

Title: Impact Assessment on the proposal to ban the supply of single-use plastic plates and cutlery in England

IA No:

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: 20/11/2021

Stage: Consultation

Source of intervention: Domestic

Type of measure: Secondary legislation

Contact for enquiries: [Nicole Gicheva](#)

Summary: Intervention and Options

RPC Opinion:

Cost of Preferred Option (2020 prices, 2023 present value)

Total Net Present Value	Business Net Present Value	Net cost to business per year	Business Impact Target Status
-£77.9m	-£80.9m	£9.4m	Qualifying provision?
			Qualifying provision

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

Single-use plastic plates and cutlery are not commonly recycled or re-used and cause multiple negative environmental externalities, particularly when they are discarded incorrectly. These include harm to marine environments, cost to local authorities and visual pollution. Even if disposed of correctly, plastic plates and cutlery may end up in incineration which generates carbon emissions on top of emissions released upon production. These negative externalities are experienced across society and are not accounted for within the market price of single-use plastic plates and cutlery. Providers of these items do not have incentives to cover the externality costs. Intervention is required in order to shift the single-use plates and cutlery market to either reusable alternatives or plastic-free alternatives that already exist and decompose much quicker, and to ensure the change and environmental benefits are sustained into the future.

What are the policy objectives and the intended effects?

The objective is to help protect our environment for the future generations, improve the quality of the environment and reduce harm to human health and marine life. This will also contribute to the Government's commitment to reduce avoidable plastic waste over the lifetime of the 25 Year Environment Plan. The ban will ensure that single-use plates and cutlery used in the UK are made of more environmentally friendly materials that decompose quicker and have lower life cycle impacts on the environment. It may also encourage UK businesses to invest in environmentally friendly alternatives to plastic. The ban also intends to increase consumer awareness of the environmental harms plastic plates and cutlery can cause when they are not correctly disposed of.

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

A number of options have been considered, including taxes/charges, subsidies and information campaigns. As a key objective of our work is to reduce the amount of single-use plastic litter in the marine environment we have focussed on two central options: 'do nothing' (option 0), or a ban (option 1, preferred). A ban is preferred as it would have the maximum impact in reducing the social costs of single-use plastic plates and cutlery. The impacts of a ban are proportionate to secure the environmental benefits without major costs. The current trend in the market for single-use plates and cutlery is to move away from plastic and alternate material products are readily available. When considering alternative options such as taxes/charges, subsidies and information campaigns we have drawn on our previous work on single-use plastic items such as straws, stirrers and cotton buds. Past experience has shown that these options would likely not be as effective as a ban in reducing the significant social costs of single-use plastic plates and cutlery particularly on reducing marine litter. However we welcome views on the effectiveness of these alternative options at consultation.

Will the policy be reviewed? It will be reviewed. **If applicable, set review date:** 5 years post implementation

Does implementation go beyond minimum EU requirements?

No

Are any of these organisations in scope?

Micro
Yes

Small
Yes

Medium
Yes

Large
Yes

What is the CO₂ equivalent change in greenhouse gas emissions?
(million tonnes CO₂ equivalent)

0.015

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

Signed by the responsible
SELECT SIGNATORY:

Date:

Summary: Analysis & Evidence

Policy Option 1 (Preferred)

Description: Ban the supply of single-use plastic 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: -£112.9	High: -£63.6	Best Estimate: -£88.3

COSTS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.5	10 years	7.8	69.7
High	1.1		13.0	116.6
Best Estimate	0.8		10.4	93.2

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

The wholesale price of paper plates and wooden cutlery (i.e. the expected alternatives) is greater than the wholesale price of plastic plates and cutlery. This means there will be additional costs which are assumed to be fully absorbed by businesses with no consumer pass-through. This is based on guidance from the Regulatory Policy Committee.¹ We have monetised the cost of additional emissions expected from paper plates and wooden cutlery sent to landfill, as plastic emits less carbon dioxide equivalent (CO_{2e}) emissions when placed in landfill relative to paper and wood. There is also an additional fuel cost to businesses associated with transporting plates, as paper plates weigh more than plastic ones.. Monitoring and enforcement costs to the public sector have also been included as well as familiarisation costs to businesses.

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

Some consumers may lose out if they prefer plastic plates and cutlery to alternatives.

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	0.0	10 years	0.4	3.7
High	0.0		0.7	6.2
Best Estimate	0.0		0.6	4.9

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

Plates and cutlery from alternative materials, expected in this analysis to become paper and wood, respectively, are less carbon intensive to both produce and incinerate than plastic, resulting in environmental savings. As paper and wood decompose much quicker than plastic, we expect to see a reduction in the presence of litter on beaches, reducing clean up costs for beaches. Clean beaches are highly valued by the public.

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

Plastic plates and cutlery contribute to marine litter which impacts wildlife as materials can entangle or be ingested by marine wildlife, causing injury and loss of life to marine animals. Also, plastics are broken down over time and some may persist as microplastics for a substantial period of time. Microplastics ingestion by animals has been shown to reduce food consumption and therefore energy levels in marine life² and can be passed down the foodchain. Although plastic plates and cutlery contribution to beach litter is relatively small, the proposed option (together with other policy measures) is likely have a significant impact on the marine environment. Marine litter has a disamenity cost, affecting pristine seascapes and quality of life which impacts those who use marine environments and also impacts those who value knowing that there is a pleasant environment available to them and to others.

Key assumptions/sensitivities/risks	Discount rate (%)	3.5%
Following commitments already made by industry, we assume the majority of retailers will move away from single-use plastic plates and cutlery over time regardless of the ban. We assume paper will be the replacement material for plates, and wood for cutlery, due to their current usage and trend in replacing plastic.		

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:	Score for Business Impact Target (qualifying provisions only) £m: 45.4
Costs: 10.7	Benefits: 0.0
Net: 10.7	

¹ Regulatory Policy Committee (2019) [Business Impact Target specific issues: direct versus](#)

² <https://www.exeter.ac.uk/research/feature/microplastics/>

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Problem under Consideration

Single-use plastic plates and cutlery are environmentally damaging, particularly to marine environments. Littering of single-use plastic plates and cutlery negatively impacts wellbeing and generates clean-up costs to local authorities – UK municipalities are estimated to be spending approximately £15.8m each year to remove all forms of beach litter.³ UK plastic litter also contributes to the global marine plastic problem, damaging the marine environment and posing a risk to wildlife. It is estimated that there are over 150 million tonnes of plastic in the world's oceans. Estimates also find 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.^{4,5}

At the end of their life, they are often disposed of inappropriately. These items are lightweight and predominantly used in restaurants, pubs, fast food outlets, workplaces, or at parties.⁶ 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 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. Meanwhile, if they have not been cleaned effectively plastic plates will be contaminated.⁷ They are therefore not recycled and are instead disposed of through landfill or incineration. Current estimates suggest that only 10% of single-use plastic plates and cutlery get recycled upon disposal.⁸

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 versatile plastics, found in most market sectors that use plastics. Its characteristics include a high melting point, it is resistant to cracking and stress even when flexed and it 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 alternatives are already established in their respective markets. For example, wooden cutlery and paper plates are widely used alternative products which offer little change in consumer experience while reducing environmental impacts.

Rationale for Intervention

As single-use plastic plates and cutlery are not commonly recycled, most are either incinerated for energy or sent to landfill at the end of their life, releasing carbon dioxide emissions.⁹ In addition, some single-use plastic plates and cutlery are littered,¹⁰ which costs public money to clean-up.¹¹ It also imposes a number of 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 from breaking down into microplastics - they can easily be ingested by marine life if they enter the water

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

4 Thompson, R.C., et al., Plastics, the environment and human health: current consensus and future trends. Philosophical Transactions of the Royal Society B: Biological Sciences, 2009.

5 Mouat, J., R.L. Lozano, and H. Bateson, Economic Impacts of Marine Litter, 2010.

6 Resource Futures: Preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

7 <https://www.recyclenow.com/what-to-do-with/crockery-cutlery-0>

8 Resource futures: A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

9 see e.g. <https://ellenmacarthurfoundation.org/the-new-plastics-economy-rethinking-the-future-of-plastics-and-catalysing>

10 see e.g. <https://wrap.org.uk/resources/report/eliminating-problem-plastics>

11 see e.g. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/706956/foresight-future-of-the-sea-report.pdf

system and/or marine environment, captured as marine debris in fishing equipment, washed up as litter on beaches.¹²

The market price for single-use plastic plates and cutlery does not account for such negative externalities. As such, businesses and end-consumers are not currently incentivised to limit their use, to dispose of single-use plastic plates and cutlery appropriately and/or to switch to items made of less environmentally harmful materials. Intervention is required to ensure businesses and consumers can make well-informed decisions that account for the negative impacts of single-use plastic plate and cutlery use.

Single-use plastic plates and cutlery have readily available alternative material products - paper plates and wooden cutlery for single-use or reusable options. These alternative materials decompose quicker¹³ - wooden cutlery is estimated decompose in 2 years¹⁴ whereas paper decomposition times vary between 6 to 60 weeks.¹⁵ Items from alternative materials are also less carbon intensive to manufacture (a tonne of wood and paper release 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)¹⁶ and incinerate than plastic, causing less environmental damage. Preferably, the policy will encourage consumers to switch away from single-use plates and cutlery towards reusable alternatives as consumer awareness surrounding single-use items develops further.

Research commissioned by Defra¹⁷ looked at current trends in the single-use plates and cutlery market. Based on the current rate of businesses switching away from plastic, it is estimated that single-use plastic plate and cutlery usage will decrease significantly regardless of a ban being implemented. If this rate continues, it is estimated that the usage of single-use plastic plates and cutlery is likely to reach 10% by 2022/23 and 2026/27, respectively.¹⁸

However, despite the predicted trend, there is rationale for government to intervene to ban these items ahead of time. A ban, rather than reliance on voluntary action, would stem the flow of single-use plastic plates and cutlery faster and more widely, ensuring that the environmental benefits are achieved quicker and are maintained into the future.

The forecasted trend is used for the purpose of this analysis 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 forecasts, 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.

Government action to ban the supply to the end user of single-use plastic plates and cutlery where alternatives are readily available means that the change needed to reduce England's harmful and unnecessary plastic pollution in our oceans is secured across the market, and that the negative effects these items have on the environment are addressed as soon as possible.

12 see e.g. Gall, S. C. & Thompson, R. C. (2015), The impact of debris on marine life. *Marine Pollution Bulletin* 92, 170-179

13 see e.g. Resource Futures: Preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

14 <https://marinedebris.noaa.gov/sites/default/files/publications-files/talking-trash-educational.pdf>

15 US National Park Service; National Oceanic and Atmospheric Administration and Woods Hole Sea Grant

16 WRAP data

17 Resource Futures: Preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

18 Resource Futures: Preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks; and Defra modelling

Policy Objective

In the 25 Year Environment Plan,¹⁹ 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. 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.²⁰ It also gives a clear direction related to plastics via two specific ambitions:

- 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;
- To work towards all plastic packaging placed on the market being recyclable, reusable, or compostable by 2025.

As part of the former ambition, the Government wants to ban the most harmful plastic products where there is a clear case for it and alternatives exist. Bans on the sale of plastic microbeads are already in place. Restrictions on the supply to the end user of single-use plastic drinking straws (with exemptions for use as medical devices and for those with disabilities who rely on them to eat and drink safely and independently) and cotton buds (with exemptions for medical, scientific, and forensic purposes) and a prohibition on the supply of drink stirrers came into force in October 2020.²¹

We are now considering the impact of banning single-use plastic plates and cutlery. The ban is intended to ensure that single-use plates and cutlery sold in the UK are made of less environmentally harmful materials which decompose more quickly and have lower life-cycle impacts on the environment. The ban may also encourage businesses to invest in alternative options to single-use plastic, such as reusable options or innovative material substitutes. This is because it would create a level playing field as any consumer preferences for single-use plastic plates and cutlery would no longer be a viable choice. A ban would strengthen the domestic plastic-free market by protecting it from low-priced single-use plastic imports.

It is intended that banning the supply of single-use plastic plates and cutlery to the end user will foster an increased degree of consumer confidence that the products they buy will not harm wildlife and the environment. It will also increase consumer awareness of the environmental harms these items can cause when they are not correctly disposed of. This is supported by our consultation in early 2019 on banning plastic straws²² where 83% of respondents supported the ban, with the majority of respondents focused on the environmental harm caused by plastics. More recently, 96% of individuals responding to Scotland's consultation on restricting the supply of single-use plastics supported a ban on single-use plastic plates and cutlery.²³

A fear associated with banning a product is that there will not be alternatives that consumers can use. This is not the case with single-use plastic plates and cutlery as paper and wooden alternatives, respectively, are already available and some organisations have already made strides to reduce their single-use plastic plates and cutlery usage. For example, the NHS has delisted plastic straws and stirrers ahead of the pledged date and is now focusing on phasing out single-use plastic cutlery and plates, single-use cups made of expanded polystyrene and oxo-degradable plastics²⁴. In addition, Tottenham Hotspur have recently built a new stadium in which no single-use plastic is sold, including

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

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

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

22 [Single use plastic: banning the distribution and/or sale of plastic straws, stirrers and plastic-stemmed cotton buds in England](#)

23 [Introducing market restrictions on single-use plastic items in Scotland – analysis of consultation responses](#)

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

cutlery.²⁵ Furthermore, as of January 2020, IKEA have removed all single-use plastic products, including plates and cutlery.²⁶

This ban is part of the wider policy objective to eliminate avoidable plastic waste by the end of 2042. This measure should be viewed as part of a wider package of reforms, which use different policy instruments, as detailed in the Resources and Waste Strategy.²⁷ A ban was chosen as the most appropriate instrument here because single-use plastic plates and cutlery were deemed as avoidable plastic, which cause environmental harm and are easily replaceable.

Together with other measures, the ban will help reduce the flow of these items to the ocean from UK 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.²⁸

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 consulting on proposals to ban 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 UK²⁹. Our proposals to reform the packaging waste regulations and introduce a new plastic packaging tax³⁰ 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 Scheme 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.

Options under consideration

The impact assessment considers two options: the 'do-nothing' option and the option **to ban single-use plastic plates and cutlery in April 2023**. The latter is our 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 currently been appraised as we believe they would not eliminate these single-use plastic items at the same speed and/or scale as the proposed ban. Other interventions would not create a level playing field and would not strengthen the market to innovate – this was highlighted in stakeholder discussions that were undertaken by Resource Futures.³¹ 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.

We welcome views on the merits of other policy levers during consultation and will reassess our position at the final stage Impact Assessment.

25 <https://www.tottenhamhotspur.com/the-club/spurs-cares/plastic-reduction-measures/>

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

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

28 see e.g. Adeyanju, G.C., Augustine, T.M., Volkmann, S. *et al.* Effectiveness of intervention on behaviour change against use of non-biodegradable plastic bags: a systematic review. *Discov Sustain* 2, 13 (2021). <https://doi.org/10.1007/s43621-021-00015-0> for similar rationale in regard to plastic bags

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

30 HMRC, [Plastic packaging tax](#)

31 Defra has commissioned Resource Futures to produce a research report on this, including information gathering via stakeholder interviews.

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.

The problem associated with this option is that, 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 plastic plates and cutlery to the end user, active from April 2023 (preferred)

This is the preferred option. As described in the rationale for intervention section, single-use plastic plates and cutlery impose environmental and social costs; a ban on supply to the end user will reduce costs significantly after April 2023. This intervention will secure the change and associated environmental benefits quickly and ensure that these are sustained into the future.

Businesses will be encouraged to source plates and cutlery from non-plastic materials, or to stop stocking single-use plates and cutlery altogether. This is expected to incur some costs, but a proportion of these will be mitigated given the current trend in the market to move away from single-use plastic items and the availability of non-plastic alternatives. There will also be some 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 products can cause when they are not correctly disposed of. The intervention is expected to increase wellbeing from reduced presence of litter and to reduce the 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, littering of plastic bags was reduced by 59% to 89%, according to locations.³²

No exemptions are currently 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 or cutlery over plastic-free alternatives (e.g. for medical use). We are inviting stakeholder views on this in the consultation published alongside this document. Considerations will also be assessed in our Equalities Assessment post-consultation.

Non-appraised options

In the 25 Year Environment Plan, and reiterated in the Resources and Waste Strategy, we commit 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

32 OECD (2021), [Preventing single-use plastic waste: implications of different policy approaches](#)

materials 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 in which were implemented and came into force in July 2021, including on plastic plates and cutlery.³³ The Welsh and Scottish Governments have already consulted on implementing a ban on the supply of various single-use plastic items, including plates and cutlery, in their respective jurisdictions.^{34 35}

The following options have not been appraised as similar legislation in the past has found that these would not reduce the impacts to the environment in the same speed and scale as a ban would:

- **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 acutely aware of the harms of single-use plastics. There having 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 being provided on top of these campaigns is likely to very to be minimal and so may not be cost effective. Additionally, studies examining the effects of environmental information provision provide limited support for the success of this option. informational interventions may succeed in improving people's knowledge about the negative environmental consequences of one's actions, but this knowledge will not gain motivational force if people do not consider protecting the environment an important personal value.³⁶
- **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 reducing usage would be smaller, and less certain, than under a ban.
- **Subsidies** towards the development of non-plastic plate and cutlery alternatives are not considered necessary. The alternatives already exist, and several major chains have already committed to using them.
- **A taxation or charge policy** - Although this would likely be effective in reducing consumption, it would not be as effective as a ban where suitable alternatives are available. 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 increased³⁷. A ban avoids this risk and ensures that the desired impact is sustained. Furthermore, a tax in this instance would be economically inefficient. Taxing plastic goods is a proxy for taxing plastic waste, which entails lower efficiency relative to the latter.³⁸

We welcome evidence on the merit of these alternative policy options at the public consultation to inform our position at the final stage Impact Assessment.

³³ European Commission, [Single-use plastics](#)

³⁴ [Reducing single use plastic in Wales](#)

³⁵ [Market restrictions on single-use plastic items: consultation analysis](#) (Scotland)

³⁶ Bolderdijk JW, Gorsira M, Keizer K, Steg L (2013) Values Determine the (In)Effectiveness of Informational Interventions in Promoting Pro-Environmental Behavior.

³⁷ [Institute for European Environmental Policy](#)

³⁸ OECD, [Preventing single-use plastic waste: implications of different policy approaches](#)

Summary of Impacts and NPVs – Preferred Option

Table 1 below gives a summary of the monetised costs and benefits and total Net Present Value (NPV) estimates for the preferred option to ban single-use plastic plates and cutlery, compared to what we expect would happen if there were no government intervention (i.e. under 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 to help investigate the significance of key assumptions used in the analysis.

The central estimate of NPV is -£88.3m. The largest positive contribution comes from disposal incineration benefit in which the plastic-alternative materials are more carbon neutral over their lifetime. The largest impacts that have been monetised are the costs incurred from alternative material plates and cutlery being more expensive than their respective plastic product, which we have modelled as being borne by businesses, as per Regulatory Policy Committee guidance.

Table 1: 10 Year NPV estimates for ban on plastic plates and cutlery, millions

		Low (worst case)	Central	High (best case)
Benefits	Production emission savings	£0.6	£0.8	£1.0
	Disposal incineration emission benefit	£3.1	£4.1	£5.1
	Reduced coastal clean-up costs*	£0.0	£0.0	£0.0
	Beach well-being benefit*	£0.0	£0.0	£0.0
Costs	Disposal landfill emission cost	-£1.6	-£1.3	-£0.9
	Additional waste management costs to businesses	-£0.3	-£0.2	-£0.2
	Additional waste management costs to LAs	-£0.1	-£0.1	£0.0
	Alternative material costs to businesses	-£113.3	-£90.6	-£68.0
	Familiarisation costs	-£1.1	-£0.8	-£0.5
	Fuel costs	-£0.1	£0.0	£0.0
	Fuel emission costs*	£0.0	£0.0	£0.0
	Enforcement costs	-£0.2	-£0.2	-£0.2
Total		-£112.9	-£88.3	-£63.6

*Note: reduced coastal clean-up costs, beach well-being benefits, and fuel emission costs appear to be zero due to rounding

Further detail on Table 1 can be found in the benefits and costs sections below. All figures are in 2020 prices.

Although the final NPV is negative, the ban remains the preferred option due to the non-monetised factors excluded from the NPV estimates. A particularly strong benefit which has not been monetised is the reduction in harm to marine wildlife and resulting societal wellbeing benefits. Although it has not been possible to monetise 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 plastic-alternative plates and cutlery fall, which is possible as scale of production increases. This material price, which we have estimated very conservatively, makes up 97% of total costs so any reduction in it will have a significant effect on the final NPV. We welcome industry responses on this in the public consultation.

Key Assumptions and Methodology

Low/Central/High Scenarios

We have modelled three different scenarios to account for the uncertainties related to the cost assumptions, the number of single-use plastic plates and cutlery consumed in the UK as well as 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 would take to decompose;
- the proportion of items that end up on beaches as litter;
- and differing values in the literature placed on having cleaner beaches.

Single-use plates and cutlery

Resource Futures estimate that 20 disposable plates and 75 items of disposable cutlery are consumed per person in England annually.³⁹ We welcome views on this assumption at the public consultation.

Applying these estimates to the mid-2020 estimate of the population generates the central estimate of single-use plates and cutlery consumed.⁴⁰ Table 2 illustrates the low and high estimates, assuming consumption to be 75% and 125% of the central estimate.

Table 2: Single-use plates and cutlery consumption in England, in billions

	Plates	Cutlery	Total
Low	0.85	3.19	4.04
Central	1.13	4.25	5.38
High	1.42	5.31	6.73

Counterfactual

We assess the costs and benefits of the preferred option against the absence of the ban (i.e. in the 'do nothing' scenario). We have estimated in the central NPV scenario that 1.1 billion single-use plates and 4.3 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, respectively.

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 single-use plates and cutlery market has already begun to move away from plastic towards paper and wooden alternatives. If we did assume that single-use plastic plates and cutlery consumption remains high, this would likely overstate the value of the costs and benefits the ban would bring. Therefore, we have attempted to model what would happen to plates and cutlery without the ban.

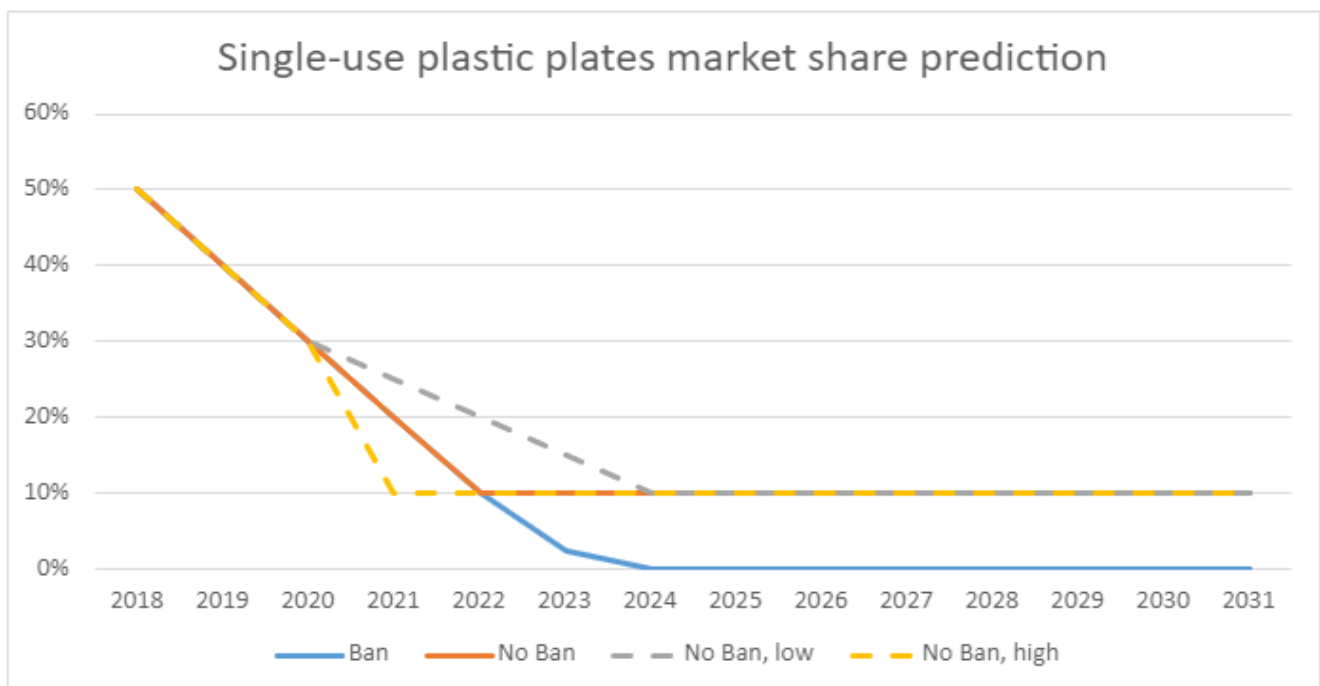
³⁹ Resource Futures: Preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

⁴⁰ ONS (2020) [Population estimates for the UK, England and Wales, Scotland and Northern Ireland: mid-2020](#)

One limitation of the analysis is that the proportion of single-use plates and cutlery made of plastic is currently changing. This makes it difficult to predict what the market would do if no ban on these items was imposed. A significant number of businesses have already committed voluntarily to switch to plastic-alternative products, so a significant proportion of the market is likely to already be paper and wood. 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 market. However, as technology develops, it is possible that different materials will be used.

We have modelled three scenarios for take up of alternatively made single-use plates and cutlery in the 'do nothing' (no-ban) scenario. We compared these against the 'ban' scenario, all of which are shown in Figure 1 and Figure 2 below and in table format in Annex 1. They show the percentage of the market share forecast to remain plastic over the next 10 years. All of the 'no ban' scenarios are similar in that they suggest that the vast majority of the market for single-use plates and cutlery will soon move away from plastic towards alternative materials instead.

Figure 1: Scenario estimates of plastic plate share out of all single-use plates



Source: Resource Futures and Defra modelling

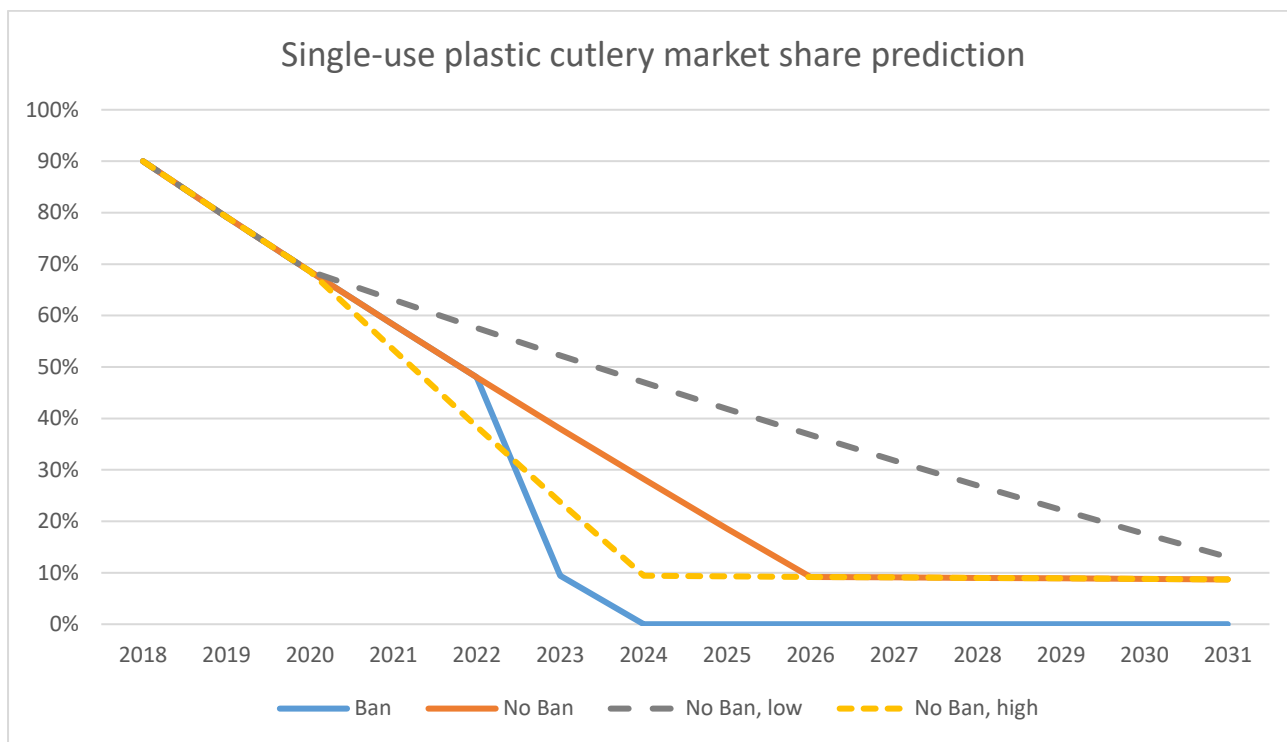
Resource Futures estimate that 50% of single-use plates used in 2018 were plastic.⁴¹ Under the no ban scenario, we forecast a significant reduction in the use of single-use plastic items, driven by voluntary business action. For instance, industry is already taking action under the UK Plastics Pact. Plastic Pact members, who are responsible for 85% of plastic packaging sold in UK supermarkets, have pledged to take action to eliminate a number of single-use plastic items, including plates and cutlery.⁴²

We have also assumed that the ban scenario follows the central no ban scenario estimates until the ban is implemented in 2023.

⁴¹ Resource Futures: Preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

⁴² <https://wrap.org.uk/media-centre/press-releases/tackle-flexible-plastic-packaging-now-or-risk-missing-uk-plastics-pact>

Figure 2: Scenario estimates of single-use plastic cutlery share out of all single-use cutlery



Source: Resource Futures and Defra modelling

Based on Resource Futures analysis, we have assumed that plastic cutlery represented 90% of all single-use cutlery that were consumed in 2018.⁴³ Again, a strong change in market share is expected under the no ban scenario.

The following assumptions were made in modelling the **no ban** scenario:

- For cutlery and plates, a shift from the same 'baseline' single-use plastic product use to a final base share of 10%, with the share reducing by 10 percentage points each year.
- Total product sales (both plastic and non-plastic single-use products) reduces by 1% per annum over 10 years. This reduces at a faster rate than in the ban scenario, by 2% per annum.

The difference between the ban and no ban central scenario assumptions is used to calculate the best NPV estimate in this impact assessment. The NPV results of each sensitivity and take up scenario can be found under Table 3 in the annex. We are seeking feedback on these market share assumptions in our consultation.

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 the Resource Futures research⁴⁴ and local authority outturn data⁴⁵, it is assumed that the items will be disposed of in the following way:

⁴³ Resource Futures: Preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

⁴⁴ Resource futures: A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

⁴⁵ Defra (2017) Statistics on waste managed by local authorities in England in 2016/17. Table 2 Management of all Local Authority collected waste financial year figures in England 2012/13 to 2016/17

Table 4: Plates end of life breakdown by material

	Plastic	Paper
Recycled	10%	10%
Incinerated	64%	57%
Landfill	26%	23%
Commercial composting	0%	10%
Terrestrial litter	0.5%	0.5%
Beach litter	0.0005%	0.000005%

Table 5: Cutlery end of life breakdown by material

	Plastic	Wood
Recycled	10%	0%
Incinerated	63%	56%
Landfill	26%	23%
Commercial composting	0%	20%
Terrestrial litter	1.0%	1.0%
Beach litter	0.01%	0.0012%

We are seeking input on these assumptions in our consultation.

Summary of Monetised Costs

Familiarisation costs

Familiarisation costs encompass the one-off transitional costs that businesses face upon the implementation of the ban. This covers 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.⁴⁶

Monetisation of familiarisation costs

We have monetised this cost using the following figures and assumptions:

- Categories of businesses likely to be affected by the ban were identified using Standard Industrialisation Codes (SIC)
 - o Instead of using the “Restaurants and mobile food service activities” SIC, we have estimated the number of fast food restaurants in the UK and used this as an estimate of restaurants impacted by the ban. We have assumed that these enterprises are more likely to use single-use plastic plates and cutlery. Using Public Health England data,⁴⁷ we have estimated the number of fast food restaurants in England.
 - o Our estimate is that 90,650 businesses will be affected by familiarisation costs in total. These include restaurants, takeaway vendors, event caterers, and a range of retailers including supermarkets - further detail on relevant SIC breakdown is included in the text below and in annex 1.

⁴⁶ 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.

⁴⁷ PHE, [Fast food outlets: density by local authority in England](#)

- The same businesses will be affected by both bans (i.e. on single-use plastic plates and cutlery) due to the complimentary nature of the two types of goods. This means that the familiarisation cost is calculated only once to avoid double-counting. Due to the varying number of single-use plastic plates and cutlery, the analysis reports the higher of those estimates.
- Although there are some businesses that have already transitioned away from single-use plastic plates and cutlery voluntarily, we have not been able to estimate the number of those businesses at this stage. As such, we have assumed that all identified businesses will experience the familiarisation cost.
- It was estimated that familiarisation would take 30 minutes of one full time employee's time under the central sensitivity, with low and high sensitivity estimated to be 15 minutes and one hour, respectively. This was costed at the average hourly wage for each businesses category⁴⁸ plus 22% non-wage labour costs. We are seeking further evidence on this assumption at consultation, as well as views on whether the time required for familiarisation would vary across businesses dependent on their size.

Table 6 calculates familiarisation costs in the central scenario by multiplying the number of enterprises for each SIC (90,650) by their respective median hourly wage (including 22% non-labour wage costs) and by the time burden required by one full time employee per business (30 min).

Table 6: Business familiarisation costs, England

SIC code	England local business units	Hourly wage	Inc. 22% non-labour wage adjustment	Familiarisation costs
4711 : Retail sale in non-specialised stores with food; beverages or tobacco predominating	25,896	£9.72	£11.86	£153,544
4729 : Other retail sale of food in specialised stores	3,560	£9.00	£10.98	£19,543
4781 : Retail sale via stalls and markets of food; beverages and tobacco products	969	£8.79	£10.72	£5,195
England Fast Food Restaurant Count (instead of 5610 : Restaurants and mobile food service activities)	47,928	£8.72	£10.64	£254,939
5621 : Event catering activities	10,157	£9.32	£11.37	£57,745
5629 : Other food service activities	2,140	£9.58	£11.69	£12,506
Total	90,650			£503,473

This results in a present value of -£0.8 m over the 10-year appraisal period, incurred in full in the first year of the ban.

Enforcement Costs

Enforcement costs relate to the estimated additional burden to 190 Trading Standards Authorities (TSAs) offices across the England⁴⁹ which will enforce the policy (many respondents to the straws consultation⁵⁰ proposed that the TSAs would be best placed to enforce the straws ban). We have

⁴⁸ Office for National Statistics 'Earnings and hours worked', gross hourly pay 2019 (provisional).

⁴⁹ 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>.

⁵⁰ Consultation Stage Impact Assessment on the proposal to ban the distribution and/or sale and of plastic drinking straws in England

estimated that the plates and cutlery ban will occupy 3.5 days of an officer's time per year⁵¹ at £149/day rate⁵². Given the high level of uncertainty around this time burden, we have set a low sensitivity at 4 days and a high sensitivity at 3 days.

Monetisation of enforcement costs

The enforcement costs are calculated by multiplying the number of TSAs in England enforcing the policy (190) by the time burden required from each Authority's officer (3.5 days in the central scenario), and by the daily wage rate of Trading Standards Officers (£149, including 22% non-labour costs).

Similarly to the familiarisation costs, single-use plastic plates and cutlery are treated as complimentary goods. As such, we have assumed that reports of instances in which single-use plastic plates would be incorrectly sold and/or supplied to customers will likely be accompanied by single-use plastic cutlery. Therefore, the estimated enforcement costs are shared across both products which helps to avoid double counting. The present value of the enforcement cost over the 10-year appraisal period is -£0.2m.

Landfill Disposal Emissions Costs

The market switching to plastic-alternative products can cause an environmental cost at the end of the products' life cycle. Paper and wooden items sent to landfill emit more greenhouse gas emissions upon decomposition than plastic products.

In our 'end-of-life' assumptions, we assume that a certain percentage of each item goes to landfill. This is reflected in the disposal landfill cost.

Monetisation of landfill disposal emissions cost

Table 4 and 5 (referenced earlier in the document) show how single-use plates and cutlery are treated upon the end of their lifecycles. 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 CO₂e per tonne in landfill,⁵³ whereas wood and paper emit 0.828 and 1.042 CO₂e per tonne, respectively.⁵⁴ The difference in emissions is then multiplied by the central series carbon value in 2020 prices.⁵⁵ This is then multiplied by the difference in both the market share and rate of decline in single-use products used under the ban and no ban scenario, resulting in a present value of -£1.3 m 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. Resource Futures estimate that the unit price of a single-use plastic plate is £0.05 and the unit price of single-use plastic cutlery is £0.0085. The report estimates that, under current market conditions, the alternative material products will be twice expensive as the single-use plastic item (£0.10 and £0.017, respectively). We welcome input in the consultation on whether these unit price assumptions are correct. As per RPC guidance, 0% of costs are assumed to be passed

51 Internal estimate

52 Based on annual gross pay for full-time LA employees (ONS), assuming a 40-hour work week and 8 hours worked per day. The figure includes 22% non-labour cost adjustment.

53 Defra, [Local authority collected waste: annual results tables](#)

54 BEIS, [Updated short-term traded carbon values used for UK policy appraisal](#)

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

through to consumers in the EANDCB (Equivalent Annual net direct costs to business) calculation.⁵⁶ 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 purchase of a drink 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 at this stage as we do not have information on the price elasticity of single-use plates and cutlery.

This cost is by far the largest factor in our analysis. Our conservative approach to analysis does not take into account potential economies of scale that may influence the unit price as a result of a restructured focus of the market following the ban. Material costs make up 97% of total costs in the 10-year NPV appraisal so any market adaption beyond this very conservative assumption of maintaining the incumbent unit prices will have very significant effects on the final NPV of the policy. We would like to gain stakeholders' views on whether the alternative products' unit price will decrease following a ban on single-use plastic plates and cutlery.

Monetisation of material costs

We estimate the total cost difference to all single-use plates/cutlery consumed by multiplying the unit price difference (£0.05 for plates and £0.01 for cutlery) by the total single-use products consumed (central estimate is 1.1.bn plates and 4.3bn cutlery). This is then multiplied by the difference in both the market share and rate of decline in single use products use under the ban and no ban scenario. The total present value over the 10-year appraisal period is -£90.6m.

Fuel Costs

Our research has shown that plastic plates are lighter than the paper alternative. Similarly, Resource Futures have estimated that plastic plates weigh 5g whereas paper plates weight 10g.⁵⁷ Additional weight requires more fuel to transport. There are no fuel costs encapsulated in the switch to wooden cutlery as Resource Futures have estimated that plastic cutlery and the wooden alternatives are similar in weight.⁵⁸

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, assuming a \$1 per litre fuel price, \$80 is saved over 200,000km.⁵⁹ To adapt to the analysis, the recent fuel prices and exchange rate were applied and the mean distance travelled by products

⁵⁶ Regulatory Policy Committee, [Business Impact Target specific issues: direct versus](#)

⁵⁷ Resource Futures: Preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

⁵⁸ Ibid

⁵⁹ <http://www.nrcan.gc.ca/node/16755>

was assumed at 100km. We are seeking evidence in the public consultation whether this assumed distance should be revised at the final stage Impact Assessment.

Multiplying the unit weight difference (5g) by the total plate consumption (1.1 billion) gives the total additional weight caused by the ban per year (6,644kg). The next step was to multiply the additional weight by the savings over 100km, and adjust it by the difference in both the market share and rate of decline in single-use products use under the ban and no ban scenarios. The present value of the cost over the appraisal period is -£0.04m.

Fuel emissions costs

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

Monetisation of fuel emissions cost

Using an average of 2.4 kg CO₂e per litre of diesel burned,⁶⁰ an additional 44,000 litres of diesel will be required over the ten-year appraisal period in the central scenario, resulting in 107 tonnes CO₂e in emissions. Using Green Book carbon prices,⁶¹ this would be worth £25,000 discounted over 10 years. These costs are then multiplied by the difference in the market share of plastic and non-plastic plates in the baseline and policy scenario to determine the effect of the ban on fuel costs.

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 waste management costs 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. Assuming that the majority of single-use plates are disposed of in commercial establishments and a small proportion in public bins, we expect businesses and local authorities to bear 80% and 20% of additional waste management costs, respectively.⁶²

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:

- 90% of single-use plastic plates and 80% of single-use paper alternatives are sent for waste treatment at the end of their lives, as outlined on Tables 4 and 5 above
 - 64% of single-use plastic plates are incinerated, while the remaining 26% are sent to landfill – resulting in 4,301 tonnes and 1,747 tonnes of plastic being sent to incineration and landfill, respectively, per year.
 - 57% of paper alternatives are incinerated and 23% end up in landfill, corresponding to 7,600 tonnes and 3,091 tonnes of paper per year.

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

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

62 Defra internal estimates, based on RF reporting

We estimate the cost of single-use plastic and paper plates sent to waste treatment using the current rates of the landfill tax⁶³, landfill gate fee and incineration gate fee.⁶⁴ We then calculate the additional costs from moving to single-use paper rather than plastic items and apportion them between businesses and local authorities. Put in 2020 prices, discounted and then applied to the profile to use which compares the ban and the no ban scenarios, the resulting 10-year NPV for businesses is estimated at £0.2m. The corresponding 10-year NPV borne by local authorities is £0.1m.

Summary of Monetised Benefits

Disposal Incineration Emissions Benefit

Our model assumes that 26% of plastic products and 23% of both wood and paper products are incinerated. Paper and wood are cleaner to incinerate than plastic due to the energy that is derived from waste. Each tonne of paper or wood burnt actually saves carbon dioxide equivalent emissions (CO₂e).

Monetisation of disposal incineration emissions benefit

To calculate the incineration benefit we estimate the difference in tonnes of CO₂e between the emissions released upon incineration of the plastic product (0.819 CO₂e per tonne of material incinerated) and the emissions released (which are actually negative due to the energy gained from incineration) upon incineration of the alternative material product (-0.331 CO₂e per tonne of material incinerated).⁶⁵ We then multiply the difference in emissions from incineration by the carbon value.⁶⁶

Finally, we adjust this value by the change in the market share and by the difference in the rate of decline in single use products used under the ban and no ban scenario. The benefit results in a present value of £4.1m over the appraisal period.

Beach Wellbeing Benefit

89% of people are concerned by plastic pollution in the ocean.⁶⁷ The presence of litter can contribute to a fear of crime and injury, both of which have a negative well-being impact.⁶⁸ Litter can also discourage the use of public spaces and reduce our enjoyment of marine environments. There is a negative well-being impact experienced when harm to marine environments and the wildlife in them is observed. Clean environments have a 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 plastic plates and cutlery is expected to have a positive amenity benefit by reducing the amount of single-use plastic in circulation and littered. Even if they still end up in the marine environment, paper plates and wooden cutlery decompose much faster. This will lead to fewer of them being found across all environments as litter. This amenity benefit is generated because people may gain a satisfaction from knowing that something is being done to support marine environments (beaches and seas) and monetised using a willingness-to-pay method.

Monetisation of beach wellbeing benefit

63 HMRC, [Landfill Tax rates](#)

64 <https://www.letsrecycle.com/prices/efw-landfill-rdf-2/efw-landfill-rdf-2020-gate-fees/>

65 BEIS, [Greenhouse gas reporting: conversion factors](#)

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

67 [Populus: Ocean Plastic Survey](#)

68 Lorenc, T., Petticrew, M., Whitehead, M. *et al.* Fear of crime and the environment: systematic review of UK qualitative evidence. *BMC Public Health* **13**, 496 (2013). <https://doi.org/10.1186/1471-2458-13-496>

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

- The Economics for the Environment Consultancy⁶⁹ estimated that households' mean willingness to pay for clean beaches is £8.50⁷⁰, based on surveying 809 beach and non-beach users. Based on 27,824,000 households in the UK⁷¹, we estimate that the total beach well-being benefit is £236,504,000 per annum (central estimate). This estimate was then scaled down to England using the latest population factors. We assume that a small proportion of this estimate can be attributed to the reduction of littered plates and cutlery.
- Plastic plates and cutlery are estimated to make up 0.05% and 0.2% of all beach litter⁷² based on item count. We adjust these percentages to account for the difference in the decomposition rates between plastic and alternative material. Our central estimate is that wood and paper decomposes between 150 and 650 times faster than plastic. This is to reflect that paper plates and wooden cutlery 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 marine litter reduction as a result of using alternative materials.
- To attribute this effect to the ban, we adjust the total well-being benefit by the percentage of reduced litter and by the difference in the market share between the ban and no ban scenario.

Wooden cutlery is estimated to take 2 years to decompose.⁷³ This means there will be very similar levels of littered cutlery on beaches in the first two years. Banning plastic cutlery will deliver well-being benefits from year 3 onwards. In comparison, paper decomposes in 24 weeks⁷⁴ and the effect of banning plastic plates will be visible from year 1. Over the 10-year appraisal period, the beach well-being benefit results in a present value of £0.02m.

Reduced Coastal Clean-Up Costs

The implementation of the ban on plastic plates and cutlery is predicted to reduce marine litter clean-up costs to local authorities. The faster decomposition rates of plastic alternatives (our central estimate is paper decomposes 650 times, and wood decomposes 150 times, faster than plastic) mean that these items will be present on beaches for less time. This means there will be less 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.

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)⁷⁵ estimated that UK municipalities spend approximately £15.8 million each year removing all forms of beach litter, and £2.1 million each year on harbours; and the contribution of each product to total beach litter (0.05% for plates and 0.1% for cutlery) is based on item count in beach litter surveys carried out by Nelms et al (2017).⁷⁶

69 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

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

71 ONS (2019) Families and households

72 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".

73 <https://marinedebris.noaa.gov/sites/default/files/publications-files/talking-trash-educational.pdf> Assuming wooden cutlery will decompose in the same manner as plywood.

74 US National Park Service: National Oceanic and Atmospheric Administration and Woods Hole Sea Grant

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

76 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".

In our central estimate we have assumed that decomposition of paper plates takes 24 weeks, 0.15% of the time taken for plastic plates, which take 300 years. For paper we have used a range of estimates for decomposition from 6 weeks to 60 weeks – the lower estimate is based on 6 weeks that takes for newspaper to decompose⁷⁷. For plastic it takes from 200 to 400 years⁷⁸. This is to reflect the fact that rates vary according to oxygen, light and moisture levels.

For wooden cutlery it takes 2 years to decompose⁷⁹, 0.67% of the plastic cutlery decomposition rate. The fact that it takes wood around 2 years to decompose led us to estimate no reduction in litter clean-up costs in the first 2 years as a result of banning plastic cutlery.

To estimate the reduced clean-up cost we have used the proportion (0.05% for plates and 0.1% for cutlery) of the total litter count made up by each product; and adjusted it to reflect the difference in decomposition rates between plastic and the alternative materials (paper plates decomposition rate is 0.154% the length of time of plastic and wooden cutlery decomposition rates is 0.667% the length of time it takes for plastic cutlery to decompose). This gives us an estimate of marine litter reduction as a result of using alternative materials.

We have then multiplied this estimate by the total annual litter clean-up cost in beaches and harbours (£17,894,737). We have also taken into account that only 65%⁸⁰ of the total cost are assumed to be variable.

Finally, reduced clean-up costs are adjusted to reflect the difference in the market share associated reductions in the volume of sales under the ban and no ban scenario (i.e. counterfactual). This results in a present value benefit of £0.001m over the appraisal period.

Production Emission Savings

The alternative materials to plastic are much less emission intensive upon production. We have assumed that 10% of both the plates and cutlery markets are supplied by domestic manufacturers⁸¹. This means that the ban will deliver some production-related savings. Resource Futures have reported that for both plastic plates and cutlery, 10% of total products consumed in England are manufactured in England. We have made the assumption that this relationship can be extended over the whole of the UK. The estimation of domestic production is something we would like to shareholder views on in our consultation.

Monetisation of production emissions benefit

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

- Most plastic plates are made from polystyrene⁸² and its production is associated with 2.306 tonnes of CO₂e.
- Most plastic cutlery is made from polystyrene or polypropylene⁸³. We have assumed that plastic plates are made using both materials equally. Per tonne produced, polystyrene emits 2.306 tonnes of CO₂e and polypropylene emits 1.876 tonnes of CO₂e. Given the 50/50 plastic material composition, this gives us an average estimate of 2.091 CO₂e⁸⁴ per tonne produced.

77 US National Park Service; National Oceanic and Atmospheric Administration and Woods Hole Sea Grant

78 Based on estimates of 200 years from [4ocean](#) and 400 years from [Wessex Water](#).

79 <https://marinedebris.noaa.gov/sites/default/files/publications-files/talking-trash-educational.pdf>

80 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.

81 Resource futures: A preliminary assessment of the economic impacts of a potential ban on plastic cutlery, plastic plates and plastic balloon sticks

82 <https://homesteady.com/13410830/what-are-plastic-plates-made-of>

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

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

- We have estimated the total number of products produced in England. This was based on the total number of single-use plates and cutlery 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.
- The production emission savings result in a present value saving of £0.8m over the 10-year appraisal period.

Non-monetised Costs and Benefits

Summary of non-monetised costs

Public Sector Familiarisation Costs

A potential cost that we have not been able to monetise is the familiarisation costs to public sector organisations. There might be several organisations such as schools, hospitals and prisons that use single-use plastic plates and cutlery and would be affected by the proposed ban. The extent of usage is unknown however, for example, the NHS is already transitioning away from single use plastics⁸⁵.

This public sector cost omission would only affect familiarisation costs and not the other areas of costs and benefits. This is because we assume that any plates and cutlery used by the public sector are implicitly captured in the total England plates and cutlery consumption data. They will therefore be factored in calculations related to other costs and benefits identified in this IA. Whether public sector organisations use single-use plates and cutlery is something we would like to gain stakeholders' views on in the consultation.

Lost Revenue for Producers

Another possible cost that we have not monetised is the loss in revenue and associated profits from lost domestic production of plastic plates and cutlery. Our assumption is that 10% of single-use plates and cutlery are produced in the UK.

There may also be an additional cost to businesses if they decide to adapt their production to use alternative materials. They may incur a significant cost if alternative material production will require different capital inputs.

We welcome evidence on the response of producers of single-use plates and cutlery in the public consultation. We also plan to engage with the relevant industry bodies and third parties to better understand the domestic production landscape for these items.

Summary of non-monetised benefits

Reduced Damage to Marine Life

Plastics are the largest, most harmful and most persistent fraction of marine litter, accounting for at least 85 per cent of total marine waste.⁸⁶

⁸⁵ <https://www.england.nhs.uk/2019/10/nhs-bids-to-cut-up-to-100-million-plastic-straws-cups-and-cutlery-from-hospitals/>

⁸⁶ From Pollution to Solution: Marine Litter and Plastic Pollution Global Assessment, UNEP, 2021

It is estimated that 1.5–4.5% of all global plastics production ends up in the ocean every year⁸⁷. 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 entanglement⁸⁸. It has been estimated that 50% of marine mammals, 40% of seabirds and all turtle species have been known to ingest plastic⁸⁹. 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 starvation⁹⁰. 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 sorb harmful substances such as endocrine disrupting chemicals (EDCs) that can disrupt the hormonal equilibrium of marine life⁹¹. 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.⁹²

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.⁹³

Furthermore, research is gradually revealing the impact that this marine plastic pollution could have on human health. When marine life ingests plastic, the toxins in microplastics can be transferred up the food chain and can be ingested by humans⁹⁴. 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 unclear⁹⁵ ⁹⁶. However, some of these chemicals are associated with serious health impacts, especially in women.⁹⁷

Given that plastic plates and cutlery contribute to marine litter⁹⁸, 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)⁹⁹ while the monetary value of losses of marine natural capital is estimated to be as high as US\$ 2,500 billion per year (1,860 billion GBP)¹⁰⁰. The European commission¹⁰¹ estimated that the cost of marine litter to the EU fishing industry could amount to almost €60 million. 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.

87 <http://www.sciencemag.org/news/2015/02/here-s-how-much-plastic-enters-ocean-each-year>

88 https://www.biologicaldiversity.org/campaigns/ocean_plastics/

89 Estimates from Centre for Environment, Fisheries & Aquaculture Science

90 [Cotton bud project](#)

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

92 From Pollution to Solution: Marine Litter and Plastic Pollution Global Assessment, UNEP, 2021

93 From Pollution to Solution: Marine Litter and Plastic Pollution Global Assessment, UNEP, 2021

94 <https://www.nationalgeographic.com/news/2017/08/ocean-life-eats-plastic-larvaceans-anchovy-environment/>

95 World Health Organisation (2019) <https://apps.who.int/iris/bitstream/handle/10665/326499/9789241516198-eng.pdf?ua=1>

96 Cox et al, 2019, Human consumption of microplastics <https://pubs.acs.org/doi/abs/10.1021/acs.est.9b01517>

97 From Pollution to Solution: Marine Litter and Plastic Pollution Global Assessment, UNEP, 2021

98 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

99 Exchange rate value as of 17th November 2021

100 Exchange rate value as of 17th November 2021

101 http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/index_en.htm

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 that therefore consumers will litter more or not recycle plates and cutlery as frequently. 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.

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 and alternative material to plastic. If a ban is not imposed retailers may fall back on or delay commitments they have made.
- **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.

The effect of this policy will be reviewed in line with the standard 5-year post implementation review process.

Equality Impact Assessment

The public sector equality act introduced the requirement for public bodies to assess whether policy proposals will unlawfully discriminate against a group of people. We believe that the ban on plastic plates and cutlery will not unlawfully discriminate against any group of people. We are inviting public input on this topic in our consultation.

Monitoring and Evaluation

The effect of this policy will be reviewed in line with the standard 5-year post implementation review process.

Current monitoring arrangements

Monitoring change is focused on our intended outcomes, namely reductions in resource use and waste production and improvements in waste management (more recycling, less landfilling and less waste crime). The changes are part of a 'golden thread' which leads upwards to the objectives of the 25 Year Environment Plan, the Clean Growth Strategy, and the Litter Strategy. The framework of indicators is set out on page 139 of the Resources and Waste Strategy

The framework was devised prior to the focus on Net Zero, to which all three 25YEP goals are relevant. We have set out our approach to monitoring change in our *Monitoring Progress* report.¹⁰²

¹⁰² [Resources and Waste Strategy: Monitoring progress](#)

Current data collection regimes

Data on waste is limited, something we are addressing through our work on a) mandatory reporting on food waste and b) waste tracking. Both are due to be implemented, subject to consultation and legislative change, in the next couple of years. In the meantime, we rely on the Defra-funded WasteDataFlow reporting platform for local authority collected waste, on work delivered by WRAP, on our own in-house models (MELMOD and FOWST), and on bespoke Defra-funded measurement initiatives.

Proposed monitoring arrangements

We have devised a series of high-level theories of change from which a sub-set of SMART indicators will be selected. We expect that we will currently be collecting some of these, but that we will need to define and collect data on additional indicators relevant to specific policy initiatives.

We also plan to expand our routine monitoring from the high-level indicators shown above to a) material-based indicators e.g. plastic waste and b) lead indicators of change, e.g. shifting patterns of behaviour. These will be reported in future editions of the annual *Monitoring Progress* report.

Both activities are elements of an external commission for evaluation of the Resources and Waste Strategy which we expect to start in early 2022. We have approval to start the procurement process, which we will be initiating in autumn 2021.

External influencing factors

The context within which the ban on single-use plastic plates and cutlery will be implemented is extremely complex, with many interacting parts, policies and actors. The complexity supplement to the Magenta Book is helpful in this respect and will be the basis of evaluation commissioning.

Key factors which may influence the outcome of the ban, which are not under our control, include:

- Any exemptions of items, subject to consultation;
- Disproportionate impacts on groups through a protected characteristic under the Equality Act 2010;
- Disproportionate impacts on small and micro-sized businesses;
- Falling demand for single-use plates and cutlery items in favour of reusable alternatives.

We will ensure that evaluation takes account not only of our own activities but also those of other actors. Similarly, we will ensure that we look for unintended outcomes as well as intended outcomes, and that we assess both benefits and disbenefits, as whether an outcome is felt as a 'good' or 'bad' thing depends on who is affected, how and when.

Early indications that policies are not working as intended

We intend to commission both an impact evaluation and a process evaluation. The process evaluation will be carried out in parallel to policy implementation, to help us understand what is and is not working, get feedback from stakeholders and make corrections to design, implementation and regulation if needed. It will provide evidence to defend the ban on single-use plastic plates and cutlery in the face of unjustified external criticism, but also enable us to quickly stop policies which are not working as intended, or which may be causing hardship.

Performance evaluation

The impact evaluation we are commissioning will enable us to make a formal assessment of policy performance compared with expectations. We intend to build in a way of quantifying attribution, so

we can distinguish, quantitatively, the impact of the ban as distinct from other factors while recognising the system interactions that mean it is rarely the case that a single policy leads to a single outcome.

The impact evaluation will gather quantitative and qualitative evidence about the difference the ban is making, which aspects are working, which are not working so well, and recommendations for future improvements. Following from this, we will be able to use the data to estimate cost-benefits and to satisfy any commitments we have made to carry out formal reviews.

Small and Micro Businesses Assessment (SaMBA)

Although there is a large number of small and micro businesses (as illustrated on Table 7) affected, we do not have any evidence to suggest that they will be disproportionately affected by the ban. This is because the ban would create the level playing field across all businesses and would also strengthen the market for innovation. We are seeking to gain further evidence on this in the consultation published alongside this document.

We also welcome evidence on whether there will be any economies of scale associated with large businesses being able to purchase larger quantities of items at a lower price.

As noted in the discussion on familiarisation costs, the consultation also seeks evidence on whether small and micro businesses would require a different amount of time for employees to become aware of the ban.

Table 7: Breakdown of Standard Industrial Classification (SIC) local business units in UK by employment bands¹⁰³

UK SIC code	Employment Size Band							Total
	0-4	5-9	10-19	20-49	50-99	100-249	250+	
4711 : Retail sale in non-specialised stores with food; beverages or tobacco predominating	21,530	6,370	2,035	670	130	40	45	30,820
4729 : Other retail sale of food in specialised stores	2,960	810	395	165	30	10	5	4,375
4781 : Retail sale via stalls and markets of food; beverages and tobacco products	905	205	40	5	0	0	0	1,155
5610 : Restaurants and mobile food service activities	47,020	23,900	11,730	4,950	855	365	320	89,140
5621 : Event catering activities	6,505	1,555	770	400	120	50	45	9,445
5629 : Other food service activities	1,695	330	180	90	25	15	45	2,380
Total	80,615	33,170	15,150	6,280	1,160	480	460	137,315

Annex 1

Table8: Number of enterprises in SIC codes that are assumed to be affected by ban, scaled down to England

SIC code	Number of enterprises
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¹⁰³ ONS, [UK business: activity, size and location](#)

4711 : Retail sale in non-specialised stores with food; beverages or tobacco predominating	25,896
4729 : Other retail sale of food in specialised stores	3,560
4781 : Retail sale via stalls and markets of food; beverages and tobacco products	969
5610 : Restaurants and mobile food service activities	47,928 ¹⁰⁴
5621 : Event catering activities	10,157
5629 : Other food service activities	2,140
Total	90,650

104 Fast food outlets: density by local authority in England