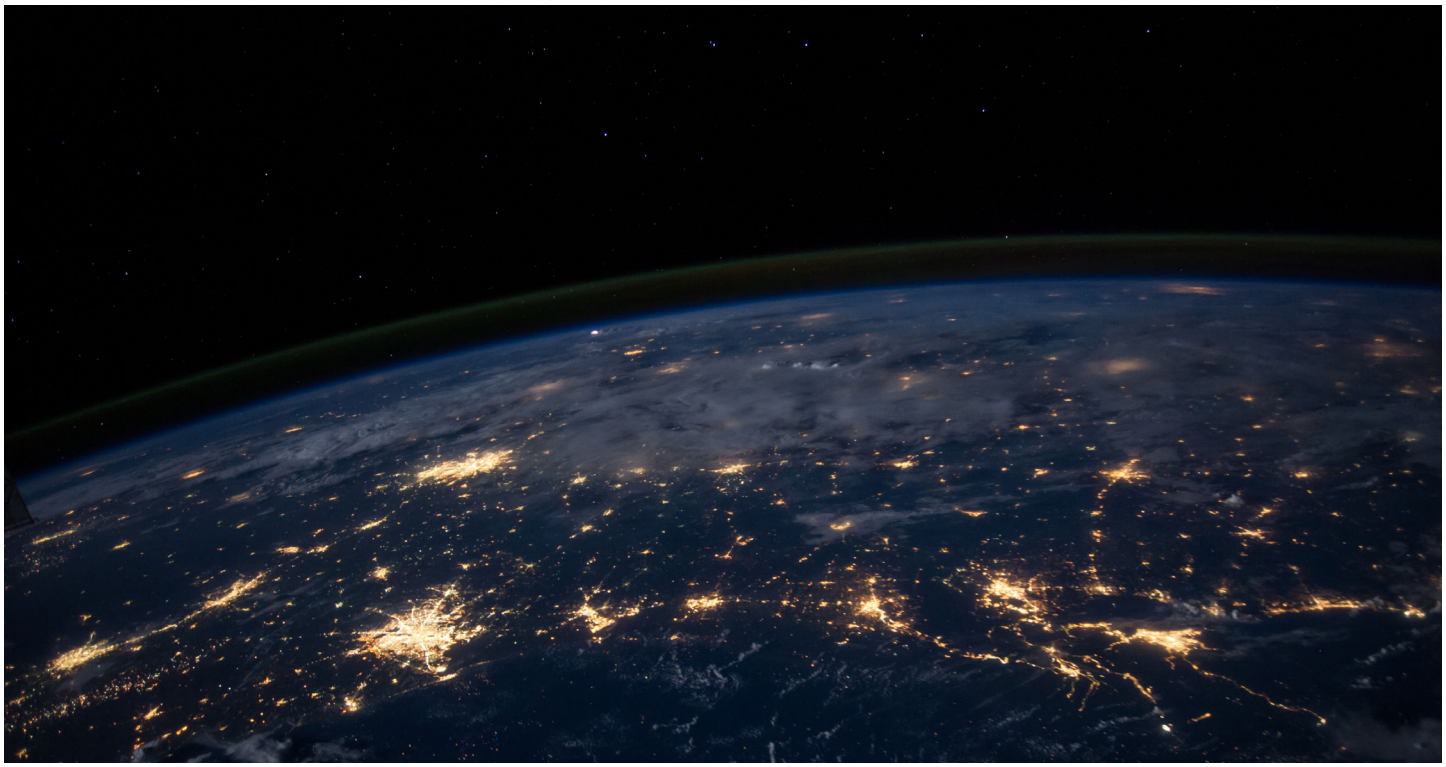
Sustainability isn't a Thing we do – it's our Focus on how we do Everything

At Avery Dennison, we have pledged to deliver innovations that advance the circular economy and reduce environmental impact. Let's talk recyclability.

Recyclability – a Key Feature of Avery Dennison Tape Solutions

As a world-class operation focused on developing and manufacturing high-performance solutions for a broad range of applications, delivering innovations that advance the circular economy is always top of mind. We take pride in that approach. We implement and advance technologies to enable recyclability, extend the lifespan of materials, reduce waste, increase recycled content and integrate opportunities for circular processes across our industries.

Whatever the application, you can rely on Avery Dennison technology to offer the next step in recyclability and advancing the circular economy. As a member of the Circular Economy for Labels (CELAB) consortium, we organize collaboration among other companies to bring that economy to life faster. In this trend study, we will share some of the latest examples.



Sustainability

From Beginning to End of Life

Recycling may be defined as the action or process of converting waste into reusable material and generally comes at the end of a product's life cycle. However, our efforts in sustainability start at the very beginning. Which is why we reenvisioned our entire production process.

Development and construction of pressure-sensitive adhesive (PSA) tape solutions starts with an outlook on end-of-life possibilities for recycling. For instance, we are increasingly moving towards liners and carriers that are partially constructed from recycled material. Our transfer tape portfolio consists of pressure-sensitive adhesives (PSAs) of different coat weights and strengths with a variety of release liners. We use these PSAs for their multitude of advantages, as they offer a variety of benefits compared to other alternatives, be it glue-down, click-and-lock, or free-floating installation methods.

PSAs hold two surfaces together solely by surface contact, which is achieved by firm initial external pressure. These dry adhesives require no activation with water, solvent or heat, and firmly adhere to many dissimilar surfaces with minimal pressure. The release liner protects the adhesive until it is removed. In other words, these general-purpose tapes add value in a variety of ways, helping manufacturers solve their bonding issues.

Towards a Solvent-Free Future

Depending on the actual application, the adhesive used in our tapes has to meet specific requirements, such as low VOC, heat, chemical and moisture resistance, and of course excellent adhesion – while at the same time meeting our sustainability goals. You must already know about our rubber and water-based acrylics, but our R&D department didn't stop there – as materials science is the name of our game.

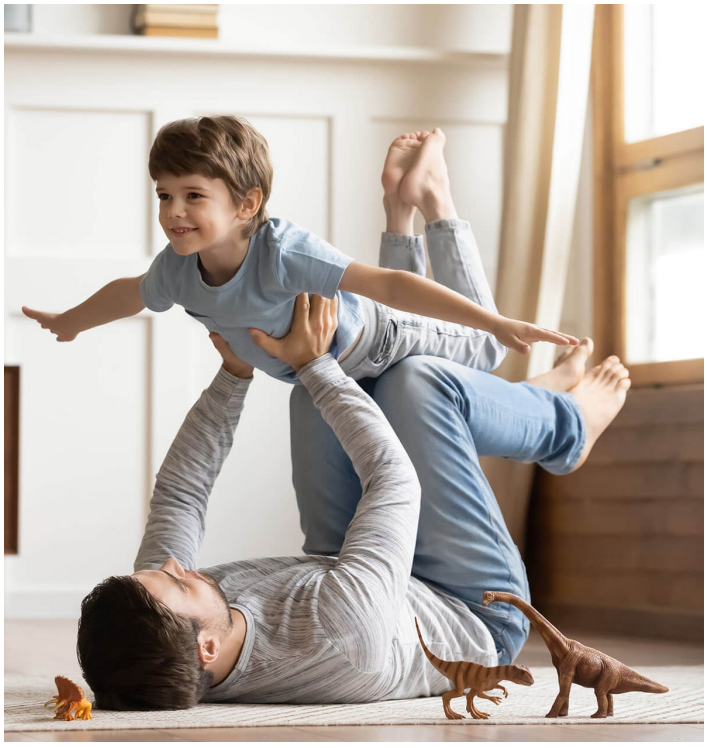
Our special UV acrylic solution has been specifically designed for the manufacture of high-quality adhesive tapes for building & construction applications, among other market segments.

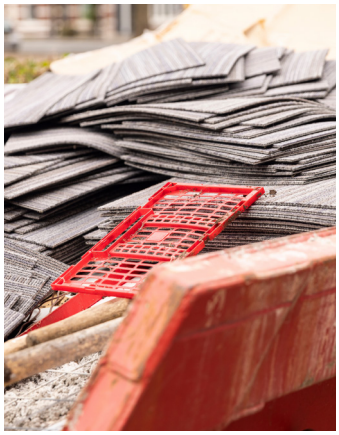
We are developing a UV cured acrylic adhesive that is coated as a warmmelt, which means no solvent is used in the process. The product contains only pure solids and can be processed immediately on standard hotmelt coaters equipped with commercial UV lamps. No extra drying equipment or flash-off zones are required.

UV Acrylic

The UV-part simply refers to the process of turning the acrylic polymer into a usable adhesive by giving it the required degree of cross-linking. The process by which we coat adhesives can generally be done in three ways: using solvent, in water, or as the topical third option: hotmelt. Both the adhesive and its manufacturing process are patented, which in turn led us to master a myriad of applications when used in performance tapes. The most striking benefit of UV acrylics then is the fact that no solvent or water is used in the coating process. There is no need to use long drying tunnels, which keeps down energy consumption, while curing by UV light eliminates the dependence on water as well.

Looking one step further, at the polymer for which more often than not classic petrochemicals are used, there too is a move towards bio-based, organic solutions. For instance, certain rubbers already contain resins from pine trees as bio-based substitutes. At the same time, the customer is willing to go the extra mile. The drive towards more natural materials – like bamboo and cork for flooring, or wood fibers and sheep's wool for insulation – is matched by advancements in tapes. If carpet specialists introduce new materials, new substrates, it brings new challenges. We have the toolkit to take them on.





Raising Awareness

Besides the aforementioned efforts within Avery Dennison business units that line up with our sustainability goals, our industry is seeing more and more regulation and legislation as well – and rightfully so. In the EU, there is the European Green Deal, the Waste Framework Directive, the Single Use Plastic Directive and the Packaging Waste Directive – to name a few.

As a corollary, there is an uptake in demand for sustainable solutions due to increased awareness from both consumers and businesses. Brand owners, end users and converters are all looking for solutions that convey a sustainable reputation, strengthen customer service and meet sustainability goals as well as recycling targets.

Recycability

Eliminating Liner Waste

Avery Dennison is serious about sustainability. We have set clear goals to dramatically improve recyclability and to reduce waste across the whole value chain. Our materials are used in a wide range of industries – not only building and construction, but also automotive, appliances, electronics, specialty industrial, medical and personal care segments.

In a world of ever-evolving needs of customers and consumers, Avery Dennison is delighted to share significant leaps regarding reliable, sustainable and forward-thinking tape solutions.

However, liner waste is a big problem, even if it is the sole waste product of our solutions. When you're applying thousands or even millions of adhesive tapes, it adds up. Recycling can be difficult and expensive. That's why we have developed AD Circular to help out.

Liner Recycling Program

Our AD Circular Program stems the tide of liner waste and increases the supply of recycled liner material. It also strengthens your own sustainability story and helps you achieve your goals for recycling, reducing greenhouse gas emissions, and more. It is another contribution toward the circular economy, and one of the many ways we're enabling recycling and advancing the use of recycled materials. Because together we can eliminate liner waste.

AD Circular is a very easy 3-step solution. Firstly, you sign up online so that we can provide however many boxes you need for your leftover liners. Then, you schedule a pickup date when you're at capacity. Our helpful website application does all the work for you. The third step is the best one: simply enjoy the results, while we create new materials.

Using our website, you can see how much waste you have recycled, how much emissions you have kept out of the atmosphere, and more. It even provides certificates to show what you have accomplished, making it easier to meet your environmental targets. Do you have liners from another manufacturer? We'll take them too!

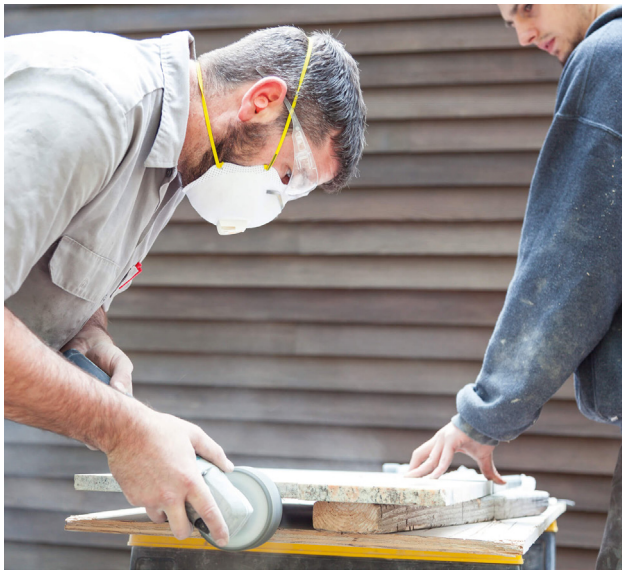
There's no reason to worry about the price either. AD Circular probably costs about the same as what you are already paying for liner disposal. Better yet, it might even help you save some money, as we also handle all the paperwork and regulatory matters.

AD Circular in a Nutshell

- Easy, transparent, cost-effective
- It works with any liner from any company
- It can move you closer to your sustainability goals and requirements
- It tracks the amount of waste you recycle and the amount of CO2 you avoid
- It supports a circular economy

Regeneration

We're not content to simply reduce our own impact. We're looking at regenerative practices. We're looking at ways that we can apply what we do well to make whole systems better – from the adhesive industry to communities to the environment. AD Circular is an example of how, working together, we can meet the challenge of reducing liner waste.

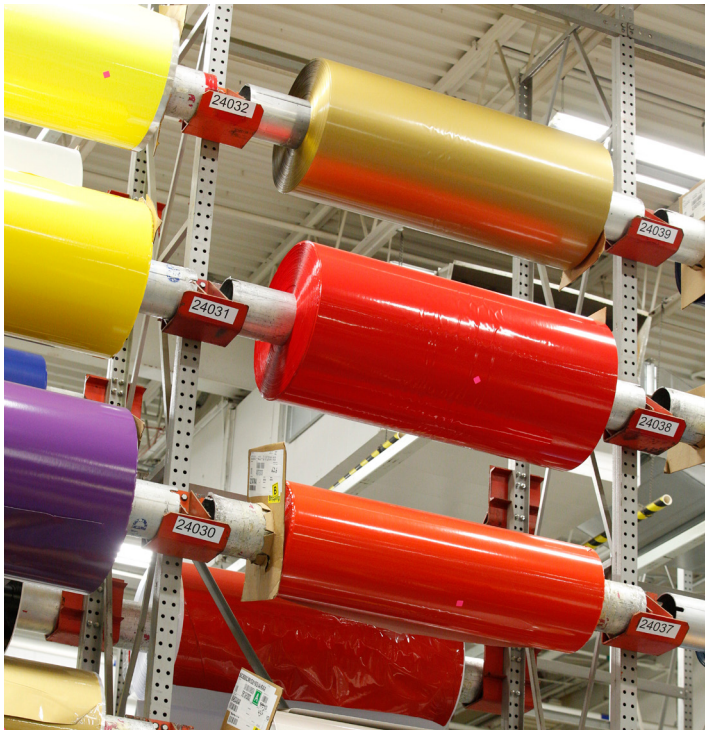


Tapes to the Rescue

Recyclability of materials has taken a step as well. Materials are now being made with rigorous focus on separability, addressing end-of-life issues. Tape can play a huge part in the approach. One of the major challenges in carpet recycling for instance has always been that carpets can consist of hundreds of components. The process of separation can be rather costly, which has led to the development of mono materials in carpet production.

It's been a while since producers relied solely on synthetic materials – in other words, materials made up of multiple parts – to manufacture carpet. The days of those complex sets of materials, irreversibly glued together, are behind us, as recyclability asked for a different approach. The industry has undergone substantial technological advances, with many producers having switched to using a single material, offering obvious advantages when it comes to end-of-life and recycling. Product circularity has become increasingly important – enabling a circular economy through regenerative products and process design.

PSA tapes are used in both the installation and assembly of various types of flooring. In terms of installation, tape systems can often replace liquid adhesive systems, making the floor easier to install and remove without leaving adhesive residue. This ensures that the flooring materials and subfloor remain uncontaminated. In assembly, there are existing solutions where PSA adhesives, through waste treatment, allow layers to be separated or can be included in the recycling process without causing any challenges.



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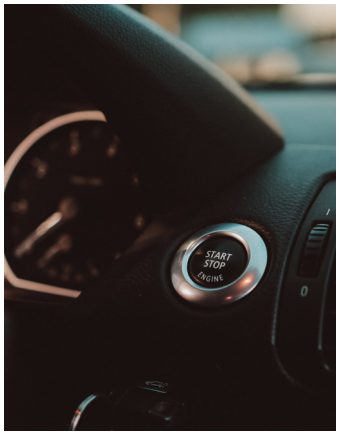

Cradle to Cradle

'Cradle to Cradle Certified' or C2C is the global standard for products that are safe, circular and responsibly made. For over a decade, C2C has been helping leading brands, retailers, designers and manufacturers across the value chain to innovate and optimize materials and products according to the world's most advanced science-based measures.

A trend following on from that in the carpet industry has been to use the same material for both carpet face and backing, further avoiding the costly process of separation and purification – taking the recyclability of carpet a long way further. New technologies have offered the freedom to manufacture carpet from fully circular mono- materials such as polyester (PET), polypropylene (PP) and polyamide (PA6, PA66). But that's not all.

Carpet to Carpet

Mounting tapes can be made with the same carrier material so that product & installation means can be wasted & recycled together, in other words combined in the waste stream.

Again, this is where Avery Dennison comes in.

To effectively facilitate a true carpet-to-carpet approach, adhesive layers are summoned to not only bond during assembly, but also debond during recycling. We offer adhesive technologies that allow for temperature-related debonding on demand. Some of our high performance transfer tapes are in fact being used in an alternative carpet assembly process where tape features as mechanical bonding for carpet-backing. We'll tell you all about it.

PSA Tapes

Backings applied to carpet fiber for the assembly of carpet tiles and roles are generally different materials bonded or melted together, which makes it hard to separate at end-of-life for recycling purposes. However, assembly with thick synthetic rubber-based transfer tape allows a secure bonding of the fibers with several types of backings. Heating up the assembly sufficiently allows for clean separation. It allows for recycling, full on. Which got us thinking: what if you use transfer tape as a bonding method for the backing material?

'Transfer tapes are suitable for many applications – and many application environments.'

Ideal for mounting, bonding and laminating, transfer tapes offer good conformability and adhesive wet-out. PSA tapes can be used for bonding materials such as plastic, paper, metal, glass, and wood, including some of the low surface energy type materials like Polyethylene, and Polypropylene. They allow for tremendous ease of use by way of DIY-friendly peel- and stick installation, offering permanent, removable and repositionable options. Specific skills and tool sets are redundant, while fast installation and the absence of cure time reduce downtime. Moreover, there are huge advantages in terms of sustainability and recyclability.

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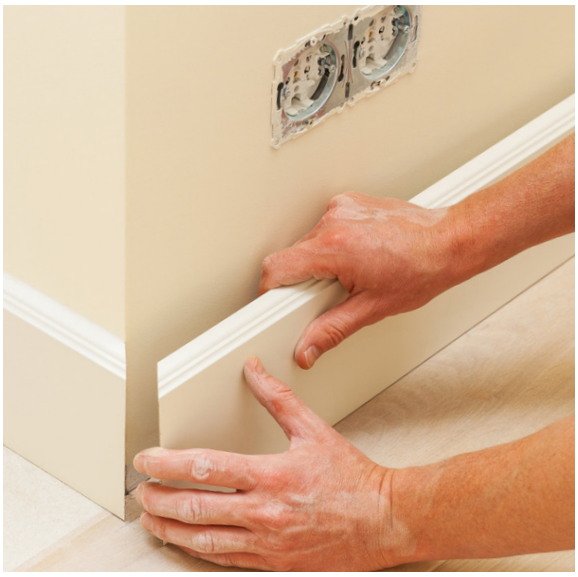
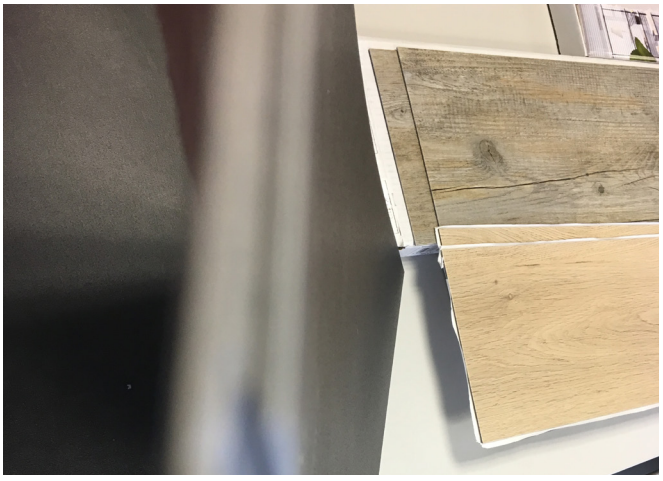
Full Recyclability

Take for instance the benefits when using event carpeting made from fully circular mono-materials with the additional application of PSA tapes. In order to further promote recycling, a suitable carrier can match the material of the carpet.

That's a major innovation, as it's far more common to have a carrier made from a different material, for instance polyester – that has a very different melting point, complicating the recycling process. Here, a double-sided tape is used that is fitted with the same material as the carpet as far as the carrier of the glue is concerned. Event carpet applied with tapes is well suited for the hundreds or thousands of visitor's feet, but it's also very easy to remove without leaving residue on the underlay or having to sand down the subfloor.

The carpet detaches itself from the floor quite easily. What is even more interesting in the context of recycling is the fact that this approach makes the whole unit recyclable as a whole, even including the glue. The glue is completely processed in the recycling process, or in any case leaves but a very small amount of contamination as opposed to the far larger quantities of PET or PP you would otherwise be left with.



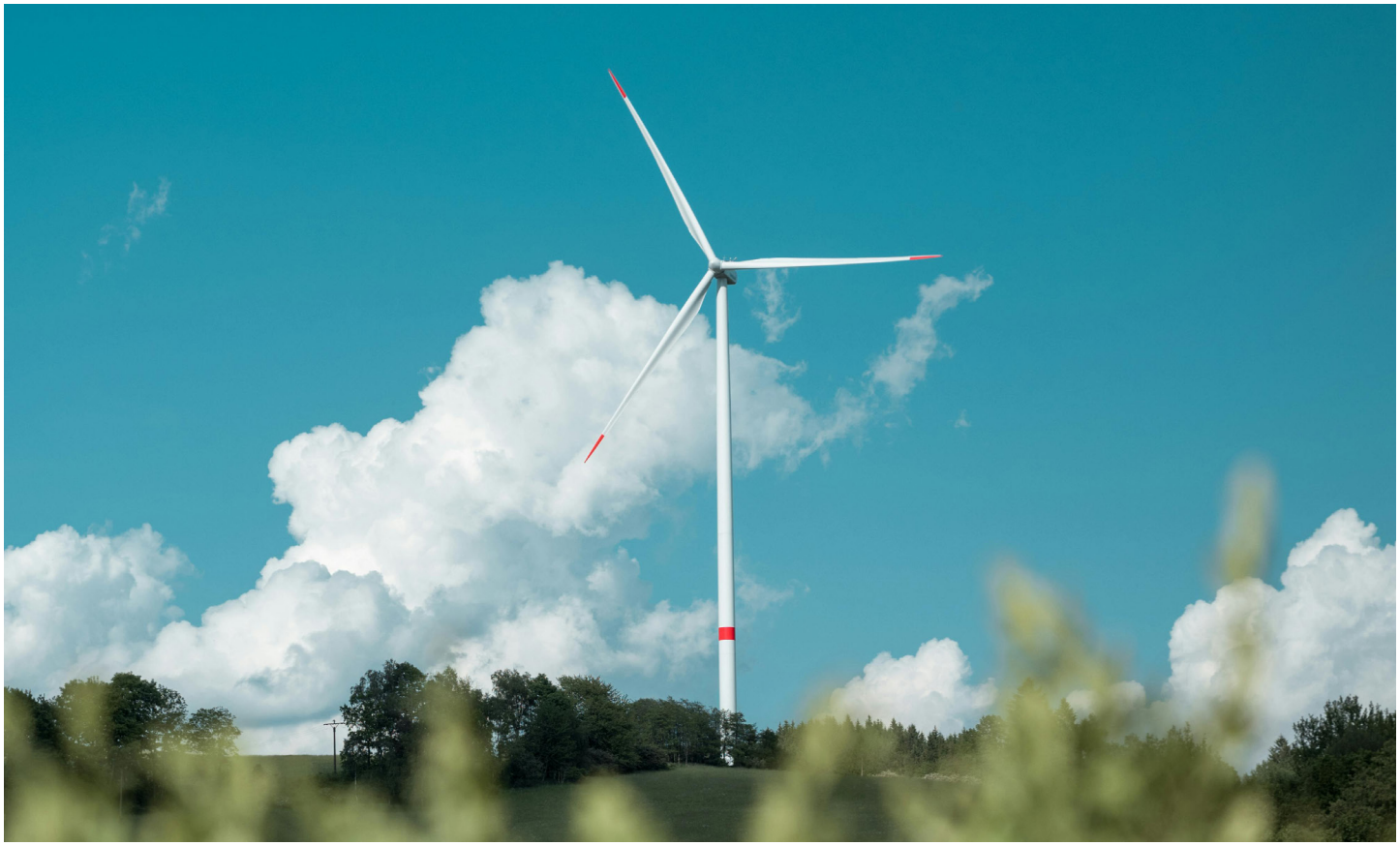


Traceability

Recyclability starts with traceability. The ability to use RFID to track and trace critical components dramatically increases supply chain integrity, improves customer safety and reduces liabilities, which is why industry observers are forecasting accelerated growth for RFID over the next few years. Tracking industrial components has been a challenge, but new Avery Dennison RFID inlay designs have overcome these obstacles.

As a provider of market-leading digital identification solutions, Avery Dennison will work with TEXAID to explore how technology can enable traceability through the sorting and recycling process. Digital identifiers, tracked via Avery Dennison's atma.io connected product cloud platform, carrying vital fiber information, will aid TEXAID to process materials into relevant resale or recycling streams.

Avery Dennison Performance Tapes EU is measuring carbon footprints to offer customers transparency regarding the environmental impact of both our products and supply chain. The Avery Dennison Life Cycle Assessment Tool is a methodology for assessing environmental performance throughout the product's life cycle. It provides a cradle-to-gate comparative analysis of products, offering insights into potential improvements over existing products. The data used for this assessment is primarily based on industry averages.



Performance Tapes

Avery Dennison Performance Tapes is a world-class operation focused on developing and manufacturing high performance pressure-sensitive adhesives and tapes for a broad range of applications in automotive, appliances, electronics, building and construction, specialty industrial and personal care segments.

The organization has 50 years of experience in supplying standard and customized pressure-sensitive materials designed to deliver innovative solutions for customers' needs across the globe. Worldwide manufacturing facilities ensure a global presence supported by local sales, technical and customer service throughout the regions.

For more information on our bonding tapes and adhesive solutions, please visit our flooring page. Our technical experts are here to show you how to work with your materials successfully during every phase of your application. You can count on us to approach any challenge with genuine curiosity and care.

Contact your Avery Dennison sales representative or visit tapes.averydennison.com

#MakingPossible

For more information on technical performance and printing recommendations, please refer to the respective datasheets. Please note that the Avery Dennison product range and service offering can be subject to changes. For an accurate overview, please check our website label. averydennison.com or contact your local Avery Dennison sales representative.