PACIFIC ENVIRONMENT

The Potential for Plastic Reduction in Milk Tea:

a Case Study from China

Pacific Environment
August 2024

Pacific Environment

Website: https://www.pacificenvironment.cn

https://www.pacificenvironment.org

E-Mail: PEchongqing@pacificenvironment.org

WeChat official account: PEChongqing

Author: Chenyang Li, Chunhua Li, Ping Deng, Yihui Chen

Other Contributors: Interns Danqing Wang and Yuqing You

Translation: Siyu Liu

Design: DancylauDesign

Special Thanks to Juanjuan Chen, Haimei Jin, Xicheng Li, Kristen McDonald, Sunan Shen, Yi Shi, Xinyi Wang, Luyun Wei, Lan Yi, Nana Zhao and Jingning Zhang (in alphabetical order by surname), for their contributions in reviewing and finalizing the report.

DISCLAIMER

- This report is published by Pacific Environment Chongqing. The information provided in the report is for reference only.
- This report does not serve as the basis or evidence for Pacific Environment to assume legal liability for any direct or indirect consequences caused by the information provided in this report.
- The right to declare, modify, update and final interpretation of this report belongs to Pacific Environment Chongqing.

EXECUTIVE SUMMARY

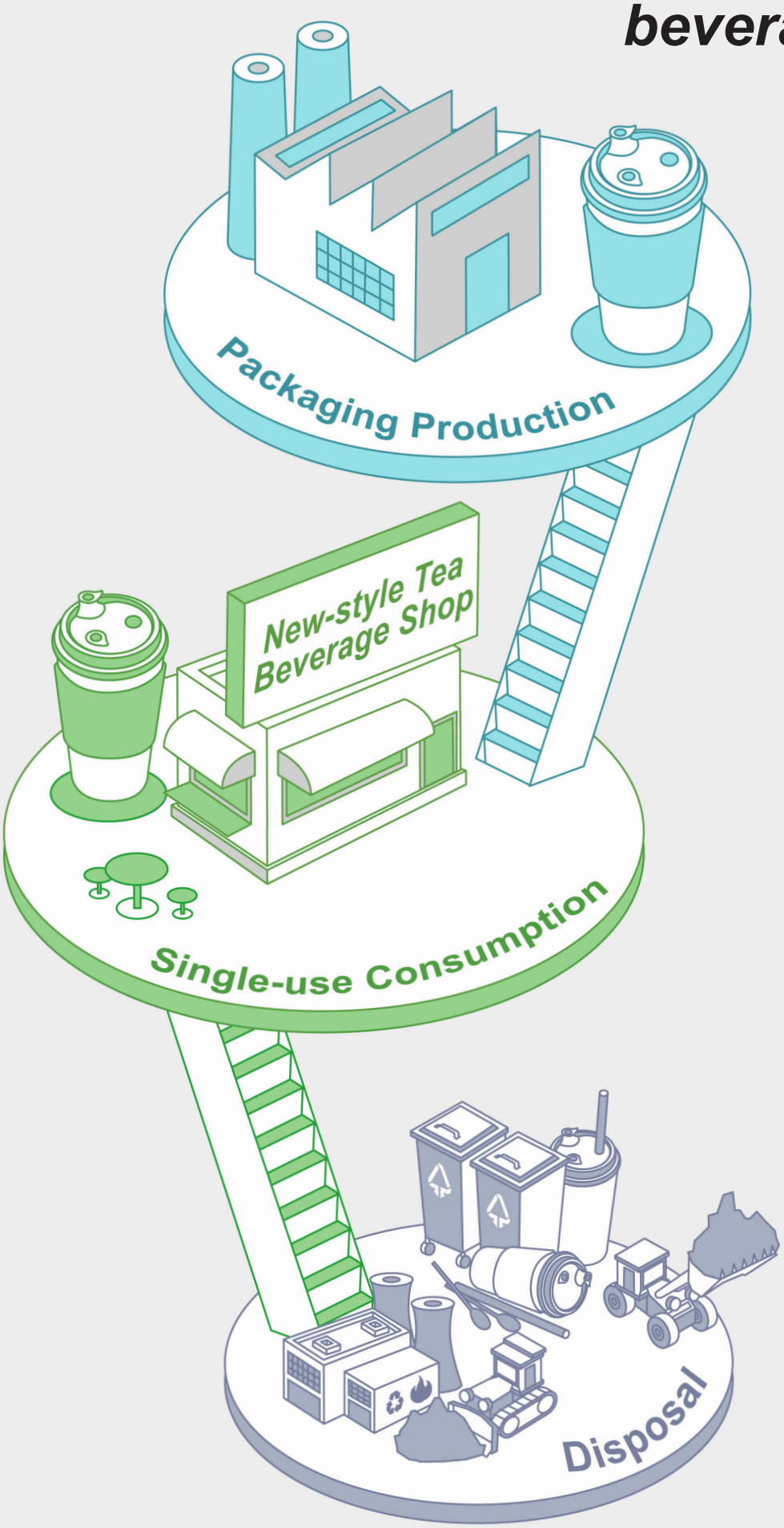
The international community recognizes the urgent need to address plastic pollution due to its severe impacts on the environment, human health and the climate. Plastic feedstock extraction, production, manufacturing, recycling and leakage into the environment contribute significantly to these issues.

In recent years, many countries have implemented plastic reduction plans and bans, but challenges remain in their implementation. China also has enacted a series of policies and regulations to combat plastic pollution, which have helped chart a course forward. To overcome the challenges in implementing plastic reduction, it is critical to analyze plastic pollution impacts and solution pathways in key consumer sectors and industries (aka, a “sectoral approach”).

In this report, we review plastic impact and reduction pathways in the new-style tea beverage industry in China. This industry includes freshly-made drinks typically served in takeout cups, such as milk tea, boba (or bubble) tea, fruit tea, and similar drinks. The impact of this sector in terms of plastic pollution is a growing problem both in China and worldwide, with no clear success case examples yet pointing towards successful solutions. This report aims to help address this gap.

China's new-style tea beverage industry has been experiencing robust growth, with significant potential for future expansion. However, the industry remains heavily reliant on single-use plastic (SUP) packaging, and packaging weight is trending upwards. Furthermore, reusable packaging business models have yet to be established, and current packaging designs are not optimized for recycling. As a result, the industry not only generates substantial plastic waste but also sees a large portion of the waste go unrecycled.

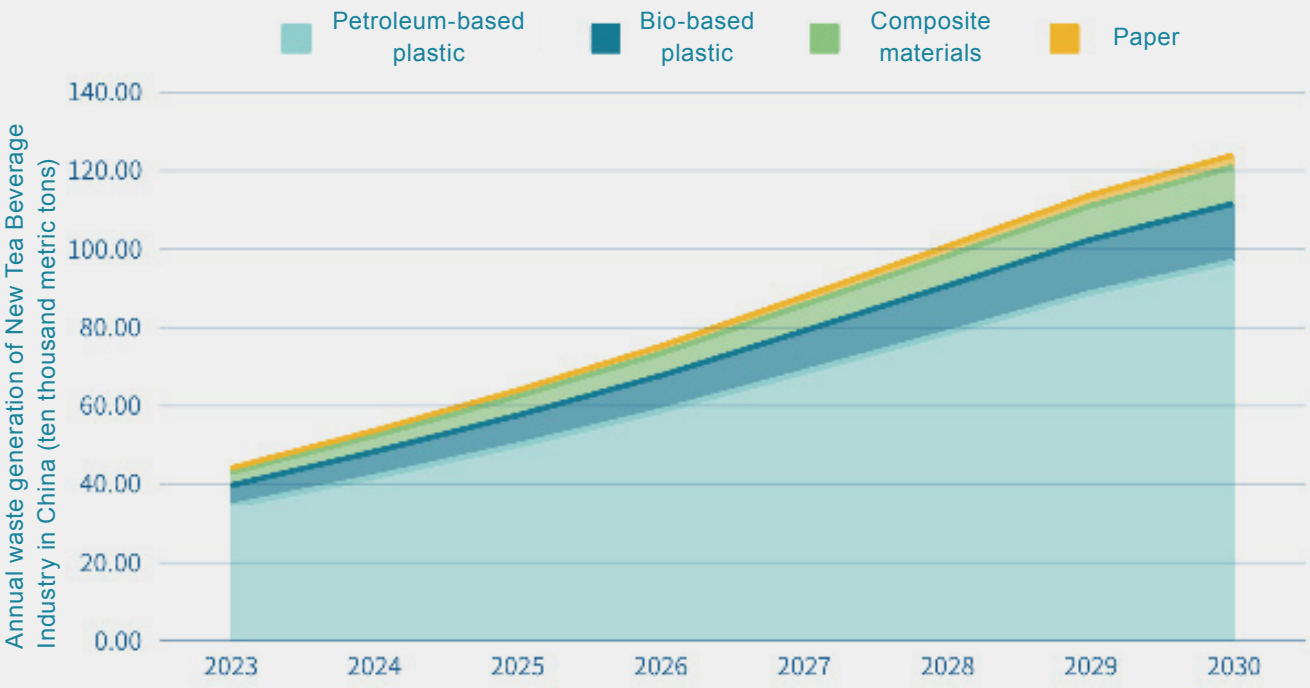
Life cycle of China's new-style tea beverage packaging



Our analysis reveals the following conclusions:

- In 2023, the new-style tea beverage industry generated 441,000 metric tons (MT) of waste in China, over 97% of which consisted of plastics (including both petroleum-based and bio-based plastics) or composite materials containing plastics. The annual plastic waste produced by the industry is equivalent to that generated by a Chinese megacity with a permanent population of 9 million.

- Without intervention, the total annual waste generated by the industry is projected to reach 1,241,000 MT by 2030, which is 2.8 times the amount produced in 2023.



To achieve plastic reduction in the new-style tea beverage industry, drawing on global practices based on the "3R" waste management hierarchy (prioritizing source reduction and reuse, with effective recycling for unavoidable plastics), we propose four strategies:

Reduce	Reduce waste in production and sales by adopting lightweight teacup designs and eliminating unnecessary packaging and accessories. This could lead to a reduction of 366,700 metric tons of annual waste by 2030, representing a 29.55% decrease compared to the business-as-usual (BAU) scenario;
Reuse	Promote reuse systems by introducing "bring your own cup" programs, reusable circulating cup programs and dine-in cups. Through these measures, the reuse rate could reach 20% by 2030, potentially leading to a 174,800 metric tons reduction in annual waste, 14.09% less than the BAU scenario;

Recycle

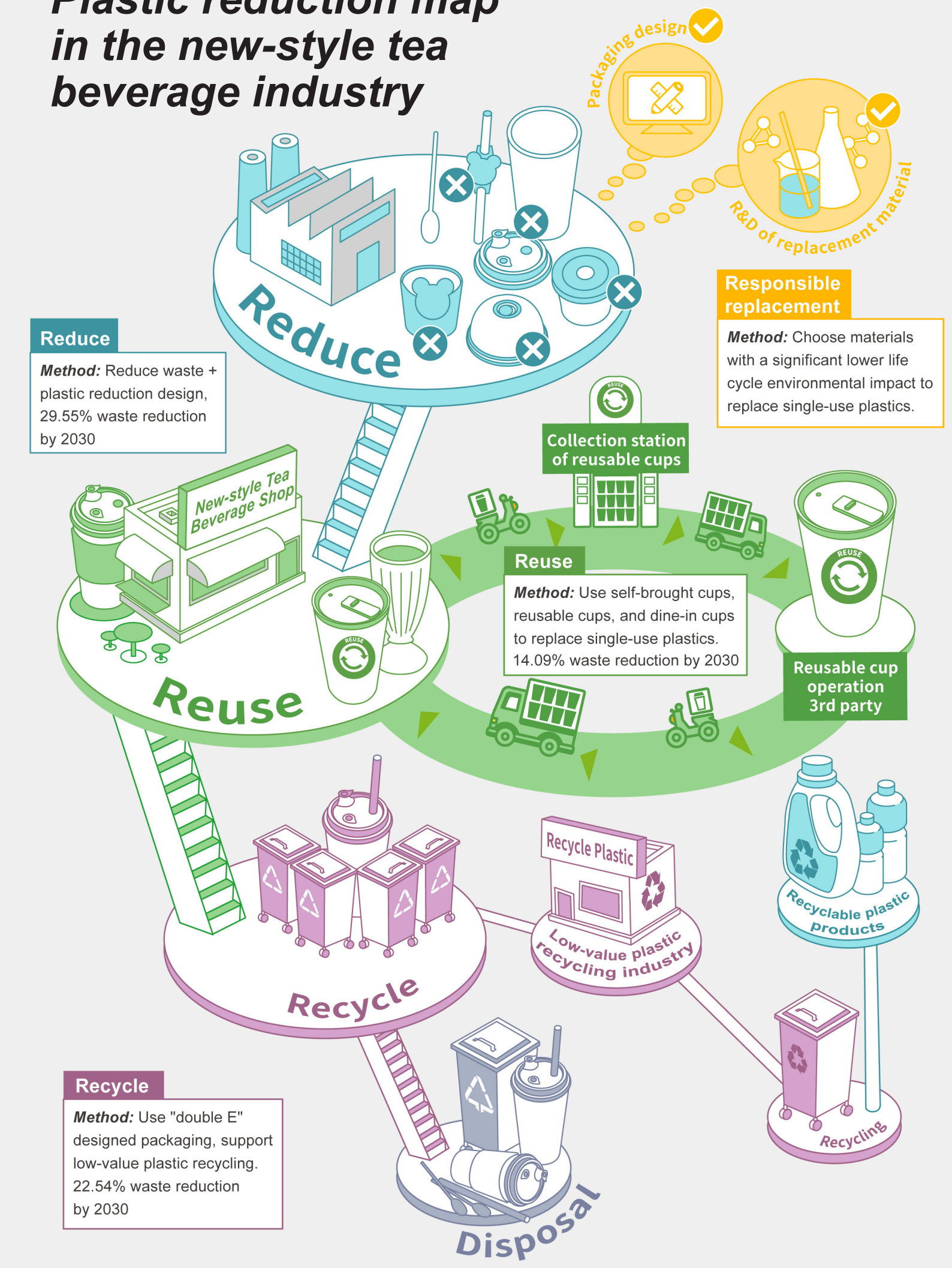
For any packaging that cannot be reduced, reused or replaced, mechanical recycling may be an option if it can be done effectively and safely. Through mechanical recycling, waste generation can potentially reduce demand for virgin plastic. Actions we propose include: improve waste separation at source, adopt easy-to-collect and easy-to-recycle packaging design, and expand recycling infrastructure for low-value plastics. By 2030, 40% of packaging could be recycled, with the potential to reach a 279,800 metric tons reduction in annual waste (a 22.54% decrease compared to the BAU scenario) if the recycled plastic is remade into products that displace virgin plastic production;

Responsible Replacement

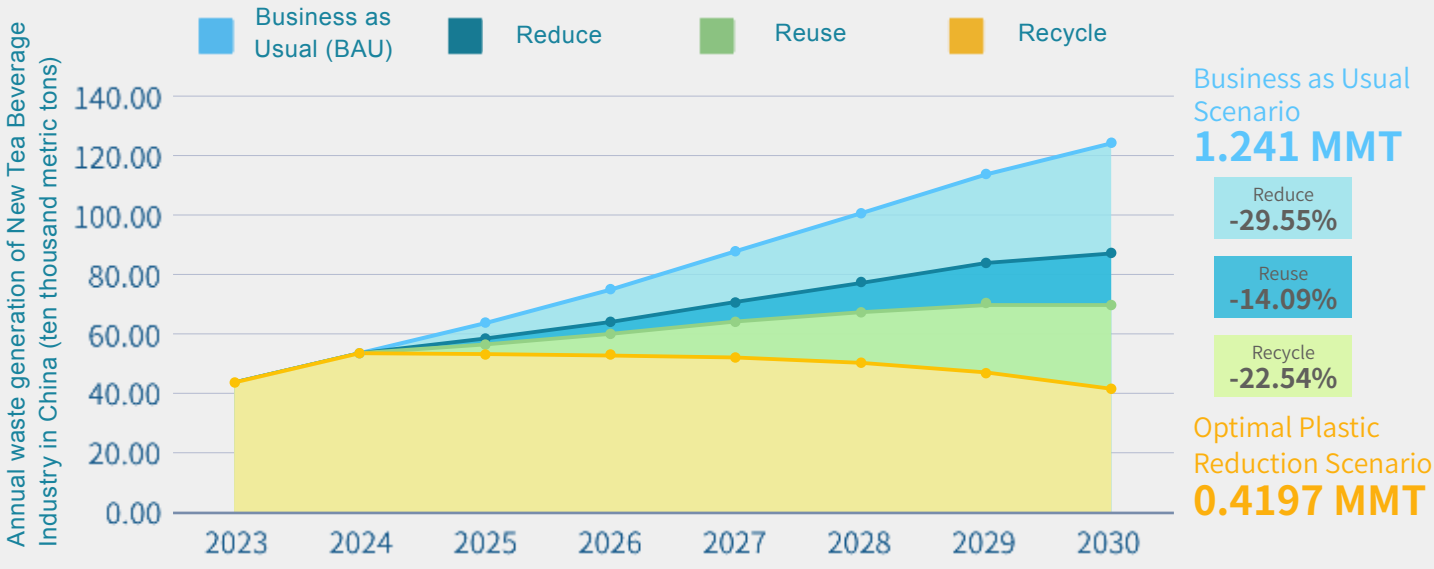
While not directly reducing waste, responsible material replacement can lower the overall life cycle environmental impact by replacing fossil fuel-based plastic with other packaging materials. However, existing alternative materials are still imperfect and require further research and development. The life cycle environmental impact of new materials should be thoroughly evaluated before application.

Combining these four strategies could facilitate the transition of the new-style tea beverage industry from a “linear economy” to a “circular economy” model.

Plastic reduction map in the new-style tea beverage industry



If all stakeholders can reach a consensus and take coordinated action starting in 2025, implementing multiple plastic reduction strategies in parallel, the total waste generated by the new-style tea beverage industry could be reduced to 419,700 metric tons by 2030. This would represent a 21.82% decrease compared to 2024 levels and a 66.18% decrease compared to the BAU scenario. And the total waste volume of the industry could peak in 2024, after which it would begin transitioning toward a zero-waste future.



The sustainable transition of the industry requires legal and policy support, corporate consensus and public recognition. Based on the research presented in this report, we propose the following suggestions:

● Recommendations for policy makers

● **Carry out baseline research and evaluation** of plastic packaging use and waste production in the new-style tea beverage industry and review global plastic reduction policies. Identify potential pathways for plastic waste reduction and set plastic reduction targets;

● **Introduce more supportive policies** to promote reduction, reuse and safe recycling of plastic packaging; promote pilot programs for reuse-based business models;

establish national standards for easily recyclable designs; expand the existing extended producer responsibility (EPR) policies to the packaging production sector; support the development of the low-value plastic recycling industry; and promote standards and regulations for recycled plastics, including consumer safety standards;

- **Formulate policies on replacement materials** with caution, based on the results of a full life cycle environmental and social impact assessment; and clearly define the applicability of labels such as "biodegradable" and "compostable."

- **Recommendations for tea beverage enterprises:** improve transparency and accountability by strictly adhering to the Ministry of Commerce's reporting system for single-use plastic products; develop and implement plastic reduction strategies; take action to reduce plastic use; disclose corporate environmental, social and governance (ESG) information, including data on plastic packaging use; and establish reuse systems.

- **Recommendations for consumers:** refuse unnecessary plastic packaging; bring their own cups; support companies that implement plastic reduction initiatives; support reusable business models; and participate in proper waste sorting.

目　录 CONTENTS

01 Background

Plastic production around the world is growing rapidly, hitting 460 million metric tons in 2019[1] (OECD, 2022). As more plastic is produced, plastic waste is also increasing rapidly to 353 million metric tons in 2019. If no action is taken, by 2040, annual plastic production may increase by 66% compared with 2019, and greenhouse gas (GHGs) emissions generated by plastics throughout their life cycle will consume 15% of the remaining carbon budget to keep global warming within 1.5 degrees Celsius[2] (UNEP, 2023). Meanwhile, leakage of plastics into the environment may double[3] (NCM, 2020). Such trends pose urgent and severe challenges to climate, biodiversity and resource utilization.

In recent years, China has enacted a series of policies and regulations to combat plastic pollution, which have helped chart a course forward. To overcome the challenges in implementing plastic reduction, it is critical to analyze plastic pollution impacts and solution pathways in key consumer sectors and industries (aka, a "sectoral approach").

In this report, we review plastic impact and reduction pathways in the new-style tea beverage industry in China. Reducing plastic in the made-to-order beverage industry (including milk tea, bubble tea, boba tea and other takeout style drinks) is a common challenge worldwide. Despite various plastic reduction plans and bans formulated by some countries and companies, implementation is inconsistent. And there is a lack of clear examples of successful solutions. This report aims to help address this gap.

"New-style tea beverages" refers to made-to-order tea beverages that are based on traditional tea beverages, with custom additions of milk, fruit, dairy products, starch products and jelly products. Since its birth in the 1980s, the new-style tea beverage industry has been continually evolving to provide more diversified, personalized beverage products that suit the tastes of a younger generation. As the

[1] The Organisation for Economic Co-operation and Development.Global Plastic Outlook[R/OL].(2022-02-22)[2024-07-01].https://www.oecd-ilibrary.org/environment/global-plastics-outlook_de747aef-en
[2] UNEP.Turning Off the Tap - How the World Can End Plastic Pollution and Create a Circular Economy[R/OL].(2023-05-16)[2024-07-01].https://www.unep.org/resources/turning-off-tap-end-plastic-pollution-create-circular-economy.
[3] Nordic Council of Ministers.Possible Elements of a new global agreement to prevent plastic pollution[R/OL].(2020-10-18)[2024-07-01].https://www.norden.org/en/publication/possible-elements-new- global-agreement-prevent-plastic-pollution

Before 2000

Era of milk tea

Birth of bubble milk tea

- In 1983, the first milk tea appeared
- In 1986, the first bubble milk tea appeared
- In 1988, the freshly made tea brand Bi Feng Tang was established in Shanghai

2000 – 2012

Era of tea beverage 1.0

Tea + milk = freshly made

- Bubble milk tea went rival

2012 – 2019

Era of tea beverage 2.0

Freshly brewed tea + milk + fruit + additional ingredients

- The new-style tea beverage emerged
- Local brands and new tea products grew like bamboo

2019 till now

Era of tea beverage 3.0

Freshly brewed tea + culture

- The new-style tea beverage becomes a new cultural icon
- Companies focus on marketing and product differentiation, launch new drinks at a growing pace, and further develop their own market niche
- Chain brands seek expansion in third- and fourth-tier cities
- Supply chain management and digital transformation are on the way
- More companies seek opportunities overseas

Figure 1-1 Chronicle of China' s new-style tea beverage industry

competition becomes more intense the industry has made three adjustments: (1) turning inward to integrate supply chains and adopt digital platforms, (2) turning downward to seize market shares in third- and fourth-tier cities[4], and (3) turning outward to seek overseas development. The timeline of the new-style tea beverage industry is shown in the figure left.

From 2018 to 2022, the size of China's new tea beverage consumption market grew from 53.4 billion yuan to 103.8 billion yuan, with an average annual growth rate of more than 20%, accounting for 50.7% of China's made-to-order beverage share[5]. It is estimated that there were 515,000 new-style tea beverage stores in operation across the country in 2023 with a market size of 149.8 billion yuan, and that figure is projected to reach 201.5 billion yuan by 2025 (China Chain Store & Franchise Association, 2023)[6] .

[4] Since China does not have an official definition of "third- and fourth-tier cities", we use the city classification in the "2023 City Business Vitality Ranking" released by YiCai. https://mp.weixin.qq.com/s/m0zpCzVuTkNcfjkR__C2Ng

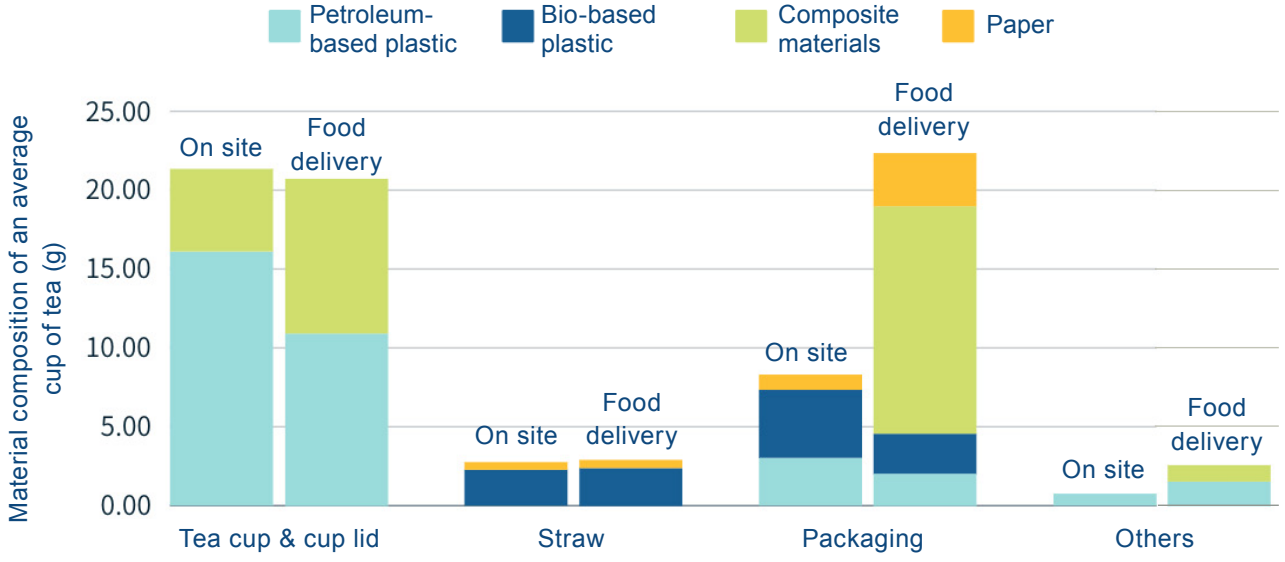
[5] China Insights Consultancy, China Tea Industry Blue Book [R/OL].(2024-06-19)[2024-07-04].

[6] New-style Tea Beverage Committee of China Chain-Store & Franchise Association & Meituan New Catering Research Institute, 2023 New-style Tea Beverage Research Report [R/OL]

02 Environmental Impacts of Plastic Packaging in the New-style Tea Beverage Industry

A. The packaging of new-style tea beverages

New-style tea beverage packaging can be divided into four major parts – cups, straws, take-out packaging and other packaging. Except for a small amount of paper material (such as straw sleeves and cup carry trays), the remainder of this packaging is made of plastic, including petroleum-based plastics (such as Polyethylene Terephthalate or “PET”; or Polypropylene or “PP” tea cups, cup lids and sealing films), bio-based plastics (such as Polylactic Acid or “PLA”/ Crystalline Polylactic Acid or “CPLA” straws) and composite materials containing plastics (such as plastic-coated paper cups, foil-insulated carrier bags, etc.). According to publicly reported data[7] and data from consumers, by October 2023, packaging amounts for the top 10 best-selling new-style tea beverage brands on food delivery platforms are as follows:



*Note: The component statistics include packaging bags and other cutlery and accessories. The packaging weight is calculated based on the average value of the top 10 best-selling new-style tea beverage brands on food delivery platforms.

Figure 2-1 Packaging material composition of a cup of tea

[7] Publicly reported data source: Green Hunan, "Exploration of Plastic Reduction in the Milk Tea Industry under the Background of the New Plastics Ban"; Shanshui Environmental, “Research Report on Plastic Usage in Hefei's New-style Tea Beverage Industry”.

B. Current status and trends of plastic packaging waste in the new-style tea beverage industry

The assumptions used for modeling waste amounts are as follows:

Assumption 1: All plastic in the new-style tea beverage industry is single-use, and the packaging volume is the same as the amount of packaging waste generated. At present, there is very limited durable plastic in use in the new-style tea beverage industry, as “bring your own cup” programs, reusable circulating cup programs and dine-in cups are rare. Further, the amount of recycled plastic in circulation in the new-style tea beverage industry is statistically insignificant; so we can assume all packaging ends up as waste.

Assumption 2: Petroleum-based plastics, bio-based plastics, and composite materials containing plastics are all considered "plastic products." At present, bio-based plastic products in use in the new-style tea beverage industry are mainly PLA/CPLA, and these materials so far lack channels for sorting, collecting and industrial decomposition. In practice they behave the same as other plastic. Composite materials containing plastics, such as polyethelene or PE-coated paper cups, have similar environmental impacts as plastic packaging and cannot be easily recycled due to their use of mixed materials and binders.

Assumption 3: We conservatively estimated the total amount of waste generated based on the minimum packaging in daily consumption. Only the weight of tea cups, cup lids (including sealing films), and straws (including straw packaging) are included; we excluded the weight of other cutlery and packaging bags.

Assumption 4: The output of new-style tea beverage is linearly related to the total projected market revenue of the new-tea beverage industry and assumes that the average selling price of a single cup of tea remains stable.

1) Current status of plastic packaging waste in the new-style tea beverage industry

Based on publicly available data, we estimated the scale of waste generation and waste growth trends in the new-style tea beverage industry. The following data were used in our analysis:

- **Plastic weight for a single cup of tea:** Based on publicly reported data on tea cups, cup lids and straws (we excluded other cutlery, packaging bags and plastic decorations from the calculation), the average packaging weight of a single cup of tea is conservatively estimated to be 20.71 grams[8];

[8] This data calculates the amount of waste based on a 500ml tea cup, including the weight of its tea cup, cup lid (or sealing film), and straw (including its packaging). Packaging bags, plastic spoons, boxes for additional ingredients, cup carry trays and other packaging are not considered. According to offline scenarios of 14 mainstream tea brands in the three cities studied in the open data (source: Green Hunan, "Exploration of Plastic Reduction in the Milk Tea Industry under the Background of the New Plastics Ban"; Shanshui Environmental, “Research Report on Plastic Usage in Hefei's New-style Tea Beverage Industry”), the average amount of packaging used per cup of tea is 20.71grams, using the weighted average of the annual sales of each tea brand.

- **The waste from a single cup of tea** is calculated at 97.56% plastic or composite materials containing plastic. 20.20 grams of plastic products are used in each cup;
- **Output:** According to data from China's freshly made tea beverage industry, the total industry output for 2023 is 21.31

Based on the above assumptions, packaging waste generated by China's new-style tea beverage industry in 2023 is conservatively estimated to be about 441,200 metric tons. An estimated 430,400 metric tons are plastic packaging waste.

2) Trends of plastic packaging waste in the new-style tea beverage industry

If the current new-style tea beverage industry packaging model continues, it is estimated that by 2030, the total amount of waste generated annually by the industry will reach 1.241 million metric tons, 2.8 times that of 2023. Plastic packaging waste will reach 1.2108 million metric tons, as shown in the figure below.

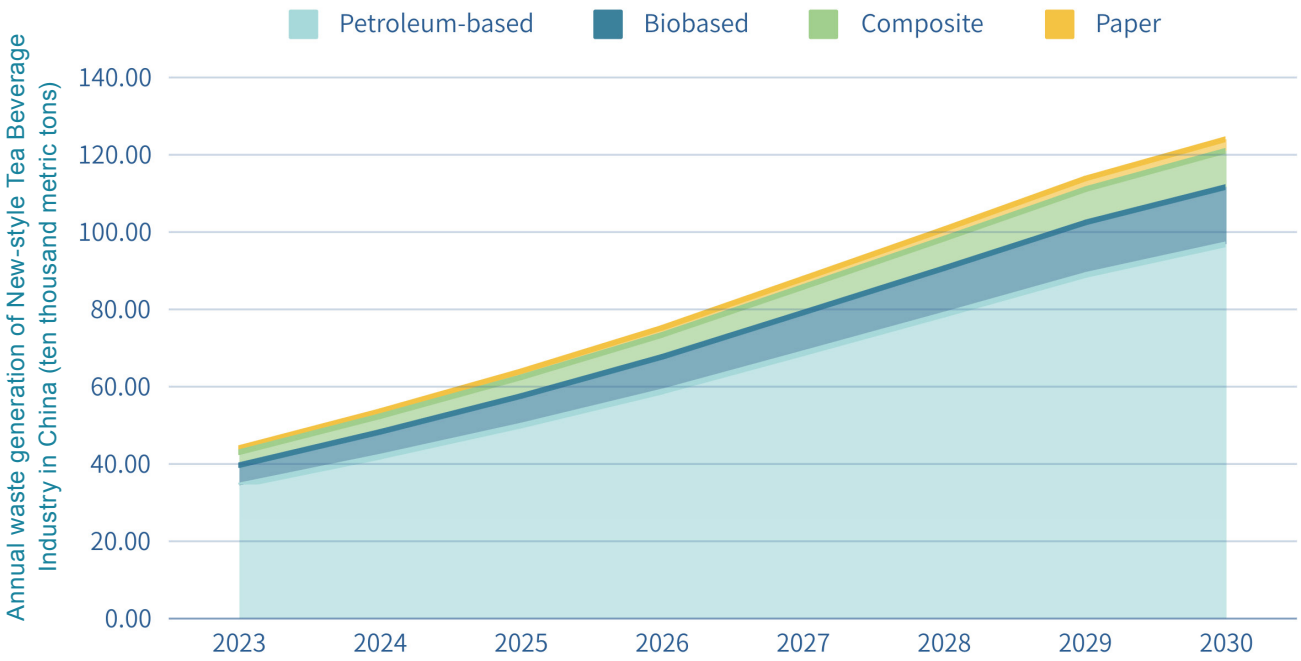


Figure 2-2 Growth trend of packaging waste under a Business-as-Usual (BAU) scenario

[9] Huafu Securities, In-depth Report on Tea Beverage Industry: Oriental Tea Go Local and Go Global [R/OL]

I C. Exploring Plastic reduction in the new-style tea beverage industry

This section explores the four main factors contributing to the growing problem of plastic waste originating from the new-style tea beverage industry: unnecessary packaging, lack of reuse systems, lack of recyclability in packaging, and lack of effective, safe replacement solutions.

1) Current status of plastic packaging waste in the new-style tea beverage industry

- **High packaging weight:** The weight of the heaviest cups and lids has reached 42 grams, three times the industry's optimal lighter packaging models;
- **Repeat packaging:** both sealing film and cup lids are often used and multiple straws are often provided to customers;
- **Unnecessary packaging:** Many items are provided to customers that aren't always needed. Sealing film, cup lids and straws are not always necessary. Many other plastic items are even less necessary, such as lid plugs/stoppers, cup carrying trays, spoons and forks and their packaging, packaging boxes for additional ingredients, etc.;
- **New products and co-branding packaging:** A full line of product packaging is often released by brands due to new product releases or co-branding events, and additional gifts are often produced to support launches and promotions, all increasing the amount of packaging plastic waste.

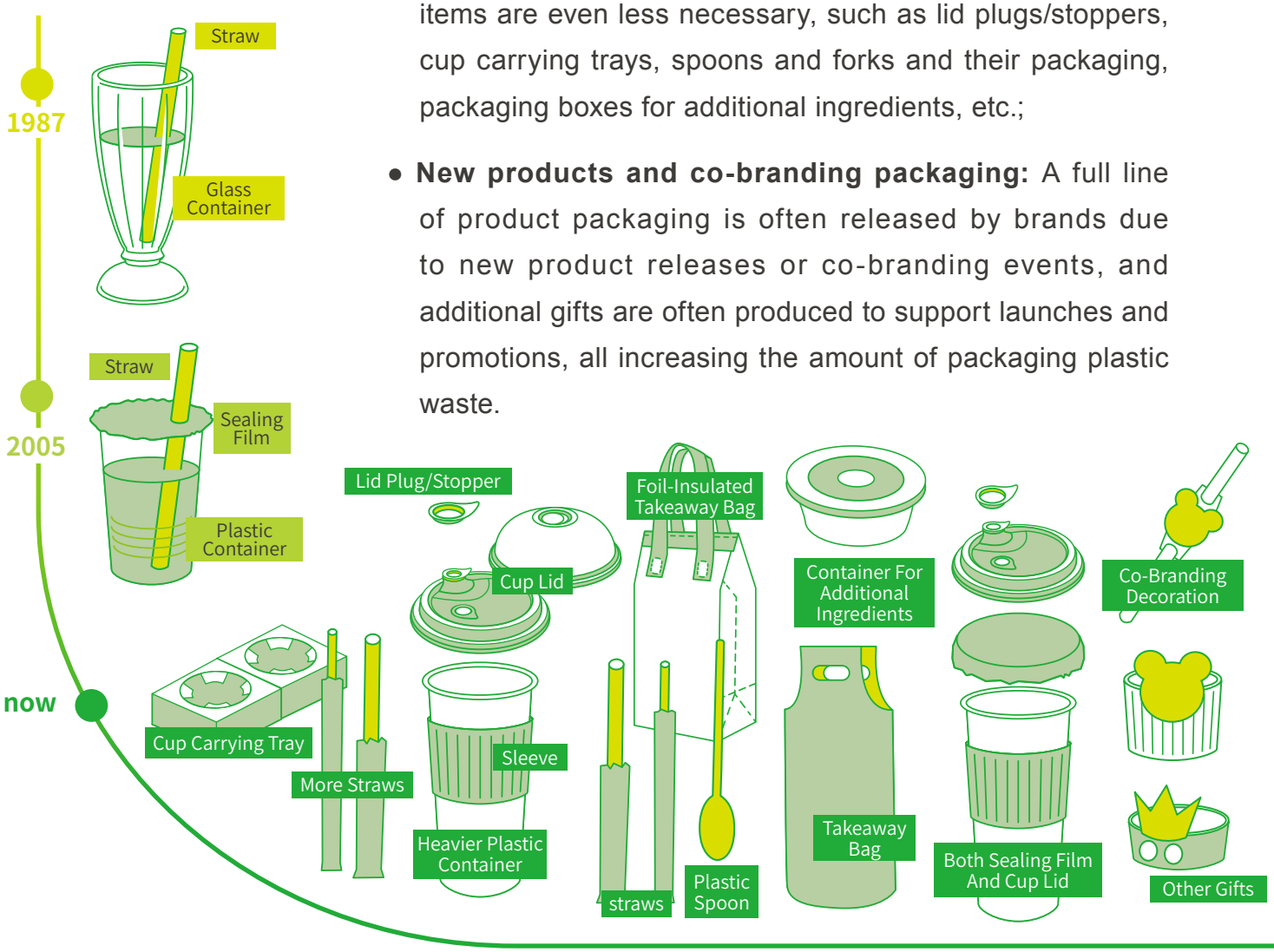


Figure 2-3 Packaging growth trends in the new-style tea beverage industry

2) Limited reuse uptake

Reuse has not yet been widely applied in the new-style tea beverage industry. The vast majority of stores use single-use cups for dine-in, take-out, and delivery. Only two brands have formulated a nationwide, long-term and effective program promoting “bring your own cup”.

3) Hard to recycle

Packaging for new tea beverages does not take recyclability into consideration. Tea cups are made of various types and colors of plastic and labels are difficult to remove; printed items include ink that is not removable or recyclable. Tea cups are often unwashed when disposed of, adding to recycling challenges. This makes the overall plastic waste “low-value” from a recycling industry perspective.

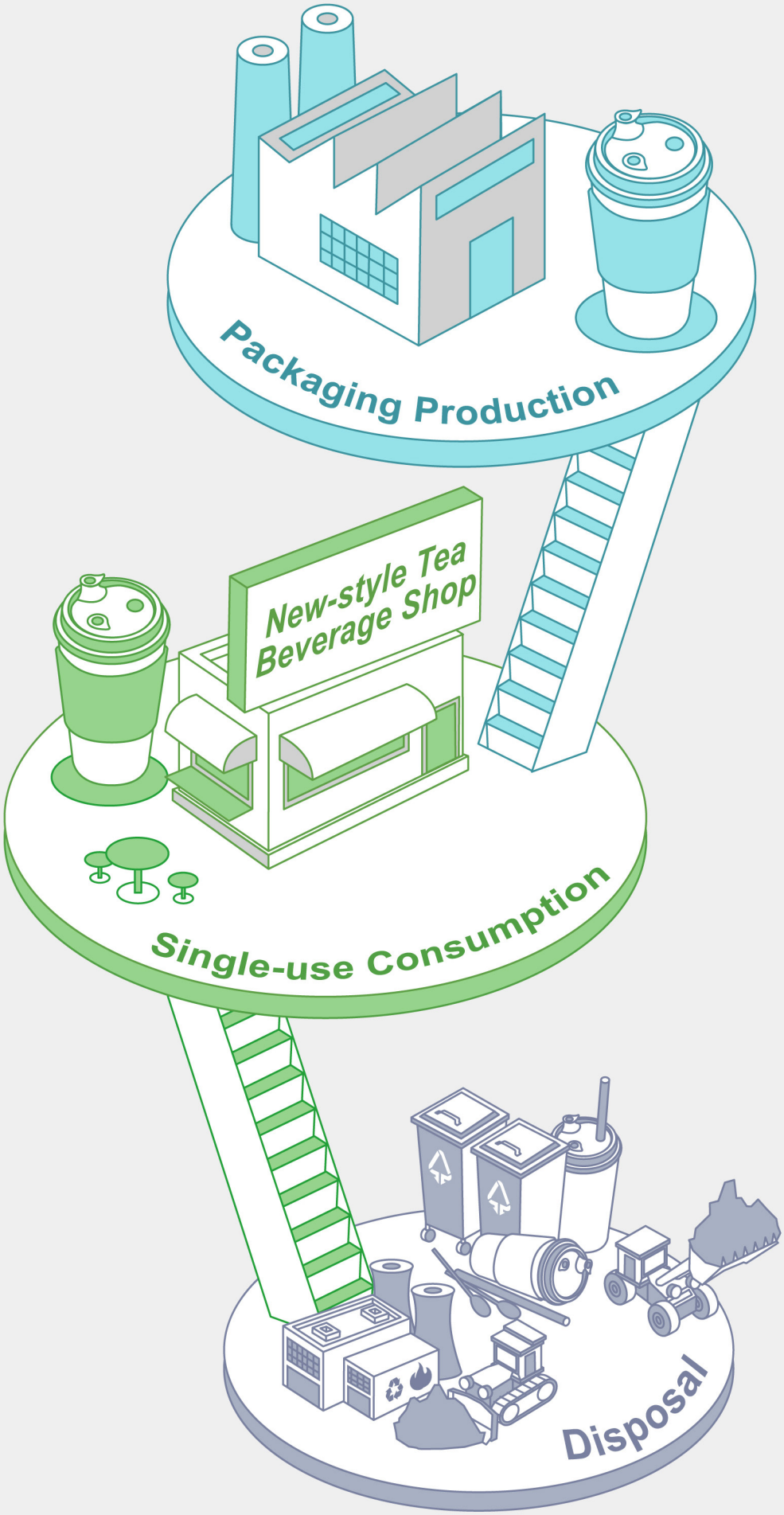
4) Limitations of bio-based plastics

Due to the ban on non-degradable single-use plastic straws and bags stipulated in the Opinions on Further Strengthening Plastic Pollution Control issued by the National Development and Reform Commission and the Ministry of Ecology and Environment, the new-style tea beverage industry has shifted in some cases to bio-based plastics, mainly composed of PLA/CPLA.

However, bio-based plastics such as PLA can degrade only when treated through a strict industrial process[10]. According to statistics, nearly 97% of degradable plastics end up in incinerators or landfills; about 3% leak into the natural environment; and less than 0.01% are treated through special industrial composting processes[11].

[10] IDTechEx, Bioplastics 2020-2025 [R/OL]
[11] Circular Economy Industry Research Center of School of Environment of Tsinghua University, Research Report on Environmental Impact Assessment and Policy Making of Degradable Plastics [R/OL].[2022-04-01] (2024-06-24).
[12] The Organization for Economic Co-operation and Development.Global Plastic Outlook[R/OL].(2022-02-22) [2024-07-01].https://www.oecd-ilibrary.org/environment/global-plastics-outlook_de747aef-en
[13] Ministry of Housing and Urban-Rural Development of China, China Urban-Rural Construction Statistical Yearbook 2022 [EB/OL].(2023-10-13)[2024-07-01].https://www.mohurd.gov.cn/gongkai/fdzdgknr/sjfb/tjxx/jstjnj/index.html

D. Plastic waste disposal in the new-style tea beverage industry



Globally only 9% of plastic waste was recycled in 2019, while 19% was incinerated and almost 50% went to landfills. The remaining 22% of plastic waste either ended up in uncontrolled dumpsites, was burned in open pits or leaked into the environment[12] (OECD,2022).

In China, disposable plastics account for 37% of total plastic consumption. About 62 million metric tons of plastic waste was generated in 2021, Approximately 15.4 million metric tons (~ 25%) went to landfills; about 27.6 million metric tons (~ 44%) was incinerated; and about 19 million metric tons (~ 31%) was recycled (Plastic Recycling Association of National Resources Recycling Association, 2023). Of all domestic waste in China, 79.86% was incinerated, 12.46% was landfilled, and 7.67% was disposed of through other measures[13].

03 Analysis of New-Style Tea Beverage Plastic Reduction Solutions

As global plastic pollution becomes increasingly severe, governments, international NGOs and companies are adopting various strategies to reduce the impact of plastic on the environment, including by promoting the reduction of single-use plastic packaging. Based on the plastic reduction roadmap recommended by the United Nations Environment Programme (UNEP) [2] and the widely accepted 3R principle — and taking into account the characteristics of the new-style tea beverage industry — we propose four plastic reduction strategies (in order of importance): reduction reuse, better recycling, and responsible replacement.

A. Reduction

Reduction refers to minimizing the use of single-use plastic in the new-style tea beverage industry through redesign, changes to manufacturing and sales, and changes to production and consumption patterns. Specific suggestions include:

1) Reduce unnecessary waste

- **Stop** over-packaging, excessive packaging and decoration for co-branding products, such as plastic decorations, insulation sleeves and boxes for additional ingredients. Avoid repeated packaging: use either sealing film or cup lid but not both;
- **Reduce** cutlery waste. When customers come to the store, stores could provide straws, plastic spoons and other cutlery only upon request by the customer, rather than by default; and when ordering on food delivery platforms, stores should only provides straws equivalent to the number of cups of tea products, and only provide additional single-use plastic products such as spoons upon request;
- **Implement** fees for packaging: stores should provide foil-insulated carrier bags by request rather than by default; and offer lightweight packaging options and discourage

[2] UNEP.Turning Off the Tap - How the World Can End Plastic Pollution and Create a Circular Economy[R/OL].(2023-05-16)[2024-07-01].https://www.unep.org/resources/turning-off-tap-end-plastic-pollution-create-circular-economy.

2) Promote lighter design

To reduce the amount of plastic waste, another strategy is to change product design including:

- **Reducing** packaging weight by designing thinner cups, cup lids, straws and packaging bags;
- **Innovate** cups that no longer requires lids, straws and plastic cutlery;
- **Disclose** corporate plastic product usage data, plastic reduction plans and plastic reduction data to ensure accountability towards reduction goals.

Compared to the BAU scenario, if the above reduction actions are applied immediately, by 2030 366,700 metric tons, or 29.55% of waste can be reduced annually.

A Reasonable Reduction Target

In 2023, among the 14 mainstream new-style tea beverage brands, the lightest weight of packaging for a 500ml cup of tea was 14.59 grams (as compared to the industry average of 20.71 grams). This figure represents a reasonable medium-term goal for the industry. The potential for reduction is calculated based on an assumption that an average weight of 14.59 grams can be achieved in the near future.

B. Reuse

Reuse refers to using packaging multiple times. This includes both durable, dine-in service ware, bring your own cup (or customer-driven reuse), and reuseable/refillable cup programs (in which cups are returned to the provider or a third party for cleaning and disinfection[14]).

1) Bring Your Own Cup

There are already mature models and successful cases of bringing your own cup working well both in China and abroad. Specific components include:

- **Having a "Bring Your Own Cup" policy** that allows customers to use their own cups to purchase drinks, incentivized through discounts when buying beverage products. Special attention should be paid to the need for Standard Operating Procedure (SOPs) when using a customer's personal cup;

[14] Refer to the definition of reuse of international organizations such as Break Free From Plastics, Zero Waste Europe and Upstream Solutions

- **Advertising the policy** in a conspicuous place in stores and online, and providing training to ensure staff familiarity with the policy.

2) Reusable/ Refillable Cup Systems

Reusable/refillable cups systems refer to systems that replace single-use tea cups with reusable ones, for dine-in use, takeaway and delivery. The supply, cleaning, disinfection, and transportation of reusable cups can be conducted by either the store itself or a third party. Specific components include:

- **Choosing** cups made with strong, durable, and lightweight materials to ensure multiple rounds of cleaning and usage;
- **Designing return systems** that make it easy for customers to return cups. One option is an online tracking system in conjunction with a QR code printed on the cup;
- **Encouraging customers to choose reusable cups,** and to return them, through deposit refund systems, membership points systems and discounts;
- **Working together** with other tea beverage brands, catering brands and food delivery service providers to jointly operate reuse/refill/return services for food boxes and drink cups. Unified regional systems (such as within a city, neighborhood, or mall), can reduce cost for participating brand;
- **Formulating industry standards** for reusable cups and cutlery.

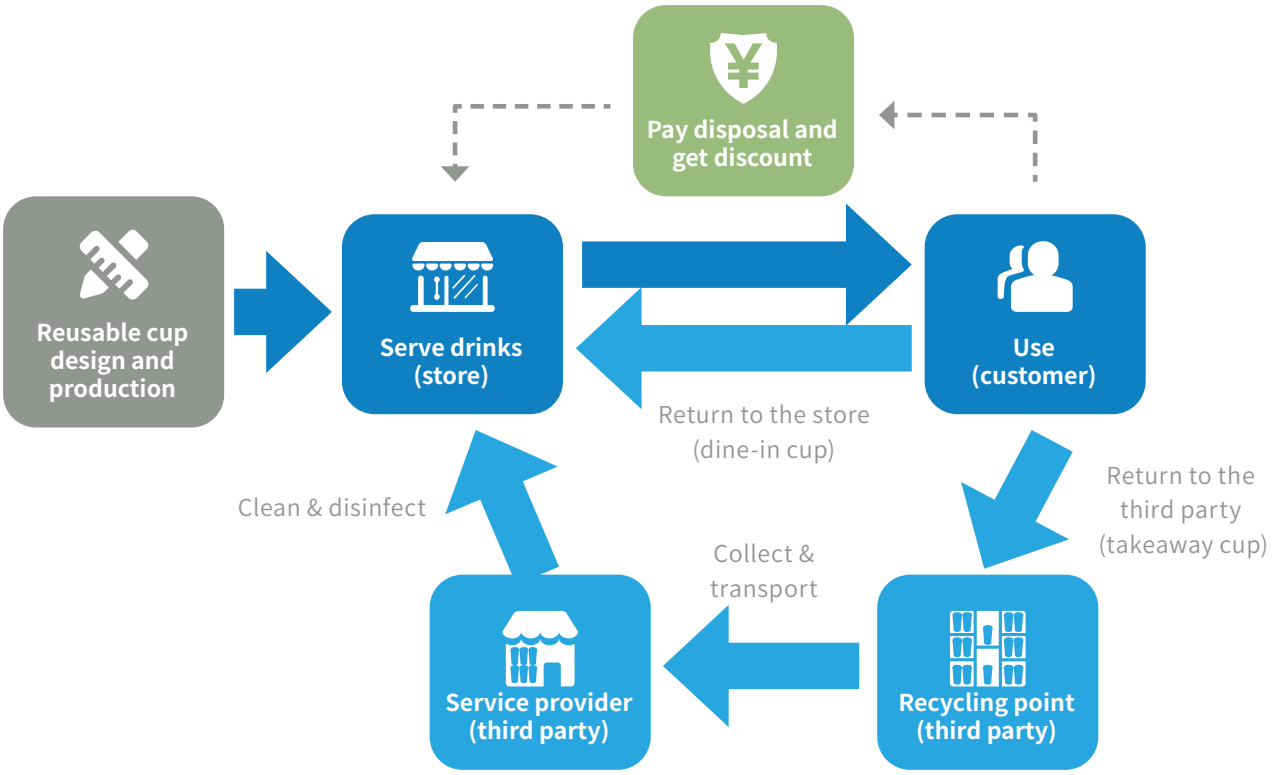


Figure 3-1 Reusable cup model for new-style tea beverage industry

3) Dine-in cups

With the increasing popularity of teahouse culture, dine-in cups could be an attractive option for companies to diversify customer base and reduce plastic waste. Components include:

- **Choosing** attractive and durable ceramic cups, mugs, glasses, metal cups or plastic cups for dine-in drinks and providing reusable straws and cutlery;
- **Installing** storage, cleaning and disinfection equipment for dine-in cups to meet food safety requirements. This can be operated by the store itself or purchased from a third party.

If the above reuse actions are taken immediately, 20% of cups can be replaced by 2030. Compared with the BAU scenario, 174,800 metric tons, or 14.09% of waste can be reduced annually.

The reuse target is to replace 20% of single use cups with reusable cups by 2030. The corresponding potential waste reduction amount was calculated based on an assumption that the industry would also adopt plastic reduction steps outlined above. Further, the target is set based on the following references:

- **The United Nations Environment Program** - target: to “Reduce 10% (25 million metric tons) of short-lived plastics versus BAU including at least 20% via reuse and new delivery models for all bottled products and beverage cups” by 2040. [15]
- **The Ellen MacArthur Foundation** target: to replace 20% of plastic packaging with reusable packaging[16].
- **France’s** "Reduction of the Environmental Impact of Packaging and Development of Reuse in the Food Delivery Sector” agreement, (2021): to achieve 100% recyclable containers and packaging by 2022 (including 100% recycling of packaging and containers used in meal deliveries); 50% of packaging to 50% reusable packaging by 2022, increasing to 70% by 2023; to place a ban on plastic bags for meal delivery by 2023; and to achieve 100% reuseable containers in catering by 2023. [17]

The reuse business model entails initial one-time costs, such as equipment procurement, installation and online system development, as well as operating costs such as for reusable cup collection, transportation, cleaning and disinfection. The cost of business model transformation can be challenging for a single party to bear alone. Thus, transitions may be easier to achieve if the entire industrial chain shares management costs.

[15] UNEP.Turning Off the Tap - How the World Can End Plastic Pollution and Create a Circular Economy[R/OL].(2023-05-16)[2024-07-01].https://www.unep.org/resources/turning-off-tap-end-plastic-pollution-create-circular-economy.
[16] Ellen MacArthur Foundation .(2019). Reuse-rethinking packaging. https://www.ellenmacarthurfoundation.org/reuse-rethinking-packaging
[17] CMS. Plastics and Packaging Laws in France, https://cms.law/en/int/expert-guides/plastics-and-packaging-laws/france.

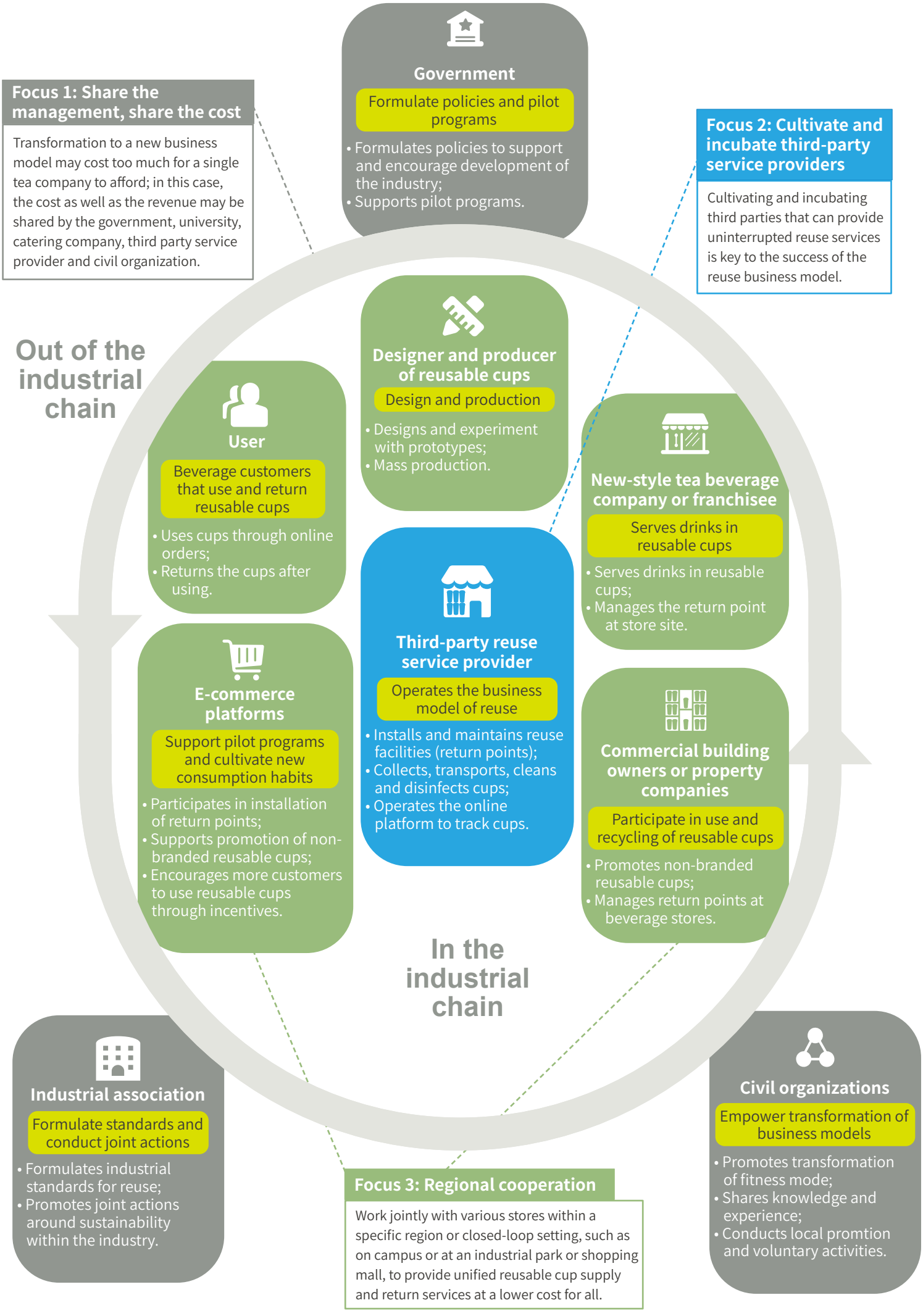


Figure 3-2 Stakeholders in reuse business models

C. Recycling

For packaging materials that cannot be reduced, reused or replaced, physical recycling can be a potential plastic reduction option only if it is efficient and safe and does not create additional environmental or health impacts. Efficient recycling involves considering the recyclability of the product during its design phase to ensure that it can be recycled effectively.

1) Adopt "Double E-certified" design principles

Companies are encouraged to select packaging products that are Double E-certified (Easy to Recycle and Easy to Regenerate)[18], or meet the following principles:

- **Choose** packaging products made from a single type of material rather than composite materials (e.g., use teacups and cup lids made from the same material and reduce foil-insulated carrier bags);
- **Preserve** the material's natural color and minimize the use of colored plastics;
- **Reduce** the use of additives, coatings and adhesives in materials;
- **Adopt** designs with easy-to-peel sealing films and labels.

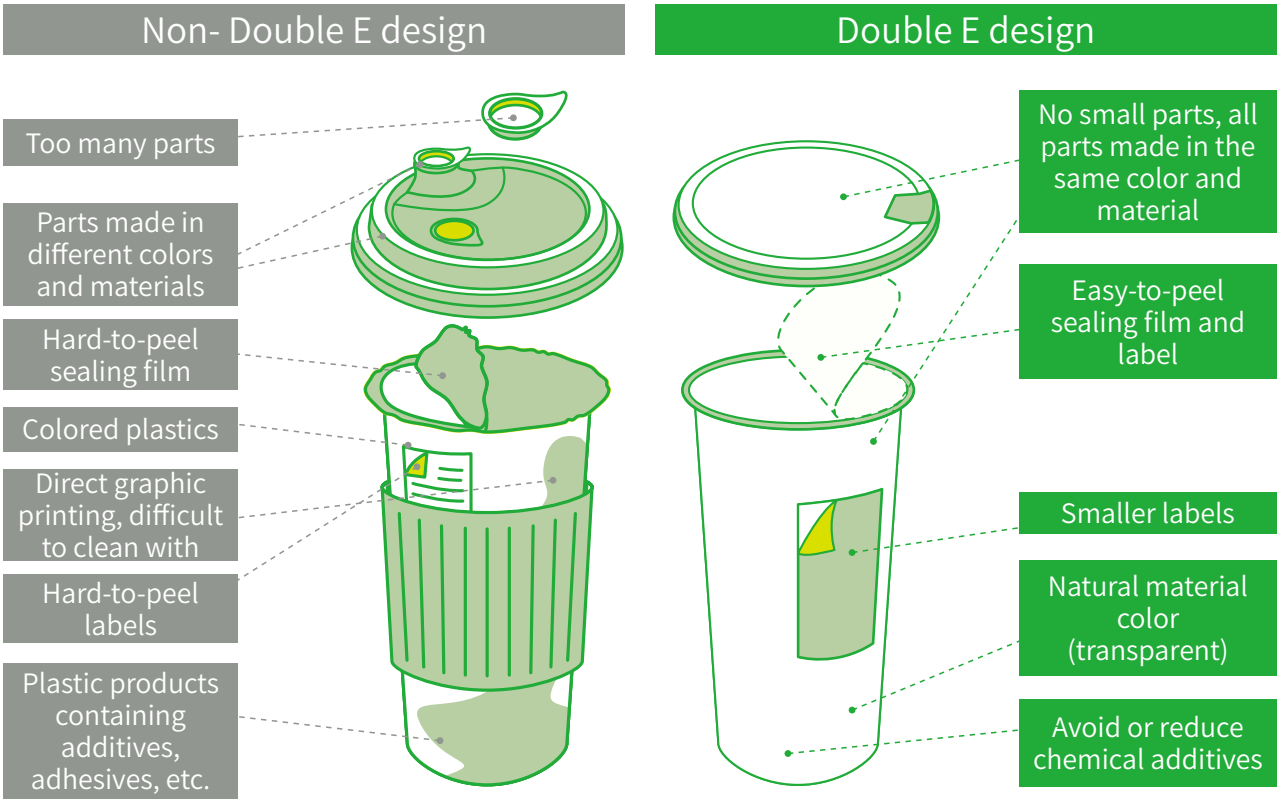


Figure 3-3 Sample design schematic for a Double E type beverage cup

[18] China National Resources Recycling Association, General Guidelines for the Evaluation of Plastic Products' Easy-to-recycle & Easy-to-regenerate Design (T/CRRA 0302-2020) [S].2021-01-18

2) Build a recycling industry chain for low-value plastics

Developing a recycling industry chain for low-value plastics, including teacups, could help reduce plastic waste through:

- **Establishing dedicated recycling points:** Special recycling collection points for teacups can be set up in stores and nearby commercial areas to facilitate efficient collection of these low-value plastics. Research shows that incorporating recycling considerations during the design phase and establishing in-store teacup collection systems can significantly enhance the willingness to recycle low-value plastics[19];
- **Providing policy support:** Governments could support the recycling industry for low-value plastics by offering measures such as public procurement, franchising, tax incentives and other benefits. Such support will help the industry grow while ensuring the safety of reuse models as well as production processes and products.

Additionally, governments should consider expanding the scope of the Extended Producer Responsibility (EPR) scheme to include the beverage industry, including the new-style tea beverage industry. This can motivate producers to improve product design and reduce waste generation. EPR-backed subsidies could also be introduced to foster the development of the low-value plastics recycling industry.

Recycling can indirectly reduce the use of new plastics and waste generation by increasing the volume of recycled plastics in circulation[20]. We estimate recycling of new tea beverage packaging could potentially reach 40% by 2030. If all recycled packaging materials are recycled once and replace the use of virgin plastics, an estimated 279,800 metric tons of waste — equivalent to a 22.54% reduction — can be reduced annually, compared with the BAU scenario.

[19] Dai Jun, Fan Shuaikang, Zhuang Xuning, etc., Current Situation and Optimization Strategy of Recycling and Reuse of Domestic Waste Plastics in Shanghai [J], Journal of Shanghai Polytechnic University, 2024,41(01):46-53.DOI:10.19570

[20] At present, due to the lack of compliance guidance, the poor quality of recycled plastics and other factors, most recycled plastics in China are downcycled rather than used to replace food applications. It plastic wastes are properly recycled, and sanitation concerns are resolved with the issuance of relevant safety and sanitation standards, recycled plastics that meet relevant standards can be redirected to produce food and beverage containers.

The recycling target aligns with the scenario outlook in the Survey Report on the Current Status of Recycling and Use of Low-value Recyclables in China[21], published by China National Resources Recycling Association: "If the recycling rate of low-value recyclables can reach 50% by 2030, 47.9 million metric tons of low-value recyclables can be recycled annually."

D. Responsible replacement – a potential way forward

Responsible replacement refers to the use of non-plastic alternatives – materials derived from natural, non-fossil sources such as plants or minerals that offer similar functionality to plastics but are safer and less harmful to the environment (UNCTAD, 2023). These alternatives can help avoid or reduce the use of plastics while mitigating the environmental problems associated with plastics.

When transitioning to alternative materials, companies are suggested to conduct further scientific assessments and consider both the full life cycle environmental impact of the materials and policy compliance requirements. We believe that an ideal alternative material should meet the following criteria:

- The alternative material should have significantly lower environmental impacts throughout its life cycle compared with petroleum-based plastics, provided that sustainable production practices are fully implemented.
- If the replacement material is designed to be single-use, it should be capable of complete degradation within a reasonable time frame under natural conditions (including soil, fresh water and sea water).
- No microplastics should be released during its natural degradation process.
- The material should avoid the use of composite materials.

[21] Institute of Economic System and Management of Macro Economy Research Institute of National Development and Reform Commission, Survey Report on the Current Status of Recycling and Use of Low-value Recyclables in China, [R/OL].(2023-12-01)[2024-07-01]

E. Plastic reduction potential

According to our research, if the new-style tea beverage industry continues with its current single-use packaging production and consumption model (BAU scenario), total waste generated from this industry is projected to reach 1.241 million metric tons by 2030 — an increase of 131.18% compared to 2024 (181.28% compared to 2023).Of this total, 97.56% will consist of plastic or composite materials containing plastic.

However, if the three strategies outlined, on Reduction, Reuse and Recycling are implemented, **total waste generated from this industry can be reduced to 419,700 metric tons by 2030, a decrease of 21.82% compared with 2024, and a decrease of 66.18% compared with BAU scenario. In our model, total waste generated from this industry can peak in 2024 and begin to decline subsequently.**

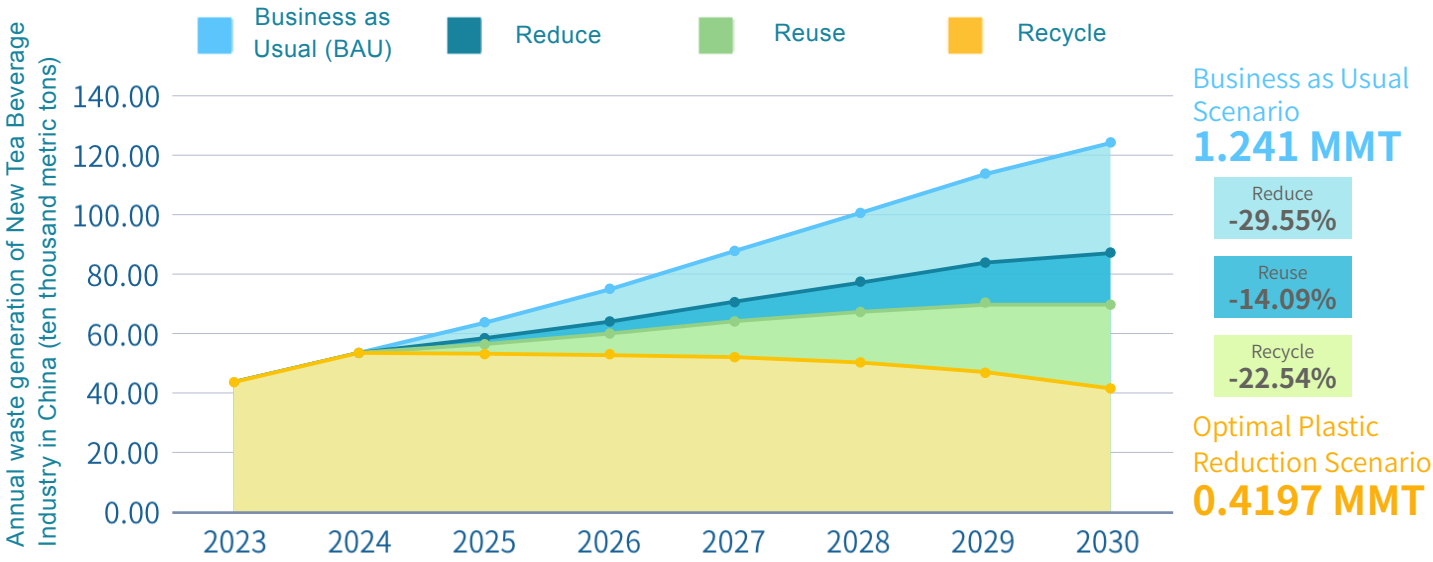
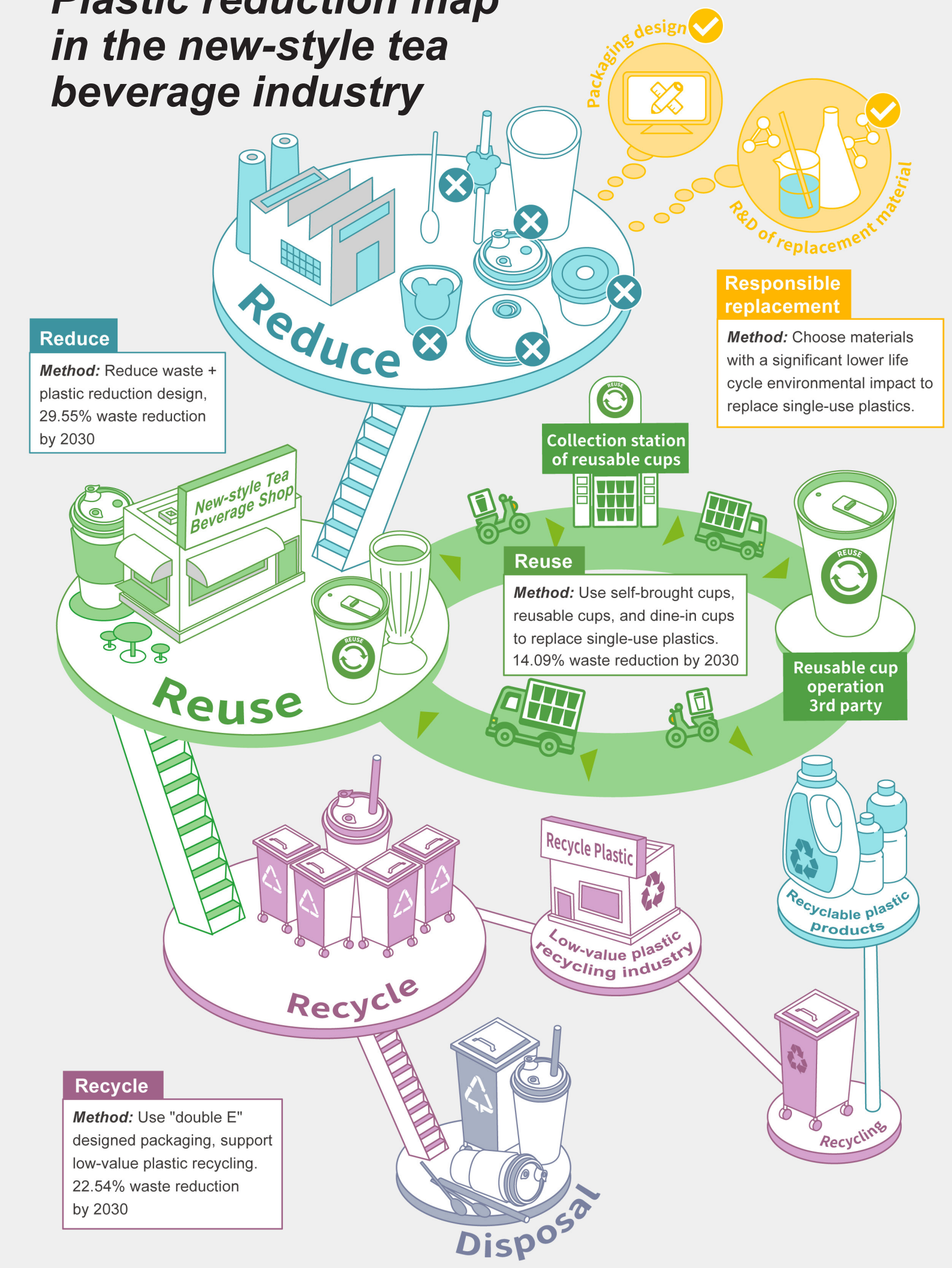


Figure 3-4 Packaging waste reduction potential of different strategies

1) Analysis of plastic reduction strategies

By combining these strategies, the new-style tea beverage industry can transition from a “linear economy” to a “circular economy” model. See the diagram below for details.

Plastic reduction map in the new-style tea beverage industry



Plastic reduction timetable for the new-style tea beverage industry

Reduce

Cultivation (2024-2025)	Development (2026-2027)	Expansion (2027-2030)
Reduce waste • ***Immediately stop*** packaging waste, redundant packaging and cutlery, unnecessary plastic in packaging and overpackaging for co-branding events and only provide necessary amount of cutlery and insulation bags. -Complete the waste reduction action ***by the end of 2025.***	**Promote design containing less plastics** • Immediately start preliminary market research, design and trial production. • ***Starting in 2026***, use lightweight teacups and no longer use containers for additional ingredients, and increase the proportion of recycled plastics in packaging materials; • ***By the end of 2027***, on average packaging becomes 20% lighter compared with that of 2023.	**Promote design containing less plastics** • ***By the end of 2030***, on average packaging becomes 30% lighter compared with that of 2023.

Target

Single-use plastic usage is sharply minimized

Reuse

Cultivation (2024-2025)	Development (2026-2027)	Expansion (2027-2030)
Bring your own cup (BYOC) • Announce and promote BYOC incentives ***before the end of 2025.***	**Reusable cup** • ***By the end of 2026***, conduct pilot programs of reusable cups at campuses, shopping malls and other closed loop settings with large customer flow and gradually	**Reusable cup** • ***By the end of 2030***, the reusable cup option will be available for all take-out and delivery orders, replacing 20% of
Dine-in cup • Pilot dine-in cup at stores ***before the end of 2025.***	**Dine-in cup** • ***By the end of 2027***, no single-use cups will be provided for dine-in orders; • ***By the end of 2027***, 7% of single-use cups will be replaced through reusable dine-in cups.	

Target

Establishment of a sustainable reuse system

Recycle

Cultivation (2024-2025)	Development (2026-2027)	Expansion (2027-2030)
Adopt Double E packaging • Shift to Double E design for packaging ***by the end of 2025.***	**Develop the industrial chain for low-value plastics** • By the end of 2027, establish a sustainable recycling system by setting up special recycling collection points in stores and nearby shopping areas and supporting companies engaged in low-value plastics recycling. Recycle 15% of tea beverage packaging.	**Develop the industrial chain for low-value plastics** • By the end of 2027, recycle 40% of tea beverage packaging.

Target

Every teacup (that is not replaced with a durable option) is properly recycled.

Responsible replacement

Cultivation (2024-2025)	Development (2026-2027)	Expansion (2027-2030)
Support research on alternative materials and comprehensively assess their environmental impacts	**Pilot programs for new materials**	**Use less non-reusable, non-recyclable and non-compostable materials in packaging**

Target

Responsible alternative materials are used with lower environmental impacts throughout the life cycle

Policy support

Cultivation (2024-2025)	Development (2026-2027)	Expansion (2027-2030)
• Assess the status of the industry; • Require companies to disclose information on plastic products; • Require companies to formulate a roadmap for reducing plastics; pilot business models; • Conduct policy research; • Encourage technology research; • Conduct research on standards.	• Promote pilot programs; • Formulate policies to support and reward reuse and recycling actions; • Formulate and improve relevant standards and specifications.	• Improve relevant laws and regulations.

Vision

A zero waste future for the industry.

Cultivation (2024-2025)	Development (2026-2027)	Expansion (2027-2030)
Companies begin to disclose information; assess current plastic usage; formulate roadmap and vision of plastic reduction; start research on policy, technology and standards.	Develop consensus on the roadmap for plastic reduction; formulate policies to support and reward reuse and recycling actions; improve standards and specifications.	Constantly improve relevant laws and regulations.

04 Suggestions

Achieving plastic waste reduction in the new-style tea beverage industry requires policy support, corporate action and public participation. Here, we present recommendations aligned with these three perspectives:

Policy support

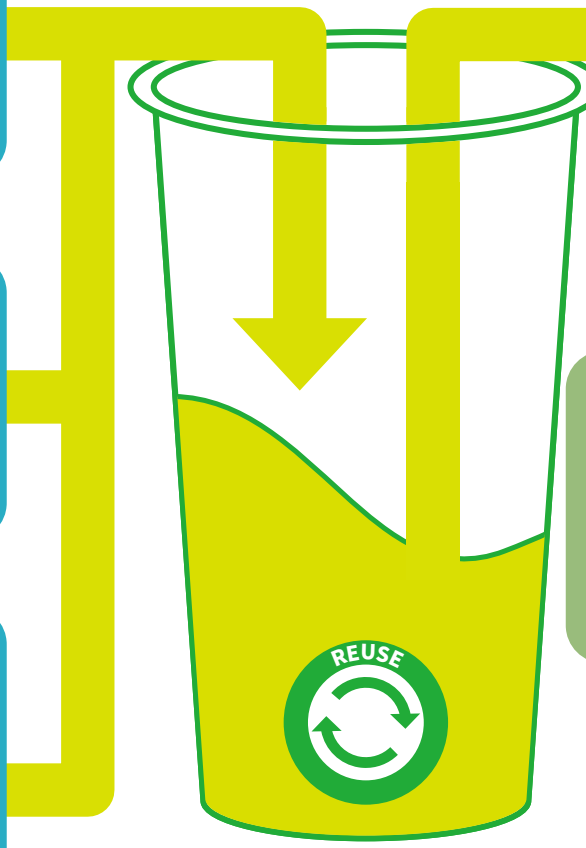
- Improve policies on plastic pollution control, reuse and recycling.

Corporate action

- Formulate targets and action plans on plastic reduction;
- Fulfill reporting obligations;
- Disclose ESG reports;
- Establish reuse systems.

Public participation

- Support product design containing less plastic and refuse unnecessary plastic packaging;
- Bring your own cup;
- Support reuse by choosing reusable packaging;
- Provide suggestions for retailers.



Plastic reduction target

Total plastic waste in the industry decreases; Shift to a zero-waste future.

A. Suggestions for policy makers

● Improve plastic pollution control policies

- **Establish a baseline:** conduct a comprehensive assessment of current plastic waste generation and disposal in the new-style tea beverage industry as the basis for scientific decision-making and management;
- **Set targets:** incorporate the new-style tea beverage industry, especially takeaway scenarios, into future policies banning or restricting single-use plastics. Define industry-specific waste caps and intensity control targets for different sectors and scenarios.
- **Expand the EPR system:** broaden the scope of the existing extended producer responsibility (EPR) framework to the packaging production sector, particularly the new-style tea beverage industry, urging producers to improve product design, shift resources towards reuse, and reduce waste.

●Reuse policies

- **Conduct research:** carry out studies on reuse policies, including horizontal comparisons of reuse policies in other countries and regions and reuse business models in key industries, a basis for policy making and target setting.
- **Implement** bring your own cup policies: require companies in the new-style tea beverage industry to establish Bring Your Own Cup policies, including serving drinks in customers' cups, offering discounts and prominently displaying the policy in stores.
- **Pilot reuse-based business models:** launch pilot programs for reuse-based business models in selected settings. Support these initiatives by sharing costs through public procurement, rewards, subsidies and tax incentives.
- **Integrate reuse into the Zero Waste initiatives:** embed reuse-based business models into Zero Waste city development at all levels, from small-scale projects to regional and city-wide policies. Make reuse an integral part of "Zero Waste commercial districts."

• Recycling policies

- **Carry out baseline research** on low-value plastic to understand the current state of industry development, identify key bottlenecks and evaluate the effectiveness of pilot policies as the basis for scientific policy making;

- **Issue national guidelines and standards** such as guideline for green design of plastic products, guidelines for easy-to-recycle and easy-to-regenerate designs, and health and safety standards for the production and use of recycled plastics;

- **Support development via industry-specific policies.** Expand existing extended producer responsibility (EPR) policies to include the packaging sector, including the new-style tea beverage industry, urging producers to shift resources towards reuse models, recycle plastic packaging and help support the development of low-value plastic recycling industry through tax incentives, public procurement and other measures;

- **Revise regional Catalog of Low-Value Recyclables** to include teacups that meet design specifications; make it clear that teacups are eligible for preferential policies for low-value recyclables, thus increasing their overall recycling rate;

- **Promote use of recycled plastics** by issuing policies for the safe application of recycled plastics and setting clear targets for recycled plastic utilization rate; guide and standardize the development of the recycled plastics industry.

• Responsible replacement policies

- Formulate policies on replacement materials with caution, based on the results of a full life cycle environmental impact assessment;

- Clearly define the applicability of labels such as “biodegradable” and “compostable” to avoid misleading consumers.

B. Suggestions for tea beverage enterprises

- Establish corporate plastic reduction goals and develop action plans categorized under Reduce, Reuse, Recycle and Responsible Replacement. Publicly disclose these plans.
- Strictly adhere to the Ministry of Commerce's reporting system for single-use plastic products, ensuring proper registration and reporting of plastic usage and disposal records.
- Disclose corporate environmental, social and governance (ESG) information, including data on plastic packaging use, as well as details and outcomes of plastic reduction initiatives.
- Implement reuse models proactively to become an industry leader while ensuring compliance with overseas regulations for international expansion.

C. Suggestions for customers

- Opt for products designed to minimize plastic use and refuse unnecessary plastic packaging during purchases.
- Bring your own cup whenever possible.
- Choose reusable packaging when available.
- Support reusable business models and companies.
- Dispose of teacups at designated recycling points when available. If none are provided, ensure the cup is empty and place it in the appropriate recycling bin.
- Provide feedback to sellers and advocate for packaging options that reduce plastic waste if such initiatives are not in place.

05 Conclusion

This report has aimed to demonstrate a pathway forward for how the new tea beverage industry can champion a Zero Waste future, using the “3 Rs” as a starting point for modeling plastic waste reduction potential. With a strong foothold in China and other Asian countries, and a growing global popularity, the new tea beverage industry has an opportunity to chart the course now for an exciting and innovative model for product delivery that can help the industry do its part to reduce waste, and to inspire similar actions in the food and beverage sector. A future free of plastic waste is possible, and we look forward to continuing the conversation with businesses, industry leaders, governments, civil society, and others to help support this vision.

References

1. The Organisation for Economic Co-operation and Development.Global Plastic Outlook[R/OL].(2022-02-22)[2024-07-01].https://www.oecd-ilibrary.org/environment/global-plastics-outlook_de747aef-en
2. UNEP.Turning Off the Tap - How the World Can End Plastic Pollution and Create a Circular Economy[R/OL].(2023-05-16)[2024-07-01].https://www.unep.org/resources/turning-off-tap-end-plastic-pollution-create-circular-economy.
3. Nordic Council of Ministers.Possible Elements of a new global agreement to prevent plastic pollution[R/OL].(2020-10-18)[2024-07-01].https://www.norden.org/en/publication/possible-elements-new- global-agreement-prevent-plastic-pollution
4. China Insights Consultancy, China Tea Industry Blue Book [R/OL].(2024-06-19)[2024-07-04].
5. New-style Tea Beverage Committee of China Chain-Store & Franchise Association & Meituan New Catering Research Institute, 2023 New-style Tea Beverage Research Report [R/OL]
6. Huafu Securities, In-depth Report on Tea Beverage Industry: Oriental Tea Go Local and Go Global [R/OL]
7. IDTechEx, Bioplastics 2020-2025 [R/OL]
8. Circular Economy Industry Research Center of School of Environment of Tsinghua University, Research Report on Environmental Impact Assessment and Policy Making of Degradable Plastics [R/OL].[2022-04-01](2024-06-24).
9. The Organization for Economic Co-operation and Development.Global Plastic Outlook[R/OL].(2022-02-22)[2024-07-01].https://www.oecd-ilibrary.org/environment/global-plastics-outlook_de747aef-en
10. Ministry of Housing and Urban-Rural Development of China, China Urban-Rural Construction Statistical Yearbook 2022 [EB/OL].(2023-10-13)[2024-07-01].https://www.mohurd.gov.cn/gongkai/fdzdgknr/sjfb/tjxx/jstjnj/index.html
11. Ellen MacArthur Foundation .(2019). Reuse-rethinking packaging. https://www.ellenmacarthurfoundation.org/reuse-rethinking-packaging
12. CMS. Plastics and Packaging Laws in France, https://cms.law/en/int/expert-guides/plastics-and-packaging-laws/france.
13. China National Resources Recycling Association, General Guidelines for the Evaluation of Plastic Products' Easy-to-recycle & Easy-to-regenerate Design (T/CRRA 0302-2020) [S].2021-01-18
14. Dai Jun, Fan Shuaikang, Zhuang Xuning, etc., Current Situation and Optimization Strategy of Recycling and Reuse of Domestic Waste Plastics in Shanghai [J], Journal of Shanghai Polytechnic University, 2024,41(01):46-53.DOI:10.19570
15. Institute of Economic System and Management of Macro Economy Research Institute of National Development and Reform Commission, Survey Report on the Current Status of Recycling and Use of Low-value Recyclables in China, [R/OL].(2023-12-01)[2024-07-01].

Pacific Environment

Website: https://www.pacificenvironment.cn

https://www.pacificenvironment.org

E-Mail: PEchongqing@pacificenvironment.org

WeChat official account: PEChongqing