APK

Closed loop recycling for plastic packaging waste

APK's innovative recycling technology enables a circular economy for plastics

Newcycling® – the closest loop back into packaging

newcycling

Design for recycling and technological innovations need to go hand-in-hand

Dear reader,

If we are truly to come full circle in creating a circular economy for plastics, the plastics value chain must consider innovations in both product design and recycling technology.

With both the European Commission's Green Deal and the 2020 Circular Economy Action Plan reinforcing the Commission's commitment as outlined in its 2018 EU Plastics Strategy, now is the right time to take stock of the results to date of the various debates among and initiatives from legislators, industry representatives, NGOs, and the scientific community. If we do so, we will quickly realise that discussions and initiatives aiming at circularity for plastics need to take a much more active approach to linking ideas for 'design for recycling' with the assessment of efficient and future-bound plastics recycling technologies.

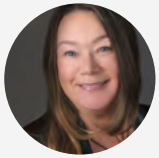
It is essential that we develop a common understanding of the relevance of today's existing mechanical recycling as well as that of advanced physical recycling processes available at industrial scale – such as APK's Newcycling® – and future chemical processes.

Guidelines, norms, and regulatory measures must incorporate a sound cognisance of the way in which today's standard technology and innovative approaches complement each other.

Only if we understand the challenges and benefits of recycling technologies can we truly determine a 'recycling technology mix of the future' that will enable closed-loop recycling for a broad range of products, helping to ease the pressure on the climate. Selecting a specific mix of technologies and developing the necessary infrastructure will also result in new opportunities for the design for recycling efforts.

APK's mission is to produce plastic recyclates with near-virgin properties from mixed plastic waste streams such as flexible, multilayer packaging waste. It has often been asserted that this type of waste is not recyclable with most mechanical processes. However, with Newcycling® – APK's advanced physical recycling technology – these fractions can be easily transformed into high-quality secondary raw materials. Technology such as that used in Newcycling® – along with efficient re-design – is the missing link in establishing a circular economy for plastic in which there is no compromise on product performance.

We look forward to working with you to achieve a truly circular economy for plastics and thus make a significant contribution to reducing CO_2 emissions. It's time to act.



Yours,

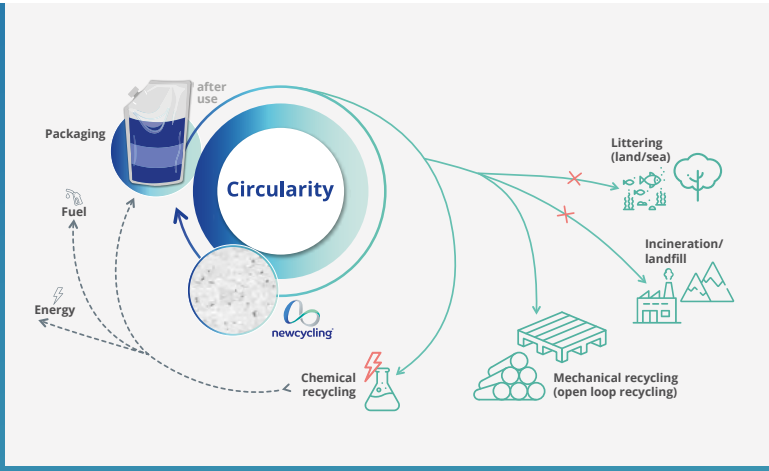
Susanne Küppers

Board of Management

High-quality LDPE recyclate from APK's Newcycling®-process.

Newcycling® – the closest loop back into packaging

In positioning Newcycling® on the recycling technology spectrum, a distinction must be made between physical and chemical processes. Mechanical recycling and advanced processes that add a solvent-based purification step (aka 'dissolution recycling') are both physical processes. These technologies keep the molecular structure of the polymer intact and retain the energy originally invested in polymerisation. This is also the major contrast to chemical recycling processes, which impact and break down polymer chains, partially explaining why such processes involve far higher energy use than physical ones.



Within the category of physical recycling technologies, APK's Newcycling® is classified as one of the dissolution recycling processes. It features a mechanical pre-treatment (fractioning, washing, etc.) and adds a solvent-based process step, which enables the separation of different polymers in complex plastic packaging. Additionally, during this part of the process, contaminants of all types (additives, colours, organic residues, etc.) are separated and the purity of the target polymer obtained is significantly higher than that from solely mechanical processes. Finally, the solvent is separated and recovered and the target polymer is regranulated.

APK's Newcycling® products – Mersamid® (recycled PA) and Mersalen® (recycled LDPE) – feature near-virgin functionality.

APK uses input material from post-industrial and post-consumer sources and is also working on blends combining the two sources. The solvent-based process step allows Newcycling® to recycle more complex plastic products and waste fractions, such as mixed, flexible multilayer plastic packaging, into high-quality secondary raw materials.

EuCertPlast

EuCertPlast certified APK's Merseburg (Germany) facilities for the environmentally conscious recycling of waste from plastic films.

Mersalen® LDPE NCY – the recyclate for challenging packaging solutions

There is increasing demand from packaging manufacturers and brand owners for LDPE recyclates for re-use in packaging. However, the availability of LDPE recyclates in a quality suitable for this purpose is very limited. With its Mersalen® LDPE NCY, APK offers high-quality recyclates with properties similar to those of virgin plastics. This allows the replacement of virgin LDPE in flexible packaging, labels, films, and many other challenging applications, with no compromise on functionality or appearance. The consistency of the technical features of Mersalen® LDPE NCY recyclates, such as their viscosity, mechanical properties, and being virtually odour-free, is also impressive.

Application range

→ **Flexible packaging**: Flexible packaging, e.g. stand-up pouches, place the highest demands on the plastic materials used. Depending upon the application, Mersalen® LDPE NCY can largely or even completely replace virgin LDPE in flexible packaging, with no compromise in quality. Moreover, both the packaging design and the processing parameters for extrusion lines and FFS packaging systems can be retained. Possible applications include: Pouches for detergents, Flexible packaging for personal care and hygiene products, Flexible tubes for cosmetics.

→ **Labels/Stickers**: The pressure to improve sustainability is particularly high when it comes to labels and stickers. For this reason, the use of recyclates is being highly pushed in this segment. Mersalen® LDPE NCY is suitable for many label applications and meets high standards in terms of appearance, e.g. optics, as well as low speck and gel concentration. With Mersalen® LDPE NCY, achieving the very thin film thicknesses often required for labels is not a problem.

→ **Film applications**: Mersalen® LDPE NCY is suitable for a variety of other film applications, e.g. collation shrink film, as well as most standard processing techniques, such as blown film and cast film extrusion. In addition, Mersalen® LDPE NCY can be used for lamination and coating.

Average CO_2 reduction of 66%*

**Mersalen® and Mersamid® recyclates compared to virgin LDPE, ifeu 2019.*

Mersamid® PA NCY – the recyclate for consumer goods and technical applications

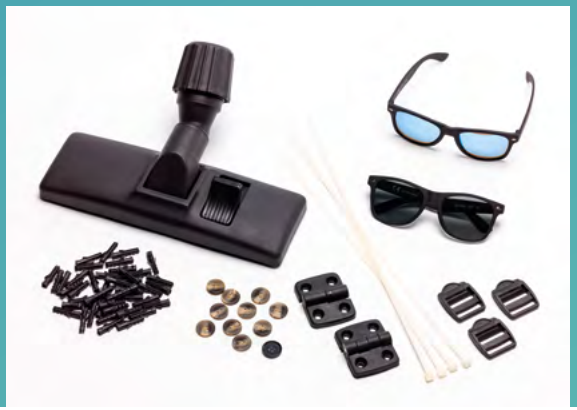
Polyamide is a high-quality technical plastic that has been used for such things as replacing metallic materials in many technical applications and can be found in a wide range of everyday products, including furniture and sports equipment. There is a significantly increasing desire for a higher proportion of recyclates in these segments as well. Mersamid® PA NCY's consistent property profile and quality make it extremely impressive, since these allow it to be used even in complex technical applications, providing a sustainable alternative to virgin polyamide.

Application range

→ **Injection moulding applications with glass fibre reinforcement**: Mersamid® PA NCY recyclates fulfil demanding requirements and can partially or fully replace virgin PA in compounds with glass fibre reinforcement. Wear resistance, including in a wide range of weather conditions, as well as durability and colouring are just some of the proven functionalities of this recyclate. Some examples of application segments are:
- Consumer goods (e.g. life style products, sports equipment, etc.)
- Automotive components
- Other technical parts (e.g. housings, covers)

→ **Injection moulding applications without glass fibre reinforcement**: Sustainability and high quality are also key in less complex injection moulding applications. Mersamid® PA NCY recyclates provide all functionalities required for it to replace the use of virgin PA in products such as dowels or cable ties.

→ **Extrusion applications (non-film) without glass fibre reinforcement**: Mersamid® PA NCY recyclates offer optimal performance when used for extrusion applications such as plates and profiles.



flustix RECYCLED 100 %

Mersalen® and Mersamid® are Flustix-certified to consist of 100% recyclates.

Scaling Newcycling®-technology around the world

With its first industrial Newcycling® plant currently producing several fully commercialised polyolefin recyclates at its Merseburg headquarters in Germany, APK's aim is to work together with strong partners from the plastics and packaging value chains to scale up and expand the use of its innovative technology.

This technology is able to valorise a broad feedstock base, including post-industrial and post-consumer sources, whether in the form of multilayer film waste or mixed unsorted plastic streams. In collaboration with first partners from the plastics industry, planning is underway for the construction of additional plants for the processing of post-consumer waste in the very near future.

Having an initial focus on LDPE APK is already working on further recyclate solutions such as PP, HDPE and for other PCR streams.

If you are interested in learning more about our ambitious scaling plans or would like to consider becoming an investor or partner, we would be happy to hear from you. Together, we can achieve closed-loop recycling for plastic waste fractions and contribute decisively to making a true circular economy for plastics a reality.

Merging high quality of recyclates and low CO_2 footprints is key.

Strong involvement and strong investors!

To raise awareness of the benefits and opportunities offered by our Newcycling® technology as well as to support the development of a regulatory framework for a circular economy for plastics, APK is involved in a number of regulatory initiatives and value chain projects at the national, European and global levels.

This comprises the development of waste and packaging legislation as well as specific guidelines and norms for the plastics and packaging value chains.

Five strong investors have been instrumental in the development of APK's site in Merseburg as well as the development of our innovative Newcycling®-technology:

MIG Fonds invests in young, unlisted start-up companies in German-speaking countries, focusing on investments in the fields of pharmaceuticals, biotechnology, clean tech, new materials and information technology. MIG Fonds offers private investors the opportunity to participate directly in a portfolio of promising technology companies.

Through **AT Newtec GmbH**, ATHOS KG is also a shareholder in APK AG. AT Newtec invests in young, unlisted companies in German-speaking countries.

KIRKBI A/S is the Kirk Kristiansen family's private holding and investment company founded to build a sustainable future for the family ownership of the LEGO® brand through generations. The holding is committed to a long-term and responsible investment strategy to ensure a sound financial foundation for the owner family's activities as well as contributing to a sustainable development in the world.

As a leader in the global chemical industry, **LyondellBasell** strives every day to be the safest, best operated and most valued company in its industry. The company's products, materials and technologies are advancing sustainable solutions for food safety, access to clean water, healthcare and fuel efficiency in more than 100 international markets. LyondellBasell has stepped up its circularity and climate ambitions and actions to address the global challenges of plastic waste and decarbonization.

Salvia is a first generation single family office based in Holzkirchen near Munich, which was founded in 2014 by Helmut Jeggle. Originally started with traditional angel investments, Salvia has evolved into an entrepreneurial venture capital investor.

MIG FONDS

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KIRKBI

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