

Title: Consultation Stage Impact Assessment on the proposal to ban the distribution and/or sale of plastic drink stirrers in England. IA No: Defra/ENV/021 RPC Reference No: TBA Lead department or agency: Department for Environment, Food and Rural Affairs (Defra) Other departments or agencies: N/A	Impact Assessment (IA)			
	Date: 16/10/2018			
	Stage: Development/Options			
	Source of intervention: Domestic			
	Type of measure: Secondary legislation			
Contact for enquiries: Tom.Murray@defra.gsi.gov.uk				
Summary: Intervention and Options				RPC Opinion: Not Applicable

Cost of Preferred (or more likely) Option				
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANDCB in 2014 prices)	One-In, Three-Out	Business Impact Target Status
£0.26m	£0m	£0m	Not in scope	Qualifying provision

What is the problem under consideration? Why is government intervention necessary?
 Plastic drink stirrers are not commonly recycled, causing multiple environmental harms particularly when they are discarded incorrectly, including harm to marine animals and visual pollution. Even if disposed of correctly plastic stirrers may be incinerated, generating high carbon emissions. These are negative externalities as they are experienced across society and are not accounted for within the market price of plastic drink stirrers. Providers of drink stirrers do not have incentives to address the externality costs. A ban will move consumers towards stirrers made from materials that impose lower environmental and disamenity costs on society and reduce the impact on marine wildlife.

What are the policy objectives and the intended effects?
 The objective is to help protect our environment for future generations, improve the quality of the environment and reduce harm to human health and marine life. The ban is intended to ensure that drink stirrers are no longer plastic and are made of materials that will decompose much quicker and have low life-cycle impacts on the environment, and the ban will encourage businesses to invest in cleaner alternatives to plastic. The ban also intends to increase consumer and business awareness of the environmental harms drink stirrers can cause after use and to signal Government's intent to reduce unnecessary plastic waste.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)
 Two options are considered for consultation, including 'do nothing' (option 0) and a ban (option 1, preferred). A ban is preferred as it would have the maximum impact in reducing the social costs of plastic drink stirrers. Alternative options such as taxes and information campaigns were considered but rejected as they would be more costly and less effective than a ban. A ban has no administration costs and will have minimal costs to businesses. As there are suitable alternatives to plastic drink stirrers already available, policies such as subsidies for environmentally friendly alternatives are not necessary, and there is no need for a ban to include any exemptions.

Will the policy be reviewed? It will be reviewed. If applicable, set review date: Month/Year				
Does implementation go beyond minimum EU requirements?			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)			Traded: 0.0002	Non-traded: 0.0001

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

Description:

FULL ECONOMIC ASSESSMENT

Price Base Year	PV Base Year	Time Period Years	Net Benefit (Present Value (PV)) (£m)		
			Low: £0.10m	High: £0.65m	Best Estimate: £0.26

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	£0.00	£0.00	£0.00
High	£0.00	£0.00	£0.01
Best Estimate	£0.00	£0.00	£0.01

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

We have monetised the cost of additional emissions expected from landfilling wooden drink stirrers (the expected substitute for plastic single use stirrers), as plastic emits very few carbon dioxide equivalent (CO₂e) emissions when placed in landfill relative to wood.

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

Some consumers may lose out if they prefer plastic drink stirrers. There will be fuel cost from wooden stirrers being heavier, this will also have a carbon impact. Any costs to English businesses are likely to be small and not easy to evidence, or do not exist as drink stirrers are predominantly imported and wooden drink stirrers are already sold at comparable prices to plastic drink stirrers, though some businesses may encounter switching costs. Monitoring and enforcement costs.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	£0.03	£0.01	£0.10
High	£0.22	£0.05	£0.65
Best Estimate	£0.09	£0.02	£0.27

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

Alternative drink stirrers, expected mainly to be wooden, generate fewer CO₂e emissions when produced and incinerated than plastic, resulting in environmental benefits. As wood decomposes much quicker than plastic, we expect to see a small reduction in the presence of litter on beaches. Clean beaches are highly valued by the public.

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

Plastic drink stirrers 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. 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%

We expect that some retailers will switch away from plastic anyway, following campaign movements such as StirCrazy. Should this assumption be wrong, this would increase the net positive impact of the ban. We assume that wooden drink stirrers will replace plastic drink stirrers rather than other materials, due to their suitability as a substitute and their current usage. We have not modelled any costs to businesses as we assume familiarisation and administration costs to businesses are minimal.

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: £0	Benefits: £0	Net: £0	
			Not applicable, low-cost measure

Problem under consideration

Plastic drink stirrers are rigid single-use products used to mix drinks in a single container or to help sugar dissolve in hot drinks. They are prone to being discarded for waste disposal due to the effort required to separate them from containers and then clean them.

It is estimated that 316 million drink stirrers are consumed in England each year¹. Single use plastics, including plastic drink stirrers, are associated with negative effects on the environment. Resources and greenhouse gas emissions are also associated with plastics production since they are oil based. Once made, plastic drink stirrers have impacts on land and in seas and rivers if they are littered or discarded incorrectly after their use. There are costs associated with their clean-up and externality costs imposed on the tourism and fishing industries from littering and the transfer of littered plastics into the environment. They can damage terrestrial and marine life and there is widespread and significant public concern regarding plastics and litter. All of these impacts contribute towards negative well-being. Every drink stirrer, if not properly disposed of can contribute towards these social costs over a long period of time as it can take plastic 300 years to decompose².

It is estimated that there are over 150 million tonnes of plastic in the world's oceans, and every year one million birds and over 100,000 sea mammals die from eating and getting tangled in plastic waste³.

Plastic stirrers are only a small part of the damage plastic causes to the environment. We estimate in this assessment that plastic drink stirrers contribute towards 0.1% of marine litter⁴.

The government is considering this ban as there are already suitable alternatives available to plastic, resulting in the costs of a ban being minimal, and therefore the government considers that an intervention should be made given the environmental benefits available.

Rationale for Intervention

Plastic drink stirrers are not commonly recycled due to the effort required to segregate and clean them. The social costs of this, as well as environmental costs associated with incineration of plastic stirrers are not accounted for within the market price, so consumers are not currently incentivised to limit their use and disposal of plastic drink stirrers, and businesses are not directly incentivised to use alternative materials.

Intervention is required in order ensure a full shift in the drink stirrer market away from plastic. Suitable alternatively made drink stirrers made from wood are available. Although switching to wood will still have some environmental impact compared to reusable alternatives, it still causes less environmental damage than plastic. Intervention in the market will help those businesses

¹ Estimate based on an assumption made by Resource Futures that 10% of the estimated annual single-use takeaway coffee cup sales include stirrers, and estimates for coffee cups used per year ranging from 2.5 – 5 billion.

² Taking an average based on estimates of 200 years from [4ocean](#) and 400 years from [Wessex Water](#). This contrasts with wood, the expected substitute material for plastic stirrers, which based on estimates for plywood by [US National Park Service](#) takes 1 – 3 years to decompose.

³ Estimates by Defra

⁴ Our best estimate for their prevalence comes from an estimate that drink stirrers and straws together make up 2% of marine litter, and we estimate that stirrers make up 5% of the group of straws and stirrers, based on estimates of the number of stirrers consumed compared to straws. See section on Prevalence of Drink Stirrers for more detail.

who have already invested in alternatives to plastic drink stirrers, and will ensure that no business benefits unfairly from using plastic stirrers should there be advantages from doing so.

Policy objective

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. These objectives are set out in the government's 25 Year Environment Plan that was published on 11 January 2018, which includes new measures to eliminate all avoidable plastic waste by the end of 2042 and a target for significantly reducing and where possible preventing all kinds of marine plastic pollution.

The government will also be publishing a new Resources and Waste Strategy later this year. The aim of the strategy will be to make the UK a world leader in resource efficiency and resource productivity and to increase competitiveness. It will set out how we will work towards our ambitions of doubling resource productivity and achieving zero avoidable waste by 2050, maximising the value we extract from our resources and minimising the negative environmental impacts associated with their production, use and disposal. Single use plastics, including plastic stemmed cotton buds, plastic drinking straws and plastic drinks stirrers, are associated with negative effects on the environment if they are littered or discarded incorrectly after their use.

This ban is intended to ensure that drink stirrers sold in England are made of more environmentally friendly materials that will decompose quicker and will have lower life-cycle impacts on the environment. It is also intended that banning plastic drink stirrers will foster increased consumer confidence that the products they buy will not harm wildlife and the environment, and will also increase consumer awareness of the environmental harms stirrers can cause when they are not correctly disposed of.

Options under consideration

This impact assessment considers two options for consideration during consultation. **The preferred option is to ban plastic drink stirrers without time delay.** A ban will be the most effective option to reduce the social and environmental costs associated with plastic drink stirrers.

Option 0: Do nothing

The **do nothing** option would allow plastic stirrers to continue being used with little incentive for consumers to switch products. The costs and benefits of this option is zero against the baseline. Some business are voluntarily moving away from plastic drink stirrers and this will be factored into the do nothing scenario.

The problem associated with this option is although there is some voluntary reduction in plastic stirrer use, there will still be many that continue to be used and disposed of. This means the environmental costs associated with plastic stirrers will continue to persist into the future.

Option 1: Implement a regulatory ban of plastic drink stirrers from October 2019 (preferred option)

The preferred option is to ban plastic drink stirrers with no exemptions and without time delay as this would be the most effective option to reduce the social and environmental costs associated with drink stirrers

A delay would reduce the environmental savings of a ban because plastic stirrers would be in use for longer. The availability of alternative drink stirrers suggests that switching costs would be small and that therefore a transition period would not be necessary. The preferred option seeks to implement a ban by October 2019.

The impacts of a ban are proportionate to secure the environmental benefits without any major costs given the current trend to move away from plastics and the availability of alternatives. The ban will foster increased consumer confidence that the products they buy will not harm wildlife and the environment, and will also increase consumer awareness of the environmental harms plastic can cause when not correctly disposed of.

Disregarded options

The following options were considered but most were rejected as they 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 wholesalers to move away from plastic drink stirrers. However there is evidence that consumers are already acutely aware of the harms of single-use plastics through many recent campaigns, including the BBC's Blue Planet II series, Daily Mail's Break the habit, Turn the Tide on Plastic and the Stir-Crazy Campaign, as well as the carrier-bag 5p charge in supermarkets. The additional impact of further information being provided on top of these campaigns may be marginal.

Subsidies towards the development of non-plastic drink stirrer alternatives are not considered necessary as stirrers are simple in design and suitable non-plastic drink stirrers have already been developed and are available at the same market price. For the same reasons we also consider that subsidies to encourage the use of non-plastic drink stirrer alternatives would not be necessary to cover any business costs and that such subsidies would be not be value for money for use of taxpayer funds.

A taxation or charge policy was rejected. These would not reduce plastic consumption and support the environment as effectively as a ban. If a ban is introduced by October 2019 as proposed, 0% of stirrers will be plastic by 2020. In a no ban scenario, plastic drink stirrers would take up 5% of the market share by 2022. We believe that regulation will truly tackle the problem of plastic pollution".

A ban with exemptions was also considered but rejected as, given the suitability of available non-plastic drink stirrers, there is no evidence that any groups would be unduly disadvantaged by a wholesale ban.

Alternatives to plastic drink stirrers

Research undertaken on behalf of Defra identifies wood as the most substitutable material to plastic for stirrers⁵ as these are comparable in price to plastic stirrers and are also disposable. For the modelling in this impact assessment we assume that wooden drink stirrers are the substitute for plastic drink stirrers. It is a conservative assumption to assume that consumers continue using single use wooden stirrers, as if consumers switch to reusable stirrers the environmental benefits of the ban would be greater.

Other materials were considered, as there are a number of alternative materials including metal, stainless steel, glass and bamboo. These materials make up a small portion of the market and are primarily used at home and are often re-used, and therefore are not expected to replace single use plastic stirrers.

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 plastic drink stirrers, compared to what we believe would happen if there were no government intervention (i.e. under the ‘do nothing’ option). The central estimate is £0.26m, with the largest contributor coming from an amenity estimate resulting from there being less litter on beaches.

Table 1 - Summary		10 Year NPV estimates, £'000s		
		Low	Central	High
Benefits	Production Emission Savings	£2	£5	£6
	Disposal incineration emission benefit	£12	£17	£23
	Reduced coastal clean-up costs	£9	£17	£35
	Beach well-being benefit	£79	£226	£588
	Costs	Disposal landfill emission cost	-£7	-£5
Total		£95	£261	£649

All figures are in 2017 prices. The range between the low and high estimates reflects the estimate ranges for the number of drink stirrers consumed in England, how long each stirrer would take to decompose, the proportion that end up on beaches and differing values in the literature placed on having cleaner beaches.

Counterfactual

In order to assess the costs and benefits of the preferred option to ban plastic drink stirrers in October 2019, we have set out what we estimate would happen to the drink stirrer market if there were no ban (i.e. we ‘do nothing’). Resource Futures estimate that 50% of disposable drink stirrers currently consumed are plastic stirrers⁶.

⁵ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.

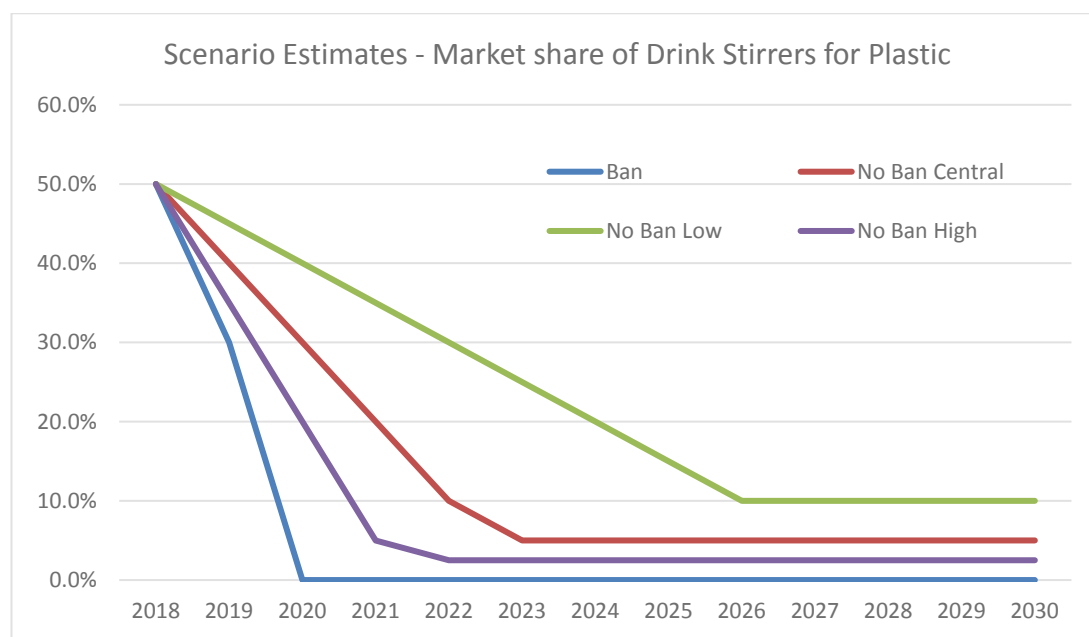
⁶ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers.

We expect it would be unrealistic to assume that plastic stirrers would keep this market share in the 'do nothing' scenario given the current campaigns and movements away from single use plastics⁷ as well as movements specific to stirrers⁸. The scenario analysis section below maps out how we expect the market share of plastic stirrers to change. These modelling assumptions make the overall net present value lower than maintaining a constant market share so this is a conservative approach to the analysis.

The value of the costs and benefits of the ban are sensitive to the number and size of providers that switch to wooden stirrers voluntarily, and the time it would take them to switch without the ban in place. A limitation of this impact assessment is that it is very difficult to predict what the market will do if no ban on plastic stirrers were imposed.

Scenario Analysis

In order to allow for the evidence gap in forecasting what would happen to plastic stirrers without a ban, we have provided an illustration of three scenarios for take up of alternatively made stirrers in the 'do nothing' (no-ban) scenario and compared these against the 'ban' scenario, all of which are shown in the graph below and in table format in annex 1. They show the percentage of the market share forecast to still be plastic over the next 10 years.



The 'ban' and 'no ban central' scenarios are based on modelling estimates made by Resource Futures. The differences in the scenarios start from 2019 as the ban is planned to be enacted October 2019.

In the ban scenario, 0% of stirrers will be plastic by 2020. In the 'no ban high' scenario, take up of alternatively made drink stirrers is very high, leaving plastic with a 5% market share for drink stirrers by 2022. The 'no ban central' and 'no ban low' take up scenarios follow similar paths but each with slightly higher proportions of plastic market share throughout.

⁷ The movements away from single use plastics are currently quite prominent in the market for cotton buds, straws and coffee cups (which stirrers are commonly used with), with numerous commitments having been made by retailers since 2017.

⁸ [Recycling waste world](#) – Stir Crazy

The difference between the 'ban' and 'no ban central' scenario is used to calculate the final net present value (NPV) estimate in this impact assessment. Table 2 below provides a sensitivity analysis to show how the NPV would change across the 'no ban' scenarios:

Table 2 - Scenarios for plastic take up if there were no ban:	10 Year NPV estimates, £'000s		
	Low	Central	High
Central Scenario NPVs	£95	£261	£649
Low take up Scenario NPVs	£203	£556	£1,382
High take up Scenario NPVs	£45	£124	£308

All of the 'no ban' scenarios are similar in that they suggest that the majority of the market for drink stirrers will soon move away from plastic. This limits the scope of the costs and benefits in this impact assessment significantly. This is a conservative approach, as the table shows that if we assumed that plastic retains a greater market share (i.e. the low take up scenario) then the ban would have stronger impacts, resulting in higher net present value estimates. If we assumed that without a ban that plastic retained a 50% market share for drink stirrers throughout the appraisal period (through to 2029), then the net present value of banning plastic drink stirrers would be approximately £2.6m⁹.

Benefits

The benefits of a ban on plastic drink stirrers include reducing the carbon emissions associated with the production and incineration through switching to wooden alternatives, improvements to marine environments and amenity benefits from litter reduction.

Monetised Benefits

Table 3 shows the value of the benefits we have quantified. In our central total present value (TPV) estimate over 10 years we expect £266,000 of benefits to come from a ban of plastic drink stirrers.

Table 3	10 Year TPV estimates, £'000s		
	Low	Central	High
Total Benefits:			
Production Emission Savings	£2	£5	£6
Disposal incineration emission benefit	£12	£17	£23
Reduced coastal clean-up costs	£9	£17	£35
Beach well-being benefit	£79	£226	£588
Total Benefits:	£102	£266	£652

The largest benefits are associated with improvements to beach environments which saves clean-up costs and has well-being benefits. Plastic drink stirrers contribute towards polystyrene pieces which are commonly found on beaches, but clean beaches are highly valued by the public. A switch away from plastic drink stirrers should help to reduce plastic debris on beaches as wooden alternatives that might reach the beaches will decompose much quicker.

⁹ 10 year net present value estimate.

The other quantified benefits are from emission savings which come from wooden based alternatives being cleaner to incinerate (each tonne of wood burnt actually saves carbon dioxide equivalent (CO₂ e) emissions through energy conversion) and also cleaner to produce. Each tonne less of CO₂ e produced has an estimated benefit saving to the environment from abatement costs.

Non-monetised Benefits

There are several benefits particularly associated with improvements to marine environments that have not been quantified. 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 have a non-use value of marine environments, as people value knowing that there is a pleasant environment available to them and to others. Marine litter impacts marine life as materials can entangle or be ingested by marine wildlife. Harm to marine wildlife may be a strong public concern and a significant part of the rationale for a ban. A ban on plastic drink stirrers will help to reduce the amount of plastic content reaching, staying and causing harm in marine environments, reducing the scope of environmental costs associated with marine litter.

Environmental Production Savings

Wooden drink stirrers are more environmentally friendly to produce than plastic drink stirrers as for each tonne of wood produced, less carbon dioxide equivalent (CO₂ e) tonnes are emitted than for each tonne of plastic. We have been able to monetise this benefit:

Monetisation and Assumptions

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

- We have estimated that 316m drink stirrers are consumed in England each year. We assumed 211m for our low estimate and 421m for our high estimate. These estimates are based on estimates for the number of coffee cups consumed in the UK¹⁰ scaled down for the population of England¹¹, and an assumption that 10% of disposable coffee cups come with stirrers¹².
- For each tonne of material produced, plastic polystyrene emits 3.78t of CO₂ e, whereas wood production emits 0.41t¹³.
- Wooden drink stirrers weigh 1.09g, compared to 0.32g per unit for plastic drink stirrers¹⁴.
- We assume that the cost of one tonne of CO₂ e in 2020 is £4.56, which increases up to £79.43 by 2030¹⁵.
- This gives an initial annual central estimate benefit of £1,100¹⁶.

¹⁰ [House of Commons Environmental Audit Committee](#), Disposable packaging: Coffee Cups

¹¹ [ONS](#) figures for population of England and UK

¹² Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

¹³ Government conversion factors. Spreadsheet used [here](#), which underpins published [government gas reporting figures](#).

¹⁴ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

¹⁵ Green Book Supplementary [Guidance from BEIS](#), P3.51, which states to use the traded price of carbon for production emissions overseas. We are assuming that stirrers are produced overseas.

¹⁶ This annual estimate, starting from 2020, includes adjustment to 2017 prices. It rises each year to £13,600 in 2029 when the traded value of carbon is much higher. It is scaled down in the final Net Present Value calculation to reflect the market share that plastic stirrers currently have and how that is expected to change over the appraisal period if there were no ban. See section on 'counterfactual'.

Environmental Incineration Emission Savings

A benefit of moving away from plastic based goods is that plastic emits more kilograms of carbon dioxide equivalent (CO₂ e) emissions when it is incinerated (1,053kg of CO₂e for each tonne of plastic polystyrene). This contrasts with wood which actually saves 842kg of CO₂e for each tonne incinerated as the energy is recaptured. Given that each tonne of CO₂ has an environmental cost associated with it, this causes wood based alternatives to make a positive contribution towards the environment relative to plastic drink stirrers, should they be given to non-recycled waste to dispose of.

Monetisation and Assumptions

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

- 316m drink stirrers are consumed in England each year. We assumed 211m for our low estimate and 421m for our high estimate. These estimates are based on estimates for the number of coffee cups consumed in the UK¹⁷ scaled down for the population of England¹⁸, and an assumption that 10% of disposable coffee cups come with stirrers¹⁹.
- Wooden drink stirrers weigh 1.09g, compared to 0.32g per unit for plastic drink stirrers²⁰.
- We assume that the cost of one tonne of CO₂ e in 2020 is £68.08, which increases up to £79.43 in 2030²¹.
- In our central estimate 99.9% of plastic stirrers are given to waste or are littered, and then collected by local authorities, with 0.1% ending up in marine environments²². Only a small proportion are thought to reach marine environments as only a fraction of stirrers are used outdoors, littered and not street cleansed²³. We assume zero recycling occurs, which is based on the effort required to segregate them and clean them from disposable cups. This assumption is also to give a conservative estimate, as if any drink stirrers were recycled wood stirrers would emit fewer carbon equivalent emissions than plastic stirrers²⁴, leading to a higher NPV for the policy to ban plastic drink stirrers.
- 71% of the 99.9% of drink stirrers collected by local authorities are sent for incineration²⁵
- When wood is compared against plastic, this gives a saving of £19,200 per year²⁶.

¹⁷ [House of Commons Environmental Audit Committee](#), Disposable packaging: Coffee Cups

¹⁸ [ONS](#) figures for population of England and UK

¹⁹ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

²⁰ This estimate is based on an estimate by Resource Futures that 0.001% of plastic stirrers enter marine environments, which we have taken as our low estimate due to the evidence available covering the contribution stirrers make to beach litter, e.g. [Eunomia](#): leverage points for reducing single-use plastics.

²¹ Green Book Supplementary [Guidance from BEIS](#): non-traded carbon values are used for emissions from household disposal.

²² This estimate is based on by Resource Futures that 0.001% of plastic stirrers enter marine environments, which we have taken as our low estimate, with 0.1% as our central estimate and 1% as our high estimate. The overall benefit from incineration emissions is not sensitive to our range given for stirrers that enter marine environments.

²³ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

²⁴ Government conversion factors. Spreadsheet used [here](#), which underpins published [government gas reporting figures](#).

²⁵ Estimate based on figures by [Local Authority collected waste generation from April 2000 to March 2017 \(England and regions\) and local authority data April 2016 to March 2017](#)

²⁶ This annual estimate, starting from 2020, includes adjustment to 2017 prices. It is scaled down in the final Net Present Value calculation to reflect the market share that plastic stirrers currently have and how that is expected to change over the appraisal period if there were no ban. See section on 'counterfactual'.

Marine Benefits

Summary

Marine litter damages marine life as materials can entangle or be ingested by marine wildlife. Marine litter also has a disamenity cost, affecting pristine seascapes and quality of life which impacts those who use marine environments and also impacts those who have a non-use value of marine environments, as people value knowing that there is a pleasant environment available to them and to others. There is a market failure as the ocean acts as a free open access resource with no direct private costs to disposal (with only a small chance of being caught and fined). The costs are experienced by all users and especially hits groups such as fishermen, water sports enthusiasts, beach goers and animal lovers. As a contributor to marine litter, banning plastic stirrers will help to reduce these social costs.

Prevalence of Drink Stirrers in Marine Environments

It is estimated that 1.5 – 4.5% of all global plastics production ends up in the oceans every year²⁷. These items are ingested by marine life (with potential knock-on effects further up the food chain), captured as marine debris in fishing equipment and washed up on beaches. The Marine Conservation Society has been monitoring the levels of plastic and polystyrene pieces (0 – 50cm) found on beaches in the UK since 2004. Polystyrene pieces continue to feature in the top ten, ranking first in most common marine litter items in beach clean surveys with an average of 225.3 for every 100m of beach surveyed in 2017²⁸. Plastic drink stirrers contribute to these pieces as they are made of polystyrene.

It is difficult to evidence the prevalence of drink stirrers in marine environments as they are a very specific item with little data collected about them. Our best estimate for their prevalence comes from an estimate that drink stirrers and straws together make up 2% of marine litter²⁹. We estimate that stirrers make up 5% of the group of straws and stirrers, based on estimates of the number of stirrers consumed compared to straws³⁰.

The ban on plastic drink stirrers is expected to reduce the prevalence of marine litter as the ban will help inform consumers of the damages they can cause; fewer stirrers will reach marine environments, and those that do will stay for less time, as wooden stirrers will decompose quicker than plastic stirrers. All of these effects will contribute towards a positive well-being impact.

Plastic Entanglement Reduction

Entanglement in marine litter is thought to cause the death of 100,000 mammals each year in the North Pacific alone, a rate that appears to be increasing^{31,32}. Recording deaths is difficult as many casualties are likely to go unrecorded as they either sink to the ocean floor or are eaten by predators. Entanglement in nets, ropes and other debris poses a significant risk to marine animals and has been recorded in over 130 species of marine animals including 6 sea turtle

²⁷ <http://www.sciencemag.org/news/2015/02/here-s-how-much-plastic-enters-ocean-each-year>

²⁸ [Marine Conservation Society](#)

²⁹ [Report](#) by Eunomia for Seas at Risk, supported by EU funding, 2017, taking the estimate for North Eastern Atlantic.

³⁰ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers. Estimates for the number of stirrers and straws consumed in England vary, and so we have assumed stirrers makeup 2.5% of the total of straws for our low estimate, 5% in our central estimate and 10% for our high estimate.

³¹ 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.

³² Mouat, J., R.L. Lozano, and H. Bateson, *Economic Impacts of Marine Litter*, 2010.

species, 51 seabird species and 32 marine mammal species³³. Entanglement causes external cuts and wounds leading to infection, suffocation and drowning, asphyxiation, impaired mobility and fitness.

A ban on plastic drink stirrers should help reduce the number of cases of entanglement as the ban will reduce plastic debris in the seas. This benefit is difficult to quantify particularly due to the difficulties of placing a value on sea life, and we don't know how much plastic drink stirrers currently contribute to entanglement. Alternatively made drink stirrers may also still contribute in a smaller way to marine litter and entanglement.

Plastic Ingestion Reduction

All plastic items fragment overtime and it has been estimated that 50% of marine mammals, 40% of seabirds and all turtle species have been known to ingest plastic fragments³⁴. 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 starvation³⁵.

Plastic drink stirrers are particularly risky for digestion due to their long thin form. This can cause physical damage to an animal's entire digestive system. If broken, plastic drink stirrers can be even more dangerous with ragged and sharp edges.

We would expect a reduction in plastic ingestion following a ban in plastic drink stirrers, but as we have not been able to monetise the cost of marine animals being injured or lost to plastic ingestion we have not been able to monetise the benefit of reduced plastic ingestion.

Damage to Fisheries

The European commission³⁶ estimated that the cost of marine litter to the fishing industry could be €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 drink stirrers contribute to fishery damage, but even a small contribution by plastic drink stirrers could cost thousands or millions of pounds each year, which could be prevented.

Benefits to Marine users

Marine litter can negatively affect people's quality of life by reducing their enjoyment of the landscape and scenery. Beaches, coasts and seas are used for recreational activities including swimming, diving, boating, recreational fishing and water sports. Accumulations of marine litter can have a strong deterrent effect³⁷, so there is a disutility cost to people who want to use the marine environment for recreational activities but feel less able to do so, or would enjoy their activities less, as a result of marine litter. As it is not clear how many people are deterred or enjoy marine activities less as a result of marine litter it has not been possible to quantify the marine-user benefit of a reduction in plastic litter.

Benefits to Marine non-users

³³ Ten Brink, 2009, referenced in Mouat, J., R.L. Lozano, and H. Bateson: [Economic Impacts of Marine Litter](#), 2010

³⁴ Estimates from Centre for Environment, Fisheries & Aquaculture Science

³⁵ [Cotton bud project](#)

³⁶ http://ec.europa.eu/environment/marine/good-environmental-status/descriptor-10/index_en.htm

³⁷ [Scottish government](#), referring to multiple publications: Ballance et al 2000; Sheavly and Register 2005

The **non-use value** of clean marine environments includes the value derived from the knowledge of the existence of a desirable coastal environment, the value of bequeathing this to future generations and the altruistic benefits of preserving attractive coastal resources for other users. We have not been able to evidence the scale of non-use values and so therefore we have not been able to quantify the benefit to non-users of marine environments following a reduction in plastic waste.

Coastal Clean-up Cost Reduction

Harbours and marinas have litter cleared in order to ensure that their facilities remain clean, safe and attractive for users. Mouat et al. (2010)³⁸ 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.

Our central estimate for the prevalence of drink stirrers in marine environments is that they make up 0.1% of marine litter³⁹. The ban will reduce marine litter clean-up costs on beaches and harbours as it will help inform consumers of the damages they can cause, and alternatively made disposable drink stirrers (which are expected to be wood) will decompose much more easily, so each stirrer will be present on beaches for less time and therefore there will be fewer of them. Plastics can take hundreds of years⁴⁰ to decompose, whereas wood can take just a couple of years⁴¹ to decompose.

Monetisation and Assumptions

It has been possible to monetise the benefits of reduced clean-up costs following a plastic drink stirrer ban, using a series of assumptions for our central estimate:

- Our central estimate for the prevalence of plastic drink stirrers in marine environments is that they make up 0.1% of marine litter, with a low estimate of 0.05% and a high estimate of 0.2%⁴².
- Annual litter clean-up costs are £15.8m for beaches and £2.1m for harbour sides (2010 prices). These figures are for the whole of the UK, so are likely to overestimate impacts for England (it was not possible to deduce how much of these costs are attributable to England only).
- We assume that if stirrers were no longer present on beaches and harbour sides and that there would be a litter clean-up cost saving equivalent to the portion of litter that cotton stirrers contribute, as the evidence collected by Mouat et al. (2010) suggests that the majority of litter removal costs are variable costs.
- In our central estimate we assume that decomposition for wood takes 2 years, 0.67% of the time taken for plastic drink stirrers which take 300 years. We have used a range of estimates for decomposition from 1 – 3 years for wooden stirrers⁴³ and 200 – 400 years for plastic stirrers⁴⁴ to reflect the fact that rates vary according to oxygen, light and moisture levels.

³⁸ [Mouat, Lozano, Bateson](#): Economic Impacts of Marine Litter, 2010. Figure based on exchange rate of £1 = EUR 1.14

³⁹ See earlier section on prevalence.

⁴⁰ [Wessex Water](#): it's time to switch the stick

⁴¹ [US National Park Service](#)

⁴² Based on stirrers making up 2.5% of the total of straws for our low estimate, and 10% for our high estimate, and straws and stirrers together making up 2% of marine litter. See earlier section on prevalence.

⁴³ [US National Park Service, based on estimate range for plywood.](#)

⁴⁴ Low estimate from [4Ocean](#) and high estimate from [Wessex Water](#). Average taken for central estimate.

- This gives an annual central estimate of a £20,000 reduction in the clean-up costs of beaches and harbours⁴⁵.

We have modelled this benefit because we believe that as wood decomposes so much quicker than plastic that this will reduce litter on beaches and therefore reduces clean-up and disamenity costs. However, these savings may be overestimated as the savings would be affected by factors such as how frequently and how thorough beach clean ups are. We will continue to assess how switching to biodegradable materials impacts the volume of litter and the implications that has for clean-up costs and disamenity costs.

Amenity benefits of reduced litter on beaches

Summary

A ban on plastic drink stirrers is expected to have positive amenity benefits. We have monetised the well-being impact of reduced litter in beach environments.

The impacts of litter on amenity well-being:

- 89% of people are concerned by plastic pollution in the ocean⁴⁶.
- Initially people may gain a satisfaction from knowing that something is being done to support marine environments (beaches and seas).
- Non-plastic drink stirrers that end up in marine environments will decompose faster, leading to fewer drink stirrers being found across all environments, and therefore the well-being costs associated with beach litter will be reduced.
- The presence of litter can contribute to a fear of crime and injury, both of which have a negative well-being impact.
- Litter can 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 (this was explored in the marine section).
- 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, and therefore there is a social disamenity cost associated with litter.

Monetisation and Assumptions:

As we have an estimate from Eunomia that beach litter has a disamenity value in England of between £136m to £250m per annum we can estimate the benefit of there being reduced plastic litter on beaches following the ban with the following assumption and calculations:

- Plastic drink stirrers contribute towards 0.1% of marine litter⁴⁷, which we assume is representative of beaches.

⁴⁵ This annual estimate, starting from 2020, includes adjustment to 2017 prices. It is scaled down in the final Net Present Value calculation to reflect the market share that plastic stirrers currently have and how that is expected to change over the appraisal period if there were no ban. See section on 'Counterfactual'. The estimate may overestimate litter reduction in the first years as we have assumed decomposition benefits occur from the first year of the appraisal.

⁴⁶ [Populus](#): Ocean Plastic Survey

⁴⁷ Based on stirrers making up 2.5% of the total of straws for our low estimate, and 10% for our high estimate, and straws and stirrers together making up 2% of marine litter. See earlier section on prevalence.

- The annual well-being loss caused by beach litter is £188m, based on a willing to pay between £6 and £11 per household (in 2002 prices) to see litter free beaches⁴⁸.
- We assume a linear relationship between beach litter clean-up and the disamenity experienced by beach users caused by litters. So as we have estimated that stirrers make up 0.1% of beach litter, we assume that if they were all cleared that this would reduce the litter disamenity costs on beaches by 0.1%. We have assumed a linear relationship as there is an evidence gap describing how litter disamenity is affected by changes in litter. This assumption does not change the overall direction of our net present value estimates, and the uncertainty that there is here is well covered for within the scope of the scenario analysis (see section on counterfactual).
- In our central estimate we assume that decomposition for wood takes 2 years, 0.66% of the time taken for plastic drink stirrers which take 300 years. We have used a range of estimates for decomposition from 1 – 3 years for wooden stirrers⁴⁹ and 200 – 400 years for plastic stirrers⁵⁰ to reflect the fact that rates vary according to oxygen, light and moisture levels.
- This gives a central estimate of a £260,000 reduction in the annual well-being loss caused by beach litter following a ban on plastic drink stirrers⁵¹.

The benefit we have monetised from wood stirrers decomposing faster than plastic stirrers is based only on those stirrers that end up on beaches. We have not quantified the benefit of stirrers that decompose in other marine settings, yet much of the well-being benefits of there being reduced litter will extend across marine environments beyond beaches. These figures therefore underestimate the well-being benefit of there being reduced litter in marine environments.

We have modelled this benefit because we believe that as wood decomposes so much quicker than plastic that this will reduce litter on beaches and therefore reduces clean-up and disamenity costs. However, these savings may be overestimated as the savings would be affected by factors such as how frequently and how thorough beach clean ups are. We will continue to assess how switching to biodegradable materials impacts the volume of litter and the implications that has for clean-up costs and disamenity costs.

Costs

The costs of a ban on plastic drink stirrers include landfill disposal emission costs, enforcement and monitoring costs and a small added fuel cost from wooden drink stirrers being heavier.

Monetised Costs

Table 4 shows the monetised costs, with our central total present value (TPV) estimate over 10 years being £5,000. The only cost we have monetised is the additional emissions expected from the disposal of wooden drink stirrers. Relative to plastic, wood emits more kilograms of carbon

⁴⁸ [Eunomia](#), using willingness to pay per household, P65. The estimate for the number of households in England is from [ONS](#).

⁴⁹ [US National Park Service](#), based on estimate range for plywood.

⁵⁰ Low estimate from [4Ocean](#) and high estimate from [Wessex Water](#). Average taken for central estimate.

⁵¹ This annual estimate, starting from 2020, includes adjustment to 2017 prices. It is scaled down in the final Net Present Value calculation to reflect the market share that plastic stirrers currently have and how that is expected to change over the appraisal period if there were no ban. See section on 'Counterfactual'. The estimate may overestimate litter reduction in the first years as we have assumed decomposition benefits occur from the first year of the appraisal.

dioxide equivalent (CO₂ e) emissions when placed in landfill. Unfortunately evidence suggests that the majority of drink stirrers are not recycled, and for waste that goes to landfill, plastic actually performs better than wooden drink stirrers.

Table 4	10 Year TPV estimates, £'000s		
	Low (worst case)	Central	High (best case)
Total Costs:			
Disposal landfill emission cost	-£6.6	-£5.0	-£3.3

Non-monetised Costs

Switching materials may create costs for producers, but very few drink stirrers are produced in the UK and therefore any such costs would be out of scope of this impact assessment. Wooden drink stirrers are already available at comparable prices to plastic stirrers, implying that there will not be costs passed onto retailers or to consumers to absorb, though there may be some costs for businesses not yet committed to switching material which we invite evidence for. There will be a small added fuel cost from wooden stirrers being heavier than plastic stirrers. There may be a disutility cost to consumers having to use wooden stirrers when they may have preferred plastic drink stirrers, but evidence suggests they are suitable substitutes. There will also be enforcement and monitoring costs.

Costs to Businesses

Production Costs

Some English businesses may lose business if they are unable to switch to alternatively made drink stirrers, or may face costs investing in alternative products in order to continue business. It is not clear what costs, if any, will be encountered by businesses switching away from plastic drink stirrers, however evidence suggests that wooden drink stirrers production costs will be small given that wooden drink stirrers are already available on the market and at a price equivalent to 0.5 pence per unit⁵², which is comparable to the cost for plastic stirrers. Wooden drink stirrers are unlikely to be technically difficult to produce instead of plastic stirrers as they are small, consist of a single material and are formed in a simple shape. Prices of wooden stirrers may rise following an upturn in demand around the time of the plastic stirrer ban, but our scenario analysis shows that there is already a trend away from plastic. Given that prices of wooden stirrers have started at the same price as plastic stirrers, an increase in production of wooden stirrers to replace plastic stirrers may lead to economy of scale benefits which could decrease the production price of wooden stirrers.

Any costs to businesses are unlikely to hit English businesses as our best evidence is that the stirrers are predominantly imported into England⁵³. This is supported by an EU study which found that 'an internet search for suppliers of plastic stirrers by location reveals 127 suppliers located in the EU, compared with 214,112 in China, 4,982 in Hong Kong and 1025 in Vietnam'⁵⁴. We do not have figures for the number and size of businesses in England that produce drink stirrers but our best evidence is that only a very small proportion of stirrers consumed in England are made in England. This leads us to believe that English businesses will be

⁵² Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

⁵³ Resource Futures assumed in their central estimate that 95% of stirrers are imported

⁵⁴ [European Commission](#) impact assessment, Reducing Marine Litter; action on single use plastics and fishing gear

predominantly unaffected by a ban on plastic drink stirrers. As we have not been able to evidence any costs to English businesses involved in production we have assumed for our NPV estimates in this assessment that there are zero production costs.

Fuel Costs

There will be an increase in fuel costs for transporting drink stirrers as wooden drink stirrers weigh more than plastic drink stirrers (1.09g compared to 0.32g per unit), so this will add to transportation costs (both the fuel cost to businesses and associated environmental costs of emissions) when the travel from production line to consumer is considered.

We have not been able to monetise the additional fuel cost as a number of factors are unclear:

- The average distance travelled by each stirrer from production to consumption.
- The mode or modes of transport used to import stirrers 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.
- Whether the added weight will require additional journeys, and if so how many will be required.

The additional fuel costs are likely to be insubstantial given that current prices for wooden stirrers are comparable to plastic stirrers despite being heavier.

Retail and Hospitality Sector Costs

The price comparability of wooden drink stirrers compared to plastic drink stirrers implies that businesses that provide stirrers to consumers are unlikely to be hit by a change in materials.

Businesses that sell stirrers (usually to other businesses) that have not made commitments to switch material may face costs that they would not have done under a ban. Such costs may also occur to coffee shops that currently provide plastic stirrers (often free of charge). There may be a cost to those with surplus stocks of plastic stirrers. Switching costs may include the staff administration and procurement cost of finding alternative suppliers of drink stirrers. These costs create an argument to have a delay option, however there is no evidence to suggest that these costs are large, and a delay would reduce the net positive impact of the ban. Switching costs may not exist at all for retailers or coffee shops if their suppliers agree to switch material. We invite businesses to respond to the consultation with evidence of any switching costs they might incur. Due to a lack of evidence of switching costs, we have modelled the costs to retailers and hospitality businesses as zero.

Costs to Consumers

It is difficult to evidence the costs that might be passed onto consumers as stirrers are not typically sold business-to-consumer. Often stirrers are provided free at the point of use to consumers as complimentary with drinks they have already paid for.

If consumers are looking to purchase their own drink stirrers, wooden drink stirrers are already available on the market and at a price equivalent to 0.5 pence per unit⁵⁵, which is comparable to the cost for plastic stirrers. This implies that consumers would not face any additional costs if single use plastic stirrers ceased to be available. It is also possible that an increase in

⁵⁵ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers. This finding was for plastic cotton buds and plastic stirrers.

production of wooden stirrers to replace plastic stirrers may lead to economy of scale benefits which could decrease the price of wooden stirrers.

Disutility from using a different product

There may be concerns that stirrers not made from plastic could be flimsier, harder to use with precision or may have an inferior shape for stirring, creating a disutility cost to consumers. However, evidence so far suggests that wooden based alternatives are considered to be just as good to use, with Resource Futures having found from their research that ‘no evidence was identified that indicated the plastic-free alternatives were less effective than their plastic counterparts’, and there are campaigns that argue ‘there is no situation in which a plastic stirrer is necessary’⁵⁶. This suggests that any disutility experienced by consumers from the ban may be small or may not exist. Furthermore, consumers may gain a well-being benefit from using stirrers that they believe are environmentally friendlier than plastic stirrers. Although stirrers were not singled out, a recent report by YouGov found that the majority of the public were in favour of banning a large number of single use plastic items⁵⁷.

Environmental Landfill Emission Cost

A cost of moving away from plastic based goods is that plastic emits very few kilograms of carbon dioxide equivalent (CO₂ e) emissions when placed in landfill (just 5kg of CO₂e for each tonne of plastic polypropylene). This contrasts with wood which emits 819kg of CO₂e for each tonne left to landfill. Given that each tonne of CO₂ has an environmental cost associated with it, this causes wood based alternatives to have a negative environmental impact when they’re sent to landfill.

Monetisation and Assumptions

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

- We have estimated that 316m drink stirrers are consumed in England each year. We assumed 211m for our low estimate and 421m for our high estimate. These estimates are based on estimates for the number of coffee cups consumed in the UK⁵⁸ scaled down for the population of England⁵⁹, and an assumption that 10% of disposable coffee cups come with stirrers⁶⁰.
- Wooded drink stirrers weigh 1.09g, compared to 0.32g per unit for plastic drink stirrers⁶¹.
- For each tonne of material placed in landfill, plastic polystyrene emits 5kg of CO₂ e, whereas paper production emits 819kg⁶². It is possible that there are impacts of plastic landfill disposal that are not included within the 5kg estimate as plastic has not been around for as long as its own estimated decomposition rate, but analytically this would reduce the emission cost of switching materials.

⁵⁶ [Recycling waste world](#) – Stir Crazy

⁵⁷ [YouGov](#) finds overwhelming support for banning ‘problem plastics’.

⁵⁸ [House of Commons Environmental Audit Committee](#), Disposable packaging: Coffee Cups

⁵⁹ [ONS](#) figures for population of England and UK

⁶⁰ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

⁶¹ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

⁶² Government conversion factors. Spreadsheet used [here](#), which underpins published [government gas reporting figures](#).

- We assume that the cost of one tonne of CO₂ e in 2020 is £68.08, which increases up to £79.43 in 2030⁶³.
- 99.9% of drink stirrers are given to waste or are littered, and then collected by local authorities, with 0.1% ending up in marine environments⁶⁴. Only a small proportion are thought to reach marine environments as only a fraction of stirrers are used outdoors, littered and not street cleansed⁶⁵. We assume zero recycling occurs, which is based on the effort required to segregate them and clean them from disposable cups. This assumption is also to give a conservative estimate, as if any drink stirrers were recycled wood stirrers would emit fewer carbon equivalent emissions than plastic stirrers⁶⁶, leading to a higher NPV for the policy to ban plastic drink stirrers.
- 29% of the 99.9% of drink stirrers collected by local authorities are sent to landfill⁶⁷.
- This gives an initial cost estimate of £5,500 per year⁶⁸.

We assume above that 0.1% of stirrers end up in marine environments. There will be emissions costs associated with the decomposition of these stirrers. We have not been able to evidence the change in carbon emissions that will occur if all of these stirrers are wood rather than plastic, but we would assume that there will be an increase given that wood emits more emissions in landfill than plastic. This will be very small scale given the light weight of stirrers and that we estimate that this applies only to 0.1% of stirrers.

Monitoring and Enforcement Costs

There will be costs associated with inspection and law enforcement services to support the ban. It has been proposed that the ban will be enforced through civil sanctions set out in part 3 of the Regulatory Enforcement and Sanctions Act 2008 (though this would require the creation of an offence punishable by a fine, to facilitate the use of the 2008 Act). As part of the consultation, we are seeking views on how such civil enforcement can most effectively and proportionately be carried out. Although the costs of enforcement have yet to be specified, it is not expected that these costs will be large in size compared to other impacts in this assessment.

Risks

Risks of 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 drink stirrers correctly

⁶³ Green Book Supplementary [Guidance from BEIS](#), which states that emissions for landfill should use non-traded values.

⁶⁴ This estimate is based on an estimate by Resource Futures that 0.001% of plastic stirrers enter marine environments, which we have taken as our low estimate, with 0.1% as our central estimate and 1% as our high estimate. The overall benefit from incineration emissions is not sensitive to our range given for stirrers that enter marine environments.

⁶⁵ Resource Futures: Preliminary assessment of the economic, environmental and social impacts of a potential ban on plastic straws, plastic stem cotton buds and plastic drink stirrers

⁶⁶ Government conversion factors. Spreadsheet used [here](#), which underpins published [government gas reporting figures](#).

⁶⁷ Estimate based on figures by [Local Authority collected waste generation from April 2000 to March 2017 \(England and regions\) and local authority data April 2016 to March 2017](#)

⁶⁸ This annual estimate, starting from 2020, includes adjustment to 2017 prices. It is scaled down in the final Net Present Value calculation to reflect the market share that plastic stirrers currently have and how that is expected to change over the appraisal period if there were no ban. See section on 'Counterfactual'.

will be reduced and that therefore consumers will litter more. However we expect that the ban will raise people's awareness of the environmental damage drink stirrers can cause, and that consumers will therefore dispose of them correctly and reduce their use of drink stirrers.

- **Increase in prices:** Even though our evidence suggests that wooden drink stirrers are no more expensive to produce than plastic drink stirrers, some suppliers may be forced to increase prices 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.

Risks of not imposing a ban

- **Environmental costs get worse:** If we don't place a ban the environmental impacts including harm to marine wildlife may worsen and possibly at a non-linear rate.
- **Businesses and consumers keep choosing plastic:** Even though wooden drink stirrers are available to consumers there is a risk that consumers will still opt for plastic drink stirrers without a ban. They could do so inadvertently if products are not well labelled, or consumers may find that they prefer plastic drink stirrers. It may be that there is a time inconsistency problem where consumers are willing to state that they should not use plastic drink stirrers 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.

SAMBA - Small and Medium sized Business Assessment

Costs to producers in England are expected to be very small as we do not believe many stirrers are produced in England. An EU study found that 'an internet search for suppliers of plastic stirrers by location reveals 127 suppliers located in the EU, compared with 214,112 in China, 4,982 in Hong Kong and 1025 in Vietnam'⁶⁹. We welcome any evidence in the consultation concerning the scale of producers based in England.

SMEs that have not made commitments to switch material may face costs that they would not have done under a ban. There may be a cost to those with surplus stocks of plastic stirrers. Switching costs may include the staff administration and procurement cost of finding alternative suppliers of drink stirrers. These costs create an incentive to have a time delay option, however we do not have any evidence to suggest that these costs are large and a time delay would reduce the net positive impact of the ban. Switching costs may not exist at all for businesses if their suppliers agree to switch material. We invite businesses to evidence any switching costs they might incur in the consultation.

Resource Futures compared online the prices of plastic and wooden-based drink stirrers, and found that prices for both were similar with a single stirrer being equivalent to 0.5 pence. This suggests that the impacts to businesses that are selling wooden stirrers rather than plastic stirrers are low or zero, or at least are sufficiently low for businesses to not feel the need to pass on any higher production costs of wooden based stirrers to consumers.

⁶⁹ [European Commission](#) impact assessment, Reducing Marine Litter; action on single use plastics and fishing gear

Additional fuel costs caused from wooden stirrers being heavier than plastic stirrers will fall to businesses involved in transportation services, a portion of which may be small and medium sized businesses. The additional fuel costs are likely to be insubstantial given that current prices for wooden stirrers are comparable to plastic stirrers despite being heavier. In the fuel costs section we demonstrated that overall additional annual fuel costs would be low, and only a portion of this would be attributable to SMEs.

Carbon Impact

Banning plastic drink stirrers will reduce carbon emissions. These are picked up in the monetised sections on production and disposal emissions. Table 5 provides an estimate of the net CO₂ equivalent change in greenhouse gas emissions, globally and to England, and whether the emissions count as traded or non-traded emissions.

Table 5 - Carbon emission savings over 10 years (CO₂e tonnes)	Global Emissions	Emissions in England	Traded	Non-traded
Production emission savings	229	0	Y	
Incineration emissions savings	263	263		Y
Landfill emission savings	-80	-80		Y
Total saving:	412	183	229	183

Emissions from production count as traded emissions, whereas emissions released in disposal (incineration and landfill) count as non-traded emissions⁷⁰.

Savings from production emissions are counted as zero in England as we have assumed that drink stirrers are imported. Globally, wooden drink stirrers will add emissions compared to plastic through being heavier and through emitting more emissions when placed in landfill. However there is a net saving due to wood being significantly cleaner to produce than plastic, and through having an emission reduction impact through energy conversion when it is incinerated.

Annex 1

Annex 1 shows the scenario analysis described in the counterfactual section. The table shows the percentage of the market share forecast to still be plastic over the next 10 years. The counterfactual described in the 'no ban central' scenario has been used to calculate the net present values in table 1.

Annex 1	Plastic market share difference to ban scenario			
	Ban	Low Take up	Central	High Take up
2020	0%	40%	30%	20%
2021	0%	35%	20%	5%
2022	0%	30%	10%	3%
2023	0%	25%	5%	3%

⁷⁰ For guidance on this, see Green Book Supplementary [Guidance from BEIS](#).

2024	0%	20%	5%	3%
2025	0%	15%	5%	3%
2026	0%	10%	5%	3%
2027	0%	10%	5%	3%
2028	0%	10%	5%	3%
2029	0%	10%	5%	3%