

Northern Ireland Single-Use Plastic Data Report



This report summarises the assumptions, calculations and sources used to calculate the data points utilised in the impact assessment.

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Executive summary

This report summarises the assumptions, calculations and sources Eunomia used to produce data points for an impact assessment of Northern Ireland's proposed policies to reduce the consumption of certain single-use plastic items, in line with the NI Executive Commitment to create a plan to eliminate plastic pollution. The impact assessment was carried out by Red Scientific.

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Glossary

FC – Food Container
GHG – Green House Gas
NI – Northern Ireland
SU Non-P – Single-Use Non-Plastic
SUP – Single-Use Plastic
SU – Single-Use
SME - small and medium-sized enterprises
MU – Multi-use
HH - Household

1.0 Introduction

Eunomia was commissioned by WRAP to gather evidence and data from comparable interventions to inform economic modelling and Life Cycle Thinking demonstrating the potential policy impacts on the consumption of single-use plastic ('SUP') products in Northern Ireland. Within the January 2020 New Decade, New Approach agreement the Northern Ireland Executive gave a commitment to create a plan to eliminate plastic pollution and therefore the Northern Ireland Environment Minister has requested this study to consider policy options to achieve a substantial reduction in the consumption of SUP products, specifically SUP cups and food containers. [DAERA is also a signatory to the UK Plastics Pact and is therefore committed along with industry partners to taking action to eliminate problematic or unnecessary single-use packaging items through redesign, innovation or alternative (reuse) delivery methods.] Policy for Northern Ireland in this area will further align with other policies being considered across the UK including the Defra Resources and Waste Strategy for England, efforts by the Scottish Government to meet or exceed standards in EU Directive 2019/904 (the SUP Directive) and policy consideration by the Welsh Government around a levy on disposable cups. This report summarises the evidence and data gathered.

2.0 Policy Definitions

In the course of the work carried out, it was necessary to help bring definition to the policies whose impact was to be assessed. Brief definitions of the policies that have been modelled for cups and food containers are recorded in this section for ease of reference.

We have split the SUP products into separate categories of cups and food containers due to the different market dynamics, consumer behaviours and relevant actors involved in driving change behind the shift away from SUP packaging of these different kinds.

The goal of the policies is to reduce the use of the targeted types of SUP packaging, by encouraging wider take up of multi-use (MU) and/or single-use non-plastic (SU Non-P) alternatives.

In keeping with recent consultations on single-use plastic product restrictions by the Welsh and Scottish governments the definitions of "cup" and "food container" used for this report are taken from the EU SUP Directive and more detail can be found in the European Commission's supporting guidance.¹ In summary, a cup is a beverage cup including a cover or lid and a food container is a receptacle such as a box, with or without a cover, used to contain food which:

- (i) Is intended for immediate consumption either on-the-spot or take-away;
- (ii) Is typically consumed from the container; and
- (iii) Is ready to be consumed without further preparation such as cooking, or heating.

2.1 Cups

Three policies are modelled for SUP cups:

- A ban on their use;
- A levy of 25p on each cup; and
- A voluntary scheme or schemes implemented by businesses that make use of SUP cups, which may comprise a range of charges for cups, discounts for multi-use cups and communication efforts. This is modelled as having the same effect as a 10p charge.

¹ Commission guidelines on single-use plastic products in accordance with Directive (EU) 2019/904 of the European Parliament and of the Council on the reduction of the impact of certain plastic products on the environment (2021/C 216/01) https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.C_.2021.216.01.0001.01.ENG

It is proposed that the levy should take the form of a charge that is visible to the consumer – so it would be shown on menus, receipts and the like. For the ban and the levy, the policy would provide for an exemption for uses in the healthcare sector, where SUP items may be needed for the purpose of infection control. No exemption is needed within the context of a voluntary scheme.

2.2 Food Containers

For the purposes of this policy, food containers (FCs) are divided into two types within their scope.

- Scope 1 includes FCs that are filled at the point of sale (e.g. plastic trays for chips, plastic boxes used at salad bars).
- Scope 2 includes FCs used for pre-packaged, prepared foods in shops (e.g. a pre-packaged sandwich, salad bowl or prepared fruit box).

It is proposed by the NI Government that only Scope 1 FCs should be included within the ambit of the policies. The rationale for this is that in the case of Scope 2 FCs (a) the consumer has no opportunity to choose to have the food put into a MU container and thereby avoid the impact of the policy, and (b) SU Non-P alternatives are not readily available to producers/retailers in all cases.

However, we would observe that for many types of FC in Scope 1, switching to MU containers may be challenging, and that while suitable SU Non-P packaging options are available in most cases, this is not true in all cases. Further, the choice to implement SU Non-P packaging will sit with the producer, rather than with the consumer. This tends to undermine the rationale for distinguishing between Scope 1 and Scope 2 containers.

There is also a risk that the proposed difference in treatment between Scope 1 and Scope 2 FCs may have something of a perverse consequence. The result of imposing costs only on the use of Scope 1 FCs (whether directly, through a levy, or indirectly, through producers adopting more costly SU Non-P FCs to avoid the charge) may lead to consumers switching away from “filled at the point of sale” options and choosing “pre-filled” alternatives (where available), even though the latter is likely to remain in SUP FCs. The policy might therefore lead to a change in consumer behaviour that does not lead to any reduction in SUP FCs.

As defined, the policy options applied to Scope 1 FCs are broadly similar to those modelled for cups:

- A ban on their use;
- A levy of 50p on each SUP FC; and
- A voluntary scheme or schemes implemented by businesses that make use of SUP FCs, which may comprise a range of charges for FCs, discounts for consumers who use MU FCs and communication efforts. This is modelled as having the same effect as a 25p levy.

The proposed levy is higher than that proposed for a SUP cup, because – although the value of foods sold in SUP FCs varies considerably – a meal sold in a FC may often be of significantly higher value than a cup of tea or coffee, making the impact of a 25p levy proportionately smaller.

Again, there is an exemption for Scope 1 FCs used in the healthcare sector.

3.0 Data and Assumptions

In this section we report the data produced as part of the output of this project. In the tables below, the data relates to SUP cups and FCs unless specifically labelled as relating to SU Non-P or MU items.

- Table 1 provides output data on cups and FCs.
- Table 2 provides volumetric data on cups, while Table 3 provides the same data for FCs.
- Table 4 provides demand data on cups, while Table 5 provides the same data for FCs.
- Additional supporting tables are provided in Appendix 1.

The tables include information on the source of each data point. In some cases, no useful data was found. In these cases, Eunomia has supplied assumptions based on its expert judgement. These assumptions should be tested through consultation to see if better-sourced information can be supplied by stakeholders.

Table 1: Output Data

Data Point	Product	Value	Calculation/Assumption	Source
Production Cost	Cup	£0.11 per cup	Converted from USD to GBP	http://www.recyclingadvocates.org/wp-content/uploads/2016/03/Fisher2008_DisposableCupThesis.pdf Page 16
	Food Container	£0.05 per container		https://www.bbc.com/worklife/article/20180705-whats-the-real-price-of-getting-rid-of-plastic-packaging
Supply Cost	Cup	£0.19 per cup		Ecuity Consulting LLP (2018) Paper Cup Levy Impact Analysis: Methodology Paper, March 2018.
	Food Container	£0.086 per container	Applied the same increase in price (of 72.72%) from production to supply cost as cups	Eunomia assumption
Cost to Consumer	Cup	£0.44	Added the supply cost to a levy of 25p	
	Food Container	£0.59	Added the supply cost to a levy of 50p	
Cost to Supplier	Cup	£0.44	Added the supply cost to a levy of 25p. Assumed same cost as to consumer.	
	Food Container	£0.59	Added the supply cost to a levy of 50p. Assumed same cost as to consumer.	
Price Responsiveness (Elasticity of Demand)	Cup	10p levy = demand decrease by 42%	These findings are derived from Eunomia’s proprietary elasticity of demand model, based on the elasticity of demand for carrier bags in the Republic of Ireland. The switchover rates derived are consistent with those given in the article listed in the “source” column.	https://resource.co/article/hubbub-launches-reusable-cup-campaign-manchester
		25p levy = demand decrease by 60%		
	Food Container	25p levy = demand decrease by 55%	As above.	
		50p levy = demand decrease by 95%		

Data Point	Product	Value	Calculation/Assumption	Source
GHG from Production	Cup	SUP: 3.50E-05 SUNP: nil (can use FC as proxy) MU: 3.50E-04	The CO ₂ emissions added to the methane emissions, the latter being multiplied by 34 to convert to CO ₂ e	Data used from DG Environment SUP Model - Calculated by expert
	Food Container	SUP: 2.90E-05 SUNP: 1.90E-05 MU: 5.40E-04	The CO ₂ emissions added to the methane emissions, the latter being multiplied by 34 to convert to CO ₂ e	Data used from DG Environment SUP Model - Calculated by expert
GHG from transport to supplier	Cup	SUP: 1.20E-05	The CO ₂ emissions added to the methane emissions, the latter being multiplied by 34 to convert to CO ₂ e	Data used from DG Environment SUP Model - Calculated by expert
	Food Container	SUP: 1.20E-05	No data – cup used as proxy	Eunomia assumption
Number of Containers Sold	Cup	70,705,176	Calculated using 2.5 billion single-use coffee cups sold based on the total UK population of 66,650,000 and scaled to the Northern Irish population	https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/657/657.pdf Page 7
	Food Container	141,297,224		Data from DG Environment SUP Model
Size of baseline market for SUP containers in scope of policy	Cup	Large: 54,442,986 SME: 8,484,621	Calculated using the in-scope percentage of serving cups sold in SUP which was calculated from the NI CEP Report multiplied by the total SUP cups sold	https://www.daera-ni.gov.uk/sites/default/files/consultations/daera/Municipal%20Recycling%20Potential%20in%20NI%202020%20%28WRAP%20Report%29.PDF
	Food Container	Large: 98,908,057 SME: 26,846,473	Calculated using the percentage of FCs sold in SUP in large and small and medium-sized enterprises (SMEs) which was multiplied by the total SUP containers sold	See table
Numbers of containers collected by method for each container type	Cup	See Table 6: Number of SUP Cups Collected by Method	The total number of the SUP cups sold was multiplied by the corresponding percentage of SUP cups sold by sector and size which was then multiplied by the corresponding percentage of collection by sector and size.	See table
	Food Container	See Table 7: Number of SUP FCs	The total number of the SUP food containers sold was multiplied by the corresponding percentage of SUP	See table

Data Point	Product	Value	Calculation/Assumption	Source
		Collected by Method	food containers sold by sector and size which was then multiplied by the corresponding percentage of collection by sector and size.	
Mass of containers collected by method for each container type	Cup	See Table 8: Mass of SUP Cups by Collection Method	Number of containers collected by method for each container type multiplied by the mass of a SUP Cup	See table
	Food Container	See Table 9: Mass of SUP FCs by Collection Method	Number of containers collected by method for each container type multiplied by the mass of a SUP food container	See table
Volume of containers collected by method for each container type	Cup	See Table 10: Volume of SUP Cups by Collection Method	Number of containers collected by method for each container type multiplied by the volume of a SUP Cup	See table
	Food Container	See Table 11: Volume of SUP FCs by Collection Method	Number of containers collected by method for each container type multiplied by the volume of a SUP food container	See table
Numbers of containers by end destination type	Cup	See Table 12: Number of Cups by End Destination	The total number of cups collected by method for each category (i.e. Household Collection) multiplied by the corresponding final destination for collected waste	See table
	Food Container	See Table 13: Number of FCs by End Destination	The total number of containers collected by method for each category (i.e. HH Collection) multiplied by the corresponding final destination for collected waste	See table
Mass of containers by end destination type	Cup	See Table 14: Mass of Cups by End Destination	The numbers of cups by end destination type multiplied by the corresponding mass of the cup type	See table
	Food Container	See Table 15: Mass of FCs by End Destination	The numbers of containers by end destination type multiplied by the corresponding mass of the container type	See table
Volume of containers by end destination type	Cup	See Table 16: Volume of Cups by End Destination	The numbers of cups by end destination type multiplied by the corresponding volume of the cup type	See table

Data Point	Product	Value	Calculation/Assumption	Source
	Food Container	See Table 17: Volume of FCs by End Destination	The numbers of containers by end destination type multiplied by the corresponding volume of the container type	See table
Energy revenue from EFW	Cup	189.06 GBP per tonne	NI wholesale electricity price divided by 1,000 multiplied by the electricity generated. Number given in euros was converted to GBP.	Calculated by expert
	Food Container	189.06 GBP per tonne	NI wholesale electricity price divided by 1,000 multiplied by the electricity generated. Number given in euros was converted to GBP.	Calculated by expert
Disamenity cost (from land and marine litter mass)	Cup	£0.000011 per item	The total disamenity cost of soft drinks is estimated by UNEP at \$1.5 billion where 15 tonnes of plastic is generated per \$1 million in revenue; therefore, the \$1.5 billion is converted to tonnes and then the unit cost was calculated. The unit cost was then converted from dollars to GBP.	UNEP report "Valuing Plastic: The Business Case for Measuring, Managing and Disclosing Plastic Use in the Consumer Goods Industry" Page 72
	Food Container	Nil	Assumed same as cup	Eunomia assumption
GHG from landfill and incineration (difference from baseline)	Cup	2.26 tCO ₂ e/tonne waste	The sum of process energy use, biogenic carbon, total offset through energy generation and total offset through materials recovery	Calculated by expert
	Food Container	2.08 tCO ₂ e/tonne waste	The sum of process energy use, biogenic carbon, total offset through energy generation and total offset through materials recovery	Calculated by expert
Multi-Use				
Baseline Proportion of sales in MU Containers	Cup	2.3%	Reflects current uptake of MU cups by consumers, in response to limited discount schemes and personal choice	https://issuu.com/hubbubuk/docs/hubbub_s_starbucks_coffee_cup_charge Page 15
	Food Container	Nil	While some sales in MU containers may take place, these are considered to be negligible in the baseline	Eunomia assumption
Value of MU Container Sales	Cup	£1 per cup	The cheapest available cup of the required quality is likely to be favoured. More expensive cups are available.	https://www.starbucks.com/responsibility/environment/cups-and-materials

Data Point	Product	Value	Calculation/Assumption	Source
	Food Container	Nil	Based on likelihood that most diversion will be to SU non-P containers, and that no widely used MU option will be available	Eunomia assumption
Number of MU containers disposed of per annum	Cup	10%	Based on wear and tear of the item, lost items and the likelihood that there will be some delay between item going out of regular use and disposal	Eunomia assumption
	Food Container	10%	Based on wear and tear of the item, lost items and the likelihood that there will be some delay between item going out of regular use and disposal	Eunomia assumption
Average Use of MU	Cup	564	Number of uses in item's lifespan	Data used from DG Environment SUP Model
	Food Container	515	Number of uses in item's lifespan	Data used from DG Environment SUP Model

Table 2: Volumetric Data - Cups

Data Point	Product	Value	Calculation/Assumption	Source
Total Number of Cupfuls Sold in Scenario	SUP	70,705,179	The SUP figure of 2.5 billion was taken from the UK Parliament report and scaled to the NI population	https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/657/657.pdf Page 7
	MU	1,626,219	The Starbucks report indicates that 2.3% of consumers used MU cups before they implemented a charge. That percentage was then multiplied by the 2.5 billion and then scaled to the NI population.	https://issuu.com/hubbubuk/docs/hubbub_starbucks_coffee_cup_charge Page 15
	Total	72,331,395	SUP and MU added together	
Breakdown by Sector and Size	SUP	In-scope: Large – 77% SME – 12% Exempt: Large – 1% SME – 10%	The breakdown was calculated using the NI CEP report on the breakdown of sector and business size for hospitals, hospitality and consumer retail. The On-the-go WRAP report assumes 100% of SUP cups are purchased from hospitality or consumer retail, which is why those sectors were focused on. Additionally, hospitals are exempt from the levy. The breakdown by sector and size was then used in a	https://www.daera-ni.gov.uk/sites/default/files/consultations/daera/Municipal%20Recycling%20Potential%20in%20NI%202020%20%28WRAP%20Report%29.PDF Appendix 1

Data Point	Product	Value	Calculation/Assumption	Source
			waste arisings model to get the distributional breakdown by business size for in-scope and exempt.	https://wrap.org.uk/sites/default/files/2021-03/OTG%20Drinks%20Containers%20Final%20Report%20ENG017-012.pdf
	SU Non-P	In-scope: Large – 77% SME – 12% Exempt: Large – 1% SME – 10%	Assumed same as SUP	Eunomia assumption
	MU	In-scope: Large – 77% SME – 12% Exempt: Large – 1% SME – 10%	Assumed same as SUP	Eunomia assumption
Collection by Sector and Size	SUP In-scope: Large and SME	See Table 18: SUP Cups In-Scope and Exempt Collection by Sector and Size	The distribution of collection type was taken from the WRAP On-the-go report, where the disposal location was multiplied by the total disposed per category (e.g. 20% x (58% perceived as rubbish + 34% perceived as recycled)) to get the distribution of each collection category. In addition, the 4% of the “other” category within the report has been evenly distributed between Household, Commercial and Street Collection. For litter, the total of the collection methods was subtracted from 100%. It was assumed that the distribution of collection between large and SMEs are the same.	https://wrap.org.uk/sites/default/files/2021-03/OTG%20Drinks%20Containers%20Final%20Report%20ENG017-012.pdf Page 32
	SUP Exempt:	See Table 18: SUP Cups In-Scope and Exempt Collection by	The distribution of collection type for businesses that are exempt (i.e. hospitals) are based on assumptions. It was assumed that 95% of SUP cups	Eunomia assumption

Data Point	Product	Value	Calculation/Assumption	Source
	Large and SME	Sector and Size Table 19: MU Cups In-Scope and Exempt Collection by Sector and Size	served in hospitals are disposed in hospitals which is categorised as Commercial collection. In addition, it was assumed that 3% would be taken out of the hospital and disposed of in street collection. Lastly, it would be less likely that a cup is taken from a hospital to a home and disposed of at home; therefore, 1% was assumed. For litter, it was also assumed 1% to account for any that end up as litter. The same distribution is assumed for Large and SMEs.	
	MU In-scope: Large and SME	See Table 19: MU Cups In-Scope and Exempt Collection by Sector and Size		Eunomia assumption
	MU Exempt: Large and SME	See Table 19: MU Cups In-Scope and Exempt Collection by Sector and Size	Same as SUP	Eunomia assumption
Container Average Parameters	SUP	Bulk density: 39kg/m ³ Mass: 14g Volume: 355cm ³	The mass was taken from the DG Environment SUP model. The volume was based on a 12-ounce cup. The bulk density was calculated based on the mass and volume.	DG Environment SUP model
	SU Non-P	Bulk density: 39kg/m ³ Mass: 14g Volume: 355cm ³	Assumed same as SUP due to lack of data	Eunomia assumption
	MU	Bulk density: 270.42kg/m ³ Mass: 96g Volume: 355cm ³	The mass was taken from the DG Environment SUP model. The volume was based on a 12-ounce cup. The bulk density was calculated based on the mass and volume.	DG Environment SUP model
Final Destination for Collected Waste	SUP:	See Table 20: Cup Final Destination	The breakdown of final destination was based on 2019/2020 Q4 numbers provided by DAERA's waste	https://datavis.nisra.gov.uk/daera/northern-ireland-waste-management-statistics.html

Data Point	Product	Value	Calculation/Assumption	Source
	HH, Commercial and Street Collection		management statistics. The totals of LAC waste recycling, waste energy recovery and waste landfill were divided by the total waste to get a percentage. The waste energy recovery is in the "Other" category.	
	SUP: Litter	See Table 20: Cup Final Destination	<p>The 5% of litter ending up as land litter is based on an expert's estimate in the Common Seas – Marine Litter Wedges Mitigation Framework model.</p> <p>Similarly, 4% of litter ending up as marine litter is also from the Common Seas – Marine Litter Wedges Mitigation Framework project where it states that 12% of litter ends up in the sewage system and drains but 8% is caught in the system and does not make it to a body of water. Therefore, the remaining 4% ends up as marine litter.</p> <p>It is assumed that the majority of litter is picked up by street cleaners, litter pickers, etc. and goes into a collection stream, which has been proportionally calculated into the Household, Commercial and Street Collection figures from the DAERA data.</p>	<p>Common Seas – Marine Litter Wedges Mitigation Framework model</p> <p>https://www.eunomia.co.uk/reports-tools/plastic-drawdown-policy-instruments-reduce-plastic-pollution/</p>
	SU Non-P: HH, Commercial and Street Collection	See Table 20: Cup Final Destination	Assumed same as SUP	Eunomia assumption
	SU Non-P: Litter	See Table 20: Cup Final Destination	Assumed same as SUP	Eunomia assumption
	MU: HH, Commercial	See Table 20: Cup Final Destination	Assumed same as SUP	Eunomia assumption

Data Point	Product	Value	Calculation/Assumption	Source
	al and Street Collection			
	MU: Litter	See Table 20: Cup Final Destination	Assumed none are littered based on DG Environment SUP model assumption	Eunomia assumption

Table 3: Volumetric Data - Food Containers

Data Point	Product	Value	Calculation/Assumption	Source
Total Number of Boxfuls Sold in Scenario	SUP	141,297,224	The number from the model was adjusted using the Northern Irish population.	DG Environment SUP Model
	SU Non-P	163,357,239	The number from the model was adjusted using the Northern Irish population.	DG Environment SUP Model
	Total	304,654,464	SUP and SU Non-P added together	DG Environment SUP Model
Breakdown by Sector and Size	% of Boxes Sold in SUP	In-scope 1: Large – 10% SME – 10% In-scope 2: Large – 60% SME – 9% Exempt: Large – 1% SME – 10%	In-scope 1: It is assumed that take away sales from fast food where the box is filled at the point of sale is quite niche and, therefore, the number of boxes sold in SUP within scope 1 wouldn't be very big. It is assumed the same percentage for large and SMEs. In-scope 2: It is assumed that a larger portion of boxes sold in SUP would be from pre-packaged prepared foods in shops, where the majority would come from large instead of SMEs. Exempt: Same distribution as SUP cups is assumed.	Eunomia assumptions
	% of Boxes Sold in SU Non-P	In-scope 1: Large – 55% SME – 29%	In-scope 1: It is assumed that take away sales from fast food where the box is filled at the point of sale will most	Eunomia assumptions

Data Point	Product	Value	Calculation/Assumption	Source
		<p>In-scope 2: Large – 3% SME – 2%</p> <p>Exempt: Large – 1% SME – 10%</p>	<p>likely be in SU Non-P. It is assumed that large chains will account for over half while SMEs will account for 29%.</p> <p>In-scope 2: It is assumed that a minimal amount of SU Non-P is used for pre-packaged prepared foods in shops. It is assumed that larger shops will have a higher percentage served in SU Non-P than SMEs.</p> <p>Exempt: Same distribution as SUP boxes is assumed.</p>	
Collection by Sector and Size	In-scope 1: SUP Large and SME	See Table 21: SUP FCs In-Scope and Exempt Collection by Sector and Size	The distribution of collection by sector and size is based on assumptions that 50% of take-away sales from fast food will mostly likely be eaten at work and disposed of in commercial collection. Household collection accounts for 25% as it is assumed people will bring the fast-food home and eat it from the container. Street collection is assumed at 15% where people will eat it on-the-go and dispose of it in a street or park bin. Lastly, the 10% accounts for litter. It is assumed the same distribution for large and SMEs.	Eunomia assumptions
	In-scope 2: SUP Large and SME	See Table 21: SUP FCs In-Scope and Exempt Collection by Sector and Size	It is assumed at 65% of consumers will dispose of a pre-packed SUP food container from a shop in a commercial bin at work. Additionally, 12% would be disposed of at home and 15% would be disposed of in a street or park bin from someone eating it on-the-go. Lastly, 8% would account for litter. It is assumed the same distribution for large and SMEs.	Eunomia assumptions

Data Point	Product	Value	Calculation/Assumption	Source
	Exempt: Large and SME	See Table 21: SUP FCs In- Scope and Exempt Collection by Sector and Size	Assumed same as SUP Cups	Eunomia assumptions
	In-scope 1: SU Non-P Large and SME	See Table 22: SUNP FCs In- Scope and Exempt Collection by Sector and Size	Based on the assumption in the percentage of boxes sold in SU Non-P, it is assumed at 50% of people have fast-food out of a SU Non-P that is disposed at home (such as pizza, fish and chips, burgers, etc.). It is also assumed that 25% of people would dispose a SU Non-P container at work in commercial collection. 15% is assumed to be eaten on-the-go and thrown away in a street or park bin which is considered street collection. Lastly, 10% is assumed to end up as litter. It is assumed the same distribution for large and SMEs.	Eunomia assumptions
	In-scope 2: SU Non-P Large and SME	See Table 22: SUNP FCs In- Scope and Exempt Collection by Sector and Size	Assumed same as SUP	Eunomia assumptions
	Exempt: Large and SME	See Table 22: SUNP FCs In- Scope and Exempt Collection by Sector and Size	Assumed same as SUP	Eunomia assumptions
Container Average Parameters	SUP	Bulk density: 26.67kg/m ³ Mass: 20g	The mass is taken from the DG Environment SUP model. The volume is based on a 750ml food	DG Environment SUP model

Data Point	Product	Value	Calculation/Assumption	Source
		Volume: 750cm ³	container. The bulk density is calculated based on the mass and volume.	
	SU Non-P	Bulk density: 26.67kg/m ³ Mass: 20g Volume: 750cm ³	Assumed same as SUP due to lack of data	Eunomia assumptions
	MU	Bulk density: 200kg/m ³ Mass: 150g Volume: 750cm ³	The mass is taken from the DG Environment SUP model. The volume is based on a 750ml food container. The bulk density is calculated based on the mass and volume.	DG Environment SUP model
Final Destination for Collected Waste	SUP: HH, Commercial and Street Collection	See Table 23: FCs Final Destination	Assumed same as cups.	Eunomia assumptions
	SUP: Litter	See Table 23: FCs Final Destination	Assumed same as cups.	Eunomia assumptions
	SU Non-P: HH, Commercial and Street Collection	See Table 23: FCs Final Destination	Assumed same as SUP	Eunomia assumptions
	SU Non-P: Litter	See Table 23: FCs Final Destination	Assumed same as SUP	Eunomia assumptions
	MU: HH, Commercial and Street Collection	See Table 23: FCs Final Destination	Assumed same as SUP	Eunomia assumptions

Data Point	Product	Value	Calculation/Assumption	Source
	MU: Litter	See Table 23: FCs Final Destination	Assumed none are littered based on DG Environment SUP model assumption	Eunomia assumptions

Table 4: Demand Assumptions - Cups

Section	Assumption	Rationale	Source
Baseline	Total demand for beverages scales with (adult) population growth	Beverage market is well developed, and unlikely to grow substantially for other reasons	Eunomia assumption
	DRS, EPR, Plastic Tax do not impact demand	The impact of these measures on the cost of packaging are very small	Eunomia assumption
	97.5% of beverages are sold in SUP 2.5% of beverages are sold in MU	Based on limited data points	https://resource.co/article/hubbub-launches-reusable-cup-campaign-manchester
	0% of beverages are sold in SU Non-P cups	Eunomia research has yielded no examples of viable SU Non-P cups	Eunomia assumption
	In 2035: 97.5% of sales are in SUP cups 2.5% of sales are in MU cups	No significant change expected without policy interventions	Eunomia assumption
Future scenarios	SU Non-P cups become available in 2027	Commercial pressure across the EU will be likely to stimulate a market for SU Non-P cups	Eunomia assumption
	Until SU Non-P cups become available, all diversion is to MU cups	No other alternative is available	Eunomia assumption
	All SUP Cups are replaced by SU Non-P Cups by 2035	Commercial pressure will lead to a rapid take-up of SU Non-P cups	Eunomia assumption
	In 2035: 75% of sales are in MU cups 25% of sales are in SU Non-P cups	After policy interventions, people who have switched to MU cups tend to stay with them, rather than switching to SU Non-P.	Eunomia assumption
SUP Ban	Starts in 2022, and has full effect by 2026		Based on policy definition
	There is a 15% drop in demand by 2026	Lack of SU Non-P options and additional costs lead to a reduction in demand	Based on confidential source
	100% recovery of lost demand by 2035	Assumed to be due to availability of SU Non-P options, and better established MU options.	Eunomia assumption

Section	Assumption	Rationale	Source
SUP Levy	25p in 2022	Value of levy, which is visible to consumers and maintained in real terms	Based on policy definition
	60% reduction in demand for SUP in 2022	Reduction in SUP cup sales due to levy	Based on elasticity of demand calculation
	85% displaced sales 15% reduced demand	Consequence of "lost" SUP sales	Eunomia assumption
	100% recovery of lost demand by 2035	Assumed to be due to consumers switching to MU and then availability of SU Non-P options.	Eunomia assumption
SUP Voluntary Scheme(s)	Starts in 2022, and is set at a fixed value of 10p	Assumed to be modelled as lower rate levy	Based on policy definition
	There is a 42% reduction in demand by 2022	The levy is visible to consumers and causes a degree of "lost" SUP sales	Based on elasticity of demand calculation
	95% displaced sales 5% reduced demand	Consequence of "lost" SUP sales	Eunomia assumption
	100% recovery of lost demand by 2035	Assumed to be due to consumers switching to MU and then availability of SU Non-P options.	Eunomia assumption

Table 5: Demand Assumptions - Food Containers

Section	Assumption	Rationale	Source
Baseline	Total demand for food containers (FC) scales with (adult) population growth	Food market is well developed, and unlikely to grow substantially for other reasons	Eunomia assumption
	DRS, EPR, and Plastic Tax do not impact demand	The impact of these measures on the cost of packaging are very small	Expert assumption
	46.4% of beverages are sold in SUP 53.6% of beverages are sold in SUNP	Based on data	Based on volumetric data of food containers
	We assume that 0% of foods are sold in MU FCs as there are effectively no viable/compliant FCs available	Eunomia research has yielded no examples of viable MU FCs	Eunomia assumption
Future Scenarios	MU becomes available in 2023	Commercial pressure across the EU will be likely to stimulate a market for MU FCs	Eunomia assumption
	By 2035 all SUP FCs will be replaced by SUNP FCs	Commercial pressure will lead to a rapid take-up of SUNP FCs	Eunomia assumption

Section	Assumption	Rationale	Source
	By 2035: 10% of sales will be in MU FCs 90% in SUNP FCs	After policy interventions, companies will be more inclined to purchase and use SUNPs based on a cost perspective. However, people who have switched to MU FCs will stick with them.	Eunomia assumption
	All displacement from SUP is to SU Non-P FCs	Until MU FCs are widely available and more convenient	Eunomia assumption
	0% growth in demand across period to 2035	Based on population growth factor	Eunomia assumption
SUP Ban	Starts in 2022, is in full effect by 2023		Based on policy definition
	The move to SU Non-P and (later) MU FCs will have no impact on overall sales demand	People will still demand food at the same rate	Eunomia assumption
SUP Levy	50p in 2022	Value of levy, which is visible to consumers and maintained in real terms	Based on policy definition
	95% reduction in demand for SUP in 2022	Reduction in SUP cup sales due to levy	Based on elasticity of demand calculation
	98% displaced sales 2% reduction in demand	Consequence of "lost" SUP sales	Eunomia assumption
	100% recovery of lost demand by 2035	Assumed to be due to consumers and suppliers switching to SUNP and MU.	Eunomia assumption
SUP Voluntary Scheme(s)	Start in 2022 and is set a fixed value at 25p	Assumed to be modelled as lower rate levy	Based on policy definition
	55% reduction in demand for SUP in 2022	Reduction in SUP cup sales due to levy	Based on elasticity of demand calculation
	98% displaced sales 2% reduction in demand	Consequence of "lost" SUP sales	Eunomia assumption
	100% recovery of lost demand by 2035	Assumed to be due to consumers and suppliers switching to SUNP and MU.	Eunomia assumption

Appendix

This appendix provides the tables referred to in the “Value” column in the tables shown in the previous sections.

The following tables refer to the values cited in Table 1: Output Data.

Numbers of containers collected by method for each container type

Cups

Table 6: Number of SUP Cups Collected by Method

	HH collection	Commercial collection	Street collection	Litter	Total
Large	6,714,635	30,097,897	10,743,416	6,887,038	54,442,986
SME	1,046,437	4,690,581	1,674,299	1,073,305	8,484,621
Large	7,071	671,699	21,212	7,071	707,052
SME	70,705	6,716,992	212,116	70,705	7,070,518

Food Containers

Table 7: Number of SUP FCs Collected by Method

		HH collection	Commercial collection	Street collection	Litter	Total
In-scope 1	Large	3,532,431	7,064,861	2,119,458	1,412,972	14,129,722
	SME	3,532,431	7,064,861	2,119,458	1,412,972	14,129,722
In-scope 2	Large	10,173,400	55,105,917	12,716,750	6,782,267	84,778,335
	SME	1,526,010	8,265,888	1,907,513	1,017,340	12,716,750
Exempt	Large	14,130	1,342,324	42,389	14,130	1,412,972
	SME	141,297	13,423,236	423,892	141,297	14,129,722

Mass of containers collected by method for each container type

Mass is given in grams

Cups

Table 8: Mass of SUP Cups by Collection Method

		HH collection	Commercial collection	Street collection	Litter	Total
In-scope	Large	94,004,889	421,370,562	150,407,822	96,418,528	762,201,800
	SME	14,650,113	65,668,140	23,440,180	15,026,264	118,784,696
Exempt	Large	98,987	9,403,788	296,962	98,987	9,898,725
	SME	989,872	94,037,884	2,969,617	989,872	98,987,247

Food Containers

Table 9: Mass of SUP FCs by Collection Method

		HH collection	Commercial collection	Street collection	Litter	Total
In-scope 1	Large	70,648,612	141,297,224	42,389,167	28,259,445	282,594,449
	SME	70,648,612	141,297,224	42,389,167	28,259,445	282,594,449
In-scope 2	Large	203,468,003	1,102,118,350	254,335,004	135,645,335	1,695,566,692
	SME	30,520,200	165,317,752	38,150,251	20,346,800	254,335,004
Exempt	Large	282,594	26,846,473	847,783	282,594	28,259,445

	SME	2,825,944	268,464,726	8,477,833	2,825,944	282,594,449
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Volume of containers collected by method for each container type

Volume is given in cm³

Cups

Table 10: Volume of SUP Cups by Collection Method

		HH collection	Commercial collection	Street collection	Litter	Total
In-scope	Large	2,383,695,393	10,684,753,537	3,813,912,628	2,444,898,382	19,327,259,940
	SME	371,484,996	1,665,156,395	594,375,994	381,023,125	3,012,040,510
Exempt	Large	2,510,034	238,453,207	7,530,101	2,510,034	251,003,376
	SME	25,100,338	2,384,532,071	75,301,013	25,100,338	2,510,033,758

Food Containers

Table 11: Volume of SUP FCs by Collection Method

		HH collection	Commercial collection	Street collection	Litter	Total
In-scope 1	Large	2,649,322,956	5,298,645,911	1,589,593,773	1,059,729,182	10,597,291,823
	SME	2,649,322,956	5,298,645,911	1,589,593,773	1,059,729,182	10,597,291,823

In-scope 2	Large	7,630,050,113	41,329,438,110	9,537,562,641	5,086,700,075	63,583,750,938
	SME	1,144,507,517	6,199,415,716	1,430,634,396	763,005,011	9,537,562,641
Exempt	Large	10,597,292	1,006,742,723	31,791,875	10,597,292	1,059,729,182
	SME	105,972,918	10,067,427,232	317,918,755	105,972,918	10,597,291,823

Numbers of containers by end destination type

Cups

Table 12: Number of Cups by End Destination

Material	Collection	Destination				
		Land Litter	Marine Litter	Landfill	Recycling	Other
SUP	HH collection	-	-	1,959,712	3,527,481	2,351,654
SUP	Commercial collection	-	-	10,544,292	18,979,726	12,653,151
SUP	Street collection	-	-	3,162,760	5,692,969	3,795,312
SUP	Litter	401,906	321,525	1,828,672	3,291,609	2,194,406
SU Non-P	HH collection	-	-	-	-	-
SU Non-P	Commercial collection	-	-	-	-	-
SU Non-P	Street collection	-	-	-	-	-
SU Non-P	Litter	-	-	-	-	-

MU	HH collection	-	-	45,073	81,132	54,088
MU	Commercial collection	-	-	242,519	436,534	291,022
MU	Street collection	-	-	72,743	130,938	87,292
MU	Litter	-	-	46,219	83,195	55,463

Food Containers

Table 13: Number of FCs by End Destination

		Destination				
Material	Collection	Land Litter	Marine Litter	Landfill	Recycling	Other
SUP	HH collection	-	-	4,729,925	8,513,864	5,675,910
SUP	Commercial collection	-	-	23,066,772	41,520,189	27,680,126
SUP	Street collection	-	-	4,832,365	8,698,257	5,798,838
SUP	Litter	539,049	431,239	2,452,673	4,414,811	2,943,207
SU Non-P	HH collection	-	-	5,468,384	9,843,090	6,562,060
SU Non-P	Commercial collection	-	-	26,668,069	48,002,525	32,001,683
SU Non-P	Street collection	-	-	5,586,818	10,056,272	6,704,181
SU Non-P	Litter	623,208	498,566	2,835,596	5,104,072	3,402,715
MU	HH collection	-	-	-	-	-

MU	Commercial collection	-	-	-	-	-
MU	Street collection	-	-	-	-	-
MU	Litter	-	-	-	-	-

Mass of containers by end destination type

Mass is given in grams

Cups

Table 14: Mass of Cups by End Destination

Material	Collection	Destination				
		Land Litter	Marine Litter	Landfill	Recycling	Other
SUP	HH collection		-	27,435,965	49,384,737	32,923,158
SUP	Commercial collection	-	-	147,620,094	265,716,169	177,144,112
SUP	Street collection	-	-	44,278,645	79,701,562	53,134,374
SUP	Litter	5,626,683	4,501,346	25,601,406	405,352,776	270,235,184
SU Non-P	HH collection	-	-	-	-	-
SU Non-P	Commercial collection	-	-	-	-	-
SU Non-P	Street collection	-	-	-	-	-
SU Non-P	Litter	-	-	-	-	-

MU	HH collection	-	-	4,327,044	7,788,679	5,192,452
MU	Commercial collection	-	-	23,281,798	41,907,236	27,938,157
MU	Street collection	-	-	6,983,375	12,570,075	8,380,050
MU	Litter	-	-	4,437,041	7,986,674	5,324,449

Food Containers

Table 15: Mass of FCs by End Destination

Material	Collection	Destination				
		Land Litter	Marine Litter	Landfill	Recycling	Other
SUP	HH collection	-	-	94,598,492	170,277,285	113,518,190
SUP	Commercial collection	-	-	461,335,437	830,403,787	553,602,525
SUP	Street collection	-	-	96,647,301	173,965,143	115,976,762
SUP	Litter	10,780,978	8,624,783	49,053,451	88,296,212	58,864,141
SU Non-P	HH collection	-	-	109,367,672	196,861,809	131,241,206
SU Non-P	Commercial collection	-	-	533,361,386	960,050,495	640,033,664
SU Non-P	Street collection	-	-	111,736,352	201,125,433	134,083,622
SU Non-P	Litter	12,464,157	9,971,326	56,711,916	102,081,449	68,054,299
MU	HH collection					

MU	Commercial collection					
MU	Street collection					
MU	Litter					

Volume of containers by end destination type

Volume is given in cm³

Cups

Table 16: Volume of Cups by End Destination

Material	Collection	Destination				
		Land Litter	Marine Litter	Landfill	Recycling	Other
SUP	HH collection	-	-	695,697,690	1,252,255,842	834,837,228
SUP	Commercial collection	-	-	3,743,223,802	6,737,802,844	4,491,868,563
SUP	Street collection	-	-	1,122,779,934	2,021,003,881	1,347,335,921
SUP	Litter	142,676,594	114,141,275	649,178,502	1,168,521,304	779,014,203
SU Non-P	HH collection	-	-	-	-	-
SU Non-P	Commercial collection	-	-	-	-	-
SU Non-P	Street collection	-	-	-	-	-
SU Non-P	Litter	-	-	-	-	-
MU	HH collection	-	-	16,001,047	28,801,884	19,201,256

MU	Commercial collection	-	-	86,094,147	154,969,465	103,312,977
MU	Street collection	-	-	25,823,938	46,483,089	30,988,726
MU	Litter	-	-	16,407,808	29,534,055	19,689,370

Food Containers

Table 17: Volume of FCs by End Destination

Material	Collection	Destination				
		Land Litter	Marine Litter	Landfill	Recycling	Other
SUP	HH collection	-	-	3,547,443,438	6,385,398,188	4,256,932,125
SUP	Commercial collection	-	-	17,300,078,901	31,140,142,022	20,760,094,681
SUP	Street collection	-	-	3,624,273,803	6,523,692,846	4,349,128,564
SUP	Litter	404,286,683	323,429,346	1,839,504,408	3,311,107,934	2,207,405,289
SU Non-P	HH collection	-	-	4,101,287,689	7,382,317,841	4,921,545,227
SU Non-P	Commercial collection	-	-	20,001,051,988	36,001,893,578	24,001,262,386
SU Non-P	Street collection	-	-	4,190,113,188	7,542,203,739	5,028,135,826
SU Non-P	Litter	467,405,901	373,924,721	2,126,696,849	3,828,054,329	2,552,036,219
MU	HH collection					
MU	Commercial collection					
MU	Street collection					

MU	Litter					
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The follow tables refer to the data cited in Table 2: Volumetric Data - Cups.

Collection by Sector and Size

SUP Cups Large and SME

Table 18: SUP Cups In-Scope and Exempt Collection by Sector and Size

		HH collection	Commercial collection	Street collection	Litter	Total
In-scope	Large	12%	55%	20%	13%	100%
	SME	12%	55%	20%	13%	100%
Exempt	Large	1%	95%	3%	1%	100%
	SME	1%	95%	3%	1%	100%

MU Cups Large and SME

Table 19: MU Cups In-Scope and Exempt Collection by Sector and Size

		HH collection	Commercial collection	Street collection	Litter	Total
In-scope	Large	50%	20%	20%	10%	100%
	SME	50%	20%	20%	10%	100%
Exempt	Large	1%	95%	3%	1%	100%
	SME	1%	95%	3%	1%	100%

Final Destination for Collected Waste

Cups

Table 20: Cup Final Destination

Material	Collection	Destination				
		Land Litter	Marine Litter	Landfill	Recycling	Other
SUP	HH collection	0%	0%	25%	45%	30%
SUP	Commercial collection	0%	0%	25%	45%	30%
SUP	Street collection	0%	0%	25%	45%	30%
SUP	Litter	5.0%	4%	23%	41%	27%
SU Non-P	HH collection	0%	0%	25%	45%	30%
SU Non-P	Commercial collection	0%	0%	25%	45%	30%
SU Non-P	Street collection	0%	0%	25%	45%	30%
SU Non-P	Litter	5.0%	4%	23%	41%	27%
MU	HH collection	0%	0%	25%	45%	30%
MU	Commercial collection	0%	0%	25%	45%	30%
MU	Street collection	0%	0%	25%	45%	30%
MU	Litter	0%	0%	25%	45%	30%

The following tables refer to the data cited in Table 3: Volumetric Data - Food Containers.

Collection by Sector and Size

SUP FCs Large and SME

Table 21: SUP FCs In-Scope and Exempt Collection by Sector and Size

	HH collection	Commercial collection	Street collection	Litter	Total

In-scope 1	Large	25%	50%	15%	10%	100%
	SME	25%	50%	15%	10%	100%
In-scope 2	Large	12%	65%	15%	8%	100%
	SME	12%	65%	15%	8%	100%
Exempt	Large	1%	95%	3%	1%	100%
	SME	1%	95%	3%	1%	100%

SU Non-P FCs Large and SME

Table 22: SUNP FCs In-Scope and Exempt Collection by Sector and Size

		HH collection	Commercial collection	Street collection	Litter	Total
In-scope 1	Large	50%	25%	15%	10%	100%
	SME	50%	25%	15%	10%	100%
In-scope 2	Large	12%	65%	15%	8%	100%
	SME	12%	65%	15%	8%	100%
Exempt	Large	1%	95%	3%	1%	100%
	SME	1%	95%	3%	1%	100%

Final Destination for Collected Waste

Food Containers

Table 23: FCs Final Destination

		Destination				
Material	Collection	Land Litter	Marine Litter	Landfill	Recycling	Other
SUP	HH collection	0.0%	0.0%	25.0%	45.0%	30.0%
SUP	Commercial collection	0.0%	0.0%	25.0%	45.0%	30.0%
SUP	Street collection	0.0%	0.0%	25.0%	45.0%	30.0%

SUP	Litter	5.0%	4%	23%	41%	27%
SU Non-P	HH collection	0.0%	0.0%	25.0%	45.0%	30.0%
SU Non-P	Commercial collection	0.0%	0.0%	25.0%	45.0%	30.0%
SU Non-P	Street collection	0.0%	0.0%	25.0%	45.0%	30.0%
SU Non-P	Litter	5.0%	4%	23%	41%	27%
MU	HH collection	0.0%	0.0%	25.0%	45.0%	30.0%
MU	Commercial collection	0.0%	0.0%	25.0%	45.0%	30.0%
MU	Street collection	0.0%	0.0%	25.0%	45.0%	30.0%
MU	Litter	0.0%	0.0%	25.0%	45.0%	30.0%