](#)

Our approach to the analysis does not take into account potential economies of scale or higher competition that may result in a lower unit price as a result of higher consumption of alternative material products following the ban.

For single use plates, on average the alternatives are less expensive. Research shows the unit price of single-use plastic plates is £0.04, and paper alternatives are less expensive at £0.03.⁸⁸ However, we assume that businesses have chosen their present actions for good business reasons, such as to keep outgoings low, and so if government compels them to change then it must cause them some net cost (or at best be cost neutral). Therefore, there may be a net loss, despite the alternatives for single-use plastic plates being cheaper. We cannot monetise this impact, thus, this impact is presented as a zero net cost.

Monetisation of material costs

We estimate the total cost difference to all single-use cutlery consumed by multiplying the unit price difference (£0.01) by the estimated volume consumed (2.7bn in the UK – see Table 2). We assume under a ban scenario that consumption of single-use plastic cutlery entirely shifts to wood. This gives an annual estimate of £18.3m of cost difference, if all single-use cutlery was plastic. To calculate the material cost caused by the ban we have then adjusted to account for market growth and the difference in market share of the banned items between the ban and no ban scenarios – see Table 3 in counterfactual section above. This reduces the annual figure to reflect the costs imposed by the ban. This estimate was then scaled down to England using 2020 ONS population factors. Since this cost is in 2021 prices, we deflate it to 2020 prices as the standard price base year before inputting this cost into the BIT calculator. This results in a present value cost over the 10-year appraisal period of £23.2m.

Fuel Costs

Resource Futures estimate that plastic plates weigh 5g while paper plates weigh 10g.⁸⁹ Additional weight requires more fuel to transport. There are no fuel costs associated with the switch to wooden cutlery as Resource Futures have estimated that plastic cutlery and wooden alternatives are similar in weight.⁹⁰

A number of important factors are unknown, which makes it difficult to form a reliable estimate of fuel costs, such as:

- The average distance travelled by each plate in England.
- The number of plates carried on average in a lorry/ van.
- The mode or modes of transport and the vehicles used.
- The fuel cost of the additional weight per mile, which will depend on the mode of transport and the weight a vehicle is already transporting.

Monetisation of fuel costs

A study by the Massachusetts Institute of Technology found that if a light truck's weight load is reduced by 10kg, 80 litres of fuel are saved over 200,000km.⁹¹ To adapt this to this IA analysis, we assume

88 Defra research based on a sample of products for sale from: Catering 24, Paperstone, Buzz Catering Supplies, Amazon, The Safety Supply Company, Viking Direct, Cater 4 You, Greenpak Supplies, Nisbets, YPO. Accessed December 2021.

89 Resource Futures (2018) [Preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

90 Ibid

91 Government of Canada [Factors that Affect Fuel Efficiency](#)

fuel prices of £1.78/litre⁹². We assume the mean distance travelled by products to be 261km, based on responses received at consultation⁹³. This implies that for every additional kg of weight transported 261km, additional fuel worth £0.19 is consumed. Due to the uncertainty surrounding a number of the inputs to this estimate, we have included this figure as the low scenario estimate and doubled it to provide a conservative central scenario estimate (£0.37). For the high scenario estimate, the estimated fuel costs have been tripled to reflect the uncertainty and to account for the extreme end of the scale (£0.56). Multiplying the unit weight difference between plastic and paper plates (5g) by the total plate consumption (0.7 billion) gives the total additional weight caused by the replacement of plastic plates with paper alternatives (if all plates were plastic). We then multiply the additional weight by the fuel cost difference over 261km. To calculate the fuel costs caused by the ban we have then adjusted to account for market growth and the difference in market share of the banned items between the ban and no ban scenarios - see counterfactual section above. Since this cost is in 2022 prices, we deflate it to 2020 prices as the standard price base year before inputting this cost into the BIT calculator. This results in a present value of the cost over the 10-year appraisal period of £4.9m.

Fuel emissions costs

In addition to higher fuel costs to businesses (which have been included in the NPV and EANDCB calculations), the use of more fuel will result in higher greenhouse gas emissions.

Monetisation of fuel emissions cost

Using an average of 2.42 kg CO₂e per litre of diesel burned,⁹⁴ and a mean travel distance of 261km⁹⁵, the additional fuel required over a 10-year period will result in approximately 15,368 tonnes of CO₂e in emissions. Using 2020 carbon prices, this results in a present value of £1.8m from higher emissions over the 10-year appraisal period. If trends continue to shift towards electric vehicles over the next decade this cost may be an overestimate of actual additional diesel costs arising from a shift to heavier weight items, however due to uncertainties we have opted for this method as the most proportionate.

Additional Waste Management Costs

As discussed in the fuel costs section above, single-use plates made of paper weigh more than plastic equivalents. This will increase the cost of waste management as landfill tax and landfill/incineration site gate fees are calculated by weight. Single-use wooden and plastic cutlery are estimated to weigh the same, so this analysis applies to single-use plates only.

Local authorities and businesses are expected to share the additional waste management cost burden. As outlined in 'End of life assumptions' we expect businesses and local authorities to manage 80% and 20% of the waste from these items respectively and therefore bear the same proportions of these costs.⁹⁶

Monetisation of additional waste management cost

Waste management costs are based on the difference in weight between paper and plastic single-use plates – calculated via multiplying the weight of each type of plate by consumption levels in England. The following assumptions inform the rest of the analysis:

92 BEIS, Monthly and annual prices of road fuels and petroleum products, Diesel price 2022.

93 The Foodservice Packaging Association's consultation response noted that 261km was the average distance according to their members.

94 BEIS, [Valuing greenhouse gas emissions in policy appraisal](#)

95 The Foodservice Packaging Association's consultation response noted that 261km was the average distance travelled according to their members.

96 Based on internal advice from Defra statistics

- 90% of single-use plastic plates and 80% of single-use paper alternatives are sent for residual waste treatment (incineration or landfill) at the end of their lives, as outlined in Tables 5 and 6.
 - 41.2% of single-use plastic plates are incinerated, while the remaining 48.3% are sent to landfill.
 - 36.6% of paper alternatives are incinerated and 42.9% end up in landfill.

We estimate the cost of single-use plastic and paper plates sent to waste treatment using 2020 rates of the landfill tax⁹⁷, landfill gate fee and incineration gate fee.⁹⁸ We then calculate the additional costs from moving to single-use paper rather than plastic items and apportion them between businesses and local authorities. To calculate the additional waste management costs caused by the ban we have then adjusted to account for market growth and the difference in market share of the banned items between the ban and no ban scenarios - see counterfactual section above. This results in a present value cost of £0.8m for businesses and £0.2m for Local Authorities over the 10-year appraisal period.

Only the cost to business has been included in the EANDCB.

Producer impacts

Evidence suggests that 10% of single use plastic plates and cutlery are produced domestically and the remaining 90% are imported.⁹⁹

Following the implementation of the ban, producers will be forced to stop selling single-use plastic plates and cutlery in England and domestic producers are likely to stop production of these items entirely¹⁰⁰. The ban will have the direct impact of loss of profit from production of these items. This is monetised in the section below.

Following the ban, we would expect businesses to choose the course of action which maximises their profit function. Though there is potential that for some producers this may mean ceasing trading, we would also expect some producers to move to production of the next most profitable alternative for their business. We acknowledge any switch in production is likely to result in lower total profit, otherwise producers would have already made this switch. But it is reasonable to expect a proportion of the lost profit to be recouped through production of other items. This would be an indirect impact and is not considered within our EANDCB calculation.

Where producers switch to producing other items, there is likely to be some capital investment cost associated with making this switch. In an extreme scenario, all producers could choose to buy entirely new production capital, in order to produce the product types which are the subject of the ban using alternative materials, for example wooden cutlery. In a low-cost scenario, producers may be able to make more modest changes to their production processes, for example to pivot to produce other plastic items, which are not the subject of the ban. The reality is likely to fall between these two scenarios, with some existing production capital adjusted, some new production capital purchased and potentially some producers ceasing to trade. These investment decisions will also depend on the age and condition of existing capital assets. Fully depreciated capital assets, for example, may have led to significant capital investment anyway.

⁹⁷ HMRC, [Landfill Tax rates](#)

⁹⁸ Let's Recycle [EFW Landfill RDF 2020 rates](#)

⁹⁹ Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

¹⁰⁰ A Foodservice Packaging Association members survey on the impact of this set of bans (EPS, plates and cutlery and balloon sticks) indicated that no members intend to continue domestic production of the banned items.

Monetisation of producer profit loss

We calculate annual wholesale revenue using an estimate of domestic sales for all single-use plates and cutlery multiplied by the average price wholesalers are selling the items at, which is £0.04 for plates and £0.02 for cutlery. This gives an estimate of £7.3 million, for wholesale revenue generated by domestically produced single-use plates and cutlery.

2020 Annual Business Survey Data for SIC code 46 'wholesale trade, except of motor vehicles and motorcycles'¹⁰¹ is used to calculate an estimate of wholesale markup. Turnover net of purchases of goods, materials and services is calculated as a proportion of turnover, giving an estimated wholesale markup of 15.8%. This estimate was sense checked and various sources¹⁰² indicated it to be a credible assumption. We then multiply wholesale revenue by the complement of wholesale markup to calculate an annual producer revenue estimate of £6.1 million¹⁰³.

Annual Business Survey Data for SIC code 22 'manufacture of rubber and plastic products'¹⁰⁴ is used to calculate an estimate of producer profit margins. Turnover net of purchases of goods, materials and services and net of employment costs is calculated as a proportion of turnover, giving a producer profit margin of 16.2%. Multiplying producer revenue by the producer profit margins gives us an annual producer profit estimate of £0.99 million¹⁰⁵, for all single-use plates and cutlery (plastic and other materials).

The initial totals above are calculated using the production estimate all single-use plates and cutlery. To calculate the profit loss caused by the ban, we have then adjusted to account for market growth and the difference in market share between the ban and no ban scenarios - see counterfactual section above. Since this cost is in 2021 prices, we deflate it to 2020 prices as the standard price base year before inputting this cost into the BIT calculator. This results in a present value cost of £2.3m over the appraisal period. To reflect the uncertainty in these calculations, we have used 75% and 125% of this central estimate for our lower and upper estimates.

Monetisation of capital investment

We have engaged with industry to gain evidence on the level of capital investment that may be required to replace or adapt production capital following the ban on single-use plastic plates and cutlery. However, no estimates were able to be provided.

In the absence of suitable estimates from industry, we have used the best available evidence to provide approximate estimates for the level of investment that may be seen. This involves using the capital investment estimates for expanded and extruded polystyrene (EPS) food and beverage containers as a proxy and adjusting these based on the value of domestic plastic plates and cutlery production relative to the value of domestic EPS containers production.

To obtain an estimate of capital investment costs, we first calculate the value of domestic production of plastic plates and cutlery by multiplying the annual consumption by the domestic production market share by the unit cost of the single-use plastic item by the share of the market in 2023 that belongs to the single-use plastic item. The value of domestic production of plastic plates and plastic cutlery is £1,470,114 and £2,319,215 respectively. We then calculate these figures as proportions of the value

101 [Non-financial business economy, UK regional results: Sections A to S - Office for National Statistics](#)

102 [PROs, Distributor Markup and Profit Margins in the Supply Chain and Chron, The Average Profit Margin for Wholesale](#)

103 $\text{£}7.3\text{m} * (1 - 15.8\%) = \text{£}6.1\text{m}$

104 [Non-financial business economy, UK regional results: Sections A to S - Office for National Statistics](#)

105 $\text{£}6.1\text{m} * 16.2\% = \text{£}0.99\text{m}$

of the domestic production of EPS (£4,073,833). These are 36% for plastic plates and 57% for plastic cutlery (93% combined).

In our high-cost scenario, all plates and cutlery manufacturers are assumed to invest in new production capital, to switch to producing alternative material plates and cutlery. For this estimate, we apply the 93% value of production proportion to the EPS high-cost scenario capital investment (£120m). This gives an estimate of £111.6m for the high-cost scenario plates and cutlery capital investment.

Our central scenario assumes some producers will invest in new capital assets, some may adapt existing production processes at a lower cost, and some may cease trading entirely¹⁰⁶. For this estimate, we apply the 93% value of production proportion to the EPS central scenario capital investment (£60m). This gives an estimate of £55.8m for the central scenario plates and cutlery capital investment.

Our low-cost scenario assumes a higher proportion of producers will choose to cease trading or make more moderate adaptations to their production processes, with fewer choosing to invest in new assets to switch to alternative material production. For this estimate, we apply the 93% value of production proportion to the EPS low-cost scenario capital investment (£30m). This gives an estimate of £27.9m for the low-cost scenario plates and cutlery capital investment.

Since this cost is in 2018 prices, we inflate it to 2020 prices as the standard price base year before inputting this cost into the BIT calculator. This results in a central present value cost of £60.5m over the appraisal period, incurred in full in the first year of the ban.

Producer familiarisation costs

Producers of the banned items will also face familiarisation costs, from the time taken to read and understand the legislation and subsequently make business decisions relating to the ban. For some this could involve decisions relating to altering production processes or adjusting business plans. Therefore, we would expect familiarisation costs to be higher per business for producers than for other businesses, though they are likely to vary for each individual producer.

Familiarisation costs are likely to be minimised by single-use plastic bans having been in the public domain for a significant amount of time and therefore many businesses would have anticipated these bans. The Resources & Waste Strategy, published in 2018, set out potential bans. A ban on plastic straws, buds and stirrers was implemented in 2020, and this set of bans were consulted on in 2021. The government response announcing this set of bans has been published 9 months before implementation. Additionally, similar single-use items have been banned in other countries, such as Scotland.

Responses to our consultation and to industry body surveys have suggested that many producers have already planned what they will do following a ban.

Familiarisation costs should be further reduced by the guidance on the set of bans which Defra has shared with key industry bodies in April 2023, available for them to share with their members.

These producer familiarisation costs would only apply to a very low number of businesses. We estimate there to be around 10 domestic producers who produce single-use plastic plates and/or

¹⁰⁶ A Foodservice Packaging Association members survey on the impact of this set of bans (EPS, plates and cutlery and balloon sticks), indicated that only one member intended to install new equipment to produce alternative material items, and confirmed that more moderate changes are more likely for most producers.

cutlery¹⁰⁷. Producers of other single-use plastic items would face no familiarisation costs, as it would be clear from the legislation that their products are not in scope.

Due to the very low number of businesses impacted it is not proportionate for producer familiarisation costs to be monetised in this impact assessment.

Summary of Monetised Benefits

Disposal Incineration Emissions Benefit

We assume that 41.2% and 40.9% of plastic plates and plastic cutlery respectively are incinerated and 36.6% and 36.4% of the respective paper and wood alternatives are incinerated (table 5 and 6). Paper and wood items produce biogenic GHG emissions when incinerated, unlike plastic which are cyclical in nature and not included in carbon accounting. Once the energy generated is accounted for, paper and wood items produce net emissions savings.

Monetisation of disposal incineration emissions benefit

To calculate the incineration benefit we estimate the difference in tonnes of CO₂e between emissions released upon incineration of the plastic product (1.691 tonnes CO₂e per tonne of material incinerated) and the emissions released upon incineration of the alternative material product (-0.218 CO₂e per tonne of material incinerated)¹⁰⁸. We then multiply the difference in emissions from incineration by the carbon value.¹⁰⁹

To calculate the disposal incineration emissions benefit caused by the ban we have then adjusted to account for market growth and the difference in market share of the banned items between the ban and no ban scenarios - see counterfactual section above. The benefit results in a present value of £5.1m over the appraisal period.

Beach Wellbeing Benefit

89% of people in the UK state that they are concerned about plastic pollution in the ocean.¹¹⁰ The presence of litter can contribute to a fear of crime and injury, both of which have a negative wellbeing impact.¹¹¹ Litter can also discourage the use of public spaces and reduce our enjoyment of marine environments. There is a negative wellbeing impact experienced when harm to marine environments and the wildlife in them is observed. Clean environments have value to people who care for the welfare of wildlife and other people, and littered environments affect people's sense of safety, enjoyment and willingness to use public spaces. Therefore, there is a social disamenity cost associated with litter.

A ban on single-use plastic plates and cutlery is expected to have a positive amenity benefit by reducing the amount of single-use plastic in circulation and potentially littered. Even if the alternative material items end up in marine environments, paper plates and wooden cutlery will decompose much faster. This will lead to fewer of them being found across all environments as litter. As the alternative materials are derived from cellulose, they also pose less of a risk to wildlife if ingested and reduce the cumulative impact of microplastics in marine environments. An amenity benefit is generated from the satisfaction of knowing that something is being done to reduce harm to marine environments (beaches and seas) and monetised using a willingness-to-pay method.

107 This estimate has been viewed by an industry expert from the British Plastics Federation, who agrees it is a reasonable estimate of the number of producers of these items. British Plastics Federation members have not been consulted on this estimate.

108 WRAP (2021) [Carbon Waste and Resources Metric](#)

109 BEIS, [Valuing greenhouse gas emissions in policy appraisal](#)

110 Populus (2018) Ocean Plastic Survey

111 Lorenc, T., Petticrew, M., Whitehead, M. *et al* (2013) [Fear of crime and the environment: systematic review of UK qualitative evidence](#). *BMC Public Health* **13**, 496

Monetisation of beach wellbeing benefit

These impacts are difficult to monetise directly, so we have used a willingness to pay method:

The Economics for the Environment Consultancy (Eftec)¹¹² estimate that households' mean willingness to pay for clean beaches is £8.50¹¹³ per year, based on a survey of 809 beach and non-beach users. Based on there being 27,792,000 households in the UK¹¹⁴, we estimate that the total willingness to pay for clean beaches is £236,504,000 per annum (central estimate). This estimate was then scaled down to England using 2020 ONS population factors. We assume that a small proportion of this estimate can be attributed to a reduction in littered plastic plates and cutlery.

- Single use plates are estimated to make up 0.03% of all beach litter¹¹⁵ based on item volume. We multiply this by the total willingness to pay for clean beaches to obtain willingness to pay estimates for beaches free of plates litter.
- We then account for the difference in the decomposition rates between plastic and the alternative material items. Our central estimate is that paper decomposes in 0.022% of the time it takes for plastic to decompose.¹¹⁶ We multiply the complements of this (99.98%) by the willingness to pay for beaches free of plastic plates litter. This is to reflect that the alternatives will be present in the marine environment for a significantly shorter period of time, leading to fewer items found.
- This gives us an estimate of the annual amenity benefit of marine litter reduction as a result of switching to alternative materials (£0.07m), if all single-use plates were made of plastic.¹¹⁷
- To calculate the impact of the ban, we then adjust using the difference in the market share between the ban and no ban scenario.
- Since this cost is in 2002 prices, we inflate it to 2020 prices as the standard price base year before inputting this cost into the BIT calculator.

Over the 10-year appraisal period, the beach well-being benefit results in a present value of £0.3m.

Reduced terrestrial litter benefit

As mentioned above, a ban on single-use plastic plates and cutlery is expected to have a positive amenity benefit by reducing the amount of single-use plastic in circulation and potentially littered. While a ban won't reduce instances of littering, the alternative material items decompose much faster which will lead to fewer of them being found across all environments as litter. In addition to being visually unpleasant, it has been found to be the case that higher amounts of litter in an area are correlated with higher rates of crime in that same area, as suggested by the Broken Windows Theory¹¹⁸. An amenity benefit is generated from the satisfaction of having cleaner streets in local authority areas.

112 Eftec (2002), Valuation of Benefits to England and Wales of a Revised Bathing Water Quality Directive and Other Beach Characteristics Using the Choice Experiment Methodology

113 A range of £6 to £11 per household was given in the survey. We have used the mean value of this for calculations.

114 ONS (2020) Families and households

115 Resource Futures (2018), using Nelms et al. (2017) Marine anthropogenic litter on British beaches: A 10-year nationwide assessment using citizen science data.

116 Chamas et al (2020) Degradation Rates of Plastics in the Environment.

Nagamine, R., Kobayashi, K., Kusumi, R. *et al.* (2022) Cellulose fiber biodegradation in natural waters: river water, brackish water, and seawater

Wood: <https://cementanswers.com/does-submerged-wood-rot/>

117 We have not modelled beach wellbeing benefits associated with paper for the first 1.88 years of the policy due to the paper alternatives taking 1.88 years to decompose. Similarly, we have not modelled beach wellbeing benefits associated with wood for the duration of the policy due to the wooden alternatives taking 155 years to decompose in a marine environment. This approach is in line with previous single-use plastic ban IA's, such as the straws ban.

118 Eunomia (2014) Exploring the Indirect Costs of Litter in England

Monetisation of reduced terrestrial litter benefit

This area is difficult to monetise directly, so we have used a willingness to pay method:

- The Economics for the Environment Consultancy (Eftec)¹¹⁹ estimate that households' mean marginal willingness to pay for a 1% point reduction in Local Authority area litter is £0.66 per year (2020 prices). Based on there being 27,792,000 households in the UK¹²⁰, we estimate that the total willingness to pay for a clean terrestrial environment is £18,342,720 per annum (central estimate) based on a 1% point improvement. This estimate was then scaled down to England using the latest ONS population factors. We assume that a small proportion of this estimate can be attributed to a reduction in littered plates and cutlery.
- Single-use cutlery and plates are estimated to make up 0.12% and 0.48% of all terrestrial litter respectively¹²¹ based on item volume. We multiply these by the total willingness to pay for a clean terrestrial environment to obtain an estimate for willingness to pay for a terrestrial environment free of these littered items. We then account for the difference in the decomposition rates between plastic and alternative material items in a soil environment. Our central estimate is that paper decomposes in 0.001% of the time it takes for plastic to decompose¹²² and wood decomposes in 0.005% of the time it takes for plastic to decompose¹²³, in a land environment. We multiply the complements of these (99.999% and 99.995% respectively) by the willingness to pay for beaches free of plates and cutlery litter. This is to reflect that paper plates and wooden cutlery will be present in the environment for a significantly shorter period of time, leading to fewer items found.
- This provides an estimate of reduced terrestrial litter benefit as a result of using alternative materials, if all single-use plates and cutlery were plastic.¹²⁴
- To calculate the impact of the ban, we then adjust using the difference in the market share between the ban and no ban scenario.

Over the 10-year appraisal period, the reduced terrestrial litter benefit results in a present value of £0.3m.

This estimate is less than the beach well-being benefit. The terrestrial litter estimate is encompassing of litter in all terrestrial locations, not solely populated streets. Additionally, marine litter is associated with harm to marine life, which may explain the higher willingness to pay for clean beaches.

Reduced Coastal Clean-Up Costs

The implementation of the ban on single-use plastic plates and cutlery is predicted to reduce marine litter clean-up costs to local authorities. The faster decomposition rates of plastic alternatives (our

119 Eftec (2021) Amenity Value Benefits of a Deposit Return Scheme for Drinks Containers

120 ONS (2020) [Families and households](#)

121 Resource Futures (2018), using Resource Futures Composition analysis of litter waste in Wales

<https://www.gov.wales/sites/default/files/publications/2020-01/composition-analysis-of-litter-waste-in-wales.pdf>

122 Plastic: Chamas et al (2020) Plastic: [Degradation Rates of Plastics in the Environment](#).

Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

Plastic decomposition rate in soil is estimated to be 8,500 years. Paper decomposition rate in soil is estimated to be 0.096 years. We use soil environments as a proxy for terrestrial litter environments.

123 Wood: <https://cementanswers.com/does-submerged-wood-rot/>

124 We have not modelled 'reduced terrestrial litter benefit' associated with paper plates for the first 0.1 years of the policy due to the paper alternatives taking 0.1 years to decompose. Similarly, we have not modelled a benefit associated with wooden cutlery for the first 0.3 years of the policy due to wood being estimated to take 0.3 years to decompose in a terrestrial environment. This approach is in line with previous single-use plastic ban IA's, such as the straws ban.

central estimate is paper decomposes 4,500 times faster than plastic mean that these items will be present on beaches for less time. This means there will be fewer litter items to be cleared over time in harbours and beaches. There are no savings associated with street litter collection as these items are often cleaned up before they decompose, this may underestimate the benefit in the cases where items are not cleared up in the time taken for wood or paper to decompose.

Monetisation of benefits associated with reduced coastal clean-up

Harbours and marinas have litter cleared in order to ensure that their facilities remain clean, safe and attractive for users. Mouat et al. (2010)¹²⁵ estimate that UK municipalities spend approximately £15.8 million each year removing all forms of beach litter, and £2.1 million each year on harbours.

By volume, single use plates are estimated to make up 0.03% of all marine litter¹²⁶. We multiply this by the total annual litter clean-up costs in beaches and harbours, taking into account that only 65%¹²⁷ of the total cost are assumed to be variable. This estimate was then scaled down to England using 2020 ONS population factors.

We then account for the difference in the decomposition rates between plastic and the alternative material items. Our central estimate is that paper decomposes in 0.022% of the time it takes for plastic to decompose¹²⁸.

We multiply the complement of 0.022% (99.98%) by the annual litter clean-up costs as calculated above. This is to reflect that paper plates will be present in the marine environment for a significantly shorter period of time, leading to fewer items found.¹²⁹

Finally, to calculate the impact of the ban, we then adjust using the difference in the market share between the ban and no ban scenario. Since this cost is in 2010 prices, we inflate it to 2020 prices as the standard price base year before inputting this cost into the BIT calculator. This results in a present value benefit of £0.01m over the appraisal period.

Production Emission Savings

Paper and card are much less emission intensive when produced. This means that the ban will deliver production-related emissions savings. When monetising we only account for those savings that will occur within England. Resource Futures have reported that for both plastic plates and cutlery, 10% of total products consumed in England are manufactured in England¹³⁰.

Monetisation of production emissions benefit

The decrease in emissions during production can be monetised using government carbon prices.

125 Mouat, Lozano, Bateson (2010) Economic Impacts of Marine Litter. Figure based on exchange rate of £1 = EUR 1.14

126 Resource Futures (2018), using Nelms et al. (2017) Marine anthropogenic litter on British beaches: A 10-year nationwide assessment using citizen science data.

127 LA Revenue outturn <https://www.gov.uk/government/statistics/local-authority-revenue-expenditure-and-financing-england-2018-to-2019-individual-local-authority-data-outturn> This is England data. We assume that the UK will have the same variable cost share.

128 Chamas et al (2020) Degradation Rates of Plastics in the Environment.

Paper: Nagamine, R., Kobayashi, K., Kusumi, R. *et al.* (2022) Cellulose fiber biodegradation in natural waters: river water, brackish water, and seawater

Wood: <https://cementanswers.com/does-submerged-wood-rot/>

129 We have not modelled 'reduced coastal cleanup cost' benefits associated with paper for the first 1.88 years of the policy due to the paper alternatives taking 1.88 years to decompose. Similarly, we have not modelled the benefit associated with wood for the duration of the policy due to the wooden alternatives taking 155 years to decompose in a marine environment. This approach is in line with previous single-use plastic ban IA's, such as the straws ban.

130 Resource futures (2018) A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

- Most plastic plates are made from polystyrene¹³¹ and one tonne of material produced is associated with 3.78 tonnes of CO₂e.¹³²
- Most plastic cutlery is made from polystyrene or polypropylene¹³³. We have assumed that plastic cutlery are made using both materials equally. Per tonne produced, polystyrene emits 3.78 tonnes of CO₂e and polypropylene emits 3.10 tonnes of CO₂e.¹³⁴ The 50/50 plastic assumed material composition gives us an average estimate of 3.44 tonnes CO₂e¹³⁵ per tonne produced.
- We have estimated the total number of plates and cutlery produced in England. This was based on the total number consumed in England multiplied by the domestic share of the market (10%).
- This is multiplied by the respective unit weight of the product to find total tonnage of each product produced domestically. Total tonnage is then multiplied by the emissions per tonne of the plastic/plastic alternative material. The difference between the emissions resulting from the plastic plate/cutlery production and the alternative material plate/cutlery production is the production emission savings benefit.
- To calculate the production emission savings caused by the ban we have then adjusted to account for market growth and the difference in market share of the banned items between the ban and no ban scenarios - see counterfactual section above. The production emission savings result in a present value saving of £1.4m over the 10-year appraisal period.

Non-monetised Costs and Benefits

Summary of non-monetised costs

Familiarisation costs

Familiarisation costs are the one-off costs that businesses face upon implementation of the ban. For retailers, this will cover the time taken to inform employees about the ban, costs attached to any necessary price changes of products, and time taken to shop around for an alternative supplier.¹³⁶ Wholesalers and producers may face more complex business decisions following a ban. These have been discussed further in the Producer impacts and Wholesaler impacts sections.

Our estimate is that 155,923 businesses¹³⁷ will be affected by familiarisation costs in total across the bans on single-use plastic plates and cutlery and EPS food and beverage containers. These include restaurants, takeaway vendors, event caterers, and a range of retailers including supermarkets - further detail on relevant SIC breakdown is included in the EPS IA.

The businesses in scope of the bans on single-use plastic plates and cutlery are also in scope of the ban on single-use EPS food and beverage containers. And the 30 minute central estimate for familiarisation time (supported at consultation) covers familiarisation with the bans on both EPS and plates and cutlery. This means that the familiarisation cost is calculated only once (monetised in the EPS IA) to avoid double-counting. See EPS IA for further details.

131 Homesteady (2017) [What are plastic plates made of?](#)

132 Greenhouse Gas reporting conversion factors, 2020

133 <http://www.designlife-cycle.com/plasticcutlery>

134 Greenhouse Gas reporting conversion factors, 2020

135 Based on publications from Plastics Europe, WRAP, PriceWaterhouseCoopers & Ecobilan, Ecoinvent v 3

136 There are no proposed exemptions under this ban. As such, we did not include any on-going familiarisation costs to businesses. This is unlike the IA analysis on banning plastic straws which did include some exemptions and associated on-going familiarisation costs to businesses.

137 Office for National Statistics, UK business: activity, size and location, 2020 and FSA Food Hygiene Rating Scheme

Familiarisation costs should be minimised by the guidance on the set of bans which Defra has shared with key industry bodies in April 2023, available for them to share with their members.

Non-monetary preferences for plastic single-use plates

Despite single-use plastic plates being more expensive than single-use paper plates, a proportion of the market is still accounted for by single-use plastic plates. This would indicate that consumers have non-cost reasons that drive them to purchase plastic products over paper alternatives, for example robustness, availability or quality. For those consumers with this preference a ban on single-use plastic products will represent a disbenefit cost. Our consultation asked respondents if they anticipated any other costs from the proposed bans and the disbenefit cost was not raised in responses. As a result, due to insufficient evidence on the estimates for the monetised benefit of plastic over paper alternatives, we have not however monetised this as part of our assessment.

Excess Stock

If businesses stockpile more single-use plastic plates and cutlery than they can use before the ban is implemented, there is a risk they will be left with excess stock, which they may need to pay to dispose of. This is considered very low risk, as the government response announcing the ban has been published 9 months before implementation, giving businesses adequate time to switch to alternative materials. Also, single-use plastic bans have been in the public domain for a significant amount of time, with the Resources & Waste Strategy, published in 2018, setting out potential bans. A ban on plastic straws, buds and stirrers was implemented in 2020, and the 2021 consultation on banning the supply of commonly littered single-use plastic items.

Additionally, similar single-use items have been banned in other countries, such as Scotland. Therefore, many businesses would have anticipated these bans.

We have discussed the matter of excess stock costs with a representative of UK Hospitality. Following discussions with their members, they stated they do not believe excess stock is likely to be an issue for most businesses, with many already transitioning towards alternative material products and unlikely to be holding months' worth of stock of single-use plastic items. This discussion was held with the assumption of an April 2023 implementation date, rather than October 2023. This delay to the implementation date further decreases the likelihood of excess stock costs being incurred, giving businesses more time to adapt.

Wholesaler impacts

The wholesale sector is likely to be able to continue to trade the alternative material items replacing the banned items. There is a risk that some wholesalers could see reduced trade or margins, particularly during a transition period from plastic items to alternative materials, which may initially be harder to source. There may be some increased costs to wholesalers if they are required to source a greater proportion of their stock from abroad than prior to the bans¹³⁸. This could also result in longer lead times for customers.

¹³⁸ A Foodservice Packaging Association members survey on the impact of this set of bans (EPS, plates and cutlery and balloon sticks) indicated that the majority of alternative material items are likely to be sourced from outside of the UK.

Summary of non-monetised benefits

Increased use of re-useable alternatives

The ban may encourage increased use of re-usable alternatives to the banned single-use plastic items, rather than only a shift to alternative material single-use items. Generally, if items are re-used enough times, an increase in use of re-usable items will bring environmental benefits, compared to single-use items, including reduced raw material use.

Reduced damage to marine life

Plastics are the largest, most harmful and persistent fraction of marine litter, accounting for at least 85 per cent of total marine waste.¹³⁹ It is estimated that 1.5-4.5% of all global plastics production ends up in the ocean every year¹⁴⁰. In 2019, 6 million tonnes of plastic ended up in aquatic areas globally¹⁴¹. Single use plastic plates and cutlery are estimated to make up 0.03% and 0.01% of all beach litter respectively¹⁴² based on item volume.

These items can break down and be ingested by marine life up and down the food chain. Nearly 700 different marine species are affected by plastic ingestion and entanglement¹⁴³. It has been estimated that 50% of marine mammals, 40% of seabirds and all turtle species have been known to ingest plastic¹⁴⁴. Plastic can be retained in animals' stomachs and can impede dietary habits, either by making them feel full and therefore preventing them from eating, or by impeding their digestion, resulting in malnutrition and eventual starvation¹⁴⁵. Plastic cutlery are a particular risk to marine life given their long, thin form which can cause physical damage to an animal's digestive system. Furthermore, microplastics can absorb harmful substances such as endocrine disrupting chemicals (EDCs) that can disrupt the hormonal equilibrium of marine life¹⁴⁶. When microplastics are ingested, they can cause changes in gene and protein expression, inflammation, disruption of feeding behaviour, decreases in growth, changes in brain development, and reduced filtration and respiration rates. Microplastics also act as vectors for pathogenic organisms harmful to humans, fish and aquaculture stocks.¹⁴⁷

Plastics can also alter global carbon cycling through their effect on plankton and primary production in marine, freshwater and terrestrial systems. Marine ecosystems, especially mangroves, seagrasses, corals and salt marshes, play a major role in sequestering carbon. By damaging oceans and coastal areas, it becomes harder for these ecosystems to both offset and remain resilient to climate change.¹⁴⁸

Given that plastic plates and cutlery contribute to marine litter¹⁴⁹, the ban on these items will contribute to the reduction of marine plastic pollution which will in turn help reduce the damage to marine life, including fisheries.

The global plastic market in 2020 has been estimated at around US\$ 580 billion (432 billion GBP)¹⁵⁰ while the monetary value of losses of marine natural capital is estimated to be as high as US\$ 2,500

139 UNEP (2021) From Pollution to Solution: Marine Litter and Plastic Pollution Global Assessment

140 Science (2015) [Here's how much plastic enters the ocean each year](#)

141 OECD Global Plastic Outlook,

142 Nelms et al. (2017) [Marine anthropogenic litter on British beaches: A 10-year nationwide assessment using citizen science data](#). We assume plates make up 0.25% of 3 "ambiguous" plastic categories in the MCS data. We assume cutlery makes up 5% of "cutlery/trays/straws/cups".

143 Centre for Biological Diversity [Ocean Plastic Pollution](#)

144 Estimates from Centre for Environment, Fisheries & Aquaculture Science

145 [Cotton bud project](#)

146 Chen et al (2019) <https://www.sciencedirect.com/science/article/pii/S0160412019303137>

147 UNEP (2021) From Pollution to Solution: Marine Litter and Plastic Pollution Global Assessment

148 UNEP (2021) From Pollution to Solution: Marine Litter and Plastic Pollution Global Assessment

149 EU described plates and cutlery as in the top ten single use plastics littered in marine environments https://ec.europa.eu/commission/presscorner/detail/en/MEMO_18_3909

150 Exchange rate value as of 17th November 2021

billion per year (£1,860bn)¹⁵¹¹⁵². The European commission estimated that the cost of marine litter to the EU fishing industry could amount to almost €60 million¹⁵³. We have not quantified the effect the ban would have on reducing these costs as it is not clear the extent to which plastic plates and cutlery contribute to fishery damage, but even a small contribution by plastic plates and cutlery could cost thousands or millions of pounds each year, which could be prevented under a ban.

Other natural capital benefits

Banning single-use plates and cutlery will help to conserve natural assets and improve air quality. Where single use plates and cutlery are made from virgin plastic, they will contribute to depletion of natural assets, specifically fossil fuels. The production of plastic also pollutes air quality. Over 99% of plastic is made from petrochemicals derived from fossil fuels, which release hazardous air pollutants during extraction. Oil and gas drilling can release many toxic air contaminants including benzene, carbon monoxide, ethylbenzene, hydrogen sulphide, ozone, particulate matter, sulphur dioxide, toluene, volatile organic compounds and xylene.¹⁵⁴

A ban will also mitigate damage to land quality. When plastics are not properly disposed of, they can degrade land quality. Plastic is produced using toxins and these toxic chemicals can leach into the soil used for growing food. Plastic can also block storm drains and culverts, which can cause or worsen flooding and bank erosion.¹⁵⁵

Further, a ban will provide targeted action to address the ever-growing issue of marine plastic pollution thus improving water quality. Globally in 2019 there was 2.7Mt of microplastics leakage and 6Mt of plastic aquatic leakage. The accumulated stock of plastics globally is estimated to be 109Mt in rivers and lakes, and 30Mt in oceans.¹⁵⁶ These plastics cause harm to terrestrial and marine life as discussed in this impact assessment and degrade the water quality further with toxic compounds.

Improvements to human health

Furthermore, research is gradually revealing the impact that this marine plastic pollution could have on human health. The decomposition of plastics leads to microplastics. When marine life ingests plastic, the toxins in microplastics can be transferred up the food chain and can be ingested by humans¹⁵⁷. Human uptake of microplastics via seafood is likely to pose serious threats to coastal and indigenous communities where marine species are the main source of food. The human consumption of microplastics has been documented by many studies in recent years, but the impact of human microplastic consumption is still unclear¹⁵⁸ ¹⁵⁹. The decomposition of plastics leads to microplastics. When marine life ingests plastic, some studies suggest the toxins in microplastics can be transferred up the food chain and can be ingested by humans¹⁶⁰. Human uptake of microplastics via seafood is likely to negatively impact coastal and indigenous communities where marine species are the main source of food. It is estimated that humans consume 5g of plastic a week – the equivalent of a credit card.¹⁶¹ Microplastics have also been found in human blood.¹⁶² and a study which exposed human alveolar cells to polystyrene microplastics saw inhibition of cell proliferation and changes in cell

151 Exchange rate value as of 17th November 2021

152 UNEP (2021) From Pollution to Solution: Marine Litter and Plastic Pollution Global Assessment

153 European Commission [Our Oceans, Seas and Coasts. Good Environmental Status Descriptor](#)

154 Naturaler (2019) [How Does Plastic Pollution Affect the Air? - Naturaler](#)

155 KWRC (2021) [Plastics Reduction | kennebecasisriver](#)

156 OECD (2022) Global Plastic Outlook

157 National Geographic (2017) [Ocean Life Eats Tons of Plastic](#)

158 World Health Organisation (2019) [Microplastics in Drinking Water](#)

159 Cox et al (2019) [Human consumption of microplastics](#)

160 National Geographic (2017) [Ocean Life Eats Tons of Plastic](#)

161 WWF (2019) [plastic ingestion web spreads 1.pdf \(panda.org\)](#)

162 Leslie et al (2022) [Discovery and quantification of plastic particle pollution in human blood](#)

morphology.¹⁶³ Furthermore, babies and children may be more exposed to microplastics than adults. A recent study comparing stool samples of infants and adults¹⁶⁴ found that “the estimated mean daily exposures from the diet of infants to PET¹⁶⁵ and PC¹⁶⁶ microplastics were 83,000 and 860 ng/kg body weight per day, respectively, which were significantly higher than those of adults (PET: 5,800 ng/kg-bw/day; PC: 200 ng/kg-bw/d). This suggests that infants are exposed to higher levels of microplastics than adults.”

Additionally, Styrofoam products, which contain carcinogenic chemicals like styrene and benzene, are highly toxic if ingested, damaging the nervous systems, lungs and reproductive organs. The toxins in Styrofoam plastic plates can leach into food and drinks.¹⁶⁷

Risks

Risk surrounding imposing a ban

- **Increase in littering:** There is a risk that a change in material may encourage consumers to believe that the consequences of not disposing of plates and cutlery correctly will be reduced and therefore consumers will litter more or not recycle plates and cutlery as frequently. Following a ban on EPS cups in San Francisco in 2007, waste audits indicated that while there was a 34% reduction in littered cups in 2009 relative to the 2007 baseline, littering of paper cups increased by 141%.¹⁶⁸ However, we expect that the ban will raise people’s awareness of the environmental damage single use plastic items can cause, and that consumers will therefore dispose of them correctly.
- **Increase in prices:** Some suppliers may be forced to increase prices of single-use cutlery made from alternative materials in the short term due to excess demand around the ban. There may also be an incentive to use the forced change in material following the ban as an opportunity to impose price rises on consumers. As similar single-use plastic items have already been banned in the European Union and Scotland and businesses should have 8-9 months’ notice of this ban in England, attempting to mitigate this impact by delaying the ban is likely to have limited impact.
- **Inadequate provision of exemptions:** This would impose welfare costs on those who rely on using single-use plastic plates and cutlery in their everyday lives.
- **Stockpiling of single-use plastic plates and cutlery:** There is a risk that some members of the public may stockpile single-use plastic plates and cutlery in anticipation of the ban being implemented, which could increase sales and result in an underestimation of the number of these items being consumed after the ban is introduced. However, as the ban is on the supply of single-use plastic plates and cutlery to the end-user, rather than on preventing these items coming onto the market, there is a low risk of retailers stockpiling single-use plastic plates and cutlery for later sale, as they would be in breach of the law to do so.

Risks surrounding not imposing a ban

- **Environmental costs get worse:** If we don’t impose a ban the environmental impacts including harm to marine wildlife may worsen and possibly at a non-linear rate.
- **Commitments not met:** The ban forces retailers to adhere to the voluntary commitments many retailers have already made towards switching to plates and cutlery made from alternative material to plastic. If a ban is not imposed retailers may fall back on or delay commitments they have made.

163 Goodman et al (2021) [Exposure of Human Lung Cells to Polystyrene Microplastics Significantly Retards Cell Proliferation and Triggers Morphological Changes](#)

164 Zhang et al (2021) [Occurrence of Polyethylene Terephthalate and Polycarbonate Microplastics in Infant and Adult Feces](#)

165 Polyethylene terephthalate

166 Polycarbonate

167 UNEP (2018) Single-use plastics – A roadmap to sustainability

168 OECD (2021) Preventing single-use plastic waste: implications of different policy approaches.

- **Consumers keep choosing plastic:** There is a risk that consumers will still opt for plastic plates and cutlery without a ban. They could do so inadvertently if products are not well labelled, or consumers may find that they prefer plastic plates and cutlery. It may be that there is a time inconsistency problem where consumers state that they should not use plastic plates and cutlery because of their associated environmental harms, but upon purchase they discount future and indirect environmental costs too strongly in favour of a plastic product that they may prefer to use now.

Equality Impact Assessment

The public sector equality duty introduced the requirement for public bodies to assess whether policy proposals will unlawfully discriminate against a group of people. Defra has conducted an Equality Impact Assessment alongside this. We believe that the ban on plastic plates and cutlery will not unlawfully discriminate against any group of people. From our consultation, only 2.9% of respondents felt a ban on single use plastic plates and cutlery would negatively impact those with protected characteristics. Many of these responses were anecdotal or suggestions for consideration rather than clear requests from organisations or charities representing people with disabilities or mental health conditions. By contrast, when we consulted on banning single use plastic straws, many organisations and charities responded with clear, concise requests for medical exemptions which we factored into our decision making. We sought to carry out post-consultation engagement to ensure that disabled groups were not discriminated following which no objections were raised.

Competition Assessment

We acknowledge the competition impacts that arise from banning a product. Some suppliers of single use plastic plates and cutlery may decide to exit the market.

By banning single-use plastic plates and cutlery there may also be positive competition impacts in alternative material item markets through increased demand for these products encouraging new entrants to the market. This may bring the benefits increased competition drives such as innovation and greater efficiency. In turn this may reduce the impact on end suppliers modelled in this impact assessment by reducing the price of alternative material items.

Further, since the ban on the supply of single-use plastic plates and cutlery to the end user is to be applied uniformly across England it will create a level playing field for all businesses and therefore we do not expect competition issues with consumers switching to go to a different retailer to request these items. Businesses will also be on a level playing field as they will not be able to undercut each other by offering cheaper containers made from plastic, as those will be banned. Introducing a ban in England will level the playing field with Wales and Scotland, where bans either are being proposed (Wales) or have come into force (Scotland).

Although there could be barriers to entry to new businesses entering the market in the form of higher costs of the alternative material items, this may be short lived as these items become more popular and economies of scale form. Further, retailers and hospitality businesses compete on the goods and services they offer and not on single use plastic packaging so any potential barriers to entry created would likely be very minimal.

Trade and Innovation Assessment

Evidence suggests that 10% of single use plastic plates and cutlery are produced domestically in the UK and the remaining 90% are imported.¹⁶⁹

If the UK has a comparative advantage in manufacturing items made from wood and paper, this will may benefit UK production. Additionally, a ban on single-use plastic plates and cutlery could further strengthen the market for innovation of items made from alternative materials. This was supported in our consultation where a ‘green’ business said a ban would encourage them to create a wider range of products and designs.

However, a Foodservice Packaging Association members survey on the impact of this set of bans (EPS, plates and cutlery and balloon sticks) indicated that the majority of alternative material items are likely to be sourced from outside of the UK, which would increase reliance on imports.

Monitoring and Evaluation

Evaluation plan

Defra made a commitment in the Resources & Waste Strategy¹⁷⁰ that “all significant policies, programmes and projects should be subject to comprehensive but proportionate evaluation” (p.143). In 2020, we published the Evaluation Plan. Since then, we have also published three editions of Monitoring Progress. In March 2022 we commissioned the evaluation and in November 2022, we published the Programme of Work for 2022/2023 which provides some further information on the evaluation approach.

The aim of the evaluation is to help Defra understand what has and has not been successful about key objectives and commitments of the Strategy, why and for whom. We will use that knowledge to adapt design, implementation and/or regulation, or provide additional input into the operating context to make policies more effective. Understanding what has and has not worked, why and for whom, will help inform decision making and design better resources and waste policy in the future.

The evaluation will run over at least five years and will design and deliver:

- Light-touch evaluations of key policies (**process evaluations**) that Defra will implement over the lifetime of the evaluation, kicked off at least six months after the policy’s implementation, with the aim of understanding the initial outcomes of the policy and indicative progress towards longer-term outcomes.
- **Impact evaluations** covering high-level policy outcomes of the policies.
- An **economic evaluation**, comprising a cost-benefit analysis of each of the policies and estimates of the cost/benefit ration of making the progress to date towards achieving the policy outcomes.

Six high-level desired policy outcomes (POs) of the Strategy will be assessed:

- a. PO1: More products are regularly retained, reused, repurposed, refurbished or remanufactured;
- b. PO2: Recycling rates for households, businesses, municipal waste increase;
- c. PO3: Household, municipal and business waste streams improve in quality;
- d. PO4: Plastics waste is prevented at all stages of the plastics life cycle; and,
- e. PO5: Waste crime is reduced.
- f. PO6: Food Waste is prevented

¹⁶⁹ Resource futures (2018) [A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks](#)

¹⁷⁰ <https://www.gov.uk/government/publications/resources-and-waste-strategy-for-england-monitoring-and-evaluation>

In addition, 12 policy evaluations will be conducted. This set of single-use plastic bans (EPS, plates and cutlery and balloon sticks) is one of the key policies for which a policy evaluation will be undertaken as part of this programme. This policy will also be considered and evaluated as part of PO4: Plastic Waste is prevented at all stages of the plastic life cycle, given that it is one the policies expected to have the greatest effect on plastic waste prevention.

In February 2022 we appointed a consortium led by Ipsos, to deliver the evaluation of the Strategy. The evaluation started in February 2022 with pre-implementation activities and planning for baseline data collection taking place so far. Data collection and reporting will be delivered over the course of five years starting in March 2022, and a final synthesis report will be produced at the end of the programme in 2027 which will draw together the findings from all evaluation activity. The policy process evaluation will take place six months after the policy has been implemented (Spring 2024).

As part of the evaluation, a list of indicators of change based on the Theory of Change for the policy are being developed. This will include measurable, meaningful and proportionate indicators of outcomes (or proxy indicators) and impacts. A Data Collection Plan will be produced in 2023 outlining available data sources, identifying data gaps and new approaches to gathering necessary data to fill in these gaps. This will consider and be linked to the existing Monitoring Progress and the 25 Year Environment Plan indicators as well.

The evaluation budget is £2.5 million for 2022 - 2027, with £300,000 committed for FY23/24. Indicative timeline:

Scoping	May-22
Development of Theory of Change	June - Feb 2023
Indicator plan & monitoring data collection plan	Jan 22- March-23
Baseline data collection	July 23 – Sep 23
Process evaluation	2023 - 2025
Impact evaluation	2023 - 2027
Economic evaluation	2027

Small and Micro Businesses Assessment (SaMBA)

Businesses in the Accommodation and Food Services sector will bear the business costs of the ban directly linked to the volume of plastic plates and cutlery used (waste management costs, the cost of switching to higher priced paper items and fuel costs). Small and Micro businesses account for 36% of the turnover of businesses in the Accommodation and Food Services group. As illustrated in Table 8, large businesses account for almost half of the size of the market by turnover.

Table 8: Breakdown of total turnover of businesses in Accommodation and Food Services in England, by employment bands

England	Employment size band
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	Micro (1 – 9 employee s)	Small (10 – 49 employee s)	Medium (50 – 249 employee s)	Large (250 or more employee s)
I: Accommodation and Food Services	19%	20%	13%	49%

.Source: ONS¹⁷¹ Totals do not sum to 100 due to rounding.

The above turnover split could be used as a proxy for use of single-use plastic plates and cutlery by business size. However, this would likely underestimate the costs to small and micro businesses. Larger businesses are more likely to have already switched to alternative material items than smaller businesses and this was confirmed through our engagement with UK Hospitality. This is due to larger businesses benefitting from economies of scale when purchasing alternative material items and potentially having more resources allocated to considering environmental impacts.

Acquiring accurate data on the split of use of single-use plastic plates and cutlery items by business size would require a large-scale survey and is not proportionate for this analysis. Recognising that available data (turnover) would underestimate single-use plastic plates and cutlery use for small and micro businesses, we have instead modelled an upper and lower scenario range.

We have modelled the scenarios below, reflecting that the majority of remaining single-use plastic plates and cutlery use will be in small and micro businesses.

Table 9: Sensitivity scenarios on use of single-use plastic plates and cutlery by business size, modelled by Defra

	Micro	Small	Medium	Large
Lower scenario	35%	35%	15%	15%
Upper Scenario	45%	45%	5%	5%

Applying these percentages to the costs incurred by businesses which are directly linked to the volume of single-use plastic plates and cutlery used results in the following split.

Table 10: 10-year Net Present Value of business costs relating to single-use plastic plates and cutlery use, by business size, lower scenario (millions)

	Micro	Small	Medium	Large
Waste Management Costs to Businesses	-£0.285	-£0.285	-£0.122	-£0.122
Wooden cutlery costs to businesses	-£9.361	-£9.361	-£4.012	-£4.012
Fuel costs	-£1.727	-£1.727	-£0.740	-£0.740

Table 11: 10-year Net Present Value of business costs relating to single-use plastic plates and cutlery use, by business size, upper scenario (millions)

¹⁷¹ ONS, (2018) [Enterprises in England by SIC section, turnover and employment size - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk)

	Micro	Small	Medium	Large
Waste Management Costs to Businesses	-£0.366	-£0.366	-£0.041	-£0.041
Wooden cutlery costs to businesses	-£12.036	-£12.036	-£1.337	-£1.337
Fuel costs	-£2.220	-£2.220	-£0.247	-£0.247

Familiarisation costs are not directly linked to the volume of single-use plastic plates and cutlery used. We have precautionarily assumed that every business within the impacted sectors will incur familiarisation costs. Monetised familiarisation costs for single-use plastic plates and cutlery producers are accounted for in the EPS IA, to avoid double counting.

Producers of the banned items will also face costs in the form of lost profits and capital investment as a result of the ban. The level of lost profit and capital investment per business is likely to be linked to business turnover. Smaller producers of the banned items may be less likely to have the capital required to adjust their production processes and may be at a greater risk of going out of business.

The lower scenario has been calculated using turnover data by employment size band of the manufacturing sector.¹⁷² A limitation of this data is that it relates to the manufacturing sector as a whole and is not available at a more granular level. To account for uncertainty we have also modelled an upper scenario where a higher proportion of producer costs are born by smaller businesses. Both scenarios are shown in the table below.

Table 12: Sensitivity scenarios on split of producer costs by business size, modelled using ONS turnover data and Defra assumptions

	Micro	Small	Medium	Large
Lower scenario	5%	10%	17%	69%
Upper scenario	10%	20%	20%	50%

Applying these percentages to the discounted costs incurred by producers under the central scenario in the IA results in the following split.

Table 13: 10-year Net Present Value of producer costs, by business size, lower scenario (millions)

	Micro	Small	Medium	Large
Capital investment costs	-£3.030	-£5.826	-£10.138	-£41.507
Producer profit loss	-£0.124	-£0.239	-£0.416	-£1.704

Table 14: 10-year Net Present Value of producer costs, by business size, upper scenario (millions)

	Micro	Small	Medium	Large
Capital investment costs	-£6.050	-£12.100	-£12.100	-£30.251
Producer profit loss	-£0.248	-£0.497	-£0.497	-£1.242

¹⁷² [Enterprises in England by SIC section, turnover and employment size - Office for National Statistics \(ons.gov.uk\)](https://ons.gov.uk)

Overall, the costs to businesses with the lower and upper scenario distributions applied are summarised in the below tables.

Table 15: 10-year Net Present Value of business and producer costs, by business size, lower scenario (millions)

	Micro	Small	Medium	Large
Waste Management Costs to Businesses	-£0.285	-£0.285	-£0.122	-£0.122
Wooden cutlery costs to businesses	-£9.361	-£9.361	-£4.012	-£4.012
Fuel costs	-£1.727	-£1.727	-£0.740	-£0.740
Capital investment costs	-£3.030	-£5.826	-£10.138	-£41.507
Producer profit loss	-£0.124	-£0.239	-£0.416	-£1.704
Total	-£14.527	-£17.438	-£15.429	-£48.085

Table 16: 10-year Net Present Value of business and producer costs, by business size, upper scenario (millions)

	Micro	Small	Medium	Large
Waste Management Costs to Businesses	-£0.366	-£0.366	-£0.041	-£0.041
Wooden cutlery costs to businesses	-£12.036	-£12.036	-£1.337	-£1.337
Fuel costs	-£2.220	-£2.220	-£0.247	-£0.247
Capital investment costs	-£6.050	-£12.100	-£12.100	-£30.251
Producer profit loss	-£0.248	-£0.497	-£0.497	-£1.242
Total	-£20.921	-£27.220	-£14.222	-£33.177

Mitigation assessment

When considering businesses which use the banned items, the analysis above shows that small and micro businesses will bear a significant proportion of the cost, due to their slower transition away from these items compared to larger businesses. Exemptions or partial exemptions from the regulation would not be appropriate as the majority of the ban's benefits would be lost, given the majority of single-use plastic plates and cutlery use comes from these small and micro businesses. In the case of our upper modelled scenario, where small and micro businesses combined use 90% of single-use plastic plates and cutlery, an exemption for these businesses would result in the loss of 90% of the benefits of the policy, which all relate to reduced use of the banned items.

An extended transition period or temporary exemption would not result in lower transition costs for small and micro businesses as they would still incur familiarisation costs. Temporary measures would only be appropriate to alleviate any excess stock costs but as outlined above the ban's implementation date has already been moved back 6 months, minimising this risk, and our engagement with industry has shown that excess stock is not expected to be an issue.

There are no appropriate different requirements by firm size that could be introduced. Compliant businesses are not expected to face any enforcement-related costs, due to the reactive enforcement method chosen. Therefore, differing inspection regimes by business size are not a relevant option.

Defra will provide guidance on these bans for all impacted businesses. Though this is unlikely to be tailored specifically to small and micro businesses, Defra will ensure this guidance is circulated as early as possible through trade associations, to help ensure all businesses (particularly smaller ones) are aware of the requirements.

Financial re-imbursalment of compliance costs for smaller businesses would not be appropriate or feasible. Given the market structure of the impacted sectors, this would involve financial aid to the majority of businesses impacted by the regulation. The largest cost for the majority of small and micro businesses will be the higher unit cost of alternative material items. There would be no accurate and proportionate method of determining the level of cost incurred by each impacted business, to provide financial aid to cover this. These costs may reduce through economies of scale from increased production of alternative material items following the implementation of the ban.

A voluntary or opt-in approach for smaller businesses would be likely to see the majority of the benefits of ban lost, as for an exemption, given the majority of the banned items are used by small and micro businesses.

Though the ban does not directly prevent production of single-use plastic plates and cutlery, domestic producers will no longer be selling these items to domestic businesses. Therefore, they will incur a loss of profit from these sales and potentially a capital investment cost to switch to producing alternative material items. Some of these impacts may fall on small and micro producers. It would not be logical or enforceable to allow continued use of only single-use plastic plates and cutlery produced by small or micro businesses. Therefore, no exemptions for small and micro producers are appropriate.

Medium Businesses Assessment

Tables 17 and 18 show the NPV's of costs we expect to be incurred by medium sized businesses, using the ONS definition of a medium sized business (50-249 employees). These are -£15.43m (lower scenario) and -£14.22m (upper scenario).

We recognise that the new Better Regulation Framework guidance classifies medium sized businesses as having an employment size band between 50-499 employees. As ONS data is unable to provide an estimate for the number of businesses with an employment size band between 50-499, we have used Nomis data to provide an approximate estimate. Table 19 shows the number of businesses in the 50 – 499 employment size band, as obtained through Nomis¹⁷³ data. This suggests that there may be approximately 300 more businesses in scope within the 50-499 employees definition, compared to the 50-249 employees definition. Data showing a turnover split including this size band was not available.

Table 19: Breakdown of number of businesses in England under the scope of the ban – medium (50 – 499 employment size band) businesses

SIC code	Total 50 - 499 size band	Percentage exempt	Total (excluding exempt businesses)

¹⁷³ Nomis, UK business counts – entered by industry and employment size band. Filtered to private sector businesses and for the year 2020.

4711: Retail sale in non-specialised stores with food; beverages or tobacco predominating	115	13%	100.05
4729: Other retail sale of food in specialised stores	35	13%	30.45
4781: Retail sale via stalls and markets of food; beverages and tobacco products	0	13%	0
5610: Restaurants and mobile food service activities	1180	1%	1168.2
5621: Event catering activities	165	8%	151.8
5629: Other food service activities	50	8%	46
5510: Hotels and similar accommodation	1085	5%	1030.75
Total	2630		2527.25

As outlined in the SaMBA, an exemption for small and micro businesses would render the policy ineffective and would hinder achieving its objectives. Therefore, an exemption which also included medium businesses would further hinder the policy from achieving its objectives.

Sensitivity analysis: Consumer pass-through

One of the largest annual costs associated with the policy arise from the higher unit price of wooden cutlery compared to plastic equivalents. As per RPC guidance, the main analysis assumes that the entirety of those costs will be absorbed by businesses.

Although we do not have an estimate for the price elasticity of demand for these items, responses received in the public consultation suggested that this price difference is unlikely to be borne solely by businesses and is likely to be passed on to consumers in full, in the form of higher prices. As discussed earlier in this document, the majority of businesses impacted by the ban use single-use cutlery as a complement to the main good (food) or the service (takeaway, delivery) which they provide on the market, so it is also possible that the higher per unit price of wooden items may partially be absorbed by these businesses.

To address this uncertainty, we modelled a set of sensitivity scenarios where:

- businesses absorb 40% of the costs associated with higher per unit price of wooden cutlery and pass the remaining 60% on to consumers;
- businesses pass these costs on to consumers in full.

Table 20 illustrates the split in consumer burden:

Table 20: Consumer burden		
	Consumer pays	Businesses pay
Low	100%	0%
Central	60%	40%
High	0%	100%

Table 21 below presents the impact on businesses and consumers over the 10-year appraisal period

Table 21: 10-year NPV impact on business and consumers of different apportioning of higher wooden cutlery unit costs

	Low	Central	High
NPV consumers	-£17.4m	-£13.9m	£0.0
NPV businesses	£0.0	-£9.3m	-£29.0m