SUSTAINABILITY: THE FUTURE OF PLASTIC

Plastic has provided society with many benefits. However, articles and images about plastic waste polluting the oceans of the world as well as beaches are turning some consumers against using the material. Politicians are calling for action, yet nevertheless there is still support for the plastics industry and producers can be thankful things are not as bad as they might be.

Plastic is getting off lightly

Graphic images of plastic waste on land and at sea have left companies who make the material and finished product manufacturers who use it feeling bruised. As 2018 progresses, it's clear the pressure on plastics producers to address this problem will continue.

Recent features of ours, including *Closing the polyester loop* (WSA, May-June 2017) *Plenty more fish?* (WSA, July-August 2017), *Mass microfibre migration* (WSA, September-October 2017), show that there is clear thinking and fresh ideas among companies in the plastic-based textiles sector, but to paint a rosy picture would be wrong. The pressure on the plastics industry to improve its impact on the environment is intense enough now to have some commentators talk about a tipping point (pardon the irony). At the end of May, the European Commission announced new rules to reduce marine litter. "With the amount of harmful plastic litter in oceans and seas growing ever greater, the European Commission is proposing new rules to target the 10 single-use plastic products most often found on Europe's beaches and seas," the Commission said, "as well as lost and abandoned fishing gear. Together these constitute 70% of all marine litter items."

The new rules are "proportionate" and "tailored to get the best results", it continued. This means different measures will be applied to different products. Where alternatives are readily available and affordable, single-use plastic products will be banned from the market. For products without "straightforward alternatives", the focus will be on limiting their use through reduction in consumption, but the Commission is also seeking to impose "design and labelling requirements" and waste management (including clean-up) obligations on manufacturers. "The new rules will put Europe ahead of the curve on an issue with global implications," the Commission stated.

Plastic cotton buds, cutlery, plates, straws, drink stirrers and sticks for balloons are among the products that are to be banned; these will now have to be made from more sustainable materials instead.



Washed up plastic detritus on a beach.
Shutterstock/Erlo Brown

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One set of rules

According to the Commission's figures, plastics in general make up 85% of marine litter, globally, and plastics "are even reaching people's lungs and dinner tables, with micro-plastics in the air, water and food having an unknown impact on their health". It says "tackling the plastics problem is a must", but points out that this can also bring new opportunities for innovation, competitiveness and job creation.

"Having one set of rules for the whole EU market will create a springboard for European companies to develop economies of scale and be more competitive in the booming global marketplace for sustainable products," the Commission states. "By setting up reuse systems, companies can ensure a stable supply of high-quality material. In other cases, the incentive to look for more sustainable solutions can give companies the technological lead over global competitors."

An idea ahead of its time

Perhaps the aspect of this with the greatest potential for an immediate impact on the textile supply chain is the reference the European Commission makes to fishing gear. As long ago as 2013, fibre producer Aquafil pioneered an initiative to collect discarded fishing nets and transport them to its own sorting and depolymerisation plants in Slovenia to be recycled into new nylon 6 yarns, which it has brought to market under the brand name Econyl.

As part of a wide-ranging statement on May 28, the European Commission said: "Producers of fishing gear containing plastics will be required to cover the costs of waste collection from port reception facilities and its transportation and treatment. They will also cover the costs of awareness-raising measures."

Aquafil launched Econyl in 2008. In 2011, it acquired Slovenian synthetic fibres manufacturer Julon and began its investment in an Econyl expansion project worth €17 million, of which €3.6m was contributed by the Slovenian government. By early 2016, Aquafil said it had turned 160 tonnes of abandoned fishing nets into Econyl. Speedo, Levi's, Vaude, Volcom and Ternua are among the brands to have incorporated Econyl into their clothing. With the manufacturers of the fishing gear footing the bill, this idea, which in 2013 may have seemed like it was ahead of its time, stands a good chance of expanding further.

At the start of 2018, the European Commission published a detailed document with the title 'A European Strategy for Plastics in a Circular Economy'. This sets out the path forward for this industry if it is to have a chance of winning back the hearts and minds of conscientious consumers.



Litter on beaches is not always easy to spot. Here, the gull highlights how a single item on a clean beach can become life-threatening pollution too.

WTP/Quisk

Something that may make painful reading for beleaguered companies in the plastics value chain (but that needs saying anyway) is that there are clear indications that plastic is getting off lightly; the backlash and bans that 2018 has brought could be a great deal harsher. In relative terms, plastic still seems to attract substantial support and sometimes that support, from bodies such as the European Commission and a number of national governments, translates into money. It's possible to point to at least five sections in 'A European Strategy for Plastics in a Circular Economy' that indicate that the plastics sector is enjoying a much easier ride and much more financial backing for its efforts to clean up its supply chain than other industries.

Bottle merchants

News taking plastic to task is unrelenting. In mid-May the European Federation of Bottled Waters (EFBW) announced four industry-wide pledges that aim to increase the collection of PET (polyethylene terephthalate) bottles and the use of recycled PET. The Brussels-based body, which represents almost 600 natural mineral and spring water producers across Europe, has said this will accelerate the shift towards a more circular economy.

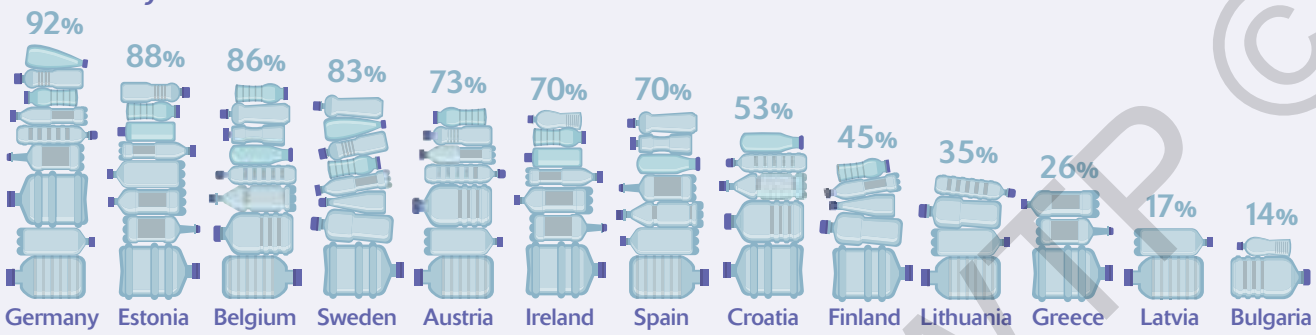
"All drinks containers used by the industry, be it PET, glass or aluminium, are recyclable," EFBW says. "However, the level of collection of PET drinks bottles varies substantially across the EU. Some member states collect more than 90% of PET bottles while others collect less than 20%, meaning our packaging today is part of the unacceptable phenomenon of littering." (See panel on page 36).

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Valuable empty bottles

Empty PET bottles must be viewed as "valuable resources", not as waste, the EFBW says. The organisation has pledged to make a 90% collection rate the average across the EU by 2025. Some countries are achieving this already, but others are nowhere near the target, and the difference cannot be explained by contrasting methods for encouraging collection. Some high performers use an 'extended producer responsibility' method, while others employing the same policy have shockingly low collection rates. The same applies to countries using 'deposit-return systems'; some fare brilliantly, while others remain far behind. The combined volume of PET collected by Germany, France, Italy, Spain and the UK in 2015 accounted for 70.9% of overall EU collection.

EU Country PET bottle collection rate



Source: PCI Wood Mackenzie/EFBW

Europe's mineral and spring water brands believe that PET bottles "must be given a second life" and its four new pledges aim to make sure this happens. These companies will make 90% the EU average for collecting PET bottles to make sure they can be used to produce new bottles or, of interest to the textile industry, "other products". Water companies will work with the recycling sector to use at least 25% recycled PET in their water bottles, although they make it clear that, for this to happen, they are going to need "a consistent supply of high-quality recycled material". These companies also promise to invest in new plastics that are made from renewable raw materials, and they will work with consumers to encourage anti-litter activities and better sorting of recyclable materials (recycling companies say this is a priority because, at the moment, they do not have enough feedstock to meet market demand). The EFBW pledges give them until 2025 to achieve these objectives.

President of the organisation, Jean-Pierre Deffis, comments: "We are committed to achieving these industry-wide actions. PET drinks bottles already achieve the highest recycling rate of any plastic packaging material in the EU. But even one bottle ending up as litter is one too many."

Viability and credibility

Progress is important. Martin Stephan, chief operating officer of Carbios, a French company that has been working since 2012 to perfect the use of enzyme technology to reverse polymerise PET (polyethylene terephthalate), insists that companies are continuing to advance, certainly as far as the science is concerned. Carbios has now shown that its technology is "viable" and compatible with industrial processes, he says, and has the backing to design and construct its own plant, which will be complete in 2021.

A second topic for him is credibility. "We've spoken to a lot of people," he explains, "brand owners and regulators, and we know that they need new technology because they cannot reach the goals they have set themselves with what's currently available." He confirms that there is leadership in this area from fast moving consumer goods brands such as the water companies, but the textiles industry remains a key market for recycled polyester fibres. According to Martin Stephan, big clothing brands and retailers "have had the discussion" with Carbios and are still considering the company's idea, which centres on using enzymes to depolymerise PET back into monoethylene glycol and terephthalic acid. Its contention is that this can make it possible to recycle PET time and time again, without any loss of quality. And its most recent advances will make this possible with all types of PET, not just the transparent variety, meaning recycled coloured bottles will be of just as much value as clear ones. It has also managed to make the process three times faster than it was originally, with 97% of PET material converting back to the original monomers in 24 hours.

Naturally, the idea of this appeals to clothing brands, but it would mean making big improvements to our systems for collecting, sorting and recycling not just bottles, but the products we make with plastic recycled from the bottles, including garments. Carbios's calculation is that 40 million tonnes of PET is

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going into textiles at the moment. "We would love to have the influence of one or two big clothing brands to help us push forward," Mr Stephan says, "but sorting and recycling garments is difficult and maybe that's why the big clothing brands are a bit shy about this."

A curious incident

Litter, as we now know, is everywhere. It emerged recently that the Global Oceanographic Data Centre of the Japan Agency for Marine-Earth Science and Technology has found plastic waste in the Mariana Trench, which is the deepest part of the world's oceans at 10,898 metres at its most profound point. Basically, if plastic can make it there, it can make it anywhere, as Frank Sinatra almost said.

Ocean advocate, sailor and artist Emily Penn needs no convincing. She says her career took a new turn the night the boat on which she was "hitching a lift" to Australia crashed into a mass of plastic waste. "We were surrounded by pieces of plastic," she says, "but we were thousands of miles from anywhere. The closest people to us were in the International Space Station above our heads."

Ms Penn now sails the world and connects scientists, communicators and others with the ocean. Speaking at a *New York Times*-organised event in May this year called, starkly, 'How to Save the World: The War on Plastics', she said the curious incident of the dregs in the nighttime led to her becoming a campaigner for projects that aim to keep plastic waste out of the oceans. Her experience is that great islands of large pieces of plastic in the water are rare, even at the "accumulation areas" or gyres that ocean currents produce at given points. That's because the larger pieces have degraded and turned themselves into much smaller pieces that are converting the seas into what she calls "a fine soup of plastic pieces".

It's difficult to distinguish between some of these bits of material and plankton that fish feed on, she explains. Therefore, it was no surprise to Ms Penn that analysis of fish she and her colleagues have carried out show large amounts of plastic inside them. "What might the implications be for us," she wonders, "if this plastic is getting into the food chain?" To find out if it really is something she ought to be devoting her time to, she decided to have analysis done on her own blood. Consultation with the United Nations identified 35 chemicals, potentially present in some ocean plastic, that might be a cause for concern. "Of those 35 chemicals, we found 29 of them inside my body," she reveals. "This really changed things for me. We all, I'm afraid, already have a body burden, a chemical footprint, something that we'll never get rid of." Levels are not so high as to make her immediately concerned about her health, she says, but she describes it as "a very scary indicator" of the direction in which we are moving.



Emily Penn (right) with colleague Lucy Gilliam at Musselburgh beach in Edinburgh unveiling a 10-metre long whale made entirely from plastic recovered from the ocean.

Sandy Young/PA Wire

Questions on the after life

At Carbios, Martin Stephan accepts that all plastics producers have a job on their hands to calm campaigners' fears. His impression is that this may be especially true in the UK where, he says, not a single week goes by without at least one negative article in mainstream media about plastic. "There is less of this on the continent," he insists, "but campaigns there are intense, too, and with good reason. Plastic is a fantastic material and it has brought a lot of benefit to society, but we have not paid enough attention to its after life. Our idea is that we can use PET waste to create a virtuous circle and bring the circular economy closer, making at least some of our new fibres and new materials from waste instead of from petrochemicals. It can be done."

If plastic receives support from bodies such as the European Commission as well as criticism, Mr Stephan believes that the main reason is the usefulness of the material. It's lightweight, so it has helped make cars and aeroplanes lighter, which lowers the carbon emissions of these forms of transport. Its ability to extend the life of food means the problem of food waste is less bad than it might be.

"It's impossible to use natural fibres to replace all of this," he says, "and we should continue to use plastic. The main thing is that we can and must do better in finding a use for plastic waste and the whole of society, including consumers, brands, retailers and regulators as well as manufacturers, shares the responsibility for that."

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