

Frequently asked questions in sustainable packaging

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Explore the questions often asked in the packaging world, and discover the role of labels in advancing sustainability. Learn how Avery Dennison's innovative solutions contribute to eco-friendly packaging and a greener future.

Recycling is a major part of sustainability. Things like plastic, paper and glass have the potential to become new products instead of winding up in a landfill or an incinerator. Ensuring that these materials—and others—can be recycled requires a holistic approach that takes everything into consideration. Labels play a particularly important role in this process, whether they're designed to break down in the soil or separate cleanly from a bottle for enhanced recycling.

This FAQ document covers topics ranging from the recyclability of plastics to how intelligent labels can help reduce a company's carbon footprint. We make every effort to provide accurate and current information, but we encourage you to conduct your own research and consult with a professional before making any decisions. Please note that the details shared here are subject to change over time.



Paper and Cardboard

How is cardboard recycled, and what role do labels play in the process?

Recycling a cardboard package begins with collecting and sorting different quantities of cardboard and sending them to mills that can handle products of a specified grade. Next, the mills turn the items into pulp and screen out contaminants like staples and plastic; those that cannot be removed are further diluted.

Paper labels are best paired with paper packaging, as they typically remain attached and are recycled alongside the cardboard. During recycling, labels are processed into raw pulp material alongside the main paper components. To improve the strength and durability of the recycled pulp, virgin paper fibers may sometimes be added, depending on the quality of the final product. However, the adhesive on labels is considered a contaminant in the recycling process. For this reason, smaller labels are preferable, as they minimize the impact on the recycled paper pulp.

Where does the post-consumer recycled waste used to produce recycled paper labels come from?

The PCR (post-consumer recycled) waste used to make recycled paper materials, such as rMC and rDT, is selected from different streams, including office and printer waste, and used glassine liners. Before it can be recycled, PCR waste must undergo de-inking, a process for removing ink from the fibers of recycled paper, to create ink-free pulp.

How do RFID tags behave in paper and cardboard recycling streams?

Avery Dennison's product is a multilayer material with aluminum. Such material can, in general, be recycled for cardboard collection or, if not available, mixed or energy waste. Our objective for the future is to enhance the sustainability of our products and develop the inlay and tag materials so that the amount of rejection in recycling is minimized.

Test results clearly show that the films and electronic components of the tags are not fragmented into small particles by the disintegration process. Therefore it can be concluded that they are well separated in standard waste paper and board processing plants and do not negatively affect the quality of the pulp produced. The adhesive used on the tags, applied at the specified addition rate, had little to no impact on fiber quality, ensuring its integrity remained unaffected.



Plastics

What's the difference between mechanical and chemical recycling?

In mechanical recycling, plastic waste is turned into new raw materials or products without changing the chemical structure of the original substance.

Chemical recycling, also known as feedstock recycling, breaks down plastic waste into smaller molecular components that can be reprocessed into new plastic. This process includes methods such as pyrolysis, depolymerization, gasification, and solvolysis. The resulting products can be used for various applications, including food-safe plastics, provided they undergo the necessary purification and meet regulatory standards.

In principle, thermoplastics such as PET and HDPE (plastics made from polymers that are molten when heated and hard when cooled, that can withstand being melted and recast repeatedly) can be mechanically recycled with little or no damage to quality. Currently, this is the most common form of recycling in APAC.

What are the processes for collecting, sorting and recycling different types of plastics, like PET, PE and PP?

Mechanical recycling begins with the collection and sorting of PET, PE, and PP plastics by type. While this process was once done manually, modern systems now commonly use infrared technology to distinguish between different types of plastics. In ANZ, recyclers have embraced the use of infrared scanners to enhance sorting efficiency. However, plastic sorting is still manually performed in ASEAN and India without the aid of infrared systems. Meanwhile, in China, some recyclers have adopted advanced methods like material-specific or AI-powered sorting technologies.

The plastic is first ground into small flakes and thoroughly washed to remove contaminants like grease and food residue. It then passes through a density separator. In the case of PET bottle recycling, the denser PET flakes sink, while lighter materials such as caps and labels, typically made of PE and PP plastics, float and are diverted to the polyolefin recycling stream.

Similarly, HDPE and PP flakes, both less dense than water, will float, while heavier contaminants like metals or PET plastics sink and are filtered out. Removing these impurities is crucial, as their presence can compromise the quality of the final recycled product. Afterwards, the plastic undergoes an extrusion process, where the plastic flakes are melted and filtered to eliminate any remaining contaminants, and finally turned into recycled plastic pellets which can be made into new products.

Avery Dennison's [CleanFlake™](#) labels are designed to accommodate the plastic recycling process. The washing step of PET recycling uses a hot caustic solution, under which CleanFlake™ labels separate cleanly from PET flakes, leaving residue-free plastic that's ready for the next steps on its journey to a second life.

What is the compatibility of labels on different types of packaging in the recycling stream, such as PET, PE and PP?

Label compatibility depends on the type of packaging and the maturity of recycling technology available.

The recycling technology for PET bottles is highly advanced, allowing food-grade bottles to be recycled into food-grade rPET through a bottle-to-bottle (B2B) recycling process (in China, this process is still under development). To maintain purity, contamination must be minimized, and labels should be designed to enable recycling by:

- Using water-soluble or releasable adhesives to ensure labels separate from PET flakes during the hot caustic washing process.
- Ensuring label construction is less dense than water, allowing it to float in the sink/float separator and be efficiently removed from the PET recycling stream.

The recycling technology for PE and PP bottles is well-developed. However, due to the chemical properties of polyolefins (PE and PP), which can absorb chemicals and contaminants, most countries do not allow the use of mechanically recycled rPE and rPP for food grade packaging. Instead, they are predominantly used in non-food applications, such as bottles for personal care products, household items, and lubricants. Polyolefin-based labels (PE, PP, PO) are particularly compatible, as they can be recycled alongside monomaterial packaging, preserving the mechanical properties of rPE and rPP in the process.

For natural and white-colored PE and PP bottles, a key challenge arises where the inks from the labels can contaminate the final rPE and rPP if recycled together. To prevent this, labels should use releasable or soluble adhesives, ensuring they detach cleanly during the recycling process. Avery Dennison's S692N adhesive has been proven to detach during the rigid HDPE recycling process and is the first in the industry to receive full compatibility recognition from RecyClass.

How many times can plastic be recycled?

The number of times plastic can be mechanically recycled depends on the type of plastic and the recycling process used. During mechanical recycling, the polymer chains in plastic become shorter each time they are melted down, resulting in weaker mechanical properties. While most plastics can undergo mechanical recycling two to three times, virgin plastic is often added to recycled plastic to improve mechanical properties—such as strength, flexibility, and durability—of the final product. This blending helps maintain material quality and can extend the number of times the plastic can be recycled.

What is the impact of RFID on plastic recycling?

RFID technology has the potential to streamline the plastic recycling processes, improve the quality of recycled materials, and increase recycling rates by enhancing tracking, sorting, and traceability throughout the recycling supply chain. Currently, the majority of RFID label materials are classified as detrimental in plastic recycling. Avery Dennison is developing customer-specific solutions to enable RFID recycling with plastic, making sure the recycling process is not disrupted. To move the industry forward, Avery Dennison is working closely with third parties, like the Association of Plastic Recyclers (APR US - EPR EU) and certification bodies.



Glass

How are glass bottles recycled?

Recycling glass bottles begins with collection and sorting by color (clear, green, amber). The bottles are then crushed into small pieces, called cullet, which are cleaned to remove contaminants. After that, they are mixed with raw materials such as sand, soda ash, and limestone to achieve the desired color and quality. This mixture is then melted in a furnace and molded into new glass products, such as bottles and jars.

What is the difference between recycled glass and returnable glass?

Recycled glass refers to glass that has been broken down, melted, and remade into new glass products. This process requires significant energy and resources. Returnable glass, on the other hand, refers to glass containers, like bottles, that are designed to be reused multiple times after being cleaned and sanitized. Returnable glass is more sustainable as it reduces the need for new production and minimizes waste.

What labels should be used for returnable glass bottles?

Avery Dennison offers [wash-off](#) labels specially designed for returnable glass bottles. Available with PETg filmic facestock or wet-strength paper facestock, these labels are engineered for optimal performance. The wet-strength paper prevents fiber loss during washing, allowing the labels to detach cleanly without fraying or tearing. Featuring a wash-off adhesive that leaves bottles completely residue-free, this solution ensures the bottles are ready for reuse. Additionally, the wash-off labels are ice-bucket resistant, making them the perfect choice for brands seeking to premiumize their products, reduce waste, conserve energy, and contribute to a circular economy.

In some cases, labels for returnable glass bottles are designed to stay intact through multiple uses and cleaning cycles. These labels are made to withstand washing, sterilization, and handling. They are durable, water-resistant, and use strong adhesives that can endure these processes. To align with sustainability goals, these labels often feature eco-friendly materials and non-toxic inks.

Both solutions cater to different needs, ensuring brands can choose the right label for their products while supporting sustainability and reusability.

What does it mean for a paper label to be without fiber loss?

Paper without fiber loss is commonly known as wet-strength paper. Wet-strength paper is designed to resist disintegration and maintain its strength when exposed to water or moisture, retaining its structure. In the washing process of returnable glass bottles, wet-strength paper does not release contaminating fibers and is removed cleanly in one piece. This ensures that the wash water remains uncontaminated and can be reused multiple times, enhancing the efficiency and sustainability of the process.

What are crate pooling companies and what kind of paper labels should they use?

Crate pooling companies distribute reusable trays to businesses and then collect them to be checked, sorted, washed and repaired before sending them out again. These trays are used in many places, including grocery stores, orchards and food packing operations. We suggest using Avery Dennison paper wash-off labels for these trays, as they are approved by several pooling companies.



Compostable and Biodegradable

What's the difference between biodegradable and compostable materials?

Biodegradable packaging products must break down completely, and decompose into natural elements, reasonably soon after disposal (typically a year or less). Within landfill sites, this helps to reduce waste buildup and contributes to a safer, cleaner and healthier environment.

Compostable materials are similar, in that they are also designed to return to the earth safely. However, they go one step further by releasing actual nutrients and becoming usable compost (for example, soil-conditioning material or mulch) after breaking down. These materials are designed to be added to industrial or home compost piles (industrial has specific conditions including, for example, a control of humidity and temperature). For a material to be compostable, it should break down into usable compost in approximately the same time as the materials with which it is composted.

Biodegradable materials break down within landfills, whereas compostable materials require special composting conditions.

Are Avery Dennison labels compostable?

Avery Dennison provides OK Compost Industrial certified products designed to safely return to the Earth, serving as soil-conditioning material or mulch. While we do not currently manufacture compostable or biodegradable products in the APAC region, these products can be imported from the EU to meet any potential demand. Our S9500 adhesive (imported from EU) is compostable, and can be combined with paper or filmic (e.g. PLA and Natureflex) facestocks for which composting is required. OK Compost Industrial certified products require specific conditions—including certain humidity and temperature levels—to help them break down.

Compostable goods are usually made with plant-based materials and must pass rigorous third-party testing for disintegration, biodegradation and non-toxicity. These requirements are outlined in the [EN 13432:2000 standard](#) and are also recognized by other key certifications, including ASTM-6400-99 (American Society for Testing and Materials), ISO 14855 (International Standards Organization), and DIN V49000 (German Institute for Standardization).

What are biodegradable labels?

Biodegradable packaging completely breaks down and returns to nature within a reasonably short time (typically a year or less) after customary disposal, meaning no special treatment is required.

For labels and packaging, there is no official biodegradability standard. When describing something as biodegradable, it's important to avoid greenwashing, in which products are made to sound more eco-friendly than they actually are. This can be achieved by clearly stating the standard used to make the claim, and the setting and timeframe required for the product to biodegrade.



The Role of Pressure-Sensitive Labels in Packaging

What is the difference between “recyclable” and “enabling recycling”?

A recyclable label can be recycled along with the container it is affixed to during a standard recycling process in a region where the material (like PET or HDPE) is commercially available. If the label enables recycling, that means it helps increase the recyclability of the container. For example, CleanFlake™ labels enable recycling because they can be removed in a way that ensures the container is recycled cleanly. Other products that enable recycling remove or simplify a step in the recycling process, like washing or sorting, with the ultimate goal of significantly improving the quality of the recycled output.

Is label-free packaging a better option for recycling?

Some types of label-free packaging are easy to recycle, or possibly easier than packaging made with certain types of labels. However, many label solutions don't get in the way of recycling and can often be recycled along with the package.

For example, removable labels can be cleanly taken off by consumers, leaving a product ready to be used or begin the recycling process. In the standard HDPE recycling process, certain types of filmic labels can even remain attached to products, since they don't interfere with the process, contaminate the resulting HDPE pellets, or harm other recyclable materials.

What factors should be considered when designing and printing labels to enhance recyclability?

There are various factors to consider when it comes to labels and optimizing recyclability. To start, we recommend incorporating Europe's [EcoDesign](#) principles into your labels and packaging. Taking this approach requires careful consideration of the environmental impact of products throughout their entire life cycle, from conception to design, and includes how they will be used and treated once discarded.

Also look for industry certifications when making a selection. Avery Dennison has earned certification from the Association of Plastic Recyclers (APR) for our solutions that support plastic recycling. These solutions, designed for PET and HDPE recycling, have undergone rigorous testing to demonstrate their effectiveness and sustainability.

Can both the bottle and its label be recycled once the label is removed?

This depends on what the label and bottle are made from. For example, with our CleanFlake™ solution, the label separates cleanly from PET bottles during recycling, leaving nothing behind. The resulting flakes can be turned into new, food-grade PET and the bottles can be fully recycled without contamination issues. Similarly, for returnable glass bottles, our Wash-off labels are designed to ensure seamless removal during the glass cleaning process, preparing the bottles for reuse with ease.

Removed labels can be repurposed through downcycling, where materials are turned into lower-quality products. They can also be used in Waste-to-Energy (W2E) systems, where waste is burned to generate energy, offering an alternative use without preserving its original quality.



The Role of a Label's Adhesive

How does CleanFlake™ work in PET recycling?

During the hot caustic bath that's part of the PET recycling process, CleanFlake™ labels separate cleanly from packaging and float to the surface in the form of flakes that can be turned into food-grade PET.

What happens with a label's adhesive during the washing part of the recycling process?

Different adhesives behave differently during the washing step of the recycling process. The type of plastic or paper they are being used with also has an impact, as do the guidelines of different organizations focused on recycling.

How does the adhesive used in removable labels support recycling?

Removable labels are designed for short-term product identification purposes. They can be removed cleanly by hand from the item they are applied to before it enters the end-of-life phase, leaving no adhesive behind. When done correctly, this supports the material separation process, simplifies the job of recyclers and makes the recycling stream cleaner.

Explore various [adhesives](#) and discover the perfect solution tailored to your needs.



The Role of Digitally-Enabled Labels in Packaging

Will tagging every item with an RFID be negative from an environmental point of view?

Adding an RFID label to a product has a minimal impact on its carbon footprint, but the benefits it brings are substantial. RFID technology enables the tracking of essential sustainability metrics, such as CO2 emissions, water usage, and chemical consumption, throughout a product's entire lifecycle.

Beyond sustainability, RFID also drives value by improving operational efficiency. By optimizing inventory levels and reducing waste, businesses can significantly lessen their environmental impact. This is crucial, as waste is a major driver of pollution—an estimated \$163 billion worth of inventory is discarded every year due to overproduction or expiration.

Learn more about the challenges of supply chain waste and explore innovative solutions in our report, [The Missing Billions: The Real Cost of Supply Chain Waste](#).

What are some practical examples of how RFID technology is being used to promote sustainability?

Embedding RFID tags in products allows us to track their journey from production to purchase while also collecting and sharing vital environmental data. These labels not only store logistical and product information but can also provide details such as the CO2 footprint of the product's lifecycle and instructions for proper waste disposal.

For food brands, RFID technology opens new possibilities, such as tracking a carton of milk from the farm to the store and later to a composting facility to reduce food waste.

As we move toward a plastic-free future, accelerating product reuse is essential. RFID can play a key role by improving return rates, making sustainable practices more efficient and achievable.

Other Questions

What is an LCA and do we have one for our products?

Life Cycle Assessment (LCA) is a valuable tool for measuring a product's environmental impact across its entire lifespan, from raw material extraction to disposal. By evaluating the effects of the labels and packaging you choose, an LCA provides insights to help minimize your environmental footprint and make more sustainable decisions. Avery Dennison provides carbon and water product footprint data for 'cradle to gate' and 'cradle to gate + transport + end of life'. While this is not the full LCA, these data provides significant step towards understanding the environmental impacts of our products.

What is a carbon footprint and does Avery Dennison measure it for its products?

A product's carbon footprint quantifies the total amount of CO2 it will contribute to the atmosphere over its lifetime, starting at the raw materials stage through to the end of its life. Avery Dennison uses its own carbon footprinting tool to measure the carbon footprint of our products and help customers fully understand their impact on the environment.

How does liner recycling work?

Recycling liners requires different approaches depending on the material. To simplify the process for brands, Avery Dennison offers AD Circular, a dedicated liner recycling program. However, program availability varies by country. Discover more about [AD Circular](#) and how it can support your sustainability efforts.

Can matrix waste be recycled?

Some matrix waste collected for recycling is incinerated to produce energy. However, there is increasing interest in exploring alternative, more sustainable uses for this material. Through AD Circular, we offer matrix recycling services in select countries and are actively collaborating with industry partners and recyclers to develop innovative, eco-friendly recycling solutions for matrix waste.

Did you find this information useful? If you have further questions, please [contact Avery Dennison](#).

Find more sustainable label solutions at label.averydennison.com



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