Tape liner waste management: Tracing the path to circularity

Adhesive tapes are multi-layered products, which comprise a carrier material as a backing, an adhesive coating, and in some cases, a removable liner. **Release liners**, either paper-based or filmic, enable the winding of the tape material into a roll and prevent early adhesion. Amounting to one-third of a technical tape, these liners become waste upon application of the tape.

So, what happens to this waste and how can it be managed sustainably?

Finding the answers to such questions is one of the main focus areas for the **Afera's Flagship Sustainability Project (AFSP)**. Read on to understand the current challenges and opportunities to enable sustainable end-of-life solutions.

Managing tape liner waste: Current scenario

Many kinds of release liners are used in the case of technical tapes. They range from **coated paper to plastic films** and are selected based on the needs of the specific application and the production process to which it is subjected. It is estimated that the majority of release liners used in tapes are filmic (~80%) and the remaining is paper-based (~20%).

Paper release substrates	Film substrates
Glassine	Polyester
Supercalendered kraft (SCK)	Polyethylene
Clay-coated kraft (CCK)	Polypropylene

Table 1. Common examples of paper-based and filmic substrates

While recycling options are available, there are some challenges regarding the **collection and the quality of the waste feedstock**. Primarily, three main challenges have been identified:

1. Fragmented availability
2. Insufficient volume for sustainable waste collection
3. Issue of contamination

In the case of technical tapes, there are many end-users and the release liner waste is spread out over the whole supply chain – from tape manufacturers to converters and end users. Collection of this waste is, therefore, challenging.

Also, depending on the type of substrate, the liner waste will go into different waste streams. For instance, glassine liner waste will be part of the paper waste stream to be processed in paper mills. Usually, such mills (and other recycling facilities) specify a **minimum quantity of waste for collection**. Even if tape liner waste is collected from the biggest end users, the volumes are expected to be insufficient to make it sustainable to collect the waste. This brings in the added complexity of having to store the waste till the minimum quantity is reached.

And finally, the processing of the liner waste **depends on how clean and segregated the waste is**. The waste available at tape manufacturers and converters is usually contaminated (adhesives, tape residue, core, etc.). Also, when it comes to siliconised liners, additional steps – like the deinking process in the case of paper recycling – would be needed for further processing.

Addressing the circularity challenge: Industry initiatives and potential opportunities

The path toward circularity requires multiple solutions and there are some interesting initiatives that support **closed-loop recycling of release liners**.

Cycle4green is one such example. The company focuses on paper release liner waste collection and specialises in recycling silicone-coated papers. They offer recycling services for release paper waste counting up to 35% of waste generated in the self-adhesive label industry. Together with recycling partners in Austria and Germany, they enable a fully closed material stream, supporting companies that are looking to circularise release paper waste. [1]

The next examples come from 2 members of **CELAB Europe** (Circular Economy for LABels) and **Afera** – UPM Specialty Papers and Avery Dennison.

UPM's circular recycling solution for siliconised release papers, UPM LinerLoop, also offers a waste collection service, thanks to a dedicated network of collection partners. In June 2023, the company launched the **"LinerLoop compatible" label** to promote closed-loop recycling of release papers used in self-adhesive labels and tapes. [2]

Avery Dennison's program for recycling used paper and filmic label liners, AD Circular, also provides collection services. The **web-based app** enables scheduling waste pick-up and also provides data and analytics (amount of liner material sent for recycling, CO_2 emissions avoided, etc.) [3]

Afera, through AFSP, has also undertaken collaborative actions to support **sustainable waste management of tape liner waste**. Let's take a look at some of the initiatives taken by the waste management workstream of the sustainability project.

Colour harmonisation of paper release liners

Paper release liners come in various colours – from white, yellow, and light brown to dark brown. While the colour of the release liner has no bearing on performance, it does impact the **end-of-life recycling options** (open-loop or closed-loop).

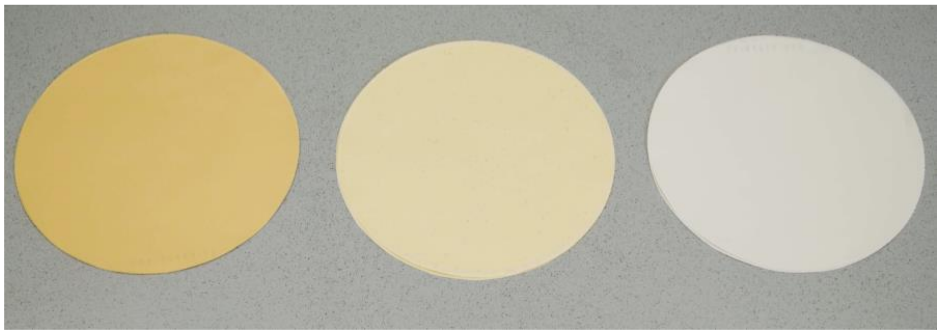

Fig. 1. Colour of paper release liner

(L to R) Dark glassine release liner; Glassine release liner resulting from recycling dark and light release liners together; Light glassine release liner

Image credit: **UPM Specialty Papers**

The mixing of dark and light glassine liners, for instance, produces dark specks on the surface of the recycled paper. This is explained in Afera's position paper, "Colour of paper release liner of adhesive tapes: Impact on material circularity", published in June 2023 in an effort to improve release liner waste management and boost material circularity.

Recyclers database

Building a wider **network of waste collectors and recyclers** across Europe is an important step. Currently, AFSP participants are conducting interviews with short-listed collectors and recyclers to gather information regarding current practices, specifically the following:

- type and minimum volume of waste collected,
- pre-requisites for acceptance of waste materials,
- geographical regions covered.

The future actions also include understanding the role third-party waste management platforms and advanced recycling technologies can play in supporting waste management of tape waste.

Advanced recycling and reuse: Technology advancements

The industry is also keeping a close watch on new technology developments that support the transition to a circular economy. There is currently a lot of interest in understanding the role **chemical recycling** can play in the tape industry. In this space, Lohmann GmbH has successfully completed testing to convert their tape waste into oil via **pyrolysis**.

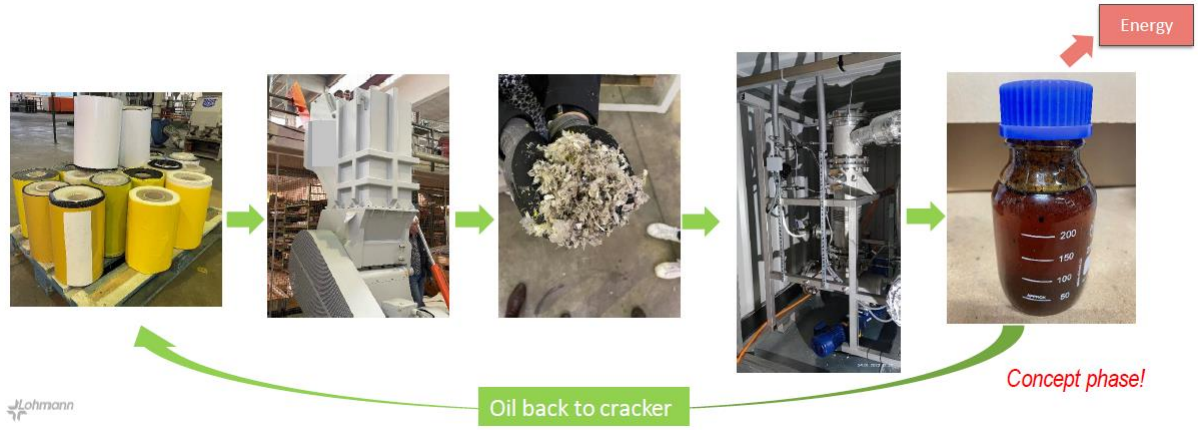

Fig. 2. Converting tape waste into oil via pyrolysis
Image credit: **Lohmann GmbH & Co. KG**

In addition to recycling, **multiple re-use of release liners** is an interesting option as well. Case in point, reuse of silicone release paper thanks to a new cleaning technology developed by Techlan Ltd. Their **patented cleaning process**, which uses no water or chemicals, removes all contamination but doesn't damage the silicone release coating. This minimises waste generation, diverts traditionally single-use release paper from ending up in landfills, and enables multiple re-use.[4]

How to circularise adhesive tape

At Afera, the main aim is to create an **ecosystem that fosters collaboration across the value chain** (tape manufacturers, converters, end-users, recyclers, …) to not only manage liner waste but enable the circularity of tapes overall.

During this year's **Afera Annual Conference in Malta**, Jean-Loup Masson, Director of Innovation, R&D, and Products at **Novacel**, conducted a **workshop** on "*How to circularise adhesive tape*". The aim was to clarify – through an interactive session – possible improvements in all companies, particularly in terms of collection, recycling, reuse or reducing the use of materials.

Interactive session on Day 1 at the Afera Annual Conference 2023 in Malta

The audience, sitting at 15 different tables, formed smaller groups and worked together to **map the circularity challenges, readiness, and potential collaborative solutions** for different types of tapes (recyclable, difficult-to-recycle, containing a liner…) with a focus on key areas like the **9Rs, material sourcing, production, and waste management** (reduction, collection, recycling…).

The insights gathered during this session will shape the discussions going forward, both at a company level and at an industry level.

For updates and project participation details, visit: https://afera.com/adhesive-tapes-sustainability/afsp-news-and-events.html or reach out to us at AFSP@afera.com

References

1. https://www.c4g.fi/
2. https://www.upmspecialtypapers.com/responsibility/release-liner-recycling/
3. https://adcircular.averydennison.com/adcircular/
4. https://techlanltd.co.uk/case_studies/techlan-and-gts-flexibles/