



Waste Reduction and Recycling in China's F&B Sector

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WASTE REDUCTION AND RECYCLING IN CHINA'S F&B SECTOR

EXECUTIVE SUMMARY

Driven by rapid economic growth and industrialisation, **China has become the world's largest producer in absolute terms of food loss, waste, and single-use plastics**, occurring across various stages of the production and consumption cycle. While China's vast population and large-scale food production contributes to this material waste, the food delivery industry—the largest globally—is the biggest contributor. To address these issues and align with sustainability, carbon peaking, and emissions reduction goals, China has developed a regulatory framework promoting waste reduction and recycling. This has created strong demand for solutions that reduce environmental pollution, waste, and emissions while enhancing recycling efficiency—offering significant opportunities for EU SMEs.

This report provides EU SMEs with a practical guide to China's waste reduction and recycling market in the F&B sector:

- Chapter 1 offers an **overview of the market, its background, and current challenges**. The sector is shaped by strict regulations, rising consumer awareness, and technological advances addressing food waste and single-use plastics. Opportunities include biodegradable materials, waste-to-energy solutions, and food-grade recycling, with domestic mid-sized private firms dominating the market alongside some foreign players.
- Chapter 2 **details market entry requirements**, emphasising the need to navigate a complex regulatory environment involving multiple agencies. While **food-grade recycled plastics** remain restricted, recent initiatives signal potential openings. EU SMEs can explore entry options such as partnerships with local distributors, direct operations, or publicly funded joint R&D and demonstration projects.
- Chapter 3 highlights **key opportunities and practical tips for EU SMEs**, focusing on high-demand technologies and strategies to address challenges, particularly in intellectual property rights protection.

- Chapter 4 presents **two case studies**: one on automation systems for plastics recycling and another on EU-China collaboration under Horizon Europe.

China's F&B waste reduction and recycling market presents promising opportunities for EU SMEs, driven by strong policy support, increasing demand for sustainable products, mature industrial chains, and technological innovation in areas such as bio-based plastics and waste-to-energy. EU SMEs, often equipped with innovative and highly regarded EFSA-certified solutions, can leverage these strengths to succeed. However, market success requires thorough preparation, significant resources, and a long-term commitment to navigating China's evolving regulatory landscape and sustainability goals.



1. SECTOR OVERVIEW

Recycling in the Food & Beverage (F&B) sector plays a critical role due to both its environmental and economic significance. The sector generates a considerable amount of waste, including packaging materials, food waste, and by-products. In 2021, **food loss and waste (FLW)** in China alone was estimated to be around 27%, accounting for nearly a quarter of the global total. Of this waste, 45% is associated with postharvest handling and storage, and 13% with out-of-home consumption activities.¹ This waste occurs at various stages, from farm to plate. However, it's important to recognise that data on FLW is not entirely reliable, particularly in the restaurant sector, where most reports focus predominantly on major urban areas.²

China's takeaway food industry, the largest in the world, saw 17 billion orders in 2020, a number that continues to rise dramatically. Research indicates that this industry alone generated approximately 1.6 million tons of plastic waste that year.³ Effective recycling in this context can **significantly reduce environmental pollution** while conserving valuable resources.

Economically, **recycling offers tangible benefits to F&B companies**. It can help businesses cut costs by reducing waste disposal fees and allowing for the recovery of valuable materials, contributing to more sustainable and financially efficient operations.

1.1 DEVELOPMENT BACKGROUND

China has implemented progressive environmental regulations and policies to promote sustainable practices over the years. At the highest legislative level, the primary laws governing this sector are:

- The **Environmental Protection Law** (1989, last revised in 2014).⁴ This law has a broad scope focused on preventing pollution, protecting public health, improving environmental quality, and promoting sustainable socio-economic development.
- The **Law on the Prevention and Control of Solid Waste Pollution** (1995, last revised in 2020,

hereinafter referred to as the *Solid Waste Law*).⁵ This law outlines a specific legal framework for the management of solid waste, including plastics. While it does not explicitly mention the F&B sector, Article 69 prohibits or restricts the production, sale, and use of disposable plastic products, such as non-degradable plastic bags. It mandates that companies such as e-commerce platforms, express delivery services, and take-out businesses report the use and recycling of such products to the relevant authorities. It also encourages the reduction and active recycling of disposable plastic products, promoting the use of recyclable, easy-to-recycle, and degradable alternatives.

- The **Circular Economy Promotion Law** (2008, revised in 2018).⁶ This law promotes sustainable development by encouraging resource conservation, recycling, and efficient use of materials throughout the production, distribution, and consumption processes to reduce waste and environmental impact. Unlike the previous two laws, it specifically mentions the F&B sector. Article 26 stipulates that service enterprises such as catering, entertainment, and hotels should adopt energy-saving, water-saving, and material-saving products conducive to environmental protection. New service enterprises must use energy-saving technologies, equipment, and facilities that reduce resource waste and pollution.

On this basis, several departmental rules and opinions were issued by individual authorities, targeting waste across various sectors, including the F&B industry. Notable examples are:

- Two key documents focusing on plastics in the F&B industry are the *Opinions on Further Strengthening Plastic Pollution Control*, [issued in 2020](#) by the National Development and Reform Commission (NDRC) and the Ministry of Ecology and Environment (MEE), and the *Notice on Further Strengthening Plastic Pollution Control in the Commercial Sector*, [issued in the same](#)

1 <https://www.nature.com/articles/s43016-021-00317-6> (accessed: 18 Oct 2024).

2 <https://www.sciencedirect.com/science/article/pii/S030147972102154X> (accessed: 18 Oct 2024).

3 <https://www.sciencedirect.com/science/article/abs/pii/S0048969721070996> (accessed: 18 Oct 2024).

4 https://www.mee.gov.cn/ywgz/fqgz/fl/201404/t20140425_271040.shtml (accessed: 18 Oct 2024).

5 https://www.gov.cn/xinwen/2020-04/30/content_5507561.htm (accessed: 18 Oct 2024).

6 http://www.npc.gov.cn/zgrdw/npc/xinwen/2018-11/05/content_2065669.htm (accessed: 18 Oct 2024).

[year](#) by the Ministry of Commerce (MOFCOM). These documents introduced an **immediate ban on single-use straws in the restaurant and catering industries**, followed by a ban on single-use cutlery starting in 2022. Additionally, they encourage the use of **bio-based and alternative products**, such as straw-coated lunch boxes and degradable plastic bags in the F&B takeout sector. The goal is to reduce the consumption of single-use plastics for food delivery packaging by 30% by 2025.

- A significant initiative targeting F&B waste, particularly in agriculture and households, is the **Food Saving Action Plan**, issued in late 2021 by the Ministry of Agriculture and Rural Affairs (MARA). This document outlines various tasks to reduce, recycle, and identify F&B waste. These include promoting source reduction, recycling, and the harmless treatment of household kitchen waste, exploring the use of leftover food as animal feed, and optimizing the utilisation of grain and oil processing by-products—such as rice bran, germ, oil meal, potato residue, and potato liquid—to produce edible foods, functional substances, or industrial products.

Building on these laws and the *Food Safety Law* (last revised in 2021), in 2021, the National People’s Congress enacted China’s first overarching law aimed at reducing food waste: the **Anti-food Waste Law** (反食品浪费法).⁷ Its goal is to reduce food waste across the supply chain, especially in the restaurant and catering sectors, by raising awareness, promoting efficient food use, encouraging food donations, banning practices that induce excessive consumption (e.g., all-you-can-eat promotions and oversized portions), and imposing fines on businesses and consumers for excessive waste.

Key drivers

Government policies and regulations are the primary drivers of waste reduction and recycling in China’s F&B sector. Measures are continuously incorporated into five-year plans, action plans, and local-level

regulations, **particularly at the municipal level.** Developed cities along coastal regions like Shenzhen, Shanghai and Hangzhou are pioneers in promoting waste reduction and recycling, with Chengdu also paying significant attention to the issue. County-level cities have more flexibility in implementation.

China’s commitment to **peaking carbon emissions by 2030 and achieving carbon neutrality by 2060**⁸ has also elevated waste reduction and recycling as central goals. A recent example is the State Council’s *Opinions on Accelerating the Construction of a Waste Recycling System*, issued in March 2024,⁹ which aims to establish a regulated waste recycling system by 2025 and achieve perfection by 2030. Though not exclusive to the F&B sector, it plays a significant role in waste management. **New policies and actions are expected leading up to the 2026 five-year plan period, guiding the sector’s development through 2030.**

Another key driver is **technological innovation**, especially in disposable plastic food packaging and waste-to-energy solutions. Innovation focuses on improving material properties, reducing production costs, and developing environmentally friendly materials. Examples include modification technologies to enhance plastics’ heat resistance, nanotechnologies to improve barrier properties, and the use of biodegradable materials derived from plant fibres.

China’s top-down planning system provides valuable insights into the technologies and innovations that are prioritised to address existing gaps and bottlenecks. In this context, publicly-funded R&D programmes can offer key indicators of the areas receiving government support and focus. Such programmes are particularly useful for identifying strategic areas of development.

Additionally, **funding opportunities for collaborative R&D or demonstration projects with Chinese partners are available**, including through EU-level initiatives like Horizon Europe, as well as at the Member State level. Further details can be found in [Chapter 3 of this report](#).

⁷ https://www.gov.cn/xinwen/2021-04/29/content_5604029.htm (accessed: 18 Oct 2024).

⁸ Carbon peak and neutrality (碳达峰碳中和, also commonly referred to as “double carbon”, 双碳) was announced in 2020 by president Xi Jinping during the 75th UN General Assembly. It encompasses a comprehensive approach of reducing fossil fuel dependency, promoting renewable energy, enhancing energy efficiency, and supporting green innovation. A wide range of policies, regulations and actions have been issued so far to meet the ambitious goals, a comprehensive overview is available at: <http://www.prcee.org/yjcg/yjbg/202403/W020240313623895148361.pdf> (accessed: 18 Oct 2024).

⁹ https://www.gov.cn/zhengce/content/202402/content_6931079.htm (accessed: 18 Oct 2024).

Finally, **consumer awareness is an increasingly important driver** in China's F&B recycling market. Rising public consciousness around the environmental impact of food systems is prompting consumers to

make more sustainable choices. This shift, particularly among students in schools and universities, further fuels the demand for effective recycling solutions and biodegradable plastics in the F&B sector.

1.2 CHALLENGES AND MARKET NEEDS

Despite efforts to phase out plastic waste in the F&B industry, particularly in the catering and food takeaway sectors, **the use of single-use plastics (SUPs) continues to rise**. According to online reports,¹⁰ the value of China's SUPs market in 2021 reached 50 billion RMB (approximately 6.5 billion EUR) and is expected to grow to 65 billion RMB (approximately 8.4 billion EUR) by 2025. In 2021, China consumed over 2.8 million tons of disposable plastic food packaging containers, exceeding 3 million tons, with Guangdong and Zhejiang provinces serving as the primary production hubs. In terms of composition, polypropylene (PP) makes up the majority (around 60%), followed by polystyrene (PS, approximately 25%) and polyethylene terephthalate

(PET, about 15%). Most SUPs are either landfilled or incinerated, with **only about 30% being recycled**, according to IPEN.¹¹

The food takeaway segment accounts for over 50% of the consumption of disposable plastic food packaging containers, followed by the restaurant and catering segment at 30%, with retail and other stores contributing the remaining 20%.

It is evident that **bans and restrictions on the use of SUPs in the F&B sector have not been particularly effective so far, especially in the takeaway segment**. Several challenges remain, as shown in the table below:

Issue	Assessment
Enforcement issues	Although online platforms have started to offer consumers to choose no-utensil options when placing takeaway orders, it is not uncommon for this choice to be overlooked, resulting in single-use utensils still being included. ¹²
Limited recycling, "dead-end" recycling	While recycling of SUPs has increased in both absolute and relative terms, official recycling figures generally do not distinguish between different types of plastics. As a result, they often include low-value plastics rather than food-grade plastics. ¹³ This contrasts sharply with the EU, where high-value recycling of plastics is promoted. At the same time, the absolute majority of recycled PET in China is used in textile and fibres, which means it can be reused only once, not in a circular way, thus requiring landfilling or incineration at the end of its second use.
Restrictions for the adoption of food-grade rPET	As mentioned above, despite China's large rPET production capacity, most rPET is currently used in textiles and fibres. Although local players are beginning to explore opportunities in food-grade rPET, its use remains unregulated in China, although strongly advocated by domestic enterprises (more details in Section 2.2 of this report).
Ineffectiveness of awareness campaigns	The launch of awareness-raising campaigns, particularly in schools and universities, has not directly led to a significant reduction in F&B waste, according to existing research. ¹⁴
Economic disparities	The adoption of waste reduction and recycling approaches varies significantly between affluent coastal regions and inland areas, primarily due to economic disparities and differences in consumer awareness.

10 https://business.sohu.com/a/805593415_120872569 (accessed: 18 Oct 2024).

11 https://ipen.org/sites/default/files/documents/ipen-china-2021-epa_v1_2.pdf (accessed: 18 Oct 2024).

12 See a report from the NGO Plastic Free China: https://mp.weixin.qq.com/s/3X1gdB_nNrx4H6IHKKgSPw (accessed: 18 Oct 2024).

13 Feedback from industry practitioners based in China, collected in Sep 2024.

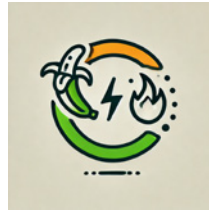
14 <https://www.sciencedirect.com/science/article/abs/pii/S0921344923004950> (accessed: 18 Oct 2024).

Three areas with particular potential in the Chinese market



Food contact materials from recycled plastic

Systems and production equipment for collecting, sorting, and recycling plastic bottles into new Food Contact Material products, including food-grade rPET and rPE.



Food waste management, waste-to-energy

Technologies for converting food waste into energy, such as anaerobic digestion systems, as well as processes that transform waste materials into high-value products like animal feed or biofertilisers.



Sterilisers for reusing packaging and containers

Equipment for sterilising and reusing packaging and containers, reducing waste and promoting sustainability.

Any technology or solution that helps tackle these challenges contributes to the achievement of national and local government policies and goals is encouraged. More specifically, **three areas are perceived to have particular potential in the Chinese market**, as shown above.

It is also useful to consider the opportunities arising from **recycling solutions that go beyond food-contact products, such as labelling films** (shrink sleeves or plastic labels that wrap around bottles) **or secondary packaging used to bundle groups of bottles** (shrink wrap for multipacks). For example, it is noted that as early as 2021, the major Chinese dairy company Mengniu began using a type of recycled shrink film resin for its secondary packaging, which is not directly intended for food contact (FCM).¹⁵ The main resin had no limitations at the time of release regarding the types of products involved. Initially, this solution was applied to two products. Sources also indicate that the two products have different environmental storage requirements: one is stored at ambient temperature, while the other is chilled.

Another noteworthy development comes from Siegwark, which has introduced washable shrink sleeves made from a specially designed film printed with washable inks. This innovation enables the shrink

sleeves to be fully recyclable alongside plastic bottles. **Recyclable shrink sleeves, produced from PETG** (a type of polyethylene terephthalate glycol-modified) **and post-consumer recycled (PCR) material**, can generate significant savings by reducing waste. Unlike traditional shrink sleeves, which can be difficult to separate from other packaging materials, leading to contamination in the recycling process, these recyclable sleeves can be processed directly with PET, eliminating the need for separation. This represents a specific market opportunity for EU SMEs.¹⁶

1.3 MARKET STRUCTURE AND KEY PLAYERS

China's recycling sector encompasses a wide range of companies, including a significant number focused on plastic recycling. Notably, many Chinese companies are well-established in the production of recycled plastic, as well as plastic recycling machinery and organic recycling equipment, such as composting lines. They have also developed expertise in washing and disinfecting solutions for recycling processes. However, due to stringent cleaning and disinfection requirements during the manufacturing process, and the high technical capabilities required, **the concentration of companies is relatively low overall, and the sector is dominated by mid-sized private firms**. Nonetheless, China's

¹⁵ <https://asiafoodbeverages.com/mengniu-becomes-1st-chinese-fb-company-to-use-recycled-resin-packaging/> (accessed: 21 Nov 2024).

¹⁶ For more details on these opportunities, see: <https://ink-safety-portal.siegwerk.com/sustainability/pet-shrink-sleeves-recycling/>; and <https://premiumlabelandpackaging.com/recyclable-shrink-sleeves-a-game-changer-for-eco-conscious-brands/> (both accessed: 21 Nov 2024).

state-owned giants (such as Sinopec) have started to increase R&D investments in this area. Specialised online databases of recycling companies provide insights into the overall market.¹⁷

Furthermore, although **the commercialisation of food-grade recycled plastics has not yet been**

approved within China (see [Section 2.2 of this report](#)), several enterprises are actively involved in this segment and are exporting to the EU and US markets thanks to authorisations obtained from the EFSA and the US FDA. Key players, both domestic and foreign, are included in the table below.

Company	Introduction
Guangxi Guolong 广西国龙	The company, officially Guangxi Wuzhou Guolong Renewable Resources Development Co. Ltd., was established in 2012 and is located in the Wuzhou Circular Economy Park. It engages in high-value recycling of waste plastics, rubber, and metal. Its annual production capacity reaches 120,000 tons of food-grade PET, HDPE, and PP. The company has obtained several certifications, including from the EFSA and the US FDA.
Incom Resources 盈创汇智	Incom Resources (Yingchuang) is one of China's pioneers in building food-grade rPET production lines. Using advanced equipment from world-leading suppliers such as Bühler, Sorema, and Pellenc, it has obtained EFSA and US FDA certifications. It was also selected by China's CFSA as one of the sites for exploring the feasibility of food-grade rPET. In 2023, it expanded its rPET factory, achieving: (i) Disposal capacity of 80,000 tons/year for waste beverage bottles; (ii) Production capacity of 60,000 tons/year for high-quality PET fragments; and (iii) Food-grade PET chip production capacity of 30,000 tons/year.
Shanghai Re-Poly 上海睿聚环保	Shanghai Re-Poly, officially Shanghai Re-Poly Environmental Protection Technology Co., Ltd., was established in 2017. It is particularly renowned for using digital applications and MES intelligent manufacturing systems in the production of food-grade recycled plastic, which closely resembles virgin materials while contributing to over a 70% reduction in carbon emissions.
Zhejiang BoReTech 宝绿特	Zhejiang BoReTech, part of the Taiwanese BoReTech Group, was established in 2005 in Pinghu City, Zhejiang. The company specialises in manufacturing equipment (particularly for high-purity recycling of PET bottles) and engineering services for entire plant recycling and cleaning, including bottle-to-bottle systems. Its equipment is used worldwide, processing more than 4 million tons of rPET bottle chips annually.
Ceville Materials 赛维尔新材料	Ceville Materials, officially Jiangsu Ceville New Materials Co., Ltd., was established in 2018 in Zhenjiang, Jiangsu Province. It is a global leader in producing food-grade rPET. Recently, it launched an expansion project in collaboration with Erema, Tomra, and Avian. Once operational in early 2025, this facility will achieve a high-quality recycled resin production capacity of 150,000 tons/year through physical and chemical methods, using waste PET bottles, HDPE/PP bottles, textiles, and films to produce food-contact grade, fine denier porous fibre grade, and functional recycled chips.

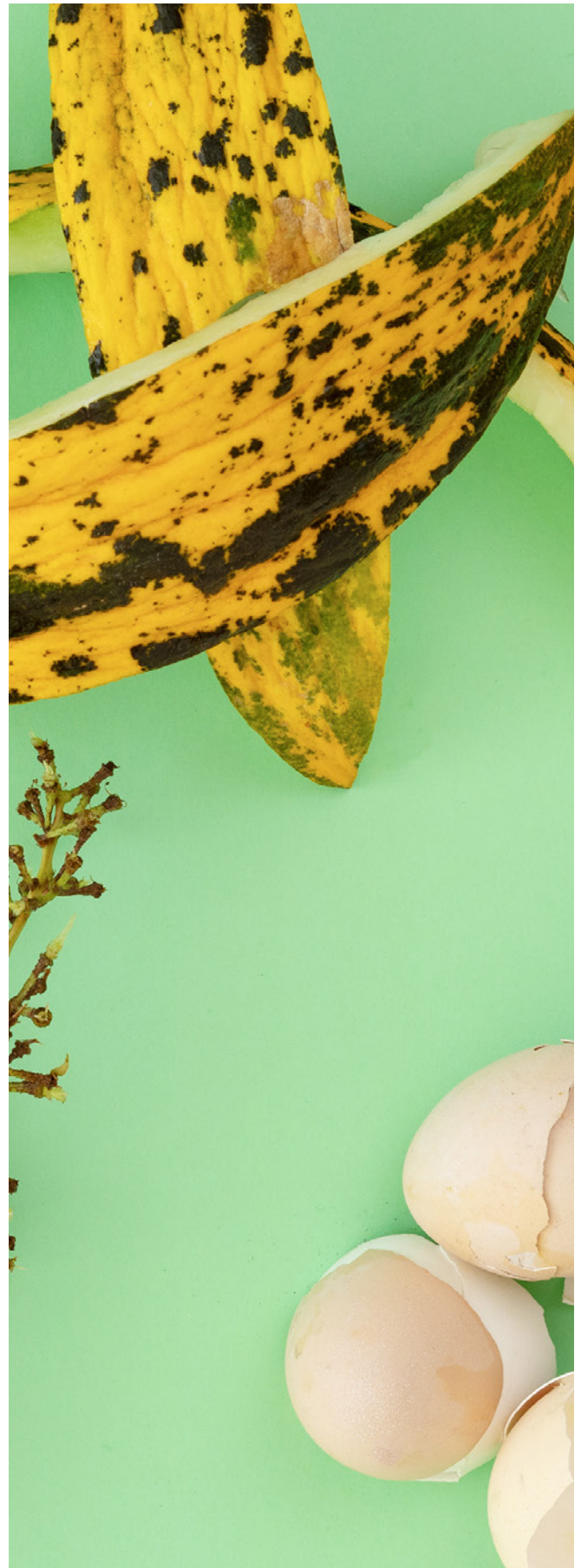
In the European Union, many companies focus on producing food-grade rPET, with a larger number of players compared to China, particularly in recycling plastics for Food Contact Materials like food-grade rPET. However, **the number of EU companies operating in or exporting to China remains limited**, partly due to competition from well-established local players in

recycling technologies and uncertainties surrounding the market for food-grade rPET. As will be detailed in the subsequent chapter, the prevailing regulatory constraints regarding food-grade rPET are predominantly restrictive, although some openings exist. One notable exception is **Germany's Alba Group**.¹⁸

¹⁷ <https://www.enfrecycling.com/> (accessed: 18 Oct 2024).

¹⁸ ALBA Group in China (in full, ALBA Longyi New Materials (Jiangxi) Co. Ltd, 欧绿保龙一新材料(江西)有限公司) is a joint venture established in 2023 by ALBA Group and Jiangxi Longyi Renewable Resources Co., Ltd, based in the High-tech Development Zone of Yingtan City, Jiangxi. It has an annual production capacity of 50,000 tons of AAA PET bottle chips and 20,000 tons of food-grade PET chips. In 2024, the company completed its first phase project for producing food-grade rPET for overseas markets, through solid phase polycondensation process.

Other EU companies operating in China in polymer treatment and plastic recycling equipment include Veolia Group China, TOMRA, Piovon Group S.p.A., Amut, Kronos AG, and Scholz Recycling. Additionally, the public-private partnership WIPO GREEN connects technology providers with those seeking innovative solutions. Finally, the innovative French company CARBIOS, which participated in the EU SME Centre's business mission to China in September 2024,¹⁹ is actively seeking partners to expand its production facilities in China.



¹⁹ <https://www.eusmecentre.org.cn/the-2024-sme-business-mission-connects-green-industry-smes-exploring-the-chinese-market/>.

2. MARKET ENTRY REQUIREMENTS FOR EU ACTORS

China offers significant opportunities for foreign companies in the F&B waste reduction and recycling sector. Investment in the sector is explicitly encouraged, enabling foreign investors to benefit from incentives such as tax reductions, land-use benefits, and expedited permits. However, navigating this market requires understanding China's complex regulatory

environment, which includes mandatory and voluntary standards, certifications, and agency oversight. Different government agencies oversee policy implementation, safety standards, and technical specifications, while evolving regulations—such as for food-grade recycled plastics—highlight both challenges and potential growth areas, as well as market entry approaches.

2.1 ENCOURAGED SECTORS FOR FOREIGN INVESTMENT

China regulates foreign market entry through a series of special administrative measures, including negative lists (which outline restricted or prohibited foreign investments) and positive lists (which encourage foreign investments). **Waste reduction, recycling and risk identification in the F&B sector does not**

present major market entry restrictions; in fact, it is an 'encouraged' industry for foreign investment, as detailed in the *Catalogue of Encouraged Industries for Foreign Investment*.²⁰ The following table provides a non-comprehensive list of relevant technologies included in the Catalogue:

Area	Description	No. on Catalogue
Materials, waste recycling	<ul style="list-style-type: none"> ▪ Sorting, recycling and reuse of waste plastics ▪ Development, production and application of environment-friendly, innovation and safe plastic materials, e.g.: biodegradable plastics and their products; new photoecological multifunctional wide-width agricultural films; pollution-free degradable agricultural films; new plastic flexible packaging technologies and new products (high-barrier, multifunctional films and raw materials) 	107, 108, 109, 110
Waste management, waste-to-energy	<ul style="list-style-type: none"> ▪ Development and production of inorganic, organic and biomembrane for environmental protection ▪ Development and production of new fertilisers such as high-concentration potassium fertilisers, compound microbial inoculant, compound microbial fertilisers, straw and garbage decomposing agents, special functional microbial preparations, humic acid fertilisers ▪ Use of new renewable resources and green environmentally friendly processes to produce biomass fibres, including new solvent cellulose fibre (Lyocell), regenerated cellulose fibre using bamboo, hemp, etc. as raw materials, polylactic acid fibre (PLA), chitin fibre, polyhydroxyalkanoate fibre (PHA), animal and vegetable protein fibre, polybutylene succinate (PBS) ▪ Design and R&D of clean and new energy power for the transportation industry, such as biomass fuel power, methanol fuel power and ammonia fuel power 	76, 77, 103, 297

²⁰ The Catalogue consists of a 'positive list' indicating which sectors are particularly open and welcoming for foreign investment, both nationwide as well as in central and western regions. Foreign investors in these sectors will receive much stronger support from local administrations, in terms of incentives, preferential policies, access to administrative services, etc. The latest edition was published in 2022 by NDRC and MOFCOM, containing 519 sectors, plus many others for specific central and western regions. See: https://www.gov.cn/zhengce/zhengceku/2022-10/28/content_5722417.htm (accessed: 23 Oct 2024).

<p>Equipment, machinery systems and devices</p>	<ul style="list-style-type: none"> ▪ Manufacturing of solid waste treatment and disposal equipment, including sewage treatment plant sludge disposal and resource utilisation, landfill leachate treatment, landfill biogas generation and power generation ▪ Rural environmental improvement, rural domestic sewage and garbage treatment ▪ Manufacturing of complete sets of new energy power generation equipment or key equipment, including garbage power generation ▪ Manufacturing of biomass drying and pyrolysis systems and biomass gasification devices 	<p>18, 241, 310, 316</p>
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Being classified as an ‘encouraged’ sector for foreign investment typically means that local administrations may offer various incentives to attract foreign investors, such as tax benefits (e.g., reduced corporate income tax for a specified number of years), favourable terms for land use or office rentals, expedited processes for obtaining operational permits, comprehensive administrative support, and official recognition.²¹ If a company does not invest directly in China but only sells equipment to Chinese partners, it may still qualify for certain subsidies, potentially allowing the equipment to be purchased at a discounted rate. However, the equipment must be classified as “advanced” or “high-tech” and not be available from domestic manufacturers.

Overall, entering the Chinese market requires EU companies to navigate a complex regulatory environment. Companies must comply with local standards, obtain necessary certifications, and make strategic decisions on how to structure their market entry. Below is a comprehensive overview of these requirements in the F&B waste reduction and recycling sector, as well as the common market entry approaches used.

2.2 REGULATORY LANDSCAPE, STANDARDS AND CERTIFICATIONS

The regulatory landscape for F&B waste reduction and recycling in China is overseen by several key agencies. Specifically, the **Food Safety Commission of the State Council** is responsible for overarching policy coordination, development, and supervision in the field of food safety. The **National Health Commission (NHC)** oversees food safety risk monitoring and assessment (through its specialised institutes), formulates and publishes national food safety standards, and discloses

public information. The **State Administration for Market Regulation (SAMR)** supervises and manages food production, distribution, and catering, as well as grants relevant licenses and permits required for launching operations; since 2018, SAMR has taken over the responsibilities of the former China Food and Drug Administration (CFDA), which has since ceased to exist. Under SAMR, the **Standardisation Administration of China (SAC)** is responsible for formulating standards other than those related to food safety through its numerous technical committees, such as the National Technical Committee for Basics and Management of Product Recycling (**SAC/TC415**) and the National Technical Committee for Plastics (**SAC/TC15**). The **General Administration of Customs (GACC)**, on the other hand, plays a critical role in ensuring the compliance of imported and exported products with Chinese laws, regulations, and standards.

In addition to the basic requirements set forth by China’s laws, such as the *Solid Waste Law* and the *Anti-Food Waste Law* (see [Section 1.1](#)), relevant entities must also **adhere to the safety and technical requirements outlined in Chinese standards and specifications**. China’s standardisation system is relatively complex, encompassing both government-led and market-driven standards, as well as national and sectoral standards, with a mix of mandatory and voluntary standards. In the F&B waste reduction and recycling sector, most standards are mandatory due to their direct impact on public health, safety, and the environment. Even non-mandatory standards are highly recommended in practice, as they may be requested by Chinese partners, used as evaluation criteria for government procurement, or required for obtaining relevant certifications.

Given the broad scope of F&B waste reduction and recycling, requirements may vary significantly and may

²¹ For an overview of the incentives that may be obtained by EU SMEs investing in China, see a dedicated EU SME Centre report: <https://www.eusmecentre.org.cn/publications/incentives-subsidies-and-funding-for-tech-smes-in-china/>. Although the report was made in 2021, the content is, overall, still up-to-date.

or may not involve obtaining licenses or certification. The following table provides an overview of the main requirements for different types of products,

technologies, and solutions. **A more detailed analysis of food-grade recycled plastics will be provided in [Section 2.2](#).**

Field	Application	Examples
Plastics recycling	Recycling of plastics generated from F&B-related industries, e.g. takeaway and delivery	<ul style="list-style-type: none"> ▪ GB/T 39171-2020 Technical Specifications for Waste Plastic Recovery (voluntary): outlines the overall requirements for the collection, sorting, storage, and transportation of waste plastics (excluding hazardous and medical waste). ▪ GB/T 37821-2019 Technical Specifications for Waste Plastics Recycling (voluntary): specifies requirements for crushing, cleaning, drying, sorting, granulating, and reusing waste plastics (including PE, PP, PS, ABS, PVC, and PET), as well as energy consumption and environmental protection requirements. <p>Several other relevant standards for plastic recycling were developed by the China Plastic Reuse and Recycling Association, including for recycled PET and High-Density Polyethylene (HDPE) packaging containers.²² It is noteworthy that several additional standards are currently being drafted under SAC/TC15 Plastics, including two guides for the recycling design of PET and HDPE, three standards for the identification and marking of recycled plastics or components, a standard for limiting restricted substances, etc.²³</p>
Waste-to-energy	Recovery of F&B waste and conversion into resources for feed, energy, fertilisers, etc.	<p>A number of voluntary national standards exist for the recycling and transformation of various types of agricultural waste into bioenergy and organic fertilisers, such as:</p> <ul style="list-style-type: none"> ▪ GB/T 42546-2023 for agricultural product processing waste, GB/T 42679-2023 for recovery, recycling, and emissions control of biomass resources, and GB/T 42550-2023 for packaging waste of materials used in agricultural production. <p>Standards also exist for the utilisation of certain types of F&B waste as feed, such as:</p> <ul style="list-style-type: none"> ▪ GH/T 1460-2024 Technical Specification for Green Fermentation of Vegetable Waste into Feed (voluntary): stipulates specific requirements for converting vegetable waste into high-quality feed through fermentation. <p>There are also local standards for the transformation of kitchen waste into feed, which apply only within specific regions. Examples include DB42/T 1884-2022 for Hubei province and SZDB/Z 252-2017 for Shenzhen.</p>

²² See: <http://cprra.org.cn/en/standards-and-certifications> (accessed: 15 November 2024).

²³ <https://m.86pla.com/news/detail/68626.html> (accessed: 15 November 2024).

Field	Application	Examples
<p>Equipment, machinery systems and devices</p>	<p>Design, production of equipment used for reducing and/or recycling F&B waste, e.g. crushing machinery, sorting equipment, sterilisers, etc.</p>	<p>Currently, there are no specific standards for the design and manufacturing of F&B waste treatment and recycling equipment, machinery, systems, and devices. However, general standards and technical specifications applicable to their category or function must be met, even if not specifically designated for F&B waste treatment. For instance:</p> <ul style="list-style-type: none"> ▪ Sterilisers for reusing F&B packaging and containers must comply with standards such as GB 8599-2023 for large-scale pressure steam sterilisers, YY/T 0646-2022 for small-scale pressure steam sterilisers, YY 0503-2005 for ethylene oxide sterilisers, and YY 0504-2005 for portable pressure steam sterilisers. ▪ Crushing equipment must meet the requirements of GB 18452-2001 Crushing Equipment – Safety Requirements, as well as additional sectoral standards such as JB/T 12799-2016 for semi-portable crushing and screening plants. <p>Relevant standards for energy efficiency and safety must also be met. Although the China Compulsory Certification (CCC) is generally not required in this sector (with some exceptions), the China Quality Certification (CQC) mark may be requested by Chinese partners. Although voluntary, this mark indicates product compliance with quality, safety, performance, electromagnetic compatibility, and other certification requirements.</p> <p>Environmental certifications may also be required, depending on the technology being exported. In the vast majority of cases, reference is made to the China Environmental Labelling (China Environmental United Certification Centre).</p>

Field	Application	Examples
Environmental management	Quality and environmental management	<p>Several standards for environmental quality management and systems are based on international (ISO) standards and are widely recognised in China. Holding these certifications is generally considered a significant asset for European entities. Key examples include:</p> <ul style="list-style-type: none"> ▪ <i>GB/T 24001-2016 Environmental Management System Requirements and Guidelines for Use</i>, based on ISO 14001. ▪ <i>GB/T 19001-2016 Quality Management Systems – Requirements</i>, based on ISO 9001. ▪ <i>GB/T 45001-2020 Occupational Health and Safety Management Systems – Requirements and Guidelines for Use</i>, based on ISO 45001.
	Waste reduction in specific industries	<p>Several standards and guidelines have been issued to reduce food waste, minimise packaging, and enhance environmental protection, particularly targeting key industries such as the food service sector. These apply to catering operators, food delivery services, restaurants, and hotels. Examples include <i>GB/T 39002-2020</i>, <i>GB/T 40042-2021</i>, <i>GB/T 33497-2023</i>, and <i>GB/T 42966-2023</i>.</p>
	Pollution control in waste treatment facilities	<p>Numerous standards and technical specifications apply to operators of domestic waste treatment and disposal facilities, covering collection, landfills, and incineration. Most are mandatory and therefore highly relevant, as they stipulate detailed requirements for operators as well as environmental protection guidelines for the selection, construction, operation, and closure of treatment sites. Examples include:</p> <ul style="list-style-type: none"> ▪ <i>GB 16889-2024 Pollution Control Standard for Domestic waste Landfills</i> ▪ <i>HJ 1307-2023 Technical Guidelines for On-site Supervision and Inspection of Domestic waste Incineration Power Plants</i> ▪ <i>CJJ/T 316-2023 Technical Standard for Solidification and Stabilisation of Domestic waste Incineration Fly Ash</i>

2.3 FOOD-GRADE RECYCLED PLASTICS

Food contact materials (FCMs) represent an attractive business segment for EU companies specialising in F&B waste reduction and recycling solutions. With China's ambitious waste and carbon reduction targets, there is increasing demand for integrated solutions that combine F&B waste recycling with sustainable food contact materials, making this a promising growth area. By innovating in sustainable, recyclable, and safe FCMs, companies can help reduce food waste throughout the production-to-consumption cycle by extending shelf life, preserving food quality, and offering reusable or biodegradable packaging options.

However, **China's regulatory framework for FCMs is highly complex** and significantly differs from the EU's. While the EU's approach is guided by overarching directives, such as the EU Framework Regulation (EC 1935/2004), which allows for harmonisation across Member States, China's framework consists of both **national and industry-specific standards that vary by region, material type, and specific use case**. China's system often requires separate testing and approval processes and includes stricter requirements for certain additives, heavy metals, and migration limits.

The main mandatory reference standard for FCMs in China is the **GB 4806 National Food Safety Standard** series, specifically *GB 4806.1-2016 General Safety Requirements for Food Contact Materials and Products*.²⁴ This standard specifies basic requirements, limits, compliance principles, inspection methods, traceability, and product information for FCMs and articles of all types. Additional standards apply to specific types of FCMs, including:

- Polymer materials and products (GB 4806.2-2016)
- Enamelware (GB 4806.3-2016)
- Ceramic products (GB 4806.4-2016)
- Glass products (GB 4806.5-2016)
- Plastic materials and products (incl. starch-based) (GB 4806.7-2023)
- Paper and cardboard materials and products (GB 4806.8-2016)
- Metallic materials and products (GB 4806.9-2023)
- Rubber materials and products (GB 4806.11-2023)
- Bamboo and wood materials and products (GB 4806.12-2022)
- Composite materials and products (GB 4806.13-2023)
- Inks for FCMs and products (GB 4806.14-2023)
- Adhesives for FCMs and products (GB 4806.15-2024)

In addition, GB 9685-2016 regulates the use of additives in FCMs, while GB 31603-2015 governs hygiene practices in the production process. Testing of the technical specifications of FCMs, including chemical migration, is carried out according to the GB 31604 standard series, which consists of 59 parts. However, according to an Italian food packaging company with decades of experience operating in China, China's rules on food packaging are generally less comprehensive and stringent than those in the EU. This has occasionally led

to instances where local competitors used excessive chemicals or other cost-cutting techniques that compromised food safety and quality.²⁵

One of the main challenges EU companies face in the Chinese market is the high frequency of new rules and technical specifications introduced by Chinese authorities, coupled with the possibility that different agencies may have overlapping regulatory responsibilities, which could lead to uncertainty in how to interpret regulations. For instance, in August 2024, the SAC released updated general technical requirements for disposable plastic and paper tableware.²⁶ To navigate these frequent shifts, companies must stay informed of regulatory changes not only at the national level but also across provinces, where regional regulations may add further compliance layers.

In addition, although innovative recycling solutions and materials have enormous potential in the FCM segment, **China currently lacks comprehensive regulations for food-grade recycled plastics. Various regulatory bodies have alternated between effectively prohibiting food-grade recycled plastics for domestic consumption and issuing fragmented regulations, often on a case-by-case basis.** Since 2020, CFSA has been researching and conducting surveys to assess the use of recycled materials in FCMs, aiming to establish a regulatory framework for these products. While the initiative has made progress, there is still no definite outcome.²⁷ Consequently, existing regulations are fragmented—especially concerning decontamination and cleanliness standards—and the market for food-grade recycled plastics in China remains largely untapped.

²⁴ The full text of the standard, in Chinese, is available at: <http://www.nhc.gov.cn/sps/s7891/201611/06ed87a09dad4cf6aee48c-d89efbef35.shtml> (accessed: 14 Nov 2024). The standard was translated in English by the U.S. Department of Agriculture, see: <https://fas.usda.gov/data/china-general-safety-requirements-food-contact-materials-and-articles> (accessed: 14 Nov 2024).

²⁵ See: <https://www.eusmecentre.org.cn/publications/goglio-tianjin-packaging-co-ltd-a-leader-of-flexible-packaging-solutions/>.

²⁶ See, in Chinese, https://www.sac.gov.cn/xw/zqyj/art/2024/art_0ce820fb0d3148749f3288a48eb7953e.html (accessed: 14 Nov 2024).

²⁷ <https://foodpackagingforum.org/news/china-works-on-strategy-for-recycled-fcms> (accessed: 21 Nov 2024).

Paradox of China's market for food-grade recycled plastics: a "closed loop" development

Currently, despite stringent decontamination and cleaning requirements for food-grade recycled plastics, several Chinese companies have obtained authorisation from the European Food Safety Authority (EFSA) and the U.S. Food and Drug Administration (FDA) to export food-grade rPET to the EU and the United States.

In practice, the development of food-grade recycled plastics in China has taken the shape of a "closed loop." Domestic companies recycle beverage bottles and produce food-grade rPET, which is then exported to Europe and the United States. European and American producers use this China-produced food-grade rPET to manufacture bottles for their finished products, which are frequently re-exported to China via cross-border e-commerce, ultimately reaching Chinese consumers.

For this reason, many domestic producers of food-grade rPET in China are advocating with Chinese authorities to open the domestic market for food-grade recycled plastics.

Nonetheless, **there appears to be potential for the food-grade recycled plastics market in China to open in the near future.**²⁸ This is driven by the need to enhance environmental protection and the circular economy, in line with the country's carbon peaking and neutrality commitments. A proposal to introduce regulations allowing recycled plastics for food contact materials was submitted during China's 2024 Two Sessions. Numerous scientific conferences are regularly organised on this topic.²⁹ Currently, the **China National Centre for Food Safety Risk Assessment** (CFSA, 国家食品安全风险评估中心), under the NHC, is conducting technical assessments on the use of recycled plastics—particularly rPET—for FCM applications. These efforts could pave the way for the gradual opening of this market. Two verification tests conducted at Chinese

28 See an analysis published by the consulting firm Chemlinked: <https://food.chemlinked.com/expert-article/outlook-about-chinas-supervision-policy-for-recycled-plastics-in-food-contact-materials> (accessed: 21 Nov 2024).

29 See, for instance, a technical workshop organised by the China National Centre for Food Safety Risk Assessment gathering regulatory, experts and industry practitioners: <https://www.cfsa.net.cn/zxd/gzdt/2023/12592.shtml> (accessed: 15 Nov 2024). See also a major scientific conference that was held in 2023 in Guangxi province, gathering scientists and experts on the subject, see: <http://www.guolongplastic.com/index.php/news/39> (accessed: 15 Nov 2024).

30 See for instance this article featuring an interview with the Director of China's National Key Laboratory of Food Contact Materials (Guangdong), <https://finance.eastmoney.com/a/202403153014219387.html> (accessed: 15 Nov 2024).

31 <https://food.chemlinked.com/expert-article/outlook-about-chinas-supervision-policy-for-recycled-plastics-in-food-contact-materials> (accessed: 15 Nov 2024).

32 <https://www.cfsa.net.cn/spaqbz/xzxkzqyj/2024/14226.shtml> (accessed: 21 Nov 2024).

factories demonstrated the effectiveness of decontamination technology under simulated extreme pollution conditions, yielding successful results.³⁰ Other pilots, involving PE and PP, are either ongoing or expected soon.

However, the approval requirements and processes China will adopt remain unclear. According to online sources,³¹ **the CFSA has indicated that China might follow the EU's approach rather than the US model. However, no official announcement has been made to confirm this direction, so the matter remains speculative at this stage.** This would involve evaluating pollution levels for different types of plastics individually and approving applicable recycling processes step by step, which would provide greater familiarity for EU companies.

Procedurally, it is anticipated that the approval process will mirror that of other food-related products in China, involving three steps: (i) Submission of a dossier to the NHC by the applicant; (ii) Inspection and technical review conducted by the CFSA; (iii) Public consultation and/or additional expert review before the NHC issues a final approval decision. Relevant EU actors are advised to closely monitor the developments and activities of CFSA to identify market openings and opportunities.

Latest updates (October 2024)

At the time of compiling this report, there are no substantial updates on the general policies regarding the acceptance of FCMs. However, progress is being made gradually, as demonstrated by **CFSA's approval of three "new food-related products", specifically three additives for FCMs.**³² After passing CFSA's technical evaluation, the three products were in the "public comments" phase until 23 November 2024. The new additives include:

- Behenamamide: used as an additive to improve the processability of plastic materials. When used in low concentrations, it minimizes the risk of migration into food.

- A polyester resin with high chemical resistance, reducing the risk of interaction with food.
- A modified polyester-styrene polymer, used in rigid

plastic containers and trays for food storage.

CFSAs has already outlined the areas of use and restrictions applicable to each of these additives.

2.4 WHAT MARKET ENTRY OPTIONS?

A common market entry approach used by EU SMEs in the sector is to **partner up with a local Chinese distributor**, which in turn resells to other clients in China by adding a margin. The distributor, normally, coordinates all the import procedures, including ensuring compliance with relevant regulations and standards in China. The main advantage is that this approach reduces regulatory risks for EU SMEs and does not require extensive resources or investment in China; the main disadvantage relates to loss over branding and operation, as well as reliance on the distributor’s operational capabilities and financial stability—especially if an agreement of exclusivity is signed.³³

For those companies with more resources and knowledge of the market, sales can also be managed in-house. Typically, this is done by **establishing a Representative Office or a Wholly Foreign-Owned Enterprise (WFOE) in China**.³⁴ The main advantage is that this approach eliminates intermediary costs, offers higher profit margin, and allows full, direct control of branding and operations; the main disadvantage is that it requires significant resources (financial and human) to manage logistics, standards and certification, sales, marketing, etc.

For companies which have already successfully entered the market, thus having established sales and brand, **production in China gives the opportunity to scale up significantly**. This can be done through a WFOE, which allows full, direct and independent control of the operations and intellectual property rights; or through a **joint venture (JV)** with a Chinese partner. The benefits of a JV are access to the local partner’s knowledge of the market, networks of partners, including government authorities, as well shared costs and risks; the core disadvantage of a JV relates to the risks resulting from the shared control of a company, which could be complex

and potentially subject to disputes/divergences of the long-term, as well as potential intellectual property loss due to technology transfer, or even infringement.³⁵

Alternative approach: Project-based cooperation through public funding

Technologies and solutions that address waste recycling, utilisation and risk prevention in the F&B industry often also **constitute a priority for China for international collaboration activities**. Through National Key R&D Programmes, specifically the “*Intergovernmental Science, Technology and Innovation Cooperation Programme*”, joint projects might be funded with international partners in the sector.

Sino-Japanese joint project – Key technologies and demonstration of kitchen waste bio-refinery and co-production of bio-based products

In 2022, China’s Ministry of Science and Technology (MOST) and Japan International Cooperation Agency (JICA) co-funded a project aimed at transforming kitchen waste into high-value bio-based products, such as organic acids and bio-fertilisers, using advanced bio-refinery technologies.

The project was implemented, on the Chinese side, by Chengdu Environment Group, the University of Science and Technology (Beijing), and the Jiangnan University; on the Japanese side, it was implemented by the Green Earth Institute and Itochu Corporation Co., Ltd. The joint team, which has extensive experience in waste management and biorefinery processes, has developed an initial

³³ In general, it is not recommended to sign any exclusive agreement with one single distributor, as this will limit your possibilities and options for future expansion through other channels or regions across China. Furthermore, if the local distributor does not perform as expected, or a dispute arises, it might be costly and complex to end the relationship. By contrast, exclusive agreement may be a feasible option if it is linked to a very large volume of sales, penalties for underperformance, and is time-bound thus subject to review after a certain amount of time.

³⁴ For more information on the requirements for establishing a Representative Office and a WFOE in China, including their benefits and limitations, see the EU SME Centre’s dedicated FAQ “Registering a company”: <https://www.eusmecentre.org.cn/faq/>.

³⁵ For more information and insights on how to protect intellectual property rights in China, including when establishing a JV in the country, see the dedicated resources of the China IP SME Helpdesk, another EU-funded project that provides free of charge technical assistance to EU SMEs: https://intellectual-property-helpdesk.ec.europa.eu/regional-helpdesks/china-ip-sme-helpdesk_en.

implementation plan and will work toward demonstrating and applying its technical achievements by 2025. This includes building a demonstration industrial chain and contributing to the development of a green circular economy.

For more information: <http://www.sc.chinanews.com.cn/bwbd/2023-03-27/184294.html>.

Funding schemes or **joint calls in place between the EU and some Member States** explicitly address F&B waste recycling, utilisation, and risk prevention, as well as broader sustainability and circular economy topics:

- At the **EU level**, any entity from any country around the world can generally participate in **Horizon Europe calls**, covering their own participation costs.³⁶ Additionally, for specific calls, co-funding might be provided by the funding agencies of the partner's country. In the case of China, some Horizon Europe topics that fall under the scope of "Food, Agriculture and Biotechnologies" and "Climate Change and Biodiversity" are eligible for co-funding. Numerous collaborative projects have already been launched—see chapter 4 for detailed case studies. Another example of a recently closed call is [HORIZON-CL6-2024-COMMUNITIES-02-2-two-stage: New sustainable business and production models for farmers and rural communities](#).
- At the **EU Member State level**, ad hoc joint calls are regularly launched with China (generally through MOST, and sometimes the National Natural Science Foundation of China or the Chinese Academy of Sciences). Eligible topics depend on bilateral agreements signed between the two countries, but sustainability and the circular economy are recurring themes. Concrete examples in 2024 include joint calls between (i) Greece and China on sustainable food systems and green food; (ii) Finland and China on sustainable bio-based materials and packaging, plastics recycling, and waste treatment and recycling; and (iii) Belgium (Wallonia) and China on circular materials.



³⁶ Under Horizon Europe, non-EU entities can participate in most projects, however, they are generally not allowed to receive direct EU funding—though exceptions apply.

3. OPPORTUNITIES, CHALLENGES AND TIPS

The sector presents strong market demand and development opportunities. Firstly, despite efforts to phase out plastic waste in the F&B industry, **the use of single-use plastics is rising steadily**, with food takeaway accounting for over half. This trend may pose a challenge to China's strategy to peak carbon emissions and achieve carbon neutrality; therefore, solutions addressing this issue have significant potential. Secondly, China has a complete industrial chain across many sectors, including plastic products: all segments of the industrial chain are mature and widely available locally, from raw material supply to the manufacturing of finished products. However, the country is lagging behind in the high-end product segment, where imports are still dominant, presenting opportunities for EU SMEs. According to industry experts, products providing **intelligent management** through the integration of technologies such as the Internet of Things and big data have particular potential. Thirdly, **Chinese consumers' awareness of health and environmental protection is growing significantly**. High-quality and sustainable F&B materials, such as containers made of biodegradable materials or nanotechnology, are gradually being favoured by the market, especially in larger cities in both coastal and inland provinces.

At the same time, however, there are several challenges:

- The sector is grappling with **intense market competition and serious product homogeneity**, leading to low profit margins. Many similar products—especially in the low- and mid-end segments—crowd the market, making it difficult for companies to stand out. Continuous investment in R&D, technological innovation, and improving product and service quality are essential to winning market competition, together with product customisation.
- Price volatility in raw materials, particularly linked to fluctuations in crude oil prices, significantly impacts production costs. There are also considerable disparities across regions and municipalities. The

municipalities of Shenzhen, Shanghai, Hangzhou, and Chengdu particularly stand out for their efforts to reduce and recycle F&B waste, while others lag behind.³⁷

- Although China's regulatory framework has seen significant improvements, implementation may lag behind as pressure intensifies. Navigating the extensive range of regulations and standards is complex, requiring specific expertise from EU SMEs.
- Finally, EU SMEs must be fully aware that **entering the Chinese market often entails a degree of technology transfer and knowledge sharing**, which is often a key requirement for the approval of demonstration projects and equipment sales.³⁸ This aligns with China's focus on building secure and high-quality supply chains. **A robust intellectual property protection strategy must be in place well before entering the market.**³⁹

In conclusion, the sector is undergoing a critical phase of industrial transformation and technological advancement. Integrating waste reduction, recycling, and risk identification technologies within China's F&B sector is essential not only for achieving environmental sustainability but also for meeting the growing consumer demand for high-quality, sustainable products. Despite the challenges, the development of technologies such as food-grade rPET, biobased plastics, and waste-to-energy solutions underscores the industry's growth potential. **EU SMEs, with their strong industrial expertise, are well-positioned to contribute significantly; however, success will require extensive preparation, resources, and a long-term commitment.** This is well exemplified by the case study in chapter 4.1 of this report.

37 For instance, in September 2024 Shenzhen issued the new 2024 version of the Guidelines for Classification and Release of Domestic Waste, incorporating disposable lunch boxes into the recyclables system, further expanding the "sub-classification" of domestic waste, see: http://cgj.sz.gov.cn/xsmh/ljfl/pgyjh/flxc/content/post_11291821.html (accessed: 15 November 2024). Shenzhen and Shanghai are the municipalities in China with the highest domestic waste recycling and recovery rates.

38 A typical scenario is that a Chinese client agrees to work with a foreign company only on the condition that the technology is transferred to China, e.g., in the form of local production, local R&D, filing of local patent, licensing IP rights, etc., even if the ownership itself is not transferred. Without such commitment, the Chinese client would not sign the contract.

39 EU SMEs are strongly recommended to engage with the China IP SME Helpdesk, another EU-funded project that provides free of charge, tailored technical assistance on IP issues in China. See: https://intellectual-property-helpdesk.ec.europa.eu/regional-helpdesks/china-ip-sme-helpdesk_en..

3.1 TIPS FOR EU SMES

EU SMEs should firmly keep in mind the two most important drivers of the sector: government policies, and technological innovation. **Policies, action plans and other documents from government administrations at all levels should be closely analysed and monitored.** For instance, following the publication of the *Food Saving Action Plan* by MARA,⁴⁰ basically all provinces and municipalities across China issued similar documents outlining specific tasks to implement within their jurisdictions. Some of these explicitly call for the involvement of private actors and for international cooperation and exchanges.

China's planning system allows external observers to anticipate needs and identify opportunities. In addition

to local and sectoral five-year plans, a closer look at **China's R&D programmes may reveal insights into the technologies and innovations that are prioritised and supported to solve gaps and bottlenecks.** For instance, at the national level, R&D of waste recycling and risk prevention solutions is funded under the National Key R&D Programme "*Key technologies and equipment of circular economy*" (循环经济关键技术与装备), which is managed by the Ministry of Ecology and Environment. Numerous related topics are supported through annual calls for proposals – the table below summarises the topics that addressed the F&B sector over the past three years. **Similar opportunities generally exist at the local level as well.**

National Key R&D Programme – <i>Key technologies and equipment of circular economy</i> Specific topics targeting F&B industry waste recycling, utilisation and risk prevention		
2022	2023	2024
1. Green substitution and low-cost manufacturing technology for disposable plastic packaging 2. Waste plastic film decontamination, purification and high-value recycling technology and equipment 3. Key technologies for hazard screening and prediction of plastic additives	1. Exploration of cutting-edge technologies of circular economy 2. Green substitution of express packaging raw materials and product ecological design technology 3. Machine learning-based enzymatic hydrolysis and recycling technology of waste PET plastics 4. Chemical depolymerisation, recycling and upgrading of waste hybrid polymers 5. Identification and risk prediction techniques for early health effects of typical fluorocarbon surfactants	1. Exploration of cutting-edge technologies of circular economy 2. Technology for preparing high-value chemicals through efficient biotransformation of degradable waste plastics

Source: author's analysis of calls for proposals issued on the National S&T Information System Public Service Platform: <https://service.most.gov.cn/>

⁴⁰ http://www.moa.gov.cn/gk/zcfg/xzfg/202111/t20211103_6381159.htm (accessed: 22 Oct 2024).

In the next chapter are some **practical tips** that EU SMEs can follow to identify and exploit the opportunities of China's F&B waste reduction and recycling. But before doing so, a **solid IP protection strategy** must be developed (see footnotes n. 35 and 39).

1

Analyse **local-level five-year plans** and action plans

As deep as the municipal level and district/county level, i.e. where the issue is regulated. By doing so, it is possible to understand the specific problems faced and solutions sought; in most cases, urgently needed technologies are explicitly indicated. It is recommended to start with the localities accounting for the highest proportion of F&B waste, for instance Guangdong and Zhejiang for single-use disposable plastic food packaging containers; the municipalities of Shenzhen, Shanghai, and Hangzhou for innovative waste sorting and recycling; etc. However, do not neglect other interesting options in inland localities as they are catching up with richer coastal regions.

2

Examine **relevant catalogues** of advanced technologies and equipment

China has issued the *Catalogue of Advanced and Applicable Process Technology and Equipment for Comprehensive Utilisation of National Industrial Resources*. The Catalogue lists a total of 88 technologies and equipment, covering solid waste reduction, comprehensive utilisation, recycling of renewable resources, and remanufacturing; it includes several items relating to F&B waste reduction and recycling. The Catalogue was redacted to promote the application of the technologies in the list, therefore items on the list are perceived to have particular market potential in China.

3

Identify **key actors and events** in the shortlisted provinces

Identify key actors and operators in the field. One way to do so is by reviewing past cases of EU-China cooperation in the field (e.g. [see Section 4.2](#) of this report). Try also to identify influential research organisations and industrial associations as these often are very effective in facilitating cooperation. Examples are the China Association of Circular Economy (中国循环经济协会), the China Plastic Reuse and Recycling Association (中国塑料再利用与回收协会), and the China Plastic Industry Processing Association (中国塑料工业加工协会). Finally, trade fairs are also an effective platform to meet potential new partners and to increase company branding, these include generic ones (e.g. China Carbon Neutrality Expo) as well as sectoral ones (e.g. ChinaReplas and Chinaplas). It is also encouraged to participate in relevant scientific and academic conferences.

4

Explore **demonstration projects**, e.g. through Horizon Europe or joint calls at Member State level

Fully leverage collaborative mechanisms existing between the EU and China, to explore concrete cooperation initiatives, e.g. a demonstration project that could be scalable upon successful completion. Horizon Europe could offer an interesting entry point: Chinese entities are eligible to participate with their own funding, in most of the topics; at the same time, co-funding might also be available from Chinese government agencies, as hazardous waste may fall under priority topics for bilateral cooperation. Similar opportunities also exist at the Member State-level: EU SMEs should engage with their national funding agencies and [National Contact Points](#) to learn more about cooperation mechanisms.

4. CASE STUDIES

4.1 A LEADER IN AUTOMATION SYSTEMS FOR PLASTICS PROCESSING

An Italian company, founded in the 1930s as a pioneering engineering firm, has evolved into a leader in automation systems for plastics processing. Initially focused on general engineering, the company made a strategic pivot towards recycled plastics, capitalising on the growing demand for sustainable solutions in the industry. It now specialises in providing cutting-edge machinery for the processing of materials like rPET and rPP, with a diverse range of products including systems for conveying, granulation, grinding, storage, and decontamination.

The company's entry into China in 2005 marked a crucial step in its global expansion strategy. Recognising China's rapid industrial growth and its increasing focus on environmental sustainability, the company saw a significant opportunity to introduce its advanced recycling technologies to the market. The decision to **establish its first production plant in Guangdong province** allowed it to tap into China's vast manufacturing ecosystem and growing demand for recycled materials, particularly in sectors like packaging, consumer goods, and industrial applications.

A major turning point in the company's China strategy came in 2021 with the **construction of a 10,000-square-meter state-of-the-art facility in Jiangsu province**. This new hub features extensive R&D sections, laboratories, offices, and testing areas, further enhancing the company's **ability to innovate locally** and adapt its products to the needs of the Chinese market. The facility not only serves as a production centre but also acts as a knowledge hub, driving the development of new technologies tailored to China's recycling landscape. This expansion reflects the company's commitment to sustainability and innovation. Its focus on recycled plastics like rPET and rPP aligns with China's increasing emphasis on circular economy principles, where waste reduction and recycling are becoming central to government policies and consumer expectations.

The company is, currently, fairly successful in China. However, its journey has not been without challenges, such as intense competition as well as evolving regulatory requirements and complexity. However, the company was able to **overcome these hurdles through strategic investments in local R&D** and by building strong partnerships with Chinese stakeholders.

Moreover, by establishing multiple facilities across key industrial regions, the company not only secured a stable production base but also localised its operations, allowing it to reduce costs and respond more quickly to market demands. Additionally, the firm's focus on high-quality recycled materials, coupled with its advanced decontamination technologies, has enabled it to carve out a niche in the high-end market, differentiating itself from local competitors who often focus on lower-end products.

This company's journey in China highlights the significant potential for European firms that invest strategically in the country's evolving plastics recycling market. Its achievements are a testament to the **power of innovation and strategic investment in the country**. By aligning with local market needs, investing in innovation, and establishing a strong production and R&D presence, European companies can position themselves as leaders in an industry that is both competitive and growing rapidly. This success requires a long-term commitment, substantial resources, and the ability to adapt to local market conditions.

4.2 EU-CHINA JOINT PROJECTS UNDER HORIZON EUROPE

This section provides an overview of a number collaborative EU-China projects tackling F&B waste recycling, utilisation and risk prevention. These projects were funded under Horizon Europe, and may have received co-funding from Chinese government bodies (such as MOST or NSFC). Some projects are Marie Skłodowska-Curie Actions, thus focusing on the mobility of researchers; other projects are Research and Innovation actions, thus focusing on technology R&D. All information in this section was obtained from the EU's CORDIS database: <https://cordis.europa.eu/>.

1. *Nanomaterial-Aided Enhancement for Psychrophilic Anaerobic Membrane Bioreactor for Sustainable Bioenergy Recovery from Organic Waste (Nano4PAnMBR)*

- Grant agreement ID: 101151552
- Funded under: Marie Skłodowska-Curie Actions (MSCA)
- Type of action: MSCA Postdoctoral Fellowship

- Project duration: 1 June 2024 – 31 May 2026
- EU contribution: 165,312.98 EUR

The Nano4PAnMBR project, led by Universitat Autònoma de Barcelona (Spain) and including Tsinghua University as an associated partner, addresses the challenge of inefficient bioenergy production in cold regions through psychrophilic anaerobic digestion. It aims to enhance this process by integrating nanomaterials and membrane bioreactor technology, improving energy recovery from organic waste. Specific tasks involve synthesising nanomaterials, improving bioreactor performance, and mitigating membrane fouling, all to boost sustainable bioenergy production.

2. **Pushing the frontier of circular agriculture by converting residues into novel economic, social and environmental opportunities** (*AgriLoop*)

- Grant agreement ID: 101081776
- Funded under: HORIZON-CL6-2022-CIRCBIO-01-05 - EU-China international cooperation on unlocking the potential of agricultural residues and wastes for circular and sustainable bio-based solutions
- Type of action: Research and Innovation action
- Project duration: 1 December 2022 – 30 November 2026
- EU contribution: 7,825,297.00 EUR

The AgriLoop project, led by France's Institut National de Recherche pour l'Agriculture, l'Alimentation et l'Environnement (INRAE) and including 15 Chinese partners from the academic, research and industry sectors, addresses the challenge of agricultural waste by transforming residues into valuable resources, thus advancing circular agriculture. Its key tasks include developing new technologies for converting agricultural by-products into bio-based materials, fertilisers, and other products, promoting environmental sustainability and economic opportunities. The project aims to reduce waste, lower emissions, and improve soil health, contributing to a more resilient agricultural sector while also creating new business models and reducing the environmental footprint of farming practices.

3. **Circular economy solutions for freshwater aquaculture** (*SAFE*)

- Grant agreement ID: 101084549

- Funded under: HORIZON-CL6-2022-FARM2FORK-01-05 - Integrated and sustainable freshwater bioeconomy: Combining aquaculture, biodiversity preservation, biotechnology and other uses

- Type of action: Research and Innovation action
- Project duration: 1 November 2022 – 31 October 2026
- EU contribution: 4,488,423.00 EUR

The SAFE project, led by Denmark-based International Organisation for the Development of Fisheries and Aquaculture in Europe and including the Shanghai Ocean University, aims to improve the sustainability of freshwater aquaculture in the EU reducing its environmental impact through the application of circular economy approaches. Specifically, the project tasks focus on developing smart, eco-friendly water management systems that enhance the sustainability and productivity of aquaculture. The goals are to reduce environmental impacts, optimise resource use, and support the aquaculture sector in transitioning toward a more sustainable future.

4. **Innovative functional foods from sustainable aquaculture** (*NOVAFOODIES*)

- Grant agreement ID: 101084180
- Funded under: HORIZON-CL6-2022-FARM2FORK-02-05-two-stage - Innovative food from marine and freshwater ecosystems
- Type of action: Innovation actions
- Project duration: 1 May 2023 – 30 April 2026
- EU contribution: 5,999,988.63 EUR

The NOVAFOODIES project, led by Spain's Idener Research & Development Agrupacion de Interés Económico and including CAS Yellow Sea Fisheries Research Institute as associated partner, addresses the need for more sustainable food production systems, specifically focusing on the aquatic sector. Key project tasks include developing sustainable production systems for macro and microalgae, valorising waste and fish biomass to create circular value chains, and formulating new functional aquafeeds and food products that meet consumer needs while minimising environmental impacts. The overall goal is to create a more efficient,

environmentally friendly value chain for aquatic food, with a focus on reducing waste, enhancing product traceability, and increasing consumer trust

5. **Hydrogen Production from Waste (HYWAY)**

- Grant agreement ID: 101130009
- Funded under: Marie Skłodowska-Curie Actions (MSCA)
- Type of action: MSCA Staff Exchanges
- Project duration: 1 January 2024 – 31 December 2027
- EU contribution: 368,000.00

The HYWAY project, led by Université du Luxembourg and including three Chinese universities and one Chinese company (among other non-EU associated partners), aims to tackle the need for sustainable energy by developing innovative processes to produce hydrogen from various waste materials, including biomass and plastics (among other types of waste). It does so by converting waste into hydrogen using advanced methods like pyrolysis, gasification, and catalysis. These technologies also incorporate life cycle assessments and digital twin models to enhance efficiency.



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SEND US YOUR QUESTIONS



For any questions or free-of-charge consultations, EU SMEs may contact the EU SME Centre via our **Ask-the-Expert** service: <https://www.eusmecentre.org.cn/ask-the-expert/>.

Further resources

The EU SME Centre has over 200 **reports, guidelines, webinars and case studies** in its Knowledge Centre, the following may be relevant to you:

REPORTS

- China's hazardous waste sector: Market, regulations and opportunities for European SMEs (October 2024): <https://www.eusmecentre.org.cn/publications/chinas-hazardous-waste-sector/>

WEBINAR RECORDINGS

- Sustainable transition for SMEs (July 2024): <https://www.eusmecentre.org.cn/publications/sustainable-transition-for-smes/>
- Taking part in trade fairs in China (May 2024): <https://www.eusmecentre.org.cn/publications/taking-part-in-trade-fairs-in-china/>
- Green supply chain management: Empowering SME suppliers (March 2024): <https://www.eusmecentre.org.cn/publications/green-supply-chain-management-empowering-sme-suppliers/>
- An SME-friendly overview of the IP regulatory landscape and compliance requirements (March 2024): <https://www.eusmecentre.org.cn/publications/ready-for-2024-an-sme-friendly-overview-of-the-ip-regulatory-landscape-and-compliance-considerations/>
- Emerging Opportunities for SMEs in China's Green and Sustainable Urban Landscape (March 2024): <https://www.eusmecentre.org.cn/publications/emerging-opportunities-for-smes-in-chinas-green-and-sustainable-urban-landscape/>

ABOUT THE EU SME CENTRE

The EU SME Centre is an initiative funded by the European Union to assist small and medium-sized enterprises (SMEs) from EU Member States and countries participating in the Single Market Programme, getting them ready to do business in China.

Our core mission is to facilitate market access and provide a comprehensive range of free first-line services to inform, advise, train, and connect SMEs. The Centre forms partnerships with business support organisations and trade promotion organisations to bring our services and expertise to European SMEs of all sectors.

This initiative created in 2010 is now in Phase IV (2022-2025) and is implemented by 4 consortium partners with 2 associated partners, with networks throughout Europe and China.

Consortium partners



Associated partners



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