Title: Consultation Stage Impact Assessment on the proposal to ban the distribution and/or sale of plastic-stemmed cotton buds 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**
£4.3m	£0	£0	Not in scope	Qualifying provision

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

Plastic stemmed cotton buds are not suitable for re-use and cause multiple environmental harms particularly when they are discarded incorrectly, including harm to marine animals and visual pollution. Even if disposed of correctly plastic stemmed cotton buds may end up in incineration, 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 stemmed cotton buds. Providers do not have incentives to cover the externality costs. Intervention is required in order to shift the cotton bud market to plastic-free alternatives that already exist and decompose much quicker.

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. The ban is intended to ensure that cotton buds are made of materials that will decompose quickly and will have low life-cycle impacts on the environment, and the ban will also encourage businesses to invest in biodegradable alternatives to plastic. The ban also intends to increase consumer awareness of the environmental harms cotton buds can cause when they are not correctly disposed of, 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 in 2019 is preferred as it would have the maximum impact in reducing the social costs of plastic stemmed cotton buds. Alternative options such as taxes, information campaigns and making plastic buds available in stores by request only were rejected as they would not be as effective as a ban in reducing the social costs of plastic stemmed cotton buds, and they would likely have higher costs than a ban. A ban has no administration costs and on the basis of our analysis is expected to have minimal costs to businesses. As there are suitable alternatives to plastic stemmed cotton buds readily 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: Preferred option, ban plastic cotton buds

FULL ECONOMIC ASSESSMENT

Price Base Year 2017	PV Base Year 2017	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: £0.94	**High:** £4.32	**Best Estimate:** £8.03

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 paper stemmed cotton buds (the expected substitute for plastic stemmed cotton buds) that are sent to landfill, as plastic emits very few carbon dioxide equivalent (CO2 e) emissions when placed in landfill relative to paper.

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

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

BENEFITS (£m)	Total Transition (Constant Price)	Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	£0.68		£0.03	**£0.94**
High	£5.81		£0.25	**£8.04**
Best Estimate	£3.13		£0.13	**£4.33**

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

Alternatively made cotton buds (expected to become paper based) are cleaner to produce and to incinerate than plastic buds, resulting in environmental savings. As paper decomposes much quicker than plastic, we expect to see a reduction in the presence of litter on beaches. Plastic stemmed cotton buds are particularly present on beach environments, but clean beaches are highly valued by the public.

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

Cotton buds 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 have assumed that many retailers will switch away from plastic stemmed cotton buds regardless of the ban which reduces our estimates of the impacts, and that paper will be the replacement. There is a risk that this proves partially inaccurate, but other alternatives such as wood are likely to have similar environmental and economic advantages compared to plastic. We have not modelled any costs to businesses as we assume familiarisation and administration costs to business 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 stemmed cotton buds are contributing to the global marine plastic problem, damaging the marine environment, increasing risk to public health when fragments of plastic enter the food chain. 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 waste[1].

Cotton buds are single-use products used in the home for hygiene purposes such as ear cleaning, first aid and makeup application and arts and crafts. Plastic stemmed cotton buds have a polypropylene stem and use a plastic-based adhesive to attach a small ball (bud) of cotton wool to each end of the stem.

Cotton buds are prone to being disposed of incorrectly as they are typically used in domestic bathrooms and are therefore rarely recycled. Resource Futures estimated that 10% of cotton buds are flushed down the toilet[2], and we have assumed the remaining 90% end up being collected for landfill or incineration. Once flushed, their small size means sewage treatment works cannot easily prevent buds from reaching the sea. Sewerage infrastructure is not effective at capturing these items and during rainstorms plastics can be discharged into rivers and the sea via storm sewer outlets.

It is estimated that 1.8 billion stemmed cotton buds are consumed in England each year[3]. The Marine Conservation Society has been monitoring the levels of cotton buds found on beaches in the UK since 2004. They continue to feature in the top ten most common marine litter items in beach clean surveys with an average of 27 found for every 100m of beach surveyed in 2017[4]. Single use plastics, including plastic stemmed cotton buds, are associated with negative effects on the environment. Resources and greenhouse gas emissions are also associated with plastics production since are oil based. Once made, plastic stem cotton buds 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. As it is not hygienic to re-use cotton buds, each bud 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 decompose[5].

Rationale for Intervention

Plastic stemmed cotton buds are not suitable for re-use and contribute to multiple negative externalities. Incorrect disposal methods lead to costs to society including visual pollution and harms to the marine environment and marine animals, all of which have a negative well-being impact on people.

[1] Estimates by Defra

[2] 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.

[3] Estimate by Resource Futures, based on evidence from a major retailer and from the British Retail Consortium.

[4] Seas at Risk – Eunomia: Leverage Points for Reducing Single-use Plastics

[5] Taking an average based on estimates of 200 years from 4ocean and 400 years from Wessex Water.

These social costs are not accounted for within the market price of plastic stemmed cotton buds, so consumers are not currently incentivised to limit the use and disposal of plastic stemmed cotton buds and businesses are not directly incentivised to switch material. Intervention is required in order to shift the cotton bud market away from plastic. Suitable alternatively made cotton buds based on paper are available which decompose quicker and therefore cause less environmental damage.

The US market is dominated by Q-TIP cotton swabs with paper-based stems, and alternatives to plastic buds are being sold across Europe[6]. Brand manufacturers such as Johnson and Johnson now produce paper-based buds[7] and many retailers including Sainsbury's[8], Tesco, Aldi and more have committed to providing them to consumers[9]. Given these commitments have been made, part of the rationale for the ban is to ensure that these commitments are adhered to.

Intervention in the market will help those businesses who have already invested in alternatives to plastic cotton bubs, and will encourage businesses to continue to invest in alternatives materials to plastic.

The commitments made by retailers may reflect demands from consumers. A recent YouGov report found that the 'public are overwhelmingly supportive of banning' "problem plastics", with 70% in favour of banning plastic stemmed cotton buds[10]. This findings suggests that the scale of the negative impacts associated with plastic stemmed cotton buds are being experienced on a large scale by the public, and therefore intervention is appropriate.

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. The ban forms part of the wider government waste strategy as the UK Government's 25 Year Plan[11] to improve the environment has specific targets for eliminating '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 ban is intended to ensure that cotton buds sold in England are made of environmentally friendly materials that will decompose quicker and will have lower life-cycle impacts on the environment. The ban will also encourage businesses to invest in biodegradable alternatives to plastic.

It is also intended that banning plastic stemmed cotton buds will foster an increased degree of consumer confidence that the products they buy will not harm wildlife and the environment, and will also increase consumer awareness of the environmental harms cotton buds can cause when they are not correctly disposed of.

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[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.

[7] https://www.cottonbudproject.org.uk/news/item/63-johnsons-paper-cotton-bud.html

[8] Sainsbury's: https://www.about.sainsburys.co.uk/news/latest-news/2017/22-02-2017

[9] https://www.citytosea.org.uk/seven-major-retailers-pledge-to-switch-the-stick-to-stop-source-of-plastic-pollution

[10] YouGov finds overwhelming support for banning 'problem plastics'.

[11] A Green Future: Our 25 Year Plan to Improve the Environment

Options under consideration

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

Option 0: Do nothing

The **do nothing** option would allow plastic stemmed cotton buds 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 stemmed cotton buds 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 stemmed cotton bud use, there will still be many that continue to be used and disposed of. This means the environmental costs associated with plastic stemmed cotton buds will continue to persist into the future.

Option 1: Implement a regulatory ban of plastic stemmed cotton buds from October 2019 (preferred option)

The preferred option is to ban plastic stemmed cotton buds with no exemptions and without delay as this would be the most effective option to reduce the social and environmental costs associated with cotton buds.

A delay would reduce the environmental savings of a ban given there is a current trend away from plastic already. The availability of alternative cotton buds and commitments already made voluntarily by retailers to switch away from plastic 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 in the market to move away from plastic stemmed cotton buds. The ban will foster an increased degree of consumer confidence that the products they buy will minimise harm to wildlife and the environment, and will also increase consumer awareness of the environmental harms cotton buds can cause when they are 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 firms and consumers to move away from plastic stemmed cotton buds. However there is evidence that consumers are already acutely aware of the harms of single-use plastics, with there having been multiple campaigns in recent times 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.

Request only option - plastic stemmed cotton buds could be made available by request only e.g. available only behind the counter, but this may cause inconvenience to businesses and consumers and the impacts in reducing usage would be less than a ban and would be less certain than a ban.

Subsidies towards the development of non-plastic stemmed cotton bud alternatives are not considered necessary as suitable non-plastic stemmed cotton buds have already been developed and are available at the same market price.

A taxation or charge policy was rejected as this would create administrative burdens to businesses. Although this would likely be effective in reducing consumption and deliver environmental benefits it would not be as effective as a ban. We also consider that the administrative burdens to businesses and to government from a tax or charge system would be disproportionate relative to the price and environmental impact of cotton buds.

A **ban with exemptions** was also considered but rejected, as given the suitability of alternative non-plastic stemmed cotton buds that are available, there is no evidence to suggest that any groups would be unduly disadvantaged from a ban on plastic stemmed cotton buds.

Alternatives to plastic stemmed cotton buds

A standard concern with banning a consumer product is a lack of suitable alternatives. This is not expected to be the case as a number of alternative materials for cotton bud stems already exist. There are companies that produce reusable sticks for cleaning ears. Paper and wood stemmed substitutes are now commercially available and are the 'market norm' in the USA[12]. Bamboo cotton sticks are also available to UK consumers.

Brand manufacturers such as Johnson and Johnson now produce paper-based buds[13] and many retailers including Sainsbury's[14], Tesco, Aldi and more have committed to providing them to consumers[15]. Given the commitments that have been made by a number of UK retailers towards switching to paper based cotton buds, for simplicity this impact assessment assumes that paper cotton buds will replace plastic cotton bubs following a plastic ban.

The estimates in this IA are not sensitive to this assumption. Other alternatives, such as wood stemmed cotton buds may lead to even greater environmental benefits, as compared to paper, wood reduces carbon emissions in production, incineration and landfill. Therefore the net present values in this IA should be considered as a conservative possible scenario.

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 stemmed cotton buds, compared to what we believe would happen if there were no government intervention (i.e. under the 'do nothing' option). The central estimate is £4.3m, with the largest contributor coming from an amenity value estimate resulting from there being less litter on beaches.

[12] European Commission: Commission Staff Working Document, Impact Assessment. Reducing marine Litter: action on single use plastics and fishing gear. Impact assessment Part 3.

[13] https://www.cottonbudproject.org.uk/news/item/63-johnsons-paper-cotton-bud.html

[14] Sainsbury's: https://www.about.sainsburys.co.uk/news/latest-news/2017/22-02-2017

[15] https://www.citytosea.org.uk/seven-major-retailers-pledge-to-switch-the-stick-to-stop-source-of-plastic-pollution

	Table 1 - Summary	10 Year NPV estimates, £m:		
		Low	Central	High
Benefits	Production Emission Savings	£0.00	£0.00	£0.00
	Disposal incineration emission benefit	£0.01	£0.01	£0.02
	Reduced coastal clean-up costs	£0.09	£0.31	£0.45
	Beach quality amenity benefit	£0.84	£4.00	£7.57
Costs	Disposal landfill emission cost	-£0.01	-£0.01	£0.00
	Totals:	**£0.94**	**£4.32**	**£8.03**

All figures are in 2017 prices. The range between the low and high estimates reflects the estimate range of uncertainty for the number of cotton buds consumed in England, how long buds of different materials take to decompose, the proportion that end up on beaches and differing values placed on having cleaner beaches.

All of the impacts that have been monetised are impacts to society as a whole, as due to their nature it would not be appropriate to apportion them to specific groups of the population.

Counterfactual

In order to assess the costs and benefits of the preferred option to ban plastic stemmed cotton buds in October 2019, we have set out what we believe would happen to the cotton bud market if there were no ban at all (i.e. we 'do nothing'). Currently 1.8 billion cotton buds are consumed in England each year[16], and until recently almost all of these would likely have been plastic based. It would be unrealistic to assume that the consumption of plastic stemmed cotton buds will continue to be this high under the 'do nothing' scenario as the cotton buds market has already begun moving towards paper-based cotton buds (away from plastic stemmed cotton buds).

The scale of the costs and benefits of the ban are sensitive to the number and size of retailers that 'switch the stick' voluntarily, and the time it would take them to switch without the ban in place. A limitation of this impact assessment is that the status quo for cotton buds being plastic is currently changing and it is very difficult to predict what the market will do if no ban on plastic button buds were imposed.

A significant number of retailers have already made voluntary commitments to 'switch the stick'. A number of retailers already offer paper-based alternatives, including major retailers Marks & Spencer's, John Lewis, The Body Shop, and Co-operative[17], while many more major retailers made commitments to ensure their own labelled cotton buds would be paper based by the end of 2017[18]. It is unclear exactly what proportion of cotton buds being sold today are plastic based, but a significant proportion are likely to already be paper-based, and that there is a continuing movement towards paper-based cotton buds. If we did assume that plastic stemmed cotton bud consumption remained high without a ban, this would likely overstate the value of the benefits a

[16] Estimate by Resource Futures, based on evidence from a major retailer and from the British Retail Consortium.

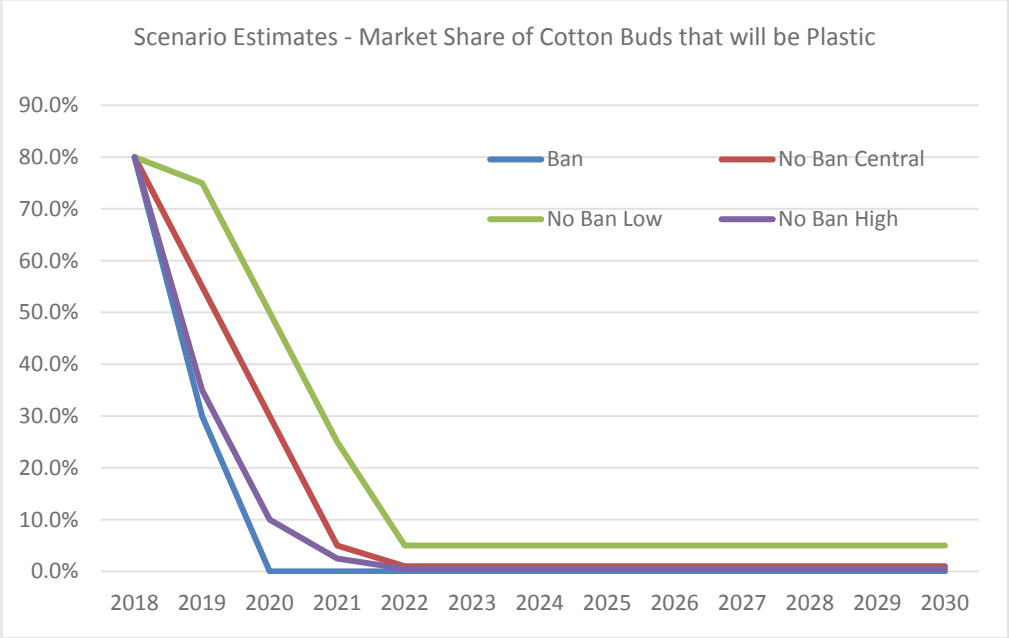
[17] Regional Activity Centre for Sustainable Consumption and Production: 25 innovative and inspiring solutions to combat PLASTIC MARINE LITTER in the Mediterranean Region

[18] https://www.citytosea.org.uk/seven-major-retailers-pledge-to-switch-the-stick-to-stop-source-of-plastic-pollution/

ban would bring, and so we have attempted to model what would happen to cotton buds without a ban.

Scenario Analysis

In order to allow for the evidence gap in forecasting what would happen to plastic stemmed cotton buds without a ban, we have modelled three scenarios for take up of alternatively made cotton buds 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 counterfactual described in the 'no ban central' scenario has been used to calculate the net present values in table 1.



We have assumed that in 2018 80% of cotton buds consumed will still be plastic based, as modelled in estimates previously made by Resource Futures. The work by Resource Futures also provides the basis for our 'ban scenario' and our central estimate for the 'no ban' scenario. The differences in the scenarios start from 2019 as the ban is planned to be enacted October 2019.

In the ban scenario, 0% of cotton buds will be plastic by 2020, with paper based cotton buds taking the market share of plastic. In the 'no ban high' take up of alternatively made cotton buds scenario a near-zero state is reached by 2022. The 'no ban central' and 'no ban low' take up scenarios follow similar paths but each with slightly higher proportions of plastic stemmed cotton buds throughout.

The difference between the 'ban' and 'no ban central' scenario is used to calculate the final 10 year net present value (NPV) estimate in this impact assessment. Table 2 below provides a sensitivity analysis to show the 10 year NPV would change across the different 'no ban' scenarios:

Table 2 - Scenarios for plastic take up if there were no ban:	**10 Year NPV estimates, £m:**		
	Low	**Central**	**High**
Central Scenario NPVs	£0.9	£4.3	£8.0
Low take up Scenario NPVs	£2.4	£11.2	£20.8

High take up Scenario NPVs	£0.4	£1.6	£3.0

The estimates in table 2 are calculated by taking the 10 year net present value totals for the low, central and high scenarios, and then multiplying the impacts by the percentage point difference of cotton buds expected to be plastic between the 'ban scenario' and each 'no ban' scenarios.

All of the 'no ban' scenarios are similar in that they suggest that the vast majority of the market for cotton buds will soon move away from plastic towards paper instead. This limits the scope of the costs and benefits in this impact assessment significantly. This is a conservative approach, as if we assumed that plastic retained a greater market share then the ban would have stronger impacts, resulting in higher net present value estimates. If we assumed that without a ban that all cotton buds were plastic stemmed cotton buds throughout the appraisal period (through to 2029), then the net present value of banning plastic stemmed cotton buds would be approximately £90m over 10 years[19].

Benefits

The benefits of a ban on plastic stemmed cotton buds include reducing the carbon emissions associated with the production and incineration of cotton buds, improvements to marine environments and well-being benefits from litter reduction.

Summary of Monetised Benefits

Table 3 shows the value of the benefits we have quantified. In our central estimate we expect £4.3m in total present value (TPV) terms of benefits to come from a ban of plastic stemmed cotton buds over a 10 year period.

Table 3	**10 Year TPV estimates, £m:**		
Total Benefits:	**Low**	**Central**	**High**
Production Emission Savings	£0.00	£0.00	£0.00
Disposal incineration emission benefit	£0.01	£0.01	£0.02
Reduced coastal clean-up costs	£0.09	£0.31	£0.45
Beach well-being benefit	£0.84	£4.00	£7.57
Total Benefits:	**£0.94**	**£4.33**	**£8.04**

The largest benefits are associated with improvements to beach environments which saves clean-up costs and has well-being benefits. Evidence shows that plastic stemmed cotton buds are particularly present on beach environments, but clean beaches are highly valued by the public and they have a willingness to pay for cleaner beaches. A switch away from plastic stemmed cotton buds should see a significant reduction in cotton buds on beaches as plastic takes significantly longer to decompose than paper.

The other quantified benefits are from emission savings which come from paper based alternatives being cleaner to incinerate (each tonne of paper burnt actually saves carbon dioxide equivalent (CO_2 e) emissions through energy conversion) and also cleaner to produce.

[19] 10 year net present value estimate.

Each tonne less of CO_2 e produced has an estimated benefit saving to the environment from abatement costs.

Summary of 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. Paper cotton buds are less harmful to marine wildlife and quickly biodegrade[20], so a ban on plastic stemmed cotton buds will reduce the environmental costs of cotton buds.

Environmental Production Savings

Paper cotton buds are more environmentally friendly to produce than plastic stemmed cotton buds as for each tonne of paper produced, less carbon dioxide equivalent (CO_2 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:

- It is estimated that 1.8 billion cotton buds are consumed in England each year[21]. We assumed 1.6 billion for our low estimate and 2 billion for our high estimate[22].
- For each tonne of material produced, plastic polypropylene emits 3.08 tonnes of CO_2 e, whereas paper production only emits 0.93 tonnes[23].
- Paper cotton buds weigh 0.44g, compared to 0.25g per unit for plastic stemmed cotton buds[24].
- We assume that the cost of one traded tonne of CO_2 e in 2020 is £4.56, which increases up to £79.43 in 2030[25].
- This gives an initial annual estimated benefit of £1,850[26].

As the vast majority of cotton buds are produced outside England, mostly in Southeast Asia[27], the emission saving from producing paper cotton buds will not directly benefit England, but has been included in the impact assessment as emissions have global implications which impact England.

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[20] Wessex Water: it's time to switch the stick

[21] 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

[22] The higher estimate is based on an additional estimate Resource Futures were given from the British Retail Consortium

[23] Government conversion factors. Spreadsheet used here, which underpins published government gas reporting figures.

[24] 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

[25] Green Book Supplementary Guidance from BEIS, P3.51, which states to use the traded price of carbon for production emissions overseas.

[26] This annual central estimate is for 2020 and includes adjustment to 2017 prices. It rises each year to £ in 2029 when the traded value of carbon is much higher. These figures are scaled down in the final Net Present Value calculation to reflect that many retailers are voluntarily switching to paper-based cotton buds. See section on the counterfactual for more detail on this.

[27] Resource Futures, based on Global Cotton Bud Market Research Report 2018

Environmental Incineration Emission Savings

A benefit of moving away from plastic based goods is that plastic emits more kilograms of carbon dioxide equivalent (CO_2 e) emissions when it is incinerated (1.34t of CO2e for each tonne of plastic polypropylene). This contrasts with paper which has actually saves 0.54t 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 paper based alternatives to make a positive contribute towards the environment relative to plastic stemmed cotton buds, 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:

- 1.8 billion cotton buds are consumed in England each year[28]. We assumed 1.6 billion for our low estimate and 2 billion for our high estimate.
- Paper cotton buds weigh 0.44g, compared to 0.25g per unit for plastic stemmed cotton buds[29].
- For each tonne of material given to incineration, plastic polypropylene emits 1.34t of CO_2 e, whereas paper production prevents the emission of 0.54t[30].
- We assume that the cost of one tonne of non-traded CO_2 e in 2020 is £68.08, which increases up to £79.43 in 2030[31].
- 90% of cotton buds are given to waste or are littered, and then collected by local authorities. This is an estimate based on 10% being disposed of down the toilet[32] and an assumption that zero cotton buds are recycled. The zero recycling assumption is based on the majority of cotton buds being disposed of in bathrooms where there is rarely recycling. This assumption is also to give a conservative estimate, as if any cotton buds were recycled paper buds would emit fewer carbon equivalent emissions than plastic buds[33], leading to a higher NPV for the policy to ban plastic stemmed cotton buds.
- 71% of the 90% of cotton buds collected by local authorities are sent for incineration, reflecting the method of disposal by Local Authorities for household residual waste[34]
- When incinerating paper is compared against plastic, this gives a saving of £35,800 per year[35].

Marine Benefits

Summary

[28] 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

[29] 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

[30] Government conversion factors. Spreadsheet used here, which underpins published government gas reporting figures.

[31] Green Book Supplementary Guidance from BEIS: guidance advises that non-traded carbon values should be used for emissions from household disposal.

[32] 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.

[33] Government conversion factors. Spreadsheet used here, which underpins published government gas reporting figures.

[34] 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

[35] This annual estimate, starting from 2020, includes adjustment to 2017 prices. It is scaled down in the final Net Present Value calculation to reflect that many retailers are voluntarily switching to paper-based cotton buds, see section on the counterfactual for more detail on this.

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 stemmed cotton buds will help to reduce these social costs.

Prevalence of Cotton Buds in Marine Environments

Estimates suggests that cotton buds make up 1 – 5% of marine litter. The European Environment agency estimated that cotton buds sticks make up 5.4% of marine beach litter in the Celtic Sea beaches[36]. For our central estimate we have taken figures from the 2016 Great British Beach Clean, where 23.7 cotton bud sticks were found per 100m, and cotton bud sticks made up an average of 3.7% of total items on UK beaches[37]. OSPAR[38] found that there were 4.9 cotton bud sticks per 100m of coast in the Southern North Sea (37 beaches in UK, France, Netherlands and Belgium, making up 1.1% of total number of items.

The ban on plastic stemmed cotton buds is expected to reduce the prevalence of marine litter, as the ban will help inform consumers of the damages they can cause, and fewer buds will reach marine environments as paper stems swell on contact with water and are much less likely to escape sewage filters. Furthermore, paper buds are less harmful to marine wildlife and quickly biodegrade[39]. All of these effects will contribute towards an amenity benefit.

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[40,41]. 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 species, 51 seabird species and 32 marine mammal species[42]. Entanglement causes external cuts and wounds leading to infection, suffocation and drowning, asphyxiation, impaired mobility and fitness.

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

Plastic Ingestion Reduction

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36 European Commission - Joint Research Centre Technical Reports, figures for Celtic Sea

37 Seas at Risk: Single-Use Plastics and the Marine Environment

38 OSPAR: Study to identify and assess relevant instruments and incentives to reduce the use of single-use and other items, which impact the marine environment as marine litter

39 Wessex Water: it's time to switch the stick

40 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.

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

42 Ten Brink, 2009, referenced in Mouat, J., R.L. Lozano, and H. Bateson: Economic Impacts of Marine Litter, 2010

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 fragments[43]. Plastic is known to 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. Both of these result in malnutrition and eventual starvation[44].

Plastic stemmed cotton buds 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 cotton bud stems can be even more dangerous with ragged and sharp edges.

We would expect a reduction in plastic ingestion following a ban on plastic stemmed cotton buds. Although we have an estimate that 8.1% of all buds enter the marine environment[45], we have not been able to monetise the cost of marine life injured or lost to plastic ingestion, so therefore we have not been able to monetise the benefit of reduced plastic ingestion.

Damage to Fisheries

The European commission[46] 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 cotton buds contribute to fishery damage, but even a small contribution by plastic stemmed cotton buds could costs 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 effect[47], 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

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

[43] Estimates from Centre for Environment, Fisheries & Aquaculture Science

[44] Cotton bud project

[45] 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.

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

[47] Scottish government, referring to multiple publications: Ballance et al 2000; Sheavly and Register 2005

Harbours and marinas have litter cleared in order to ensure that their facilities remain clean, safe and attractive for users. Mouat et al. (2010)[48] 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.

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 cotton buds (which are expected to be paper-based) will decompose much more easily, so each bud will be present on beaches for less time and therefore there will be fewer of them. Plastics can take hundreds of years[49] to decompose, whereas paper can take just a few weeks[50] to decompose.

Monetisation and Assumptions:

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

- The contribution of plastic stemmed cotton buds to litter on beaches is 3.7% in our central estimate[51].
- Annual litter clean-up costs in 2010 were £15.8m for beaches and £2.1m for harbour sides. 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 cotton buds 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 buds 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 paper buds takes 24 weeks, 0.1% of the time taken for plastic buds which take 300 years. The rate for paper is based on a low estimate of 6 weeks for newspaper to decompose[52]. We have used a range of estimates for decomposition from 6 weeks to 60 weeks for paper and 200 – 400 years for plastic[53] to reflect the fact that rates vary according to oxygen, light and moisture levels.
- This gives an annual central estimate of a £0.7m reduction in the clean-up costs of beaches and harbours[54].

We have modelled this benefit because we believe that as paper 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.

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

[49] Wessex Water: it's time to switch the stick

[50] US National Park Service

[51] Seas at Risk: Single-Use Plastics and the Marine Environment

[52] US National Park Service

[53] Taking an average based on estimates of 200 years from 4ocean and 400 years from Wessex Water.

[54] This annual estimate, starting from 2020, includes adjustment to 2017 prices. It is scaled down in the final Net Present Value calculation to reflect that many retailers are voluntarily switching to paper-based cotton buds, see section on the counterfactual for more detail on this. The estimate may overestimate litter reduction in the first years as for simplicity we have assumed decomposition benefits occur from the first year of the appraisal.

Amenity benefits of reduced litter on beaches

A ban on plastic stemmed cotton buds is expected to have positive amenity benefits. We have monetised the amenity impact of reduced litter in beach environments.

The impacts of litter on amenity and well-being:

- 89% of people are concerned by plastic pollution in the ocean[55].
- Initially people may gain a satisfaction from knowing that something is being done to support marine environments (beaches and seas).
- Non-plastic stemmed cotton buds that end up in marine environments (10% of buds are disposed of down the toilet[56]) will decompose faster, leading to fewer buds 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 evidence that plastic stemmed cotton buds make up approximately 1 – 5% of beach litter, and 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:

- The contribution of plastic stemmed cotton buds to litter on beaches is 3.7%[57].
- The annual well-being loss caused by beach litter is £193m, based on a willing to pay between £6 and £11 per household (in 2002 prices) to see litter free beaches[58].
- We assume a linear relationship between beach litter clean-up and the disamenity experienced by beach users caused by litters. As we have estimated that cotton buds make up 3.7% of beach litter, we assume that if they were all cleared that this would reduce the litter disamenity costs on beaches by 3.7%. 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).

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[55] Populus: Ocean Plastic Survey

[56] 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.

[57] Seas at Risk: Single-Use Plastics and the Marine Environment

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

- In our central estimate we assume that decomposition for paper buds takes 24 weeks, 0.1% of the time taken for plastic buds which take 300 years. The rate for paper is based on a low estimate of 6 weeks for newspaper to decompose[59]. We have used a range of estimates for decomposition from 6 weeks to 60 weeks for paper and 200 – 400 years for plastic[60] to reflect the fact that rates vary according to oxygen levels, light and moisture levels.
- This gives a central estimate of a £7m reduction in the annual well-being loss caused by beach litter following a ban on plastic stemmed cotton buds[61].

The benefit we have monetised from paper buds decomposing faster than plastic buds is based only on those buds that end up on beaches. We have not quantified the benefit of buds 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 paper 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 stemmed cotton buds include landfill disposal emission costs, enforcement and monitoring costs and a small added fuel cost from paper cotton buds being heavier.

Monetised Costs

Table 4 shows the monetised costs, with our central total present value (TPV) estimate over 10 years being £0.01m. The only cost we have monetised is the additional emissions expected from the disposal of paper-based cotton buds. Relative to plastic, paper emits more kilograms of carbon dioxide equivalent (CO_2 e) emissions when placed in landfill. Unfortunately evidence suggests that the majority of cotton buds are not recycled, and for waste that goes to landfill, the evidence suggests that plastic performs better than paper due to the CO_2 e emissions released by paper in landfill.

Table 4	**10 Year TPV estimates, £m:**		
Total Costs:	**Low (worst case)**	**Central**	**High (best case)**
Disposal landfill emission cost	-£0.01	-£0.01	£0.00

[59] US National Park Service

[60] Taking an average based on estimates of 200 years from 4ocean and 400 years from Wessex Water.

[61] This annual estimate, starting from 2020, includes adjustment to 2017 prices. It is scaled down in the final Net Present Value calculation to reflect that many retailers are voluntarily switching to paper-based cotton buds, see section on the counterfactual for more detail on this. The estimate may overestimate litter reduction in the first years as for simplicity we have assumed decomposition benefits occur from the first year of the appraisal.

Non-monetised Costs

Switching materials may create costs for individual producers, but very few buds are produced in the UK and therefore any such costs would be out of scope of this impact assessment. As prices for paper buds are already comparable to plastic buds, this also suggests 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 paper buds being heavier than plastic buds. There may be a disutility cost to consumers having to use paper buds when they may have preferred plastic buds, 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 cotton buds, or may face costs investing in alternative products in order to continue business. It is not clear which costs, if any, will be encountered by businesses switching from plastic to paper cotton buds, however current evidence suggests that any costs are minimal since prices for both kinds of buds are similar, with a single bud being equivalent to 0.5 pence[62] for both plastic and paper cotton buds. This suggests that the impacts to businesses that are selling paper buds are low and possibly zero. This evidence is consistent with the European Commission, who modelled a zero impact to consumer costs up to 2030 for their impact assessment[63].

Prices of paper cotton buds may rise following an upturn in demand around the time of the plastic cotton bud ban, but our scenario analysis shows that there is already a significant trend away from plastic cotton buds. Given that prices of paper-based cotton buds have started at the same price as plastic stemmed cotton buds, there is a possibility that costs may fall. As the production of paper based buds will scale up following a ban in plastic stemmed cotton buds, producers of paper based buds may benefit from economies of scale, causing prices to decrease if lower production costs (per bud produced) are passed onto consumers.

Furthermore the majority of buds consumed in England are produced outside of England. A global market research report lists the top 10 global manufacturers of cotton buds as having their main manufacturing base outside England (predominantly located in South-East and Southern Asia)[64]. Additionally, we consulted with the British Plastic Conferedation and found that none of their members make plastic stemmed cotton buds[65]. The costs that might be incurred by internationally based businesses is out of scope of this impact assessment.

Given the small (possibly zero) proportion of England-based firms involved in the production of cotton buds and given also that retail prices appear to be the same for paper and plastic stemmed cotton buds, any costs associated with producing paper cotton buds is likely to be small or non-existent. As we have not been able to evidence any costs to English businesses

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[62] 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

[63] European Commission Impact Assessment – Reducing Marine Litter: action on single use plastics and fishing gear

[64] Global Cotton Bud Market Research Report 2018 By Players, Type and Applications, Status and Forecast, 2013-2025 https://www.orianresearch.com/report/global-cotton-bud-market-research-report-2018/463369

[65] Conversation with the British Plastic Confederation. To be confirmed.

involved in production we have assumed in our NPV estimates in this assessment that there are zero production costs.

Fuel Costs

There will be an increase in fuel costs for transporting cotton buds, as paper buds weigh more than plastic stemmed cotton buds (0.44g compared to 0.25g 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 supermarket shelves 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 cotton bud from production to consumption.
- The mode or modes of transport used to import cotton buds 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 paper cotton buds are comparable to plastic stemmed cotton buds despite being heavier.

Retail Costs

There is evidence that businesses based in England support the ban on plastic stemmed cotton buds, with 16 out of 17 min UK retailers sampled by Resource Futures having pledged to 'switch the stick' and supermarkets including Tesco, Sainsbury's and Aldi all having made commitments[66]. Resource Futures also found that non-government organisations, the water industry and the British Retail Consortium (BRC) had all made voluntary commitments[67]. A number of retailers already offer paper-based alternatives, including major retailers Marks & Spencer's, John Lewis, The Body Shop, and Co-operative[68].

Smaller businesses and businesses 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 stemmed cotton buds. Switching costs may include the staff administration and procurement cost of finding alternative suppliers of cotton buds. These costs create an incentive to have a time delay option, however there is no 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 retailers if their suppliers agree to switch material, which many may find given commitments made by major retailers and producers including Johnson & Johnson[69]. We invite businesses to respond to the consultation with evidence of any switching costs they might incur.

The commitments and switches already made by retailers indicates that any costs that might be incurred by retailers from switching materials are not large and that they are capable of absorbing any costs associated with switching, especially given that price rises do not appear to

[66] https://www.citytosea.org.uk/seven-major-retailers-pledge-to-switch-the-stick-to-stop-source-of-plastic-pollution/

[67] 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.

[68] Regional Activity Centre for Sustainable Consumption and Production: 25 innovative and inspiring solutions to combat PLASTIC MARINE LITTER in the Mediterranean Region

[69] https://www.cottonbudproject.org.uk/news/item/63-johnsons-paper-cotton-bud.html

have been placed on consumers[70]. We have assumed for our NPV estimates in this assessment that costs to English retailers will be zero, which is consistent with the European Commission's evidence where they modelled in their impact assessment that changes in retailer turnover following a ban would be zero[71].

Costs to Consumers

Evidence shows that the price of a single bud is currently equivalent to 0.5 pence[72] for both plastic and paper cotton buds. There is some uncertainty around the possibilities of an increase in price if demand for paper rises sharply around the time of the plastic ban, but there is also reason for the price of paper buds to fall as their production increases in scale.

Disutility from using a different product

There may be concerns that cotton buds 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 paper based alternatives to cotton buds 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'. 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 cotton buds that they believe are environmentally friendlier than plastic buds. A recent report by YouGov found that 70% of the public would be in favour of a ban on cotton buds made from plastic[73]. This implies that for the majority of consumers any benefit from using a plastic stemmed cotton bud is outweighed by the perceived benefits of using environmentally friendlier materials.

Environmental Landfill Emission Cost

A cost of moving away from plastic based goods is that plastic emits very few kilograms of carbon dioxide equivalent (CO_2 e) emissions when placed in landfill (just 0.005 tonnes of CO2e for each tonne of plastic polypropylene). This contrasts with paper which emits 1.033t of CO2e for each tonne left to landfill. Given that each tonne of CO2e has an environmental cost associated with it, this causes paper based alternatives to have an element of a negative contribution towards the environment.

Monetisation and Assumptions

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

[70] 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

[71] European Commission Impact Assessment – Reducing Marine Litter: action on single use plastics and fishing gear

[72] 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

[73] YouGov finds overwhelming support for banning 'problem plastics'.

- 1.8 billion cotton buds are consumed in England each year[74]. We assumed 1.6 billion for our low estimate and 2 billion for our high estimate.
- Paper cotton buds weigh 0.44g, compared to 0.25g per unit for plastic stemmed cotton buds[75].
- For each tonne of material placed in landfill, plastic polypropylene emits 0.005kg of CO_2 e, whereas paper production emits 1.033kg[76]. It is possible that there are impacts of plastic landfill disposal that are not included within the 0.005kg estimate as plastic has not been around for as long as its own estimated decomposition rate, but this would only serve to reduce the emission cost of switching materials.
- We assume that the cost of one tonne of CO_2 e in 2020 is £68.08, which increases up to £79.43 in 2030[77].
- 90% of cotton buds are given to waste or are littered, and then collected by local authorities. This is an estimate based on 10% being disposed of down the toilet[78] and an assumption that zero cotton buds are recycled. The zero recycling assumption is based on the majority of cotton buds being disposed of in bathrooms where there is rarely recycling. This assumption is also to give a conservative estimate, as if any cotton buds were recycled paper buds would emit fewer carbon equivalent emissions than plastic buds[79], leading to a higher NPV for the policy to ban plastic stemmed cotton buds.
- 29% of the 90% of cotton buds collected by local authorities are sent to landfill[80].
- This gives an initial cost estimate of £12,400 per year[81].

We have not quantified the emission costs of the 10% of buds that biodegrade in the open marine environment as we do not have carbon emission open decomposition estimates, however the decomposition of these 10% of buds is likely to create additional emission costs when they are paper rather than plastic. These are unlikely to be large or cause any significant change to our net present value estimates given the small scale of the emissions costs we have quantified from landfill.

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. 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.

[74] 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

[75] 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

[76] Government conversion factors. Spreadsheet used here, which underpins published government gas reporting figures.

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

[78] 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.

[79] Government conversion factors. Spreadsheet used here, which underpins published government gas reporting figures.

[80] 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

[81] This annual estimate, starting from 2020, includes adjustment to 2017 prices. It is scaled down in the final Net Present Value calculation to reflect that many retailers are voluntarily switching to paper-based cotton buds, see section on the counterfactual for more detail on this.

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 cotton buds correctly will be reduced and that therefore consumers will litter more or not recycle cotton buds as frequently. However we expect that the ban will raise people's awareness of the environmental damage plastic cotton buds can cause, and that consumers will therefore dispose of them correctly and reduce their use of plastic cotton buds.
  Increase in prices: Even though our evidence suggests that paper based cotton buds are no more expensive to produce than plastic stemmed cotton buds, 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.
- **Commitments not met:** The ban forces retailers to adhere to the voluntary commitments many retailers have already made towards switching to paper-based cotton buds. If a ban is not imposed retailers may fall back on or delay commitments they have made.
- **Consumers keep choosing plastic:** Even though paper based cotton buds are increasingly being made available to consumers, and there is strong consumer support for paper based buds[82] there is a risk that consumers will still opt for plastic stemmed cotton buds without a ban. They could do so inadvertently if products are not well labelled, or consumers may find that they prefer plastic buds. It may be that there is a time inconsistency problem where consumers state that they should not use plastic stemmed cotton buds 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. Since consumers have only recently been given a choice between paper and plastic stemmed cotton buds by large retailers we do not have evidence to describe current consumer behaviours.

Samba - Small and Medium sized Business Assessment

Any cost to small and medium sized businesses involved in the production of plastic stemmed cotton buds is likely to be small as the majority of buds consumed in England are produced outside of England. A global market research report lists the top 10 global manufacturers of cotton buds as having their main manufacturing base outside England (predominantly located in

[82] YouGov finds overwhelming support for banning 'problem plastics'.

South-East and Southern Asia)[83]. We welcome any evidence in the consutlation concerning the scale of producers based in England.

The retail market is overwhelmingly dominated by own brand products from the main retailers Tesco, Sainsbury, Asda and WM Morrison, with Johnson and Johnson the leading non-supermarket brand (<5% by value)[84]. Health and beauty retailers such as Boots and Superdrug also have significant market share. Since small and medium sized businesses (SMEs) currently have a very small share in the retail market for cotton buds, the impact to SMEs in retail is expected to be very small.

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 stemmed cotton buds. Switching costs may include the staff administration and procurement cost of finding alternative suppliers of cotton buds. 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 retailers 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 paper-based cotton buds, and found that prices for both were similar with a single bud being equivalent to 0.5 pence. This suggests that the impacts to businesses that are selling paper buds 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 paper-based buds to consumers.

Additional fuel costs caused by paper cotton buds being heavier than plastic stemmed cotton buds 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 paper cotton are comparable to plastic cotton buds despite being heavier.

Carbon Impact

Banning plastic stemmed cotton buds 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 CO_2 equivalent change in greenhouse gas emissions over the next 10 years as a result of the preferred option, 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	174	0	Y	
Incineration emissions savings	223	223		Y
Landfill emission savings	-82	-82		Y
Total saving:	316	141	174	141

[83] Global Cotton Bud Market Research Report 2018
By Players, Type and Applications, Status and Forecast, 2013-2025 https://www.orianresearch.com/report/global-cotton-bud-market-research-report-2018/463369

[84] Euromonitor (2017) COUNTRY REPORT - COTTON WOOL/BUDS/PADS IN UNITED KINGDOM Example data http://www.euromonitor.com/cotton-wool-buds-pads-in-the-united-kingdom/report

Emissions from production count as traded emissions, whereas emissions released in disposal (incineration and landfill) count as non-traded emissions[85].

Savings from production emissions are counted as zero in England as we have assumed that cotton buds are all imported. Globally, paper cotton buds 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 paper 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%	50%	30%	10%
2021	0%	25%	5%	3%
2022	0%	5%	1%	1%
2023	0%	5%	1%	1%
2024	0%	5%	1%	1%
2025	0%	5%	1%	1%
2026	0%	5%	1%	1%
2027	0%	5%	1%	1%
2028	0%	5%	1%	1%
2029	0%	5%	1%	1%

[85] For guidance on this, see Green Book Supplementary Guidance from BEIS.