



SGP The GEF
Small Grants
Programme



Plastic Flexible Packaging Recycling Brochure

Small Packaging, Big Circulation,
Let's Participate Together

Foreword

Snack bags opened in the morning light, freshness-preserving bags taken while shopping, protective films inside delivery parcels... Plastic flexible packaging has become deeply woven into daily life, bringing considerable convenience to people's production and everyday activities. However, if such flexible packaging is discarded without proper disposal after use, it can pose potential threats to the ecological environment. Carelessly littered packaging may scatter across public spaces, pollute water bodies and soil, and gradually erode the surrounding ecosystems. If plastic flexible packaging is collected only to be incinerated or landfilled directly, it amounts to a waste of resources and an irresponsible attitude toward the environment. Establishing a sound recycling system, promoting technological innovation, and shifting consumer mindsets are the keys to solving the problem of plastic pollution.

Plastic flexible packaging recycling and regeneration is a difficult challenge, but the situation is quietly changing. Together with our partners, we are striving to find better ways to tackle this problem.

Design for recycling for flexible packaging—by optimizing design at the front end, the difficulty of sorting plastic flexible packaging is reduced, resource recovery efficiency is enhanced, and a positive synergy is formed among plastic recycling and the application of recycled plastics.

At present, plastic flexible packaging recycling is still in an exploratory and advancing phase, and large-scale production on a comprehensive level has yet to be achieved. However, continuous optimization of recyclable design can effectively overcome technical bottlenecks in recycling , providing core impetus for industrial upgrading.

Standardizing plastic flexible packaging recycling and emphasizing recyclable design are vital steps in fulfilling our responsibility for ecological and environmental protection and in advancing green, sustainable development. Here, we call on everyone to recognize the value of recyclable design for plastic flexible packaging, and, more importantly, to dispose of daily flexible-packaging waste responsibly and take an active part in recycling efforts. Together, let us promote the whole-chain green development of plastic flexible packaging—from “scientific design at the source” to “standardized recycling at the end”—and harness the collective power of small actions to build a clean and beautiful living environment for all.





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Part 1



| What Is Plastic Flexible Packaging?

Flexible plastic packaging is generally made of plastic films or composite packaging materials with plastic as the main component, and the shape of such packaging can be altered after filling or emptying its contents.

| Characteristics of Flexible Plastic Packaging

Lightweight & Flexible

Low weight reduces shipping costs, and the packaging shape can be adapted to various products.

Printable & Easy to Use

Enables exquisite printing and sealing processes with ease, balancing brand display and product protection.

Reliable Protection

A combination of multiple materials blocks moisture, resists impact and chemical damage, safeguarding products as required.

Versatile Applications

Extends product shelf life for food items and facilitates daily use, covering food, daily chemicals, medical care, industry and other fields.

How Has Plastic Flexible Packaging Changed Our Lives?

01

Extends the shelf life of food and reduces food waste;

02

Enables portable sub-packaging, suitable for travel, office and other scenarios;

03

Diversified packaging designs meet the needs of repeated sealing and quantitative access;

04

Reduces packaging costs, making high-quality products more affordable for consumers.



Why Is Plastic Flexible Recycling Packaging So Difficult?

Plastic flexible packaging has indeed helped us cut carbon emissions, reduce weight and save costs, yet these very advantages make its recycling exceptionally challenging.



Excessively lightweight, hard to collect

Flexible packaging is light in weight yet large in volume. This not only drives up transportation and processing costs for recycling, but also results in low recycling value—naturally dampening people’s enthusiasm for collection.



Composite materials, hard to sort

Most flexible packaging is made of composite materials. Mixed different materials are both difficult to identify and separate, while recycling call for single, pure materials—a major challenge for subsequent granulation and processing.



Elaborate printing, hard to recycle

While the exquisite printing on flexible packaging is visually appealing, the printing ink leaves persistent residues on the material. Recycling favor colorless or light-colored raw materials; ink residues make it extremely hard to produce light-colored recycled materials, which greatly restricts the application scope of the regenerated products.



What types of flexible plastic packaging are there in daily life?





Food Packaging - Meat Products

Food Packaging - Snack Foods





Food Packaging - Noodle Products



Food Packaging-Grain



Daily Chemical Product Packaging



Hygiene Product Packaging



Apparel Packaging



Daily Necessities Packaging



Express & Logistics Packaging



Electronic & Electrical Appliance Packaging



Super sack



Which Types of Plastic Flexible Packaging Can Be Recycled?

Industrial Stretch Film



Large colorless Film



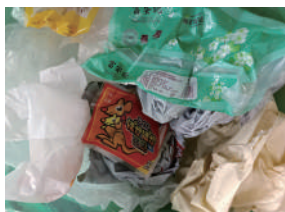
Express Packaging Bag



Super sack



Various Clean Flexible Packaging



Which Types of Plastic Flexible Packaging Cannot Be Recycled?

Heavily Contaminated Flexible Packaging





| PVC-containing plastic flexible packaging

PVC (polyvinyl chloride) is a universally recognized pollutant material in the plastic recycling system. Its hazards to recycling run through the entire process of raw material identification, technological processing, product quality and equipment service life, stemming from three core properties: chlorine (Cl) content, poor thermal stability and complex additives.

PVC starts to release HCl when its thermal decomposition temperature reaches 140°C and decomposes violently above 200°C. The massive HCl generated by the thermal decomposition of PVC can cause respiratory tract damage and skin burns to workers upon long-term exposure; it corrodes the metal surfaces of extruder screws, molds and pipelines, leading to equipment rust and seal failure, and shortening the service life of equipment by 30% to 50%; in combination with water, HCl forms hydrochloric acid mist, which corrodes wall surfaces and circuits and may even trigger electrical short circuits.

When chlorine in PVC comes into contact with oxygen and metal catalysts (e.g., copper, iron) during the regeneration process, dioxins (a class of persistent organic pollutants, POPs) are synthesized at 200°C to 400°C. Dioxins are highly toxic, bioaccumulative and carcinogenic—even trace residues can severely contaminate recycled plastics, and cannot be removed by conventional processes.

Even if PVC is not completely decomposed, its residual components will completely damage the physicochemical properties of recycled plastics, causing yellowing and blackening of the material. Such discoloration cannot be reversed by color adjustment, which drastically reduces the commercial value of recycled plastics.



Part 2

Recycling of Plastic Flexible Packaging: Practice in Community Recycling

In communities, we promote knowledge about plastic flexible packaging among residents, teach them to identify what plastic flexible packaging is, and advocate for them to recycle plastic flexible packaging.



Recycling of Plastic Flexible Packaging: Practice in Community Recycling



We work with the community committee to organize residents to collect plastic flexible packaging that has been discarded at will, and recycle it to reduce its environmental pollution.

In 2024, during the publicity and research activities carried out in Beijie Jiayuan No.5 Community, a total of 756 questionnaires were distributed, with 243 retrieved. Among them, 226 were valid questionnaires. Meanwhile, 8 community publicity activities were held, and 268 recycling plastic bags were distributed (for collection purposes). Approximately 100 households participated in the plastic flexible packaging recycling initiative, and a total of 1.2 tons of plastic flexible packaging was collected.

Survey questionnaires distributed

756 copies

Questionnaires collected

243 copies

Valid questionnaires

226 copies

Community promotion events held

8 sessions

Recyclable plastic bags distributed

268 pieces

Households participating in recycling

100 households

Total recycling volume

1.2 tons



Organize a rich variety of science popularization activities to help teenagers learn about plastics and realize the ubiquity of plastic packaging in daily life, and guide children to pay attention to the recycling of plastic packaging.

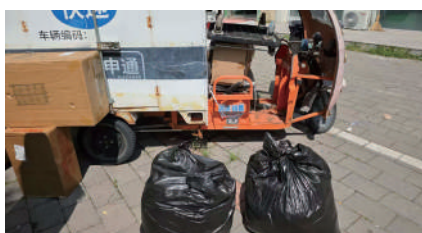


Enthusiastic volunteers, inspired by the project staff, collect the used plastic flexible packaging from their daily lives at home and hand it in to the designated collection points in exchange for certain rewards.





There are courier stations in the community where hundreds of parcels are dispatched every day. Almost every parcel is packaged and protected with plastic bags, plastic films, air cushions and other plastic packaging materials. When residents collect their parcels at the stations, they can sort and dispose of cartons and plastics from the parcel packaging separately. This not only facilitates the recycling of plastics and paper, but also reduces the amount of household waste generated.





Project staff will deliver the collected flexible plastic packaging to recycling bins, transfer it to recycling centers, or transport it directly to recycling plants.



From July to December 2025 (4 months), the "Zanzan Plan" (Plastic Recycling Initiative) implemented by Tashanshan Social Work Service Center in Huojiaying Community has collected a total of 1 ton of flexible plastic packaging. The weekly recycling volume increased from 36 kg to 76 kg, with 4 courier stations and 17 core households continuously participating in the community's flexible plastic recycling initiative.

2025

Total flexible plastic packaging recycled

1 ton

Weekly recycling volume

36 kg → **76** kg

Participating courier stations

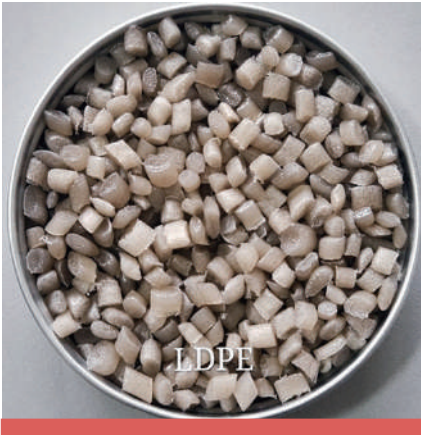
4 个

Participating households

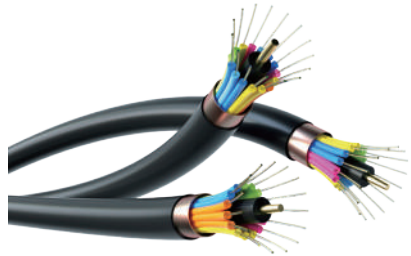
33 组

Recycled Applications of Flexible Plastic Packaging

干净的缠绕膜、无色透明的包装膜回收再生后被加工成再生颗粒。



再生颗粒可应用于吹膜、管材、鞋材、地垫以及 4G、5G 通信光缆外护套。





Anhui Guowang Eco Technology Co., Ltd. conducts recycling and reutilization of the collected flexible plastic packaging to produce industrial-applicable pallets.





Design for Recycling for flexible plastic packaging

核心
思想

Over 80% of the environmental impact of plastic products is determined at the design stage!

Design for Recycling for flexible plastic packaging

is the core prerequisite for solving its recycling challenges and promoting the circular utilization of resources, and it is also a key measure to practice the concept of green development.

At present, the recycling of flexible plastic packaging is still in the exploratory stage. Design flaws such as multi-layer compounding and material mixing lead to difficulties in sorting and processing as well as high costs. A large amount of flexible packaging waste cannot be effectively recycled and valorized, ultimately resulting in resource waste and environmental burdens.

Effective recyclable design can address the above bottlenecks at the source. On the one hand, through designs such as structural simplification, selection of single recyclable materials, and standardized labeling, the difficulty of recycling and sorting and the cost of reprocessing can be significantly reduced, laying a foundation for large-scale recycling and utilization. On the other hand, this can promote the formation of a complete green industrial chain of "design-production-use-recycling-reprocessing", reduce the consumption of virgin plastics, lower carbon emissions, and contribute to the achievement of the "dual carbon" goals.

The formulation work of the national standard Plastics—Guide of design for recycling—Part 2 polyethylene(PE)material for film and flexible packaging is to be launched soon.

塑料软包装回收再生



推动塑料软包装的可回收再生设计

塑料软包装的设计及生产者在考虑塑料软包装的功能性和安全性的同时，最大程度使其易于在消费后被回收再生，减少材料和助剂的使用种类，减少设计的元素。

扩大消费者教育与社区实践

实践证明，在社区开展塑料软包装的回收活动已初具成效，宣传塑料软包装回收再生的环保价值，从点滴行动改变塑料软包装的回收困境。

推动塑料软包装回收模式的创新

塑料软包装如何进入传统的回收网络，还是需要创新的回收网络还在探索中。塑料软包装的消费量巨大，聚焦高浓度产生场景，建立专属回收体系，把更多分散的塑料软包装回收回来。

用先进的技术增加塑料软包装再生应用的价值

塑料软包装再生应用的价值是拉动其回收链条的关键，提升塑料软包装再生后的价值，不断探索其再生应用的领域是一直需要做的工作。

The End



The green circularity of plastic flexible packaging starts with design and succeeds through action. Though plastic recycling and regeneration is still in the exploratory stage today, its advancement relies on every consideration in the design of plastic flexible packaging and every commitment to proper waste disposal.

Let us focus on the recycling and regeneration value of plastic flexible packaging from the source of design, standardize the sorted collection and proper storage of plastic flexible packaging, and spread the concept of green development.

Every small act of effort builds toward resource circularity; every active participation forges a powerful synergy for ecological protection.

Let us walk hand in hand, drive the steady progress of plastic flexible packaging recycling with small but consistent actions, co-build a clean and sustainable green home, and ensure that every piece of plastic flexible packaging lives up to our resources and the environment.



China Plastics Reuse and
Recycling Association

VISION

Vision—Make the relationship between plastic and human and nature more harmonious

MISSION

Building a plastic closed loop to
make the earth clean