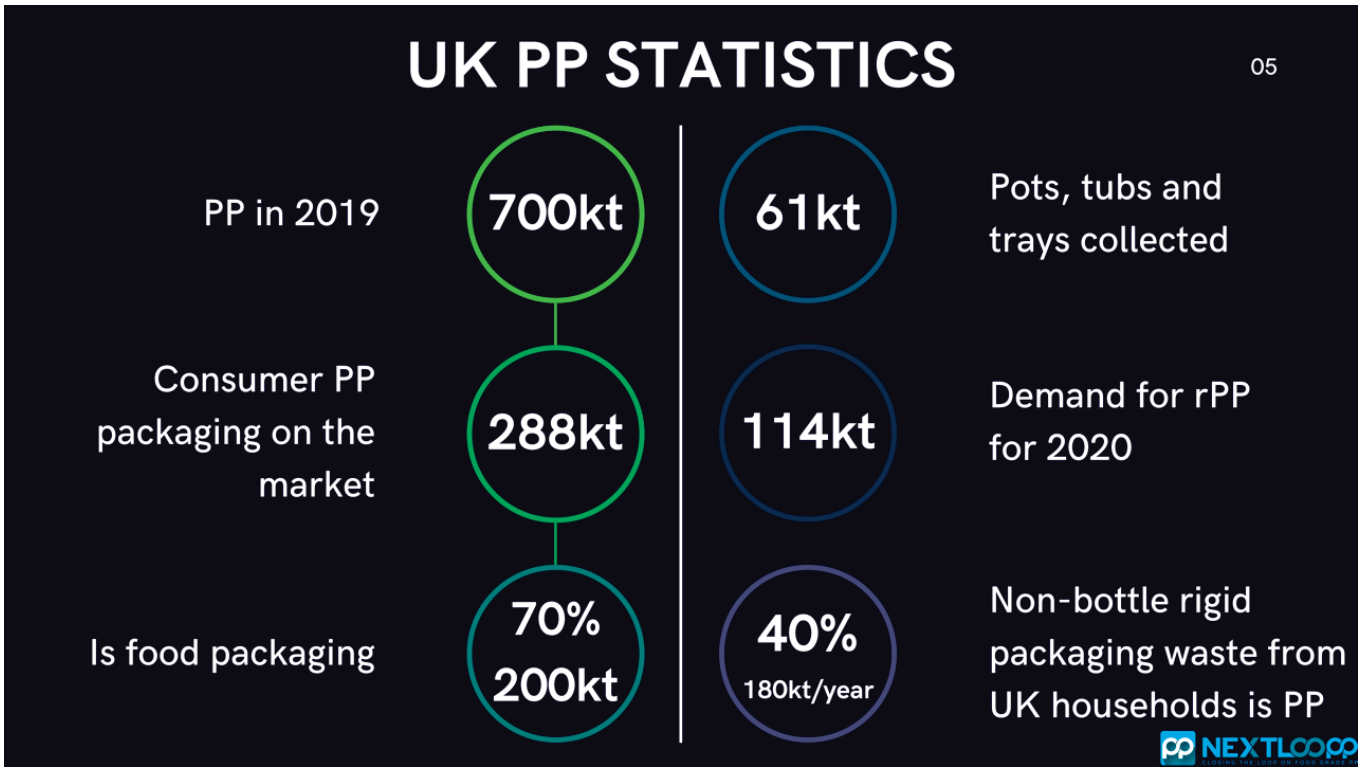
A new era dawns for polypropylene

Polypropylene (PP) is everywhere we turn, writes **Professor Edward Kosior**, from the surgical masks we are all wearing to our bank notes. PP protects our foods, encases our yoghurts, soups and ice creams and is contained in the films that wrap many of our fruits and vegetables. Whilst some may complain that we don't need as much plastic around our fresh produce it actually extends the shelf-life of many foods, thereby reducing food spoilage and waste.



PP plays a fundamental role in the way society meets many demanding applications.

This also explains why it is one of the more problematic polymers to recycle. So much so that some countries are considering delisting it as recyclable.

The issue is that its actual versatility means PP has been missing from the recycling streams. It appears in everything from soup and yoghurt pots, meat and fruit trays, films, and fast food packaging. Unlike PET and HDPE, that are widely used in beverages, PP's prolific nature defines it as difficult to recycla-ble.

To date, there is no food-grade recycled PP available for re-use into new packaging. Yet in the UK alone about 300,000tpa of PP is used in packaging, of which about 70% (210,000tpa) is food-grade packaging.

New era for polypropylene

Now, however, PP is being given a new lease of life. Currently PP makes up 20% of global plastics pro-duction, a figure that is growing at 6%. In 2018 56 million metric tons were produced valued at USD$ 97 billion and it has been estimated that by 2025 we will be producing 83 million metric tons worth USD$ 147 billion. PP is present at a critical percentage of the packaging stream, which means it can be readily recycled once it is collected.

As organisations around the world commit to stop inundating our environment with more plastic, we are seeing pledges to make plastic packaging reusable, recyclable or compostable. In fact, most are heading for 25% recycled content by 2025.

As counterintuitive as it may seem, now is not the time to ban PP, but rather we need to turn it into the fantastic polymer resource it has the potential to be. The fact that it is currently either going to landfill or being re-used where other, lesser polymers would suffice is where we need to focus. It is a waste of precious resource to produce virgin PP when we have the wherewithal to efficiently identify, sort, decontaminate and recycle the current pots, trays and tubs that are being produced.

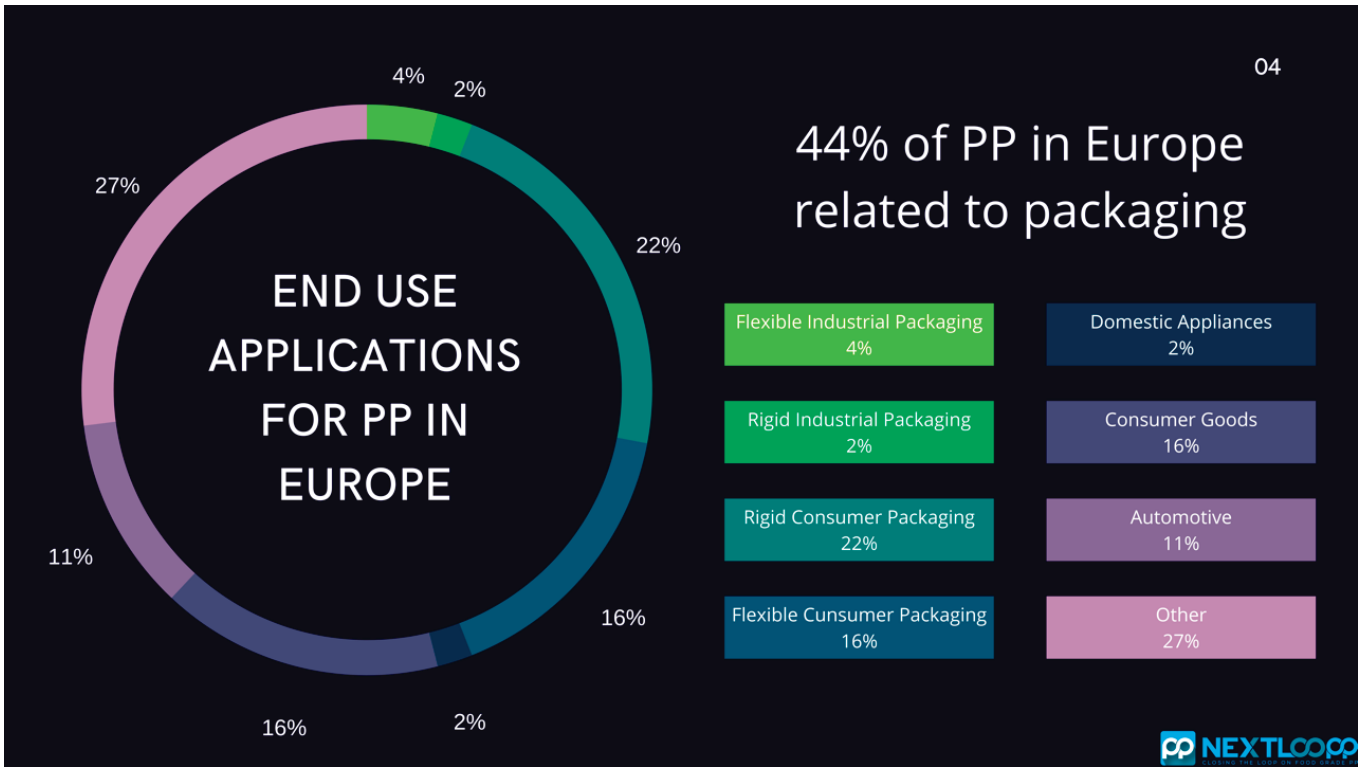
And, yes, we do have the technology, which is plug-and-play ready, to finally close the loop on PP.

Meeting the demand

As a specialist in plastics recycling, one of the most pressing enquiries I regularly receive from retailers and brand owners alike relates to unlocking the value in PP and turning it into high quality food-grade rPP. This has been the key driver behind the multi-client NEXTLOOPP project.

Whilst the UK Plastics Tax

continued on page 28



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that applies to packaging with less than 30% recycled content has been a major incentive, we are also seeing a real surge of interest to face the plastics waste issue head on and find real, sustainable, long-term solutions to this crisis.

NEXTLOOPP's mission is crafted out of this need and aims to create circular food-grade PP from post-consumer packaging. The goal is to establish a supply chain model for the collection, sorting and re-processing of food-grade PP packaging. From there, we aim to efficiently manufacture high-quality and food-grade PP.

Over the next 24 months we will shift from pilot to large-scale operations to eventually create rPP that can be used across a wide range of applications and products to meet recycled packaging targets.

Innovative technologies

We already have the innovative technologies required to decontaminate and sort. The sorting tech-nology alone is poised to transform the way recycling is managed as it has the potential to identify and sort all waste rapidly and efficiently and at very high purity. The PRISM marker-based sorting technolo-gy has been proven at full speed - even on very soiled and damaged packaging. Furthermore, PRISM can be readily implemented in most recycling plants.

We also have developed powerful decontamination technologies with which we aim to re-define what is possible through the reuse and recycling of PP. As such, one of the first materials NEXTLOOPP will manufacture will be 'inert' grade PP.

First-of-its-kind polymer type

We call it 'inert' as it will have no odour and no migration challenges for many products. This innova-tive high-quality polymer will satisfy many demanding applications ranging from the packaging sector to the cosmetics industry.

Whilst our mission is to get more food-grade material back into food contact, the cutting-edge tech-nology boosts the economics for the recycler through the creation of high value recycled PP for many non-food contact applications including cosmetics.

Mechanical versus chemical

We now have the opportunity to transform the existing recycling and decontamination processes to boost economic efficiency and reduce cost, and mechanical recycling makes perfect sense to achieve this.

The ongoing debate around mechanical versus chemical recycling has divided many, however, chemi-cal recycling has a higher carbon footprint than mechanical recycling and certainly requires more in-tensive capital per plant. Furthermore we are still some years away before any large scale plants are in operation and we need immediate, functional solutions. Mechanical recycling is the perfect low-cost, highly efficient solution particularly when using high-quality feedstock.

Finally

The next key steps towards producing food-grade rPP for re-use in consumer products are the estab-lishment of EFSA and USFDA certification for the manufacturing processes. NEXTLOOPP aims to develop new guidelines for food-grade recycling for brand owners, retailers and converters. There will be no middle measures to ensure that the loop for PP gets better with future cycles.

Creating and then closing the loop on food-grade PP has taken 8 years of intense research and com-mercial trials - now we are poised to finally unlock the value of one of the most versatile polymers yet.

The NEXTLOOPP project was launched during a webinar hosted by Professor Edward Kosior on 23 June. To view the webinar, go to https://youtu.be/3T1uMPZ0XX8

Professor Edward Kosior is the founder of Nextek, an independent consultancy that provide solutions to the challenges of the plastic recycling and resource management throughout the supply chain. For more information, https://www.nextloopp.com.