Guidelines for Leadership in Corporate Plastic Accounting

Draft for consultation, October 2020

Developed by the 3R Initiative, EA, South Pole and Quantis

Introduction

Objective

Of the nearly 415 million tonnes of plastic produced per year, 12 million tonnes end up in the ocean.[i] In order to better manage natural resources and reduce the impact of plastic waste in the environment, businesses are joining with governments in making commitments to reduce plastic production and consumption by 19 million metric tons per year by 2040 and increase recycled content by 5.4 million metric tons per year by 2025.[ii] In order to achieve such commitments, business needs to engage in holistic plastic stewardship both within and beyond their individual value chains.

These *Guidelines for Leadership in Corporate Plastic Accounting* provide **guidance to companies about how to set and credibly meet ambitious plastic waste reduction leadership commitments that include the full range of strategies to tackle the issue in a comprehensive and sustainable way**.

These *Guidelines* set out:

- High-level plastic footprint and leakage assessment metrics;
- A mitigation hierarchy to illustrate the priority of each footprint and leakage mitigation strategy, including plastic crediting, in a robust plastic stewardship program;
- How plastic credits can be used in the context of plastic stewardship; and,
- Robust plastic waste and circularity leadership claims.

Contents

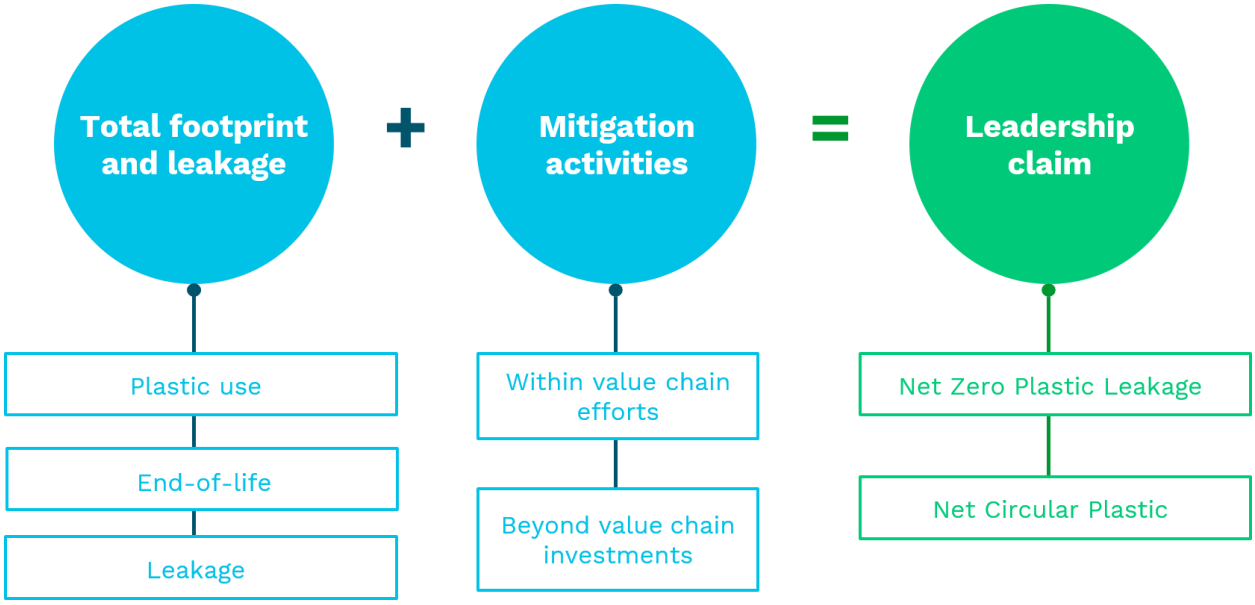
These *Guidelines* set out the following:

Overview of plastic credits and plastic waste reduction leadership commitments

New incentives are needed to meaningfully scale up waste collection and management to address the plastic waste crisis and keep the more than 400 million tonnes of plastic produced every year[iii] out of the environment. Plastic credits — transferable units representing a specific quantity of plastic that has been collected or recycled from the environment over what would have occurred under a business-as-usual scenario — represent an important means for reducing global plastic waste and supporting the circular economy.

The plastic waste reduction leadership claims introduced in this document are 'Net Zero Plastic Leakage' and 'Net Circular Plastic'. As illustrated in Figure 1, a robust assessment of a company's total plastic footprint and associated leakage serves as the starting point for any plastic waste reduction leadership commitment.[1] Companies must work to reduce total plastic use and, where plastic is still necessary, increase the recycled content of products and packaging. With respect to plastic leakage, mitigation activities should involve collection and recycling activities, which could take place both within and beyond a company's value chain (i.e., outside of its direct control or influence). As they work to make their own value chains more circular, companies can use plastic credits to drive finance to new or scaled-up plastic waste collection and recycling projects to mitigate the impact of the plastic waste they cannot yet control.

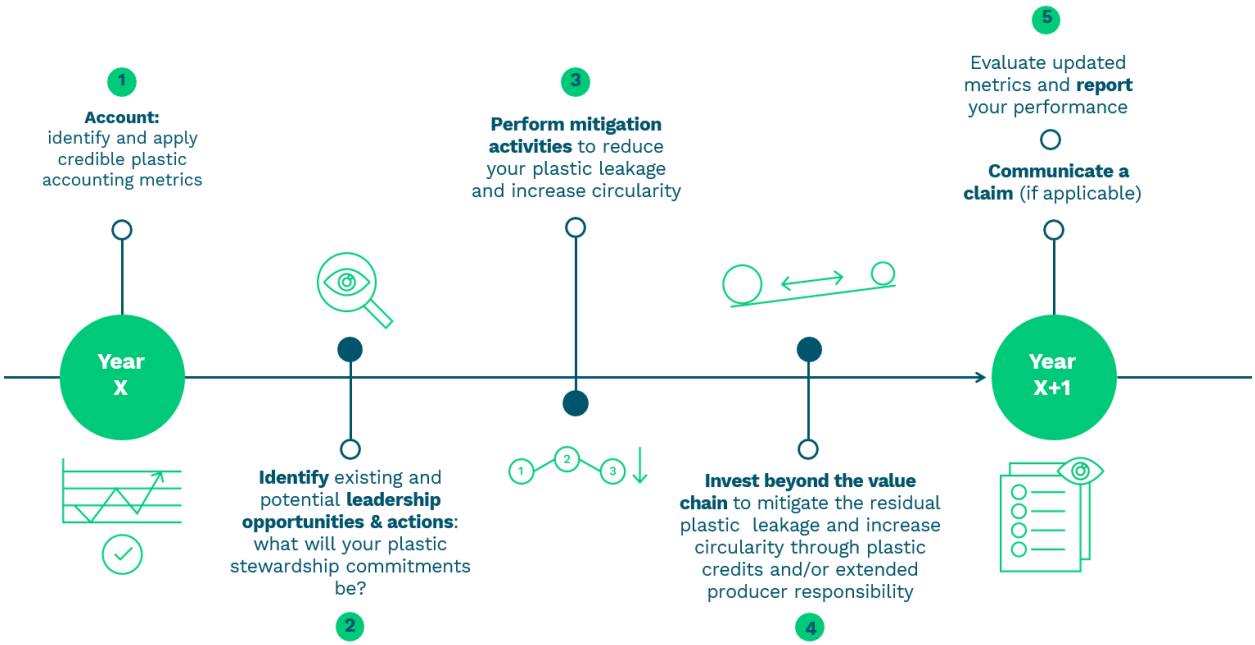
Figure 1. Activities undertaken to achieve leadership commitments



These *Guidelines* are intended to support companies on their plastic stewardship journey, starting with a baseline year (see Figure 2 below). Over time, efforts to reduce plastic production and consumption, increase recycled content and manage plastic waste should come increasingly within a company's direct control, which would reduce the need for plastic credits and reliance on extended producer responsibility schemes.

[1] A company may include its entire business or only certain products, brands or markets in its accounting for, and commitments about, plastic footprint and leakage.

Figure 2. Elements of a plastic stewardship journey, baseline year (X) to year X+1



1. Principles of a credible corporate plastic stewardship programme

1.1 Plastic stewardship requires regular and consistent accounting of plastic use and leakage that relies on quality data sources

As a first step, a company should assess its yearly plastic accounting for a baseline year. This will allow it to map plastic use in terms of markets, products and material types, as well as identify plastic leakage hotspots. All calculations (whether for plastic use, leakage, circularity or mitigation activities) should follow globally accepted methods of accounting. Reporting should include the following:

- Scope: at minimum, how the mismanaged fraction is defined and whether or not littering has been included in the review;
- Data sources: at minimum, references and the extent to which they are geographically and temporally correlated with the review period;
- Relevance: at minimum, accounting should be conducted for domestic recycling rates (not including imports); exports should not be considered as 100% recycled, and items that are "collected for recycling" are not counted as "recycled".[2]

[2] Scoping and definitions, data collection instructions and modelling approaches are available in the National Guidance for Plastic Pollution Hotspotting and Shaping Action (Life Cycle Initiative, “National Guidance for Plastic Pollution Hotspotting and Shaping Action” (2020), https://plastichotspotting.lifecycleinitiative.org/.

Corporates should conduct evidence-based reviews of their accounting of current plastic use and leakage regularly (e.g. on a yearly basis) in order to report on progress. Internal assessment of such accounting is a starting point, but over time the form of review should progress to second or third-party audits.[3]

Regular and consistent accounting will enable corporates to have complete information to identify potential opportunities for reducing plastic waste, leakage and increasing plastic circularity.

1.2 Plastic footprint and leakage mitigation activities should be prioritized using a hierarchy and aim to achieve transformative change

In considering different mitigation opportunities, corporates should take into account a number of different factors, including but not limited to the following:

- Prioritization of actions based on the mitigation hierarchy presented in Section 3.2, including taking action within a company's own value chain before financing beyond supply chain activities.
- Consideration of potential negative impacts and tradeoffs, including but not limited to those described in Section 3.3.
- Starting with actions as far upstream in a company's value chain as possible.
- Consideration of the company's overall strategy and future needs.

Balancing these factors will lead to a plastic stewardship program with mitigation activities that foster sustainability and help the company to achieve circularity at scale.

1.3 Plastic footprint and leakage mitigation activities within the company's value chain and actions beyond the value chain should be accounted for and disclosed separately

Within a company's value chain, interventions made directly by the company and those that are financed by the company should be distinguished from one another.

Disclosure of these elements, especially if they are used to substantiate claims, should be as public as possible, for example, as part of the New Plastics Economy Global Commitment annual Progress Report or in sustainability, packaging or other corporate reports.

1.4 A plastic stewardship programme's level of ambition should increase over time

Corporate plastic stewardship programs should be regularly updated and these updates disclosed for transparency around progress and achievements. A corporate's plastic stewardship goals should be increasingly challenging over time to ensure the highest level of impact in the most efficient manner. Crucially, financing of actions beyond the value chain should grow to compose less of the company's activities to reduce its plastic footprint and leakage as more of those activities are integrated into the value chain over time.

[3] Note: there is currently no reporting or assessment framework associated with these *Guidelines.*

2. Measuring plastic pollution: from assessment to accounting

2.1 The need for consistent plastic metrics

Current existing reporting plastic schemes (e.g. the Ellen MacArthur Foundation's New Plastics Economy annual progress report[iv] and GRI: 300[v]) rely solely on plastic inventories — quantities of plastic available on the market or quantities of plastic waste. However, the issue of plastic pollution is not a consequence of plastic *use* but of plastic *leakage,* i.e. plastic exiting a system of proper management. In the current life cycle assessment (LCA) framework, plastic is not accounted as a pollutant. LCAs assume 100% collection of waste streams go to landfill, incineration or recycling.

To tackle these limitations, a set of various metrics have been developed in recent years, reviewed by Boucher et al.[vi] The most advanced framework for plastic leakage assessment is the Plastic Leak Project (PLP),[vii] which can be implemented at both the product and corporate level. It provides a set of indicators to assess leakage from different sources throughout a product value chain or a corporate activity toward different environmental compartments.

There is currently no standard framework for standardised accounting and reporting (which implies comparability) of plastic leakage and measure the efficiency of different mitigation strategies.[viii] Only when equipped with credible, comprehensive and legitimate data and analyses can corporate decision-makers understand the current status of the plastic problem, set targets, agree and implement actions, and track progress towards targets over time. The goal of the following section is to provide a framework for corporate plastic accounting metrics, to be applied for internal use (evaluations of current status) or for external use (reporting, credible claims, comparability with a baseline year).

2.2 Plastic accounting metrics

In these *Guidelines*, we include both quantitative and qualitative metrics that cover plastic accounting in a life cycle perspective, that encompass plastic footprint as well as circularity metrics.

The notion of footprint may include three dimensions,[ix] leading to the following different types of metric:

1. The quantity of plastic used in a system;
2. The quantity of plastic emitted into the environment during production, transport, use or end-of-life of a plastic product (often referred to as plastic leakage); and,
3. The impact, directly or indirectly generated by the pollutants emitted (or the leaked plastic) on human health or the environment.

Circularity metrics reflect the use of recycled plastic as feedstock as well as the plastic recycling rate at the end-of-life. This use of plastic supports a circular economy, which is distinguished from the linear economy by two characteristics: slowing (through the design of long-life goods and product-life extension) and closing resource loops (circular flow of resources, i.e. the linear flows of waste are turned into secondary resources).[x] Circularity metrics for plastics can allow companies to identify new, more circular value from their products and materials, and to mitigate risks from material price volatility and material supply.[xi]

Corporate plastic accounting should reflect plastic accounting along the entire corporate value chain (Figure 3(a)), including plastics generated within a company's own operations as well as upstream (e.g. at suppliers) and

downstream (e.g. during its time with consumers and end-of-life), from pellet production to plastic packaging and end-of-life. We define several types of plastic uses according to corporate value chain stage in which they are used:

1. *Upstream plastic* uses never reach a company's operations. They are disposed of or leak in the environment before they reach a company's own production site. Examples of upstream plastic use include plastic used for agriculture (e.g. mulching plastic, silage plastic) or at a suppliers' production site.
2. *Upstream-operational plastic flows* enter a company's operations attached to a product (e.g., tertiary packaging). They leave the corporate value chain as waste and are not attached to a product when the product leaves the company's operations.
3. *Upstream-downstream plastic* enter and leave a company's operations together with the product (e.g. synthetic fibers used to produce a garment).
4. *Operational plastics* are used and disposed of during a company's own operations (e.g. industrial plastics used at a production site). These plastics do not enter or leave operations with a product.
5. *Operational-downstream plastic* is attached to a product within a company's operational boundaries and leaves those together with a product (e.g. primary, secondary and tertiary packaging).
6. *Downstream-only plastic* is never in the hands of the company, but are only handled only by the retailer and the consumer. Plastic grocery bags are one example of downstream-only plastic.

Although a full corporate plastic accounting should reflect plastic accounting along a corporate value chain as well as macroplastics and microplastics, these *Guidelines* focus on macroplastics that are disposed downstream of a company's own operations.

Figure 3(a) represents use of plastic within the corporate value chain. It includes production of virgin or recycled plastic pellets, potential emissions of microplastics during the use stage and a product/packaging's ultimate fate: recycling, incineration, landfilling, and/or leakage into the environment.

Figure 3. Use of plastic in the upstream, operational and downstream stages of a corporate value chain. Figure 3(a) illustrates several types of plastic uses along a corporate value chain, and Figure 3(b) focuses on a single plastic product's life cycle.

Figure 3(a)

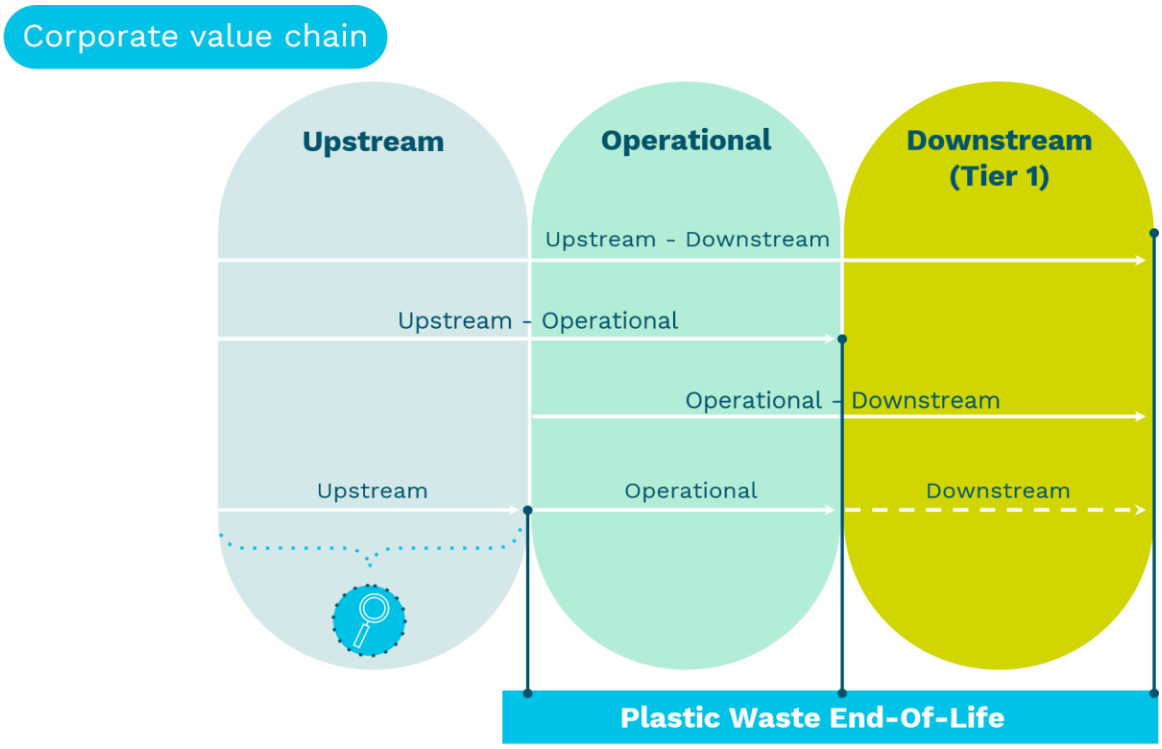
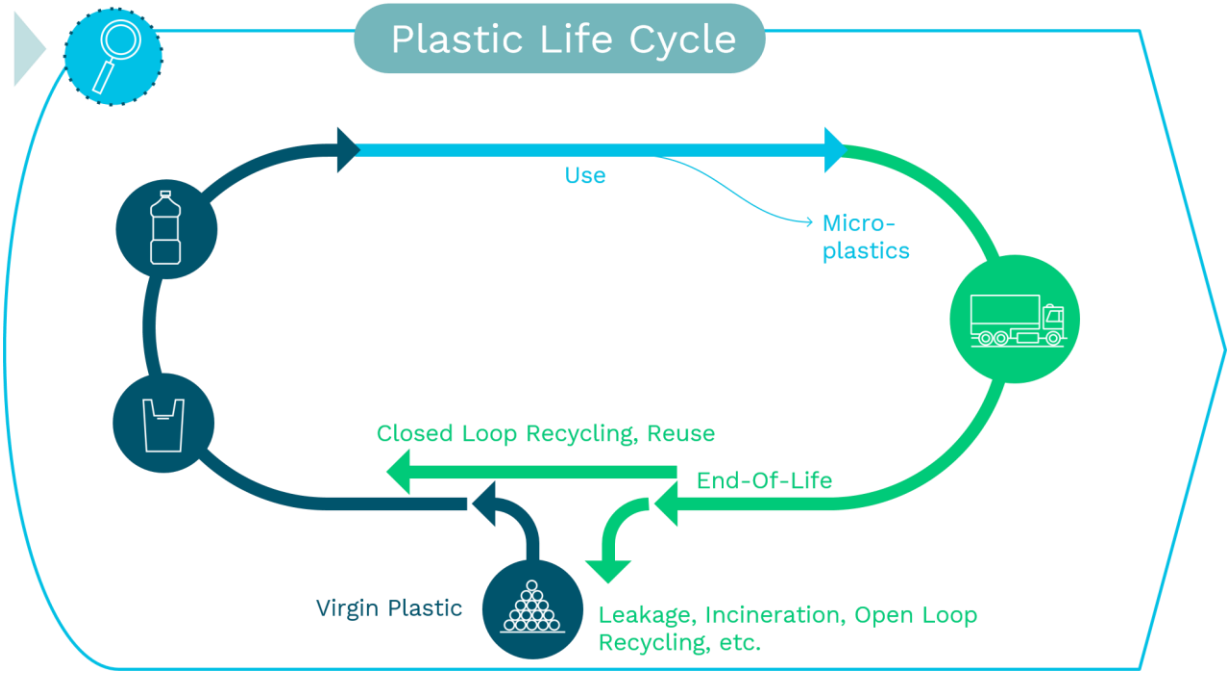


Figure 3(b)



Given the variety of metrics that can be reported, they are classified into several tiered categories to specify which shall be reported systematically (Tier 1) or optionally (Tier 2 and Tier 3). Table 1 shows the classification of different metrics to report on corporate plastic accounting in the tiered approach. Table 2 describes the different metrics that can be included to perform a corporate plastic accounting.

Table 1. A tiered approach to metrics

Tier	Description	Metric
Tier 1	Shall be used for reporting related to the claims. These metrics focus on plastic waste generated **downstream** of a companies' own operations. Downstream plastics that are never in the hands of the company such as plastics handled by the retailer and the consumer are considered as optional	* Plastic waste generated
		* Recycled and non-recycled content of plastic waste
		* Collected waste and waste treatment
		* Mismanaged waste
		* Downstream macroplastic leakage
Tier 2	Should be optionally reported for plastic accounting	* Total plastic use including upstream, operational and downstream activities (e.g. plastics used at the farm, industrial textiles used at the production site, etc.)
		* Other associated impacts (carbon footprint)
		* Material circularity Index
		* Plastic use intensity
		* Qualitative claims (plastic pledges, reduction actions, management systems)
		* Microplastic leakage
		* Macro- and microplastic leakage in oceans
		* Macro- and microplastic leakage in other environmental compartments
Tier 3	Should be optionally reported but are not covered by the current state of the art at the time of the guideline publication	* Residual leakage after 1 year (fate)
		* Impact of plastic leakage

Table 2. Metrics to report on corporate plastic accounting

Metric type	Metric name	Unit	Possible source	Preferred source	Tier 1: Metrics to support claims	Tier 2: Optional metrics	Tier 3: no method yet	Comment
Macroplastic **use**	Total **plastic use** including upstream, operational and downstream activities	kg / y	Company data			✓		
Downstream macroplastic **waste**	**Total plastic waste** generated by downstream activities	kg / y	Company data		✓			
	Recycled and non recycled content of plastic waste generated by downstream activities	%	Company data, estimation according to According to ISO 14'021		✓			
Downstream macroplastic **end-of-life**	Collected waste: share of incineration, landfill, recycling	kg / y , %	Company data, PLP		✓			
	Mismanaged waste	kg / y	Company data, PLP		✓			
Downstream macroplastic **leakage**	**Macroplastic leakage**	kg / y	PLP, Resource tool	Specific data	✓			
Macro- and microplastic **leakage** including **upstream, operational and downstream activities**	**Microplastic leakage**					✓		
	Macro and micropastic leakage **in oceans**	kg / y	PLP/JRC	PLP		✓		
	Macro and microplastic leakage **in other compartments**	kg / y	PLP	PLP		✓		
	Plastic leakage **after 1 year (fate)**	kg eq/ y	PLP	PLP			✓	Not mature enough, prone to change in coming years
Macro- and microplastic **leakage impact**	Plastic leakage impact on human health and ecosystem quality	DALYs, PAFs, etc.		none			✓	No method quantitative available yet
Other environmental impacts associated with plastic use	LCA metrics such as CO_2eq	kg CO2 eq, etc.		any		✓		LCA methods
Plastic circularity	Material Circularity Index (EMF)		EMF			✓		
	Circular transition indicator		WBCSD			✓		
	Plastic use intensity	%	Product and sector specific			✓		
Plastic pledges / reduction actions	EMF Global Commitment, GRI waste	kg ton plastic reduction	EMF			✓		
Management system	Certifications: OCS certification, EMF Global Commitment		Resource			✓		
Credits	Waste Collection Credit-WCC	kg/y	Guidelines for Leadership in Corporate Plastic Accounting			✓		Defined in section 2 of these guidelines
	Waste Recycling Credit-WRC					✓		
Claims	Net Zero Plastic Leakage		Guidelines for Leadership in Corporate Plastic Accounting			✓		Defined in section 3 of these guidelines
	Net Circular Plastic					✓		

LCA inventory — *Can be referred to as a footprint*

LCIA

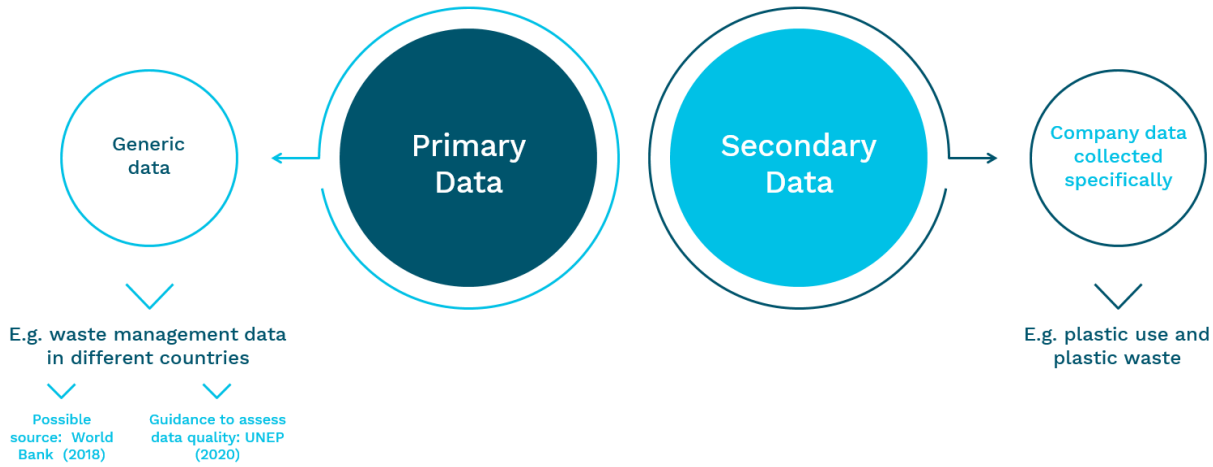
Circularity metrics

Qualitative metrics

2.3 Reliable data sources

Both primary and secondary data can be used to estimate plastic footprint and circularity metrics. Figure 4 summarizes which data can be used for different metrics.

Figure 4. Primary and secondary data sources to estimate metrics[xii,xiii]



Robust plastic leakage accounting requires reliable background calculation data, especially for waste management (collection rates, recycling rates) of different polymers in various countries. A forthcoming publication from the United Nations Environment Programme (UNEP) and International Union for Conservation of Nature (IUCN)[xiv] provides detailed waste management data for Vietnam, Thailand, South Africa, Kenya, Mozambique, Tanzania, Cyprus, Mauricius. As waste management data is often missing, the UNEP/IUCN guidance can be used to generate new country data if needed. If no detailed waste management data can be found, data from the World Bank report "What a Waste 2.0"[xv] should be used as a proxy. Important limitations of loss rates in the "What a Waste" report arise from the fact that household waste data is extrapolated to plastics. Furthermore, imports and exports of waste between countries are not considered: the data used by default considers that all waste is managed in the country of use and end-of-life, when in reality there is substantial intercountry trade of plastic waste. A usable data set and key metrics for leakage calculation are available from the PLP project repository. Other databases are currently being developed and should be available by the time these *Guidelines* are published.

3. Plastic footprint and leakage mitigation activities

3.1 Context

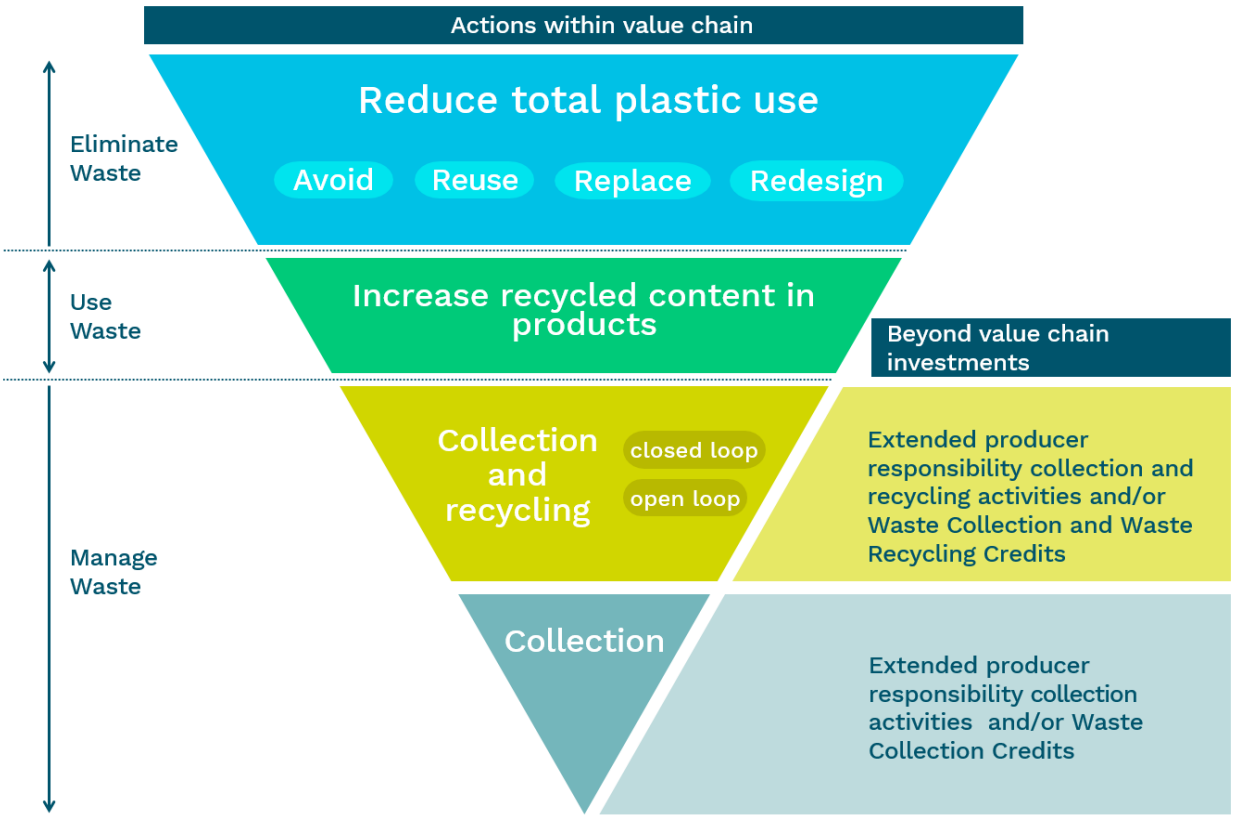
After having calculated a plastic footprint, the next step on the plastic stewardship journey is to identify and implement mitigation activities. Only when realising meaningful mitigation activities, a corporate will be able to make claims on their plastic engagement as described in Section 4. This section introduces important general considerations for mitigation activities and a mitigation hierarchy with a subsequent list of mitigation activities that fit into the hierarchy. To its end, mitigation activity metrics are introduced.

3.2 The mitigation hierarchy

Different mitigation activities can be categorized according to their position in the value chain and according to their technical potential to eliminate, use or manage waste. Figure 5 below illustrates how companies should prioritize implementing strategies to eliminate waste, then, where plastic use cannot be eliminated, use recycled material to replace virgin, and, as a final priority, to ensure that plastic waste that cannot be eliminated is properly managed.

Corporates should prioritize increasing circularity in their own supply chain before relying on external mitigation activities. However, as shown on the right side of Figure 5, beyond-value chain measures such as participation in extended producer responsibility schemes or investments in plastic waste collection and recycling activities via plastic crediting can be used to mitigate waste. Investments in beyond-value chain measures should be seen as a complement to a company's current best effort, not a replacement for it.

Figure 5. Plastic footprint and leakage mitigation activities hierarchy



There are most often social, environmental and/or economic tradeoffs between the efforts described in the plastic footprint and leakage mitigation hierarchy. Corporates should identify and mitigate potential negative impacts, putting into place appropriate safeguards. To identify the most beneficial actions, companies should apply science-based methodologies to a product/packaging's entire life cycle and its environmental and social impacts.

3.3 Potential plastic footprint and/or leakage mitigation activities

In this section, we summarize ways to avoid leakage and increase circularity in the operational and downstream parts of a corporate value chain.

3.3.1 Corporate effort in value chain

This section presents a variety of opportunities to reduce plastic consumption and waste that may fall under a business' direct control, or over which it may have influence.

Reduce total plastic use: avoid, lightweight, reuse, replace

Reduction of plastic use should always be considered first. This can be achieved by through the following activities:

- Changing product design to **avoid** using plastic (e.g. switching from liquid to solid soap; avoiding microplastic ingredients in cosmetic products). This will often require changes to the product itself, but can allow for drastic reductions of plastic use.
- **Redesign** of a product/packaging to decrease plastic use (e.g. "lightweighting" a new bottle design). This will typically be an incremental process, allowing for continuous improvement but not for a drastic reduction of plastic use. 30% of all plastic packaging (by mass) needs to be fundamentally redesigned. Only through redesign does this proportion of packaging have the potential to ever be reused or recycled.[xvi]
- Switching to a **reuse** system (e.g. using a third-party or vending machine system to enable refills). Reuse may include a change of materials (plastic type or plastic to non-plastic) or a change in design. New business models might be needed to leverage the full potential of reusable packaging. There are four different types of business models that are applicable for reusable packaging: refill at home, refill on the go, return from home, return on the go.[xvii] For at least 20% of plastic packaging (by mass), reuse provides an economically attractive opportunity.[xviii]
- Where environmentally sensible, **replacing** plastic with other materials (e.g. switching from plastic to paper).

When comparing tradeoffs between the above activities (shown in Table 4 below), it is important to define boundaries appropriately and focus on the functionality of a product for the final consumer. For example, when deciding the optimal packaging for hand soap, the functional unit should be defined as "cleaning hands X number of times" and not "packaging for Y kg or ml of soap".

Table 4. Examples of tradeoffs related to reducing total plastic use

Environmental impacts	• Increased GHG emissions due to replacement of plastic with other materials or more robust reusable plastic packaging, which can be more energy intensive to produce and/or lead to higher transport emissions. • Increased GHG emissions due to direct or indirect land-use-change impacts of biobased packaging. • Increased GHG emissions or water usage due to sanitization requirements for reusable packaging. • Increased GHG emissions due to lower product performance, i.e. increased food waste due to worse performance of packaging. • Increased GHG emissions and accumulation in the environment of a material substituted for plastic if the other material is not functionally recyclable. • Increased toxicity of alternative packaging material for the environment, either in production or mismanaged disposal.
Social, health and safety issues	• Increased toxicity of alternative packaging material for consumers. • Replacement of plastic leads to decreased product safety. • Competition to food production, for example from biobased plastics. • Hygiene issues caused by improperly cleaned reusable products or packaging.

Question 1: Does peer-reviewed information exist on how biobased plastics/biodegradable plastics can contribute to reducing a plastic footprint?

Increase recycled content

Including recycled materials in the product has two environmental benefits. First, it decreases the use of virgin material, thereby reducing the depletion of non-renewable resources and the release of GHG into the atmosphere. Second, corporates will contribute to an emerging market for recycled materials, thereby decreasing the amount of plastic leakage. However, there are often legal boundaries that hinder plastic products from being made of 100% recycled materials. They are included in Table 5, which lists potential tradeoffs.

Table 5. Examples of tradeoffs related to increasing product recycled content

Environmental impacts	• Increased GHG emissions due to higher packaging weight of packaging with recycled content which leads to higher transport emissions
Social, health and safety issues	• Increased toxicity of recycled plastics for consumers • Decreased product safety when using recycled plastics

Recover and recycle plastic waste

Ensuring collection and recycling of plastic waste consists of two main pillars. The product needs to be designed in a way that it is recyclable and it needs to be collected and recycled after it is used.

Increasing the recyclability includes different activities, such as:

- Avoiding uncommon materials, use the main plastic types that are easy to recycle at scale;
- Avoiding small-scale plastic items such as tear-offs; and,
- Avoiding hard-to-recycle multi-material composites.

Question 2: Avoiding hard-to-recycle multi-material composites has various tradeoffs (as explained in Table 6 below). Is this clear enough, or should we eliminate this point from the list of examples?

Increasing collection and recycling at end-of-life can be achieved by, for example:

- Take-back systems or other collection initiatives; and,
- Investment in recycling infrastructure to process the plastic waste into a form where it can feed back into the value chain.

Recycling is an economically and environmentally attractive option for the 50% of packaging that does not need to be fundamentally redesigned and is not suitable for reuse.[xix] As shown in the plastic footprint and leakage mitigation hierarchy (Figure 5), closed loop recycling is preferred over open loop recycling, meaning that the plastic waste should ideally be used again for a very similar product and not in a product in which plastics of lower quality could be used.

Table 6. Examples of tradeoffs related to collection and recycling of plastic waste within the value chain

Environmental impacts	• Increased GHG emissions for recyclable packaging, i.e. because packaging gets heavier than e.g. composite material. • Increased GHG emissions for recycling within own value chain (e.g. return systems) compared to recycling outside of own value chain • Increased usage of plastic due to avoidance of composites • Contamination of recycling value chain with biodegradable plastics • Confusion of consumers about whether packaging should be recycled or composted, could lead to wrong separation of waste
Social, health and safety issues	• Increased toxicity of alternative packaging material / of recycled plastics for consumers • Decreased product safety when replacing the material or using recycled plastics • Competition to food production, i.e. biobased plastics

Recover plastic waste (where recycling is not possible)

Activities for collection of plastic waste are very similar to activities for collection and recycling. In addition to the previous section, companies should avoid plastics that have a high risk not to be recovered at all, e.g. small-scale plastic items or plastic items that are blown away easily. This category also includes scaling up compostable plastic packaging, which is especially important in cases where packaging may be contaminated.

Question 3: Should scaling up compostable packaging be included as an example of plastic waste recovery activities?

3.3.2 Beyond value chain investments

Types of beyond value chain investments include plastic credits and extended producer responsibility schemes/producer responsibility organizations.

Plastic credits

To be credibly used to compensate for a company's plastic waste, plastic credits must represent plastic waste that has been recovered or recycled in excess of what would have happened in the absence of the plastic credit-generating activity (i.e. business as usual). Plastic credits must be transparently registered and managed to prevent double-counting.

The Plastic Waste Reduction Standard, developed and managed by Verra[4] in collaboration with the 3R Initiative and a multi-stakeholder committee of leading experts and practitioners, is a global standard for third-party certification of plastic waste collection and recycling projects that aim to generate Plastic Credits. There are two types of Plastic Credits that can be verified under the Plastic Standard. Waste Collection Credits (WCCs) each represent one tonne of additional plastic collected from the environment; Waste Recycling Credits (WRCs) each represent one tonne of additional plastic recycled. Material collected from the environment that goes on to be recycled could potentially generate both types of credits. Each Plastic Credit issued under the Plastic Waste Reduction Program will have a unique serial number in the Verra registry identifying key attributes such as the material type and location where the project activities that generated the credit took place.

While the claims set out in this document refer to WCCs and WRCs specifically, any credible credit representing additional waste properly removed from the environment or recycled (respectively) could be used.

Extended producer responsibility schemes

Extended producer responsibility (EPR) schemes, which are implemented through legislation or producer responsibility organizations, enable producers to contribute to the end-of-life costs of products they put on the market. Upstream impacts, impacts from production processes and downstream impacts from the use and disposal of the products may be involved. If industry is required to cover global plastic waste collection and management, it could face an annual USD 100 billion financial risk by 2040.[xx]

4. Plastic waste reduction leadership commitments and claims

The Ellen MacArthur Foundation's New Plastics Economy Global Commitment includes three actions: to "eliminate all problematic and unnecessary plastic items", to "innovate to ensure that the plastics we do need are reusable, recyclable, or compostable" and to "circulate all the plastic items we use to keep them in the economy and out of the environment". The Global Commitment challenges companies to engage in methods of plastic footprint and leakage mitigation that support the commitments set out in these *Guidelines.* ***'Net Zero Plastic Leakage'*** **and** ***'Net Circular Plastic'*** **are claims for companies that want to share their achievements in**

[4] Verra is a non-profit organization that manages the world's leading GHG accounting and crediting program, the Verified Carbon Standard (VCS).

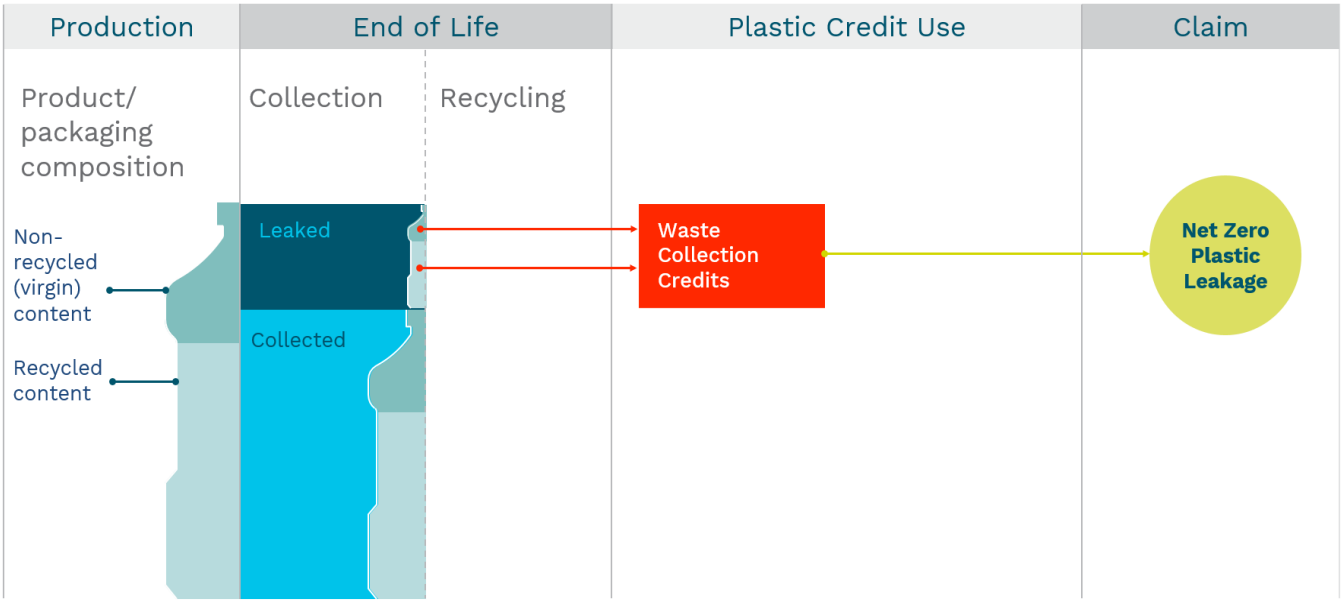
keeping post-use plastic out of nature and in the value chain. Net Circular Plastic is the more ambitious of the two claims; having achieved Net Circular Plastic means that you have achieved Net Zero Plastic Leakage.

4.1 Credible claims

4.1.1 'Net Zero Plastic Leakage'

As illustrated in Figure 6, a company can achieve Net Zero Plastic Leakage by ensuring that the amount of plastic it puts out into the market is collected and recovered. This can be accomplished through a combination of activities both within and beyond that company's value chain. The total tonnage of plastic leaked, regardless of whether or not it is composed of recycled content, must be compensated by retiring an equivalent number of Waste Collection Credits.

Figure 6. Net Zero Plastic Leakage

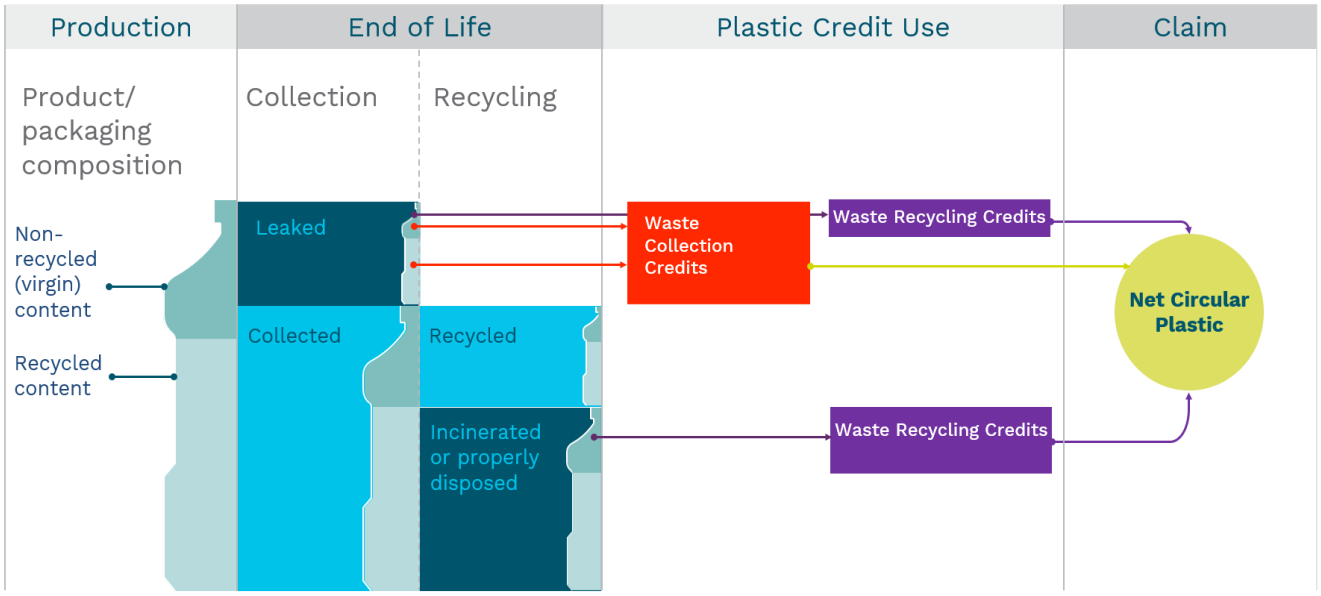


Question 4: For this consultation version of the *Guidelines,* we've used the term 'Net Zero Plastic Leakage' for this claim. Do you think this is a better term than 'Net Zero Plastic to Nature', or do you have a different suggestion?

4.1.2 'Net Circular Plastic'

A company can achieve Net Circular Plastic by ensuring that the amount of plastic it puts out into the market is collected and recycled through a combination of activities both within and beyond that company's value chain. As illustrated in Figure 7, the total tonnage of plastic leaked must be compensated by retiring an equivalent amount of Waste Collection Credits *and* (for leakage from non-recycled content) Waste Recycling Credits; the total tonnage of non-recycled content collected but not recycled (i.e. is converted to energy or ending up in a landfill) must be mitigated by an equivalent number of Waste Recycling Credits.

Figure 7. Net Circular Plastic



In a circular system, recycled material has already been removed from the environment and recycled (potentially more than once). Including recycled content would mean that companies pay twice for recycling — once through the purchase of recycled content, and once by purchasing Waste Recycling Credits. Excluding product/packaging recycled content from needing to be mitigated by Waste Recycling Credits incentivises the use of recycled material.

Question 5: Noting that all product/packaging content would need to be mitigated with Waste Collection Credits, why do you agree or disagree that recycled content of a product/packaging should be excluded from the amount of waste that a company needs to mitigate?

Question 6: Do you think this should be the case only for Net Circular Plastic, or should the proportion of leakage from recycled content also be excluded from the need to be mitigated for Net Zero Plastic Leakage?

Question 7: Does recycled content have to be post-consumer recycled?

4.2 Plastic waste reduction commitment concepts

4.2.1 Within and beyond value chain actions

Most companies will need to look beyond their own value chains in order to take full responsibility for their plastic footprint and leakage. This means that the use of plastic credits and extended producer responsibility schemes will play a key role in the foreseeable future in helping companies meet their leadership commitments to reduce plastic waste. Both claims include the word “net” as an indication that not all activities are under the direct control or influence of the company itself. To ensure full transparency and promote the pursuit of direct actions where possible, companies should report what they have achieved within their own value chain versus through beyond-value chain investments.

4.2.2 Claim levels

To enable recognition of high achievers and to allow opportunities for growth, it is proposed that the claims in this document have two levels. The higher level claim would be distinguished by the requirement that credits used to mitigate leakage *correspond with the material type of the product/packaging* and *be generated in the same region where the product/packaging was leaked*.

Question 8: Should there be two levels of claims, why, why not? If yes, what rating system should be used to communicate that one level of achievement of a claim is higher than another? Options include but are not limited to: “gold, platinum”, “+” and “high”.

Material type match

It is proposed that the material type (the plastic or plastic composite classification) must match between the plastic leaked and the plastic credits used to mitigate that leak and, potentially, recycling. This requirement creates incentives for all types of plastic materials to be recovered and/or recycled, and encourages companies to switch to materials more suitable to a circular economy.

Question 9: What are the potential repercussions (positive and negative) of this requirement for hard-to-recover and/or -recycle plastic materials?

Regional match

It is proposed that the region where the plastic was leaked must match the region where the plastic credit used to mitigate that leak was generated.

Question 10: Should ‘region’ be defined in these *Guidelines* at the country or market level, or should the definition be left to a company’s judgement based on the most appropriate geographic unit of assessment?

Additional criteria for different claim levels

Question 11: Should there be a minimum percentage of recycled content in the product/packaging required to qualify for the higher achievement and/or basic level(s) of either claim? If so, only for the high level claim, or also for the basic level? If so, what should that minimum percentage be?

Question 12: Are there other elements that should be added to the higher achievement level?

4.2.3 Plastic Credit leakage potential equivalency

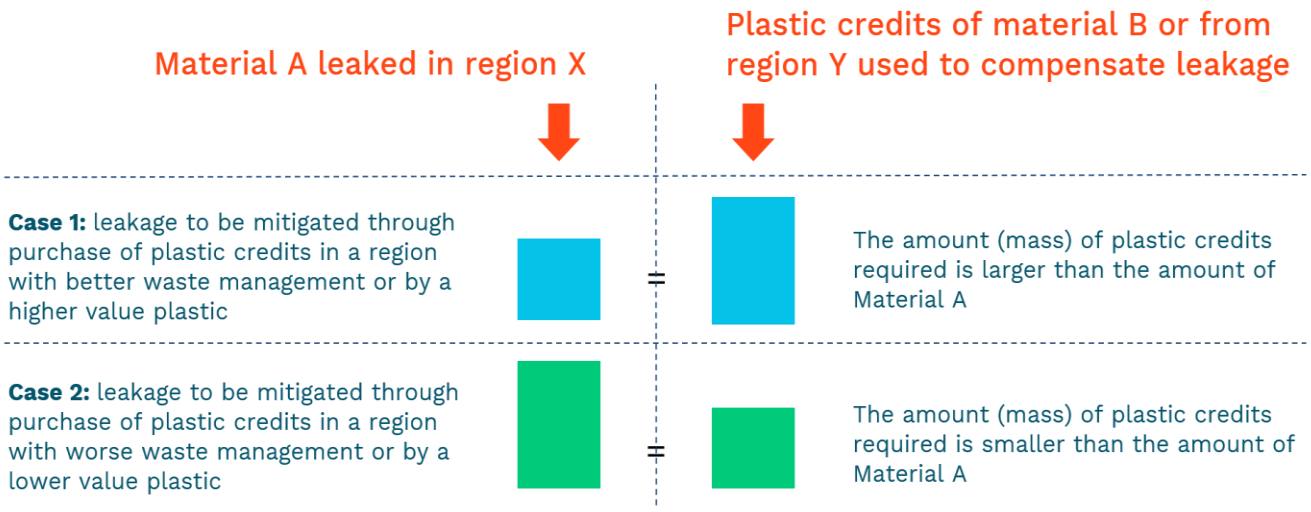
If compensation occurs for a different material type and/or in a different region, end users are encouraged to use the plastic credit leakage potential equivalency scheme described below and illustrated in Figure 8 to achieve the basic commitment level and/or to make other claims.

The leakage potential equivalency scheme is based on the concepts that (1) collecting a greater mass low value plastic is more valuable than collecting less mass of high value plastic and (2) collection of plastic in countries with poorly-developed waste management infrastructure is more valuable than collecting the same plastic in countries with highly-developed waste management infrastructure. The plastic credit leakage potential equivalency scheme aims to match the leakage of a given material type in a given country with an amount of plastic credits earned for another material type in another country.

The leakage potential equivalency scheme takes into account the following three parameters:

- Mass of plastic;
- Mismanaged waste index for the material type (at polymer level) in the country; and,
- Release rate for the material type (at polymer level) in the country (which depends on the polymer residual value).

Figure 8. Plastic credit leakage potential equivalency scheme



Question 13: Do you think these *Guidelines* should include a detailed quantitative methodology for the leakage potential equivalency scheme, or should this be included in a separate document?

4.4 How to use these claims

If commitments and claims about plastic stewardship are not explicit, clear and ideally verifiable, they represent reputational risk to the company making the claim and for the broader plastic crediting mechanism.

4.4.1 What to say

Any claim that involves using plastic credits should be backed by transparent reporting, ideally verified by a third party, about the company's plastic footprint and the amount and type of plastic credits that have been used. Examples include:

- "Shampoo Brand X aims to achieve Net Zero Plastic Leakage by 2025 by investing in Y reuse program in Y1 country, increasing the recycled content in our packaging, participating in Z producer responsibility organization, and, in the markets where we are still working to improve collection of our products currently not being recovered, investing in Waste Collection Credits (WCCs) generated by collection of HDPE bottles that would not have happened without our investment. The WCCs have been verified by a third party to the Plastic Waste Reduction Standard, ensuring that they represent real, additional, verified reductions."
- "Company X has redesigned our carpets to use 100% PET to facilitate their recyclability, and has increased the proportion or rPET we use by implementing a take-back program and building a new,

dedicated carpet recycling facility that provides employment to communities in X region. We purchased Plastic Credits generated in markets where our take-back program is not yet active to support collection and recycling of PET. Through these two strategies, we have achieved the highest level of Net Plastic Circularity."

4.4.2 Claims to watch out for

- *Plastic neutral:* this claim because it does not clearly convey the company's true impact — plastic has an impact on the environment, even if it is eventually collected and recycled.
- *Offset/offsetting:* this claim is associated with the concept of 'neutrality'.
- *One in, one out:* this claim does not clearly convey whether the action would or would not have occurred without a company's intervention.

5. Case study

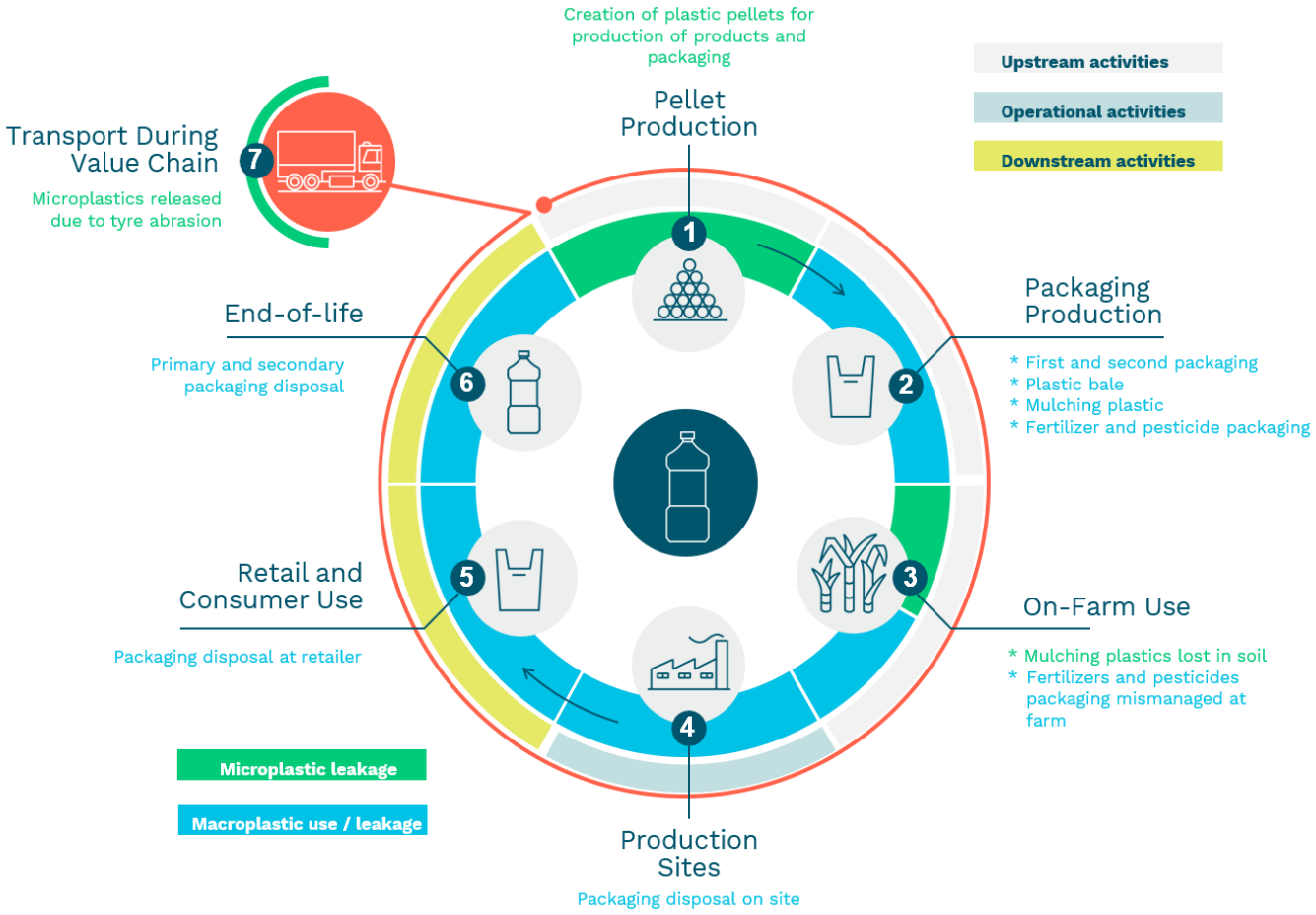
5.1 Context

A fictional company, Ice Tea Co., sells 1 billion litres of bottled iced tea per year, typically in six packs of one litre PET bottles. 70% of Ice Tea Co.'s sales are in the US and 30% are in China. The company has already performed as much light weighting as possible. Currently, a litre of Ice Tea Co. iced tea has the following packaging:

- Primary packaging: PET bottle weighs 20 g, the PP lid 3 grams;
- Secondary packaging: 20 grams per six pack; and,
- Tertiary packaging accounts for 100 grams per 1000 litres.

As shown in Figure 9, plastic is used and leaks into the environment at different stages of the corporate value chain.

Figure 9. Plastic use and leakage in the Ice Tea Co. value chain



Plastics are used at different stages of the Ice Tea co. value chain. Plastic pellets produced from virgin or recycled plastic are transported to different packaging production sites where they are used to manufacture primary, secondary, tertiary packaging, as well as the mulching plastic, fertilizers and pesticides packaging. Agricultural plastics (e.g. fertilizer and pesticide packaging and weed prevention layers) are used and disposed of on the farms where sugar and tea are produced. The plastic packaging in which ingredients arrive to the iced tea production facility is disposed of on site, and the plastic packaging in which the iced tea arrives at the retailer is disposed of at the retail location. The primary and secondary iced tea packaging are disposed of by the consumer.

Macroplastics can leak in the environment at the farm if the fertilizer and pesticide packaging are mismanaged, at the iced tea production site if ingredient packaging are mismanaged, and at the retailer and during/after consumption if the packaging is not collected and treated appropriately.

Microplastics can leak in the environment during pellet production (e.g. accidental spill during transport), at the farm (e.g. from mulching plastics lost in soils) and from tyre abrasion during transport.

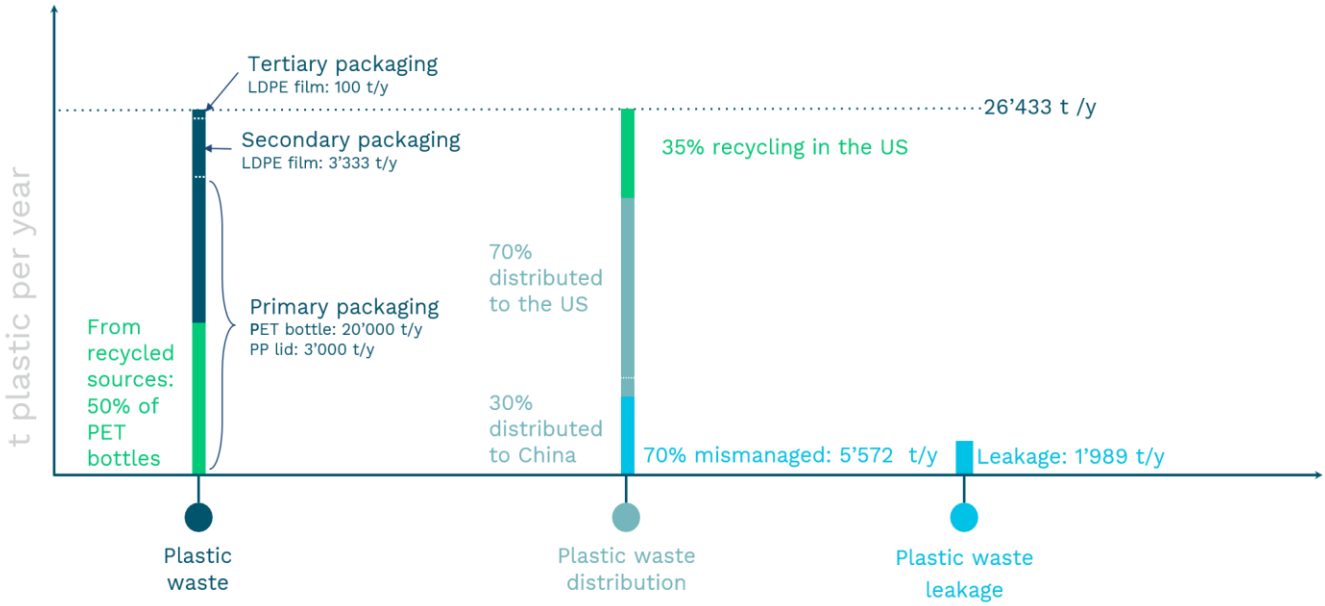
5.2 Plastic accounting metrics at baseline year X

In baseline year X, Ice Tea Co. assesses its corporate plastic accounting and communicates on the Tier 1 metrics set out Table 6 and Figure 10, focusing solely on downstream packaging use and leakage. Therefore, plastics used and leaked during the upstream and operational stages as well as microplastics are not accounted for in this case study.

Table 6. Ice Tea Co. Tier 1 accounting metrics for year X

Metric type	Metric name	Value
Downstream macroplastic waste	Total plastic waste generated by downstream activities	**Primary packaging** PET bottle: 20'000 t /y PP lid: 3'000 t/y
		Secondary packaging LDPE film: 3'333 t /y
		Tertiary packaging: LDPE film: 100 t /y
		Total: 26'433 t / y
Downstream macroplastic end-of-life	Recycled and non recycled content of plastic waste generated by downstream activities	**Primary packaging** PET bottle: 50% PP lid: 0%
		Secondary packaging LDPE film: 0%
		Tertiary packaging: LDPE film: 0%
	Collected waste: share of landfillm incineration, recycling	**US:** Incineration: 13% Landfill: 53% Recycling: 35%
		China Incineration: 28% Other: 2% Mismanaged: 70%
	Mismanaged waste	US: 0 t /y
		China : 5'572 t / y
Downstream macroplastic end-of-life leakage	Macroplastic leakage	PET bottle: 15% release rate due to PET high residual value (PET is likely to be collected through the informal system)
		Other plastics: 100% release rate
		Leakage: 1'989 t/y
Credits	Waste Collection Credit-WCC	No use of credits
	Waste Recycling Credit-WRC	
Claims	Net Zero Plastic Leakage	No claim
	Net Circular Plastic	

Figure 10. Ice Tea Co. Tier 1 accounting metrics for year X



Ice Tea Co. wants to achieve a commitment to be Net Circular Plastic in year Y. To do this, Ice Tea Co. will first plan how to achieve Net Zero Plastic Leakage by reducing the plastic leaked from its value chain and compensate the remaining leakage with Waste Collection Credits (WCCs). Leakage occurs in China and the US for each packaging type (PET bottle, PP lid, LDPE film). Therefore, to achieve the highest level of this claim, Ice Tea Co. should use WCCs that represent PET, PP, and LDPE proportional to each plastic type's representation in the leaked waste that are generated from collection activities in China.

Ice Tea Co.'s next step is to ensure that all downstream packaging that comes from recycled content and/or is recycled at the end-of-life. This can be achieved by mitigation activities in Ice Tea Co.'s value chain and compensated through Waste Recycling Credits (WRCs). Overall, the sum of plastics with recycled content and recycled at the end-of-life should exceed the amount of plastic in Ice Tea Co.'s primary, secondary and tertiary packaging. This additional commitment will lead Ice Tea Co. to become Net Circular Plastic. As for Net Zero Plastic Leakage, any WRCs used should match the material type and be generated in China and the US to achieve the highest level of this claim.

5.3 Mitigation

After having measured its plastic footprint in the first year, the company starts to implement the activities below. The calculated footprint is from five years after the first year of measurement.

5.3.1 Reduce total plastic waste

Avoid

As a highest priority, Ice Tea Co. pushes innovation in their business model that enables drastically reductions in plastic waste and has co-benefits such as reducing GHG emissions. They start offering an iced tea concentrate which consumers can mix on their own with tap water. Within five years, 25% of the original turnover is sold as

concentrate. The new liquid has a concentration factor of 10, hence primary and tertiary packaging can be reduced by 90% and secondary packaging is completely avoided — one bottle of concentrate will produce 10 litres of iced tea, which is more than the original content of the six pack.

Avoidance: 25% of the original turnover is sold as concentrate		
Packaging type	**Change induced by the mitigation**	**Final metric**
Primary packaging	PET bottle: 20 g PET / 10 L iced tea from concentrate (2 kg / t Ice tea). 0.25 million t requires 500 t PET/y.	The total PET weight changes from 20'000 t/y to **15'500 t PET /y**
	PP lid: 3 g PP / 10 L iced tea from concentrate (0.3 kg / t iced tea). 0.25 million t requires 75 t PP /y.	The total PP weight changes from 3'000 t/y to **2'325 t PP /y**
Secondary packaging	LDPE film: for the concentrate, no secondary packaging is required. 0.25 million t requires 0t LDPE /y.	The total LDPE weight changes from 3'333 t/y to **2'500 t LDPE /y**
Tertiary packaging	The tertiary packaging is also reduced by 10. LDPE film: 10 g / 1000 L Ice tea from concentrate (0.01 kg / t iced tea). 0.25 million t requires 2.5 t LDPE /y.	The total LDPE weight changes from 100 t/y to **78 t LDPE /y**

Reuse

In regions with poor tap water quality, the company decides not to offer the concentrate, as customers would then also tend to use the concentrate with bottled water, which would not lead to any reduction in plastic waste. In these regions with poor quality tap water and where LCA analysis shows that there is a net GHG emission reduction when switching to reusable packaging, Ice Tea Co. introduces a reusable plastic bottle. The LCA analysis considers the avoided emissions from packaging production and end-of-life, as well as the increased emissions from the transport to the retailer and back due to higher packaging weight and the increased emissions from the washing process. Glass is also considered as alternative material, but performs much worse from a GHG perspective in the analysis. Within five years, 50% of the original volume is sold in reusable packaging.

Reuse: 50% of non-concentrate iced tea bottles **are sold in reusable packaging.** The reusable PET packaging weighs 40 g bottle / L and is reused on average 10 times.		
Packaging type	**Change induced by the mitigation**	**Final metric**

Primary packaging	PET bottle: 40 g PET / 10 L iced tea (10 usage cycles) for a reusable bottle (4 kg / t Ice tea). 0.375 million t iced tea in reusable bottles requires 1'500 t PET/y.	The total PET weight changes from 15'500 t/y to **9'500 t PET /y**
	PP lid: 6 g PP / 10 L iced tea for a reusable bottle (0.6 kg / t iced tea). 0.375 million t requires 225 t PP /y.	The total PP weight changes from 2'325 t/y to **1'425 t PP /y**
Secondary packaging	LDPE film: 20 g / 6 L iced tea for a reusable bottle.	No changes: **2'500 t LDPE /y**
Tertiary packaging	LDPE film: 10 g / 1000 L iced tea for a reusable bottle.	No changes: **78 t LDPE /y**

Replace

As mentioned in the last paragraph, the company considered replacing the reusable plastic bottle with glass, but decided not to do so due to the GHG emission tradeoff. It also considered replacing the secondary packaging with cartons, but an LCA analysis showed that cartons would perform much worse in terms of GHG emissions. In addition, tests showed that the mechanical strength of the material was not consistent. This caused some of the packaging to fall apart at the retailer level. The result was loose bottles that were difficult to sell, leading to food waste.

5.3.2 Increase recycled content

For all PET packaging, including the concentrate bottles and the reusable bottles, Ice Tea Co. increases the recycled content from 50% to 80%.

Increase recycled content: The recycled content of PET bottles is increased from 50% to **80%**.		
Packaging type	**Change induced by the mitigation**	**Final metric**
Primary packaging	The recycled content of PET bottles is increased from 50% to **80%**	Recycled content of PET bottles: 80%

5.3.3 Recover and recycle

In a first step, the company increases the recyclability of the remaining single-use plastic bottles. It designs a bottle with a non-detachable lid that decreases the leakage of the lids and increases the probability of the lids being recycled.

Second, the company implements a take-back system for not only its intact but also its damaged reusable bottles. In a next step, this take-back system is extended to single-use plastic bottles in the Chinese market, which allows to reduce the mismanaged waste rate to 10% and to increase the recycling rate to 50%.

Recover and recycle: - Non detachable lid - Take back system on the Chinese market		
Packaging type	**Change induced by the mitigation**	**Final metric**
Primary packaging	The take back system on the Chinese markets allows to reduce mismanaged waste rate from 50% to 10%.	Mismanagement waste rate in China: 10% With a non-detachable lid and a lower mismanagement waste rate for PET bottles, the leakage is reduced to **126 t/y** and recycling in China is increased to 50%.

5.3.4 Investment beyond value chain

As Ice Tea Co. is not able to motivate 100% of the consumers to bring the empty bottles back, it decides to invest in Plastic Credits certified to the Plastic Waste Reduction Standard to compensate for the remaining plastic waste that is still leaking / not being recycled yet. To align with its messaging around iced tea being a great beverage to enjoy on the beach, it selects credits from projects that collect and recycle ocean-bound plastic in China. To support Ice Tea Co.'s promotion of recycling in the US, it chooses credits from projects that catalyse US municipal collection and recycling.

Investment beyond value chain to become Net Circular Plastic		
Packaging type	**Change induced by the mitigation**	**Final metric**
All packaging	Achievement of Net Plastic Circular commitment	**- WCC**: The leakage in China of **126 t/y** needs to be compensated by WCCs **- WRC**: Input material with recycled content: 7'600 t/y and output material recycled at end-of-life: 5'334 t /y. There is overall 13'503 t/y packaging used. To

		reach circularity, **3'571 t/y** need to be compensated by WRCs (see Figure 13).

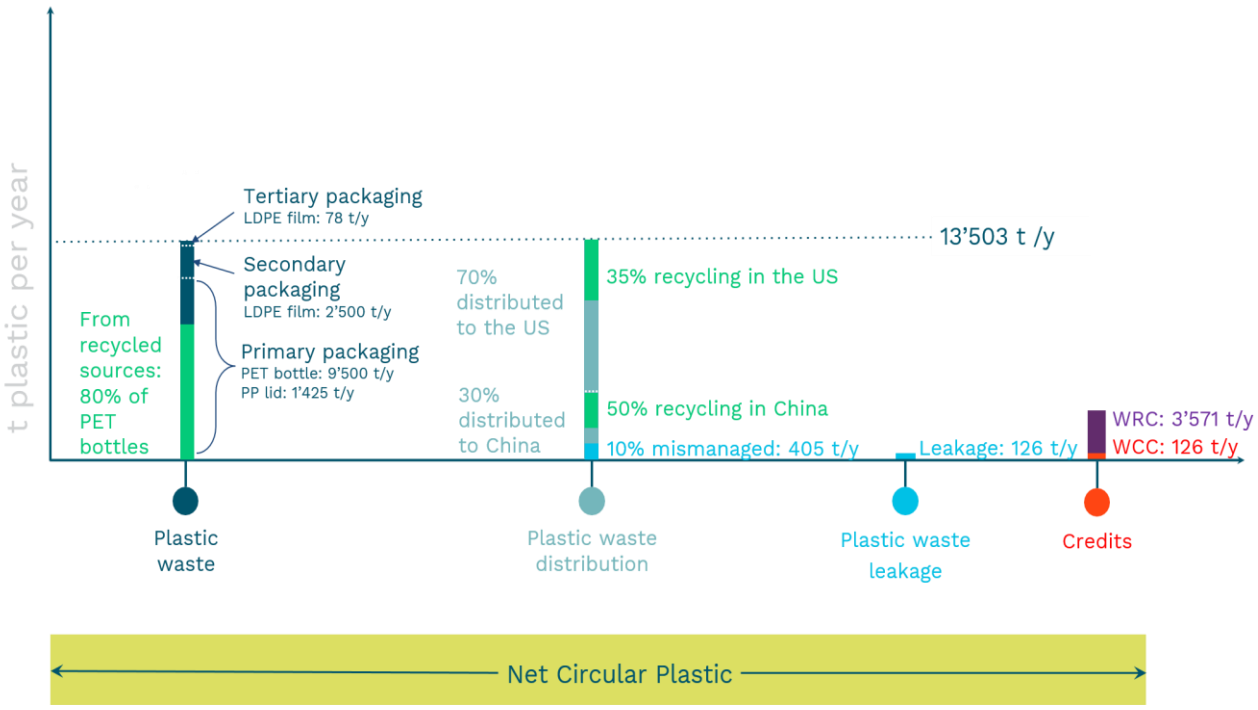
5.4 Plastic accounting metrics and claims at year Y

After having accomplished numerous mitigation activities, Ice Tea Co. can update its Tier 1 metrics per Table 7 and Figure 11.

Table 7. Ice Tea Co. Tier 1 accounting metrics for year Y

Metric type	Metric name	Value
Downstream macroplastic waste	Total plastic waste generated by downstream activities	**Primary packaging** PET bottle: 20'000 t /y => 9'500 t /y PP lid: 3'000 t/y => 1'425 t / y
		Secondary packaging LDPE film: 3'333 t /y => 2'500 t / y
		Tertiary packaging: LDPE film: 100 t /y => 78 t /y
		Total: 26'833 t / y => 13'503 t/y
Downstream macroplastic end-of-life	Recycled and non recycled content of plastic waste generated by downstream activities	**Primary packaging** PET bottle: 50% => 80% PP lid: 0%
		Secondary packaging LDPE film: 0%
		Tertiary packaging: LDPE film: 0%
	Collected waste: share of landfillm incineration, recycling	**US:** Incineration: 13% Landfill: 53% Recycling: 35%
		China Incineration: 28% Other: 2% Mismanaged: 70% => 10% Collected and treated: 10% Recycled: 50%
	Mismanaged waste	**US**: 0 t /y
		China : 5'572 t / y => 405 t / y
Downstream macroplastic end-of-life leakage	Macroplastic leakage	PET bottle and PP lid: 15% release rate due to PET high residual value (PET is likely to be collected through the informal system) and the fact that the PP lead is not detachable
		Other plastics: 100% release rate
		Leakage: 1'989 t/y => 126 t / y
Credits	Waste Collection Credit-WCC	**WCC: 126 t / y** **WRC: 3'571 t /y** (Input material with recycled content: 7'600 t /y and output material recycled at end-of-life: 5'334 t /y)
	Waste Recycling Credit-WRC	
Claims	Net Zero Plastic Leakage	Net CIrcular Plastic
	Net Circular Plastic	

Figure 11. Ice Tea Co Tier 1 accounting metrics for year Y



5.4 Claims: Net Zero Plastic Leakage and Net Circular Plastic

Ice Tea Co. achieved Net Circular Plastic though mitigation activities within its value chain and the use of WCC and WRC.

Figure 12. How Ice Tea Co. achieved its Net Circular Plastic commitment in year Y

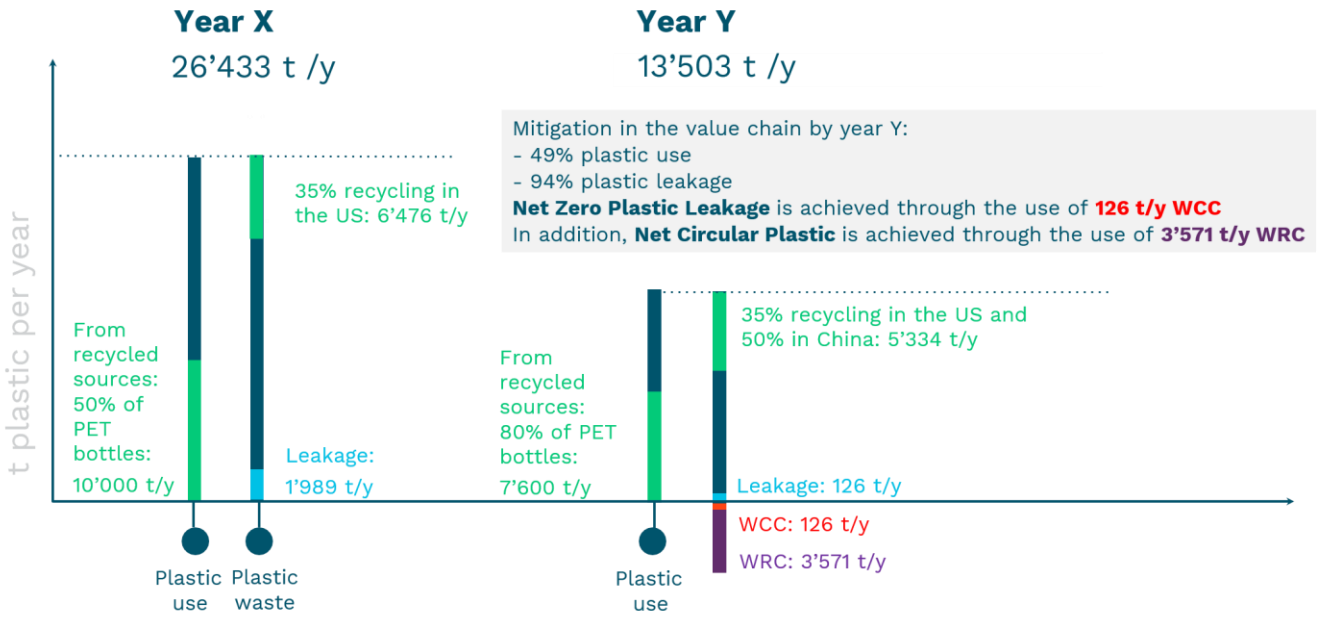
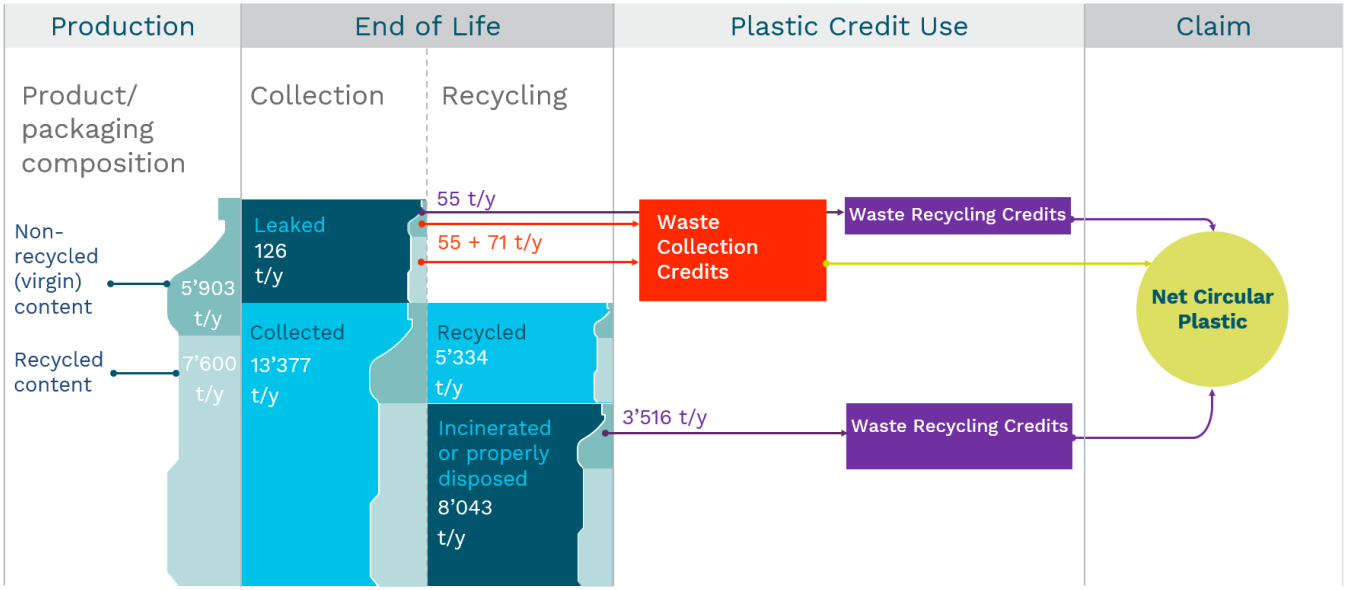


Figure 13. WCC and WRC requirements for Ice Tea Co. to become Net Circular Plastic in year Y



Question 14: Would you find it valuable to be able to download a workbook (e.g. Excel file) that illustrates the calculations that were done for this case study?

In this example, the Ice Tea Co. achieves a Net Circular Plastic Claim. The case of a company reaching the Net Zero Plastic Leakage claim would be identical but without the WRC.

6. Selected Glossary

The consultation version of these *Guidelines* includes definitions for only select terms. For definitions of all other terms, please refer to the glossary of the United Nations Environment Programme and International Union for Conservation of Nature document *National Guidance for Plastic Pollution Hotspotting and Shaping Action: Introduction to the Methodology,* which is accessible at https://wedocs.unep.org/bitstream/handle/20.500.11822/33166/NGP.pdf?sequence=1&isAllowed=y.

Beyond Value Chain

Sources or processes out of an entity's direct control or influence.

End-of-Life (EOL)

End-of-life is a generalized term to describe the part of the life cycle following the use stage.[xxi]

Extended Producer Responsibility

Schemes that enable producers to contribute to the end-of-life costs of products they place on the market.[xxii]

Leakage

A quantity (in grams) of plastic leaving the technosphere and ending up in the natural environment.[xxiii]

Material Type

A plastic or plastic composite classification; can be sub-categorized by packaging or product classification

Mismanaged Waste

Collected waste that has been released or deposited in a place from where it can move into the natural environment (intentionally or otherwise). Uncollected waste is categorized as unmanaged.[xxiv]

Plastic

A material which contains as an essential ingredient a high polymer and which, at some stage in its processing into finished products, can be shaped by flow.[xxv]

Plastic Credit

A transferable unit that represents a specific quantity of plastic that has been collected or recycled from the environment over what would have occurred under a business-as-usual scenario.

Plastic Footprint

The total amount and types of plastic used by a company/organization/event and its impacts. Plastic footprints are calculated using the following three metrics (combined):

1. The quantity of plastic used in a system;
2. The quantity of plastic emitted into the environment during production, transport, use or end-of-life of a plastic product (often referred to as plastic leakage); and,
3. The impact, directly or indirectly generated by the pollutants emitted (or the leaked plastic) on human health or the environment.[xxvi]

These Guidelines use the term 'plastic footprint and leakage' to refer to only the production, use and end-of-life contexts. In the future, upstream elements of the footprint may be added.

Acknowledgement

The European Institute of Innovation and Technology's Climate Knowledge and Innovation Community (EIT Climate-KIC) contributed support for the development of the *Guidelines for Leadership in Corporate Plastic Accounting.*

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[iii] World Economic Forum, "Plastics, the Circular Economy and Global Trade" (2020), http://www3.weforum.org/docs/WEF_Plastics_the_Circular_Economy_and_Global_Trade_2020.pdf.

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[xii] S. Kaza et al., "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050" (International Bank for Reconstruction and Development, The World Bank, 2018), https://openknowledge.worldbank.org/handle/10986/30317.

[xiii] Boucher J.,; M. Zgola, et al., "National guidance for plastic pollution hotspotting and shaping action: Introduction to the Methodology" (United Nations Environment Programme, 2020), https://wedocs.unep.org/bitstream/handle/20.500.11822/33166/NGP.pdf?sequence=1&isAllowed=y.

[xiv] Ibid.

[xv] S. Kaza et al., "What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050" (International Bank for Reconstruction and Development, The World Bank, 2018), https://openknowledge.worldbank.org/handle/10986/30317.

[xvi] World Economic Forum and Ellen MacArthur Foundation, "The New Plastics Economy – Catalysing action" (2017), http://www.ellenmacarthurfoundation.org/publications.

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[xix] Ibid.

[xx] Pew Trusts and SYSTEMIQ, "Breaking the Plastic Wave: A comprehensive assessment of pathways towards stopping ocean plastic pollution" (2020), https://www.pewtrusts.org/-/media/assets/2020/07/breakingtheplasticwave_report.pdf.

[xxi] Adapted from Pew Trusts and SYSTEMIQ, "Breaking the Plastic Wave: A comprehensive assessment of pathways towards stopping ocean plastic pollution" (2020), https://www.pewtrusts.org/-/media/assets/2020/07/breakingtheplasticwave_report.pdf.

[xxii] Ibid.

[xxiii] Peano, L., Kounina, A., Chalumeau, S., Zgola, M., Boucher, J. "Plastic Leak Project Methodological Guidelines" (Quantis and EA, 2020), https://quantis-intl.com/report/the-plastic-leak-project-guidelines/.

[xxiv] Pew Trusts and SYSTEMIQ, "Breaking the Plastic Wave: A comprehensive assessment of pathways towards stopping ocean plastic pollution" (2020), https://www.pewtrusts.org/-/media/assets/2020/07/breakingtheplasticwave_report.pdf.

[xxv] International Organization for Standardization, "ISO 472:2013(en) Plastics — Vocabulary" (2013), https://www.iso.org/obp/ui/#iso:std:iso:472:ed-4:v1:en.

[xxvi] Modified from Boucher, J., Dubois, C. Kounina, A. and Puydarrieux, P., "Review of plastic footprint methodologies: Laying the foundation for the development of a standardised plastic footprint measurement tool" (International Union for Conservation of Nature, 2019), https://portals.iucn.org/library/node/48510.