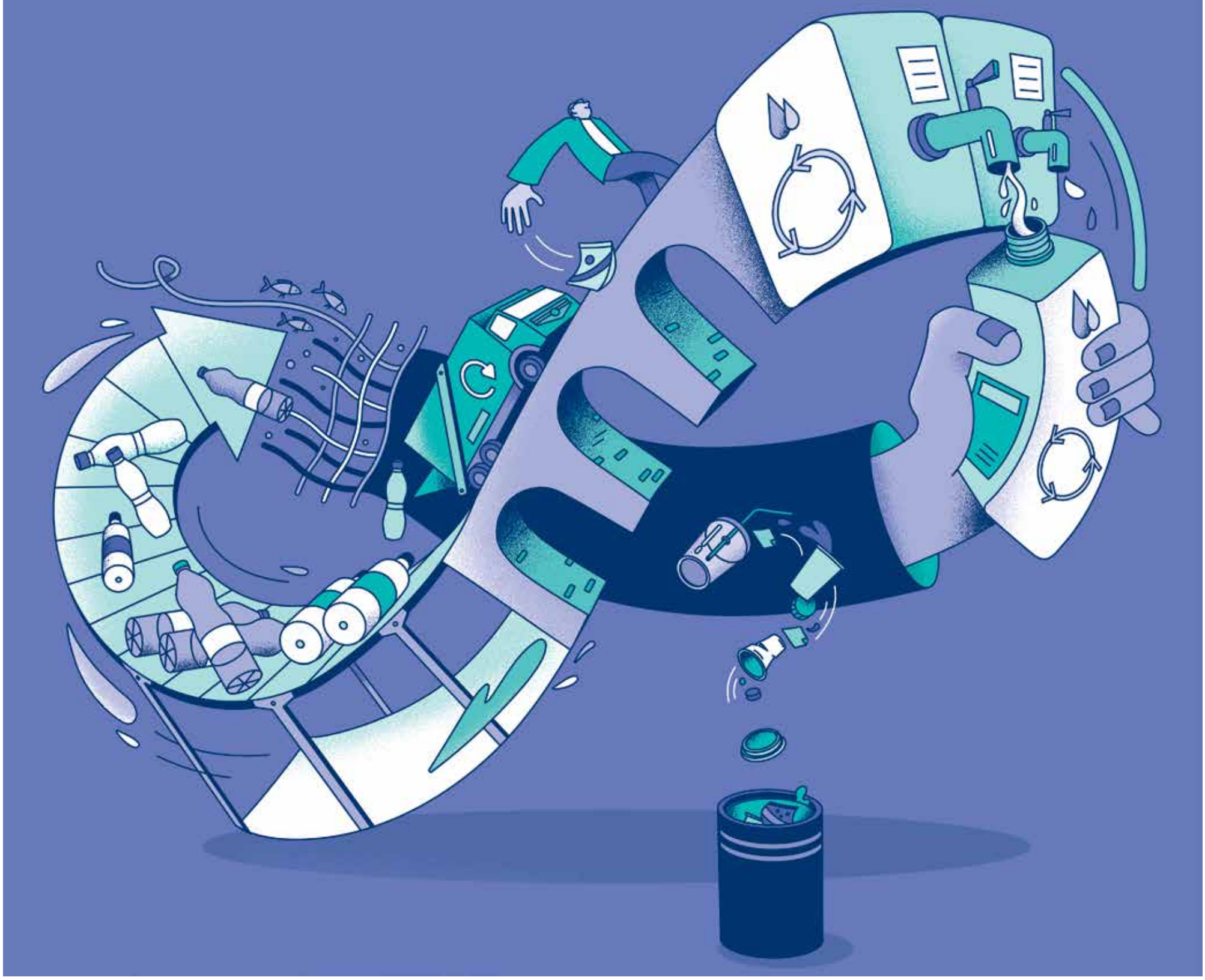
FUTURE OF PLASTICS



FUTURE OF PLASTICS

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REPUTATION

A bad rap for good wrap?

A lack of nuance in media coverage has caused plastic to be unfairly maligned. So say a number of companies that are willing to argue the case for its defence

MaryLou Costa

The negative narrative surrounding plastic is a familiar one. The amount entering our oceans each year is predicted to triple to 29 million tonnes by 2040, with packaging the main culprit. Yet big brands including Asos and Innocent have stood by it as their material of choice, which raises the question: is it time to reconsider popular perceptions of plastic as the villain of the piece?

Asos has spread the message on social media that producing its plastic mailer bags – made of 90% recycled plastic – consumes roughly a quarter of the energy it takes to make the bags out of paper, and that switching to cardboard would increase its carbon emissions by half. Meanwhile, Innocent has produced detailed answers to FAQs about its packaging, concluding that, "at the moment, plastic is the most sustainable option for our bottles. It has a lower carbon footprint than glass and is much easier to recycle than cartons."


Rawpixel.com via Shutterstock

The problem is not with plastic itself; it's with the lack of widespread recycling systems, claims Innocent, which argues that the creation of a circular economy for packaging is the solution.

"Plastic has a number of good qualities. It's lightweight, durable and, most crucially, recyclable. As well as using recycled content in our bottles, we're also advocating for higher recycling rates," says Emilie Stephenson, who leads Innocent's UK 'Force for Good' initiative.

She continues: "We've advocated across Europe by responding to government consultations and campaigning to introduce, or be allowed to join, deposit-return systems. We are supporting industry initiatives to increase recycling rates, use more recycled content, adopt reuse models and reduce plastic packaging volumes worldwide."

Plastic should be used "as an alternative material to almost anything", declares Jolyon Bennett, founder and CEO of Juice, a provider of mobile phone accessories that uses recycled and recyclable plastic in its packaging.

"There are over 300 billion tonnes of plastic on Earth and it's going to be around for up to 3,000 years, so let's use science to find ways to reuse that mountain of plastic," he says. "The negative perception of plastic is perpetrated by a global mass media that's telling us not to make plastic – and I do get that. It's the durability and longevity of the material that everyone is bemoaning, but actually it's an incredible material."

Bennett thinks that any campaign in this area should "be about not making more plastic and instead reusing the plastic we have. That would change perceptions. If everyone used recycled plastic and recycled that, production would drop by between 70% and 90% globally."

Zoe Brimelow, brand director at packaging manufacturer Duo UK, agrees. Plastic, she says, has been subject to "years of persecution, so it will take a great deal of education and transparency to change this".

Echoing Stephenson's call for a campaign to increase the use of recycled plastic material and encourage more recycling, Brimelow cites the 'Podback' scheme as a case in point. Launched by her company in collaboration with Jacobs Douwe Egberts UK and Nestlé, the scheme provides customers with mailing bags so that they can easily return used plastic and aluminium coffee pods for recycling.

While the use of recycled plastic reduces dependence on finite virgin resources, there's also value in sustainable materials such as GreenPE, a thermoplastic resin made from sugar cane, she says. "GreenPE is carbon-negative and fully recyclable. It can be blended with recycled plastic to make a hybrid solution. It's just one example of the options beyond using recycled plastics."

Sugar-cane-derived plastic is what Incognito, a provider of insect repellent, uses in its packaging, believing it to be more sustainable than recycled content. The firm's founder and CEO, Howard Carter, says: "It's a beginning-from-plant material, which is one of the easiest to recycle. Not all plastics are so easily recyclable."

This flaw is why many firms have decided to turn their backs on plastic. For instance, PharmaCare Europe recently chose compostable packaging for its new supplements brand, Vegan Life, over recycled plastic.

The company's brand manager, Alicia Sharif, says: "Recycled plastic will not naturally decompose like compostable packaging does. This means that, if our packaging were to be littered, it wouldn't have the same negative impact."

She adds that its outer layer is made from reclaimed agricultural waste, which is the stubble that in most parts of the world would typically be burned after harvest. This residue can constitute 80% of the volume of a cereal crop.

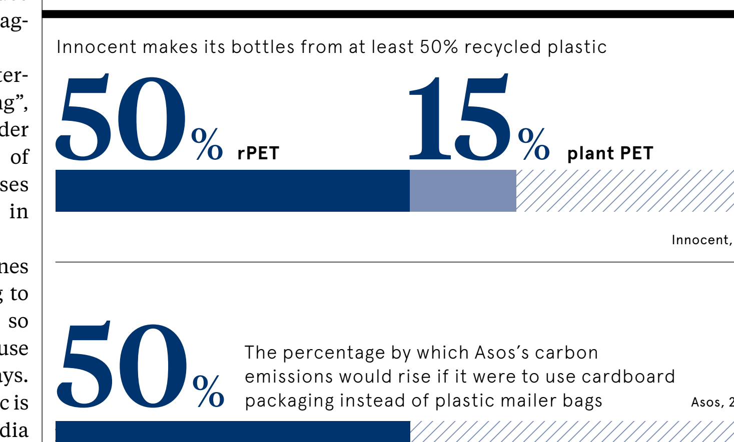
Deodorant brand Wild Cosmetics also wants to minimise its reliance on plastic. Wild's refillable deodorant case is made largely of aluminium, while the refills themselves are packaged in compostable and recyclable bamboo pulp.

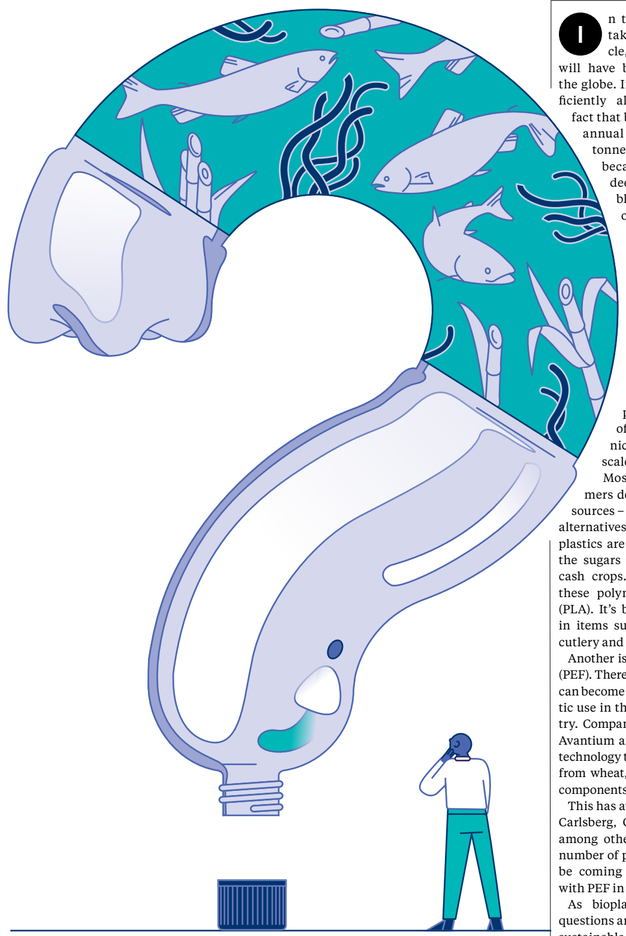
"Our vision is to help remove single-use plastic from daily personal care routines," says the firm's co-founder and CEO, Freddy Ward. "While a typical plastic deodorant pack has a lifespan of more than 400 years, a Wild refill will compost fully within six months and biodegrade within a year."

Yet there is a crucial element in the mechanism of Wild's deodorant case: recycled plastic – and Ward acknowledges the benefits of its quality, durability and mouldability. He and fellow co-founder Charlie Bowes-Lyon have investigated sustainable packaging options such as PLA, a polyester that's biodegradable and produces fewer emissions in production than traditional plastic.

But there's more to it than that, as he explains: "Even though the likes of PLA claim to be compostable, in reality this process will still take more than 50 years, and only then under certain conditions. So using recycled plastic helped us to build a durable product, while minimising the need to bring more plastic on to our Earth."

Ward remains open-minded about considering options beyond the materials that Wild currently uses to enhance his firm's sustainable credentials. But, he says, they must be able to work for the lifetime of the case and perform as well as the existing components. Those, perhaps, are the points that may yet improve plastic's reputation. ●





SUSTAINABILITY

Bioplastic: not *that* fantastic

Commercial polymers derived from plant matter have been touted as the sustainable answer to the world's eco-woes, but numerous issues need to be solved before they can reach that point

Rich McEachran

In the five minutes it will take you to read this article, 3,500 tonnes of plastic will have been produced around the globe. If that statistic isn't sufficiently alarming, consider the fact that barely 9% of the world's annual output of 368 million tonnes is recycled, either because the process isn't deemed economically viable, or because of a lack of consumer awareness.

Inventors and start-ups have been working hard in recent years to develop more environmentally friendly solutions. These have included everything from seaweed-based drinking straws to toothbrushes made using bamboo. The problem is that many of these innovations are niche and cannot yet be scaled up commercially.

Most bioplastics – polymers derived from plant-based sources – that are touted as viable alternatives to petroleum-based plastics are usually produced from the sugars extracted from certain cash crops. The most popular of these polymers is polylactic acid (PLA). It's being used increasingly in items such as disposable cups, cutlery and salad containers.

Another is polyethylene furanoate (PEF). There are high hopes that this can become the standard for bioplastic use in the food and drink industry. Companies such as Dutch firm Avantium are using plant-to-plastic technology to convert fructose syrup from wheat, corn and beet into the components of PEF, for instance.

This has attracted the attention of Carlsberg, Coca-Cola and Danone, among others. The hope is that a number of popular beverages could be coming in paper bottles lined with PEF in only two years' time.

As bioplastics gain popularity, questions are being raised as to how sustainable these materials really are. One issue is whether the sector's future growth will affect the food industry if both have to compete for feedstock.

This would be an unlikely outcome, according to Paul Mines, CEO of Biome Bioplastics. He observes that total area used for bioplastics production in 2020 came to less than 0.015% of the world's agricultural land. This will rise to 0.02% by 2025 if the industry's production capacity increases by the expected 25% from its current level to 2.8 million tonnes.

Avantium's CEO, Tom van Aken, agrees. "Creating bioplastics from plant-based feedstock can be managed in such a sustainable way that it doesn't have to be in competition with food production," he says. "Increased demand for non-food applications could support a healthier agriculture sector through investments in sustainable land use. There is tremendous potential to use waste from sustainable forestry management, for instance."

> **We must be aware that any material produced, even plant-based, can have an impact on the environment if the loop isn't closed**

Van Aken predicts that the chemical and materials industries will work closely with farmers to build new supply chains, ensuring that no part of their crop is wasted. Bioplastics could be made using feedstock sugar residue from agricultural production, for instance. To this end, Avantium already has a partnership in the Netherlands with Cosun Beet Company, which produces sugar products for the retail and food service industries.

Although the term 'bioplastics' has an eco-friendly ring to it, not all of these materials are actually biodegradable or compostable. Much depends on the polymers used and, even then, the conditions have to be right for decomposition – most bioplastics need to be subjected to high temperatures. The European standard EN 13432 for industrial composting requires 90% of a given material to biodegrade within 12 weeks. Complete disintegration has to occur within six months.

In cases where industrial composting isn't possible, the best option is recycling. Even then, the various bioplastics would need to be handled in separate streams, while some countries don't yet have facilities that can break down polymers such as PLA. If not dealt with properly, bioplastics can end up in landfill anyway, defeating their purpose.

"We have to be aware that any material produced, even plant-based, can have an impact on the environment if the loop isn't closed," says Laetitia Van de Walle, CEO of Lamazuna, a French supplier of zero-waste natural cosmetics. One of its products is the Oriculi, an ear swab made using a bioplastic derived from castor oil.

"Controlling the lifecycle of any product is incredibly important," she adds, noting that bioplastic recycling channels need to improve markedly if the materials are to become commercially successful.

Despite all best intentions to close the loop, bioplastics will inevitably find their way into the natural environment and become long-term pollutants, just like their petroleum-based counterparts.

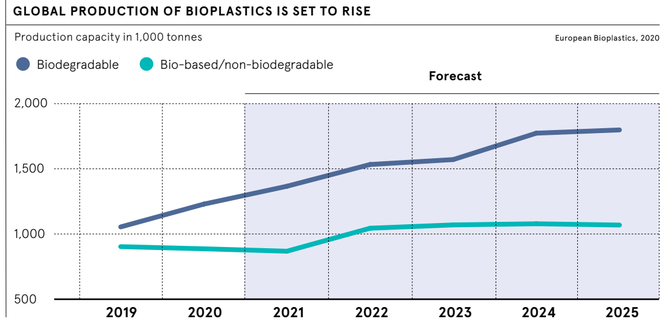
It is not enough to develop solutions that fit the circular economy – there needs to be broader change, according to Mines. He hopes to see a transition to a bioeconomy, based on chemicals, fuels and products, where the processes of creating energy and materials go hand in hand.

"The petroleum-based plastics industry has spent a lot of time optimising its supply chains," Mines says. "Replacing its products with bioplastics will require an adjustment in thinking. Continued consumer pressure, policy changes and brands deciding to alter practices will drive the transition."

Until then, the bioplastics sector must continue innovating to ensure that the loop is closed. It must also create awareness about its products' game-changing potential, while acknowledging that these are not the panacea for the world's plastic problems – not yet, anyway.

Van de Walle sums it up best. "We believe in the future of bioplastics," she says. "But we know they're still far from perfect."

GLOBAL PRODUCTION OF BIOPLASTICS IS SET TO RISE



OPINION

'For institutional investors worldwide, plastic pollution presents an ever-evolving systemic risk'

Global production and consumption of plastic has increased by more than 20 times since the 1960s, according to the UN Environment Programme. About 40% of all plastics produced today are for packaging, while only 14% of plastic packaging is collected for recycling. The problem is well known, yet both production and consumption are forecast to continue rising.

For institutional investors worldwide, plastic pollution presents an ever-evolving systemic risk. Left unaddressed, it could disrupt the environmental systems and public goods that drive the economic performance required to generate their returns on investment. But the good news is that investors possess some powerful levers through which they can help to both tackle the pollution problem and engender a circular economy for plastic.

First, they can influence change with their investment choices. The plastics value chain is complex, touching most, if not all, industries. By identifying where and how their portfolios might be exposed, investors can allocate capital accordingly, mitigating associated risks while seizing opportunities. In doing so, they protect value and fund innovative business models and solutions, enabling the seismic changes required by the shift to the circular economy.

In their position as stewards of capital, investors should encourage investee companies to act too. Acting collectively would increase their impact. Through such engagement, the investment community can spur businesses to set ambitious targets and collaborate to create systemic change.

For instance, in the fast-moving consumer goods and packaging sectors, investors could challenge investees to make their packaging 100% recyclable, reusable and compostable by 2025. A number of big companies, such as Unilever and Coca-Cola, have already set ambitious targets of this type, while others, including Nestlé and Veolia, have formed cross-sector partnerships in a bid to achieve theirs.

Second, investors should encourage investees to become more transparent about their plastic usage and report more on their progress towards reduction targets. Producing information that's clear and easily comparable is key to tackling the problem. The 'New Plastic Economy Global Commitment' initiative, started by the Ellen MacArthur Foundation and the UN Environment Programme in 2018, serves as a great example. The signatories' achievements against their targets are tracked and published annually in progress reports.

Lastly, investors have a role to play in policy and advocacy by understanding, and participating in, the regulation of plastic consumption and disposal. They should also encourage investees to engage with policy-makers to form a regulatory framework that will help to ensure that products are recycled, reused and composted.

At Principles for Responsible Investment, which has nearly 4,000 signatories representing more than £70tn-worth of assets under management, we are helping investors to play their part in tackling plastic pollution. We're sharing knowledge and best practice through an investor working group and a series of reports on the subject, encouraging them to expedite action using their levers of influence.

The transition to a circular economy will require concerted effort throughout the value chain. Abandoning the linear philosophy is necessary and, arguably, inevitable, but it will require an overhaul of business models and entire industries. It cannot be done without ambition, commitment and action from institutional investors worldwide. 'Take, make, dispose' is no longer fit for purpose – if, indeed, it ever was.

Fiona Reynolds
CEO
Principles for Responsible Investment

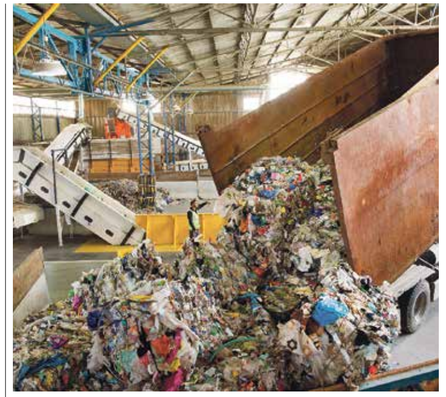
Commercial feature

Could the next unicorn valuation be sitting in our waste bins?

An innovative solution to the household waste crisis is doubling as a sustainable, scalable and cost-efficient alternative to plastic

Plastics fulfil a key function in our lives. Since the second world war, they have been used in everything from automobiles to packaging. Their benefits cannot be denied, but, sadly, neither can their environmental ramifications. Only 9% of plastic waste ever produced has been recycled, according to the World Bank Group, while much of the 380 million tonnes of plastic produced each year is discarded in landfills, dumped in rivers and seas or left in the open to pollute the environment.

But plastic isn't the problem in itself. The real problem is that the so-called end-of-life solution (EOL) for it is insufficient. If the EOL of plastic is commercially viable, safe for the environment and promotes circularity, all that's left are benefits: a cheap, strong, versatile, lightweight material that serves every aspect of our lives. Meanwhile, other materials have failed to provide a meaningful alternative to plastic for product manufacturers.



Along with the prevalence of plastics is the crisis of household waste ending up in landfills. Nearly 2 billion tons of CO2-equivalent emissions are generated each year from solid waste – a figure that's expected to double over the next three decades. Plastics comprise a relatively small proportion of this, whereas roughly 85% is organic – food, cardboard, paper, dirty nappies and textiles. Once in landfills, organic material breaks down and releases methane. This greenhouse gas is increasingly being referred to as CO2 on steroids, given that it warms the atmosphere more than 80 times as much as the equivalent amount of CO2.

"Conventional recycling is not feasible for most landfill waste, as it's a jumble of unsorted and dirty content. The urgency to close the loop on waste is critical for our climate." So says Tato Bigio, co-founder and CEO of UBQ Materials, whose revolutionary technology converts the entire household waste stream into a climate-positive material for industrial manufacturing.

> **Our technology lifts the burden of circular consumption models off individuals and turns it into an opportunity for manufacturers**

Hailing from Israel's eminent start-up scene, which produced 16 businesses valued at more than $1bn in 2020 alone, the company is turning heads away from the traditional tech sector and towards the $500bn plastics industry, which is ripe for sustainable disruption.

UBQ Materials has untapped the value of the most abundant global resource: rubbish. Founded in 2012, the company started commercial activity after seven years of stealth R&D. It patented its advanced waste-conversion technology and the resulting UBQ™ material, which can substitute oil-based plastics, wood or minerals in thousands of everyday durable goods.

Produced using 100% landfill-destined waste, the thermoplastic UBQ™ material compounds seamlessly with a variety of resins and requires no change to today's standard manufacturing processes. In contrast with conventional plastics, UBQ™ doesn't rely on oil or other fossil fuels for feedstock – a factor that keeps its price competitive and stable over long periods.

"Manufacturers no longer need to sacrifice profitability for sustainability," Bigio says. "Our technology lifts the burden of circular consumption models off individuals and turns it into an opportunity for manufacturers."

Every tonne of UBQ™ material produced prevents 11.7 tonnes of CO2-equivalent from polluting the environment – a statistic that has prompted life-cycle assessment auditor Quantis to designate the material "the most climate-positive thermoplastic on the market".

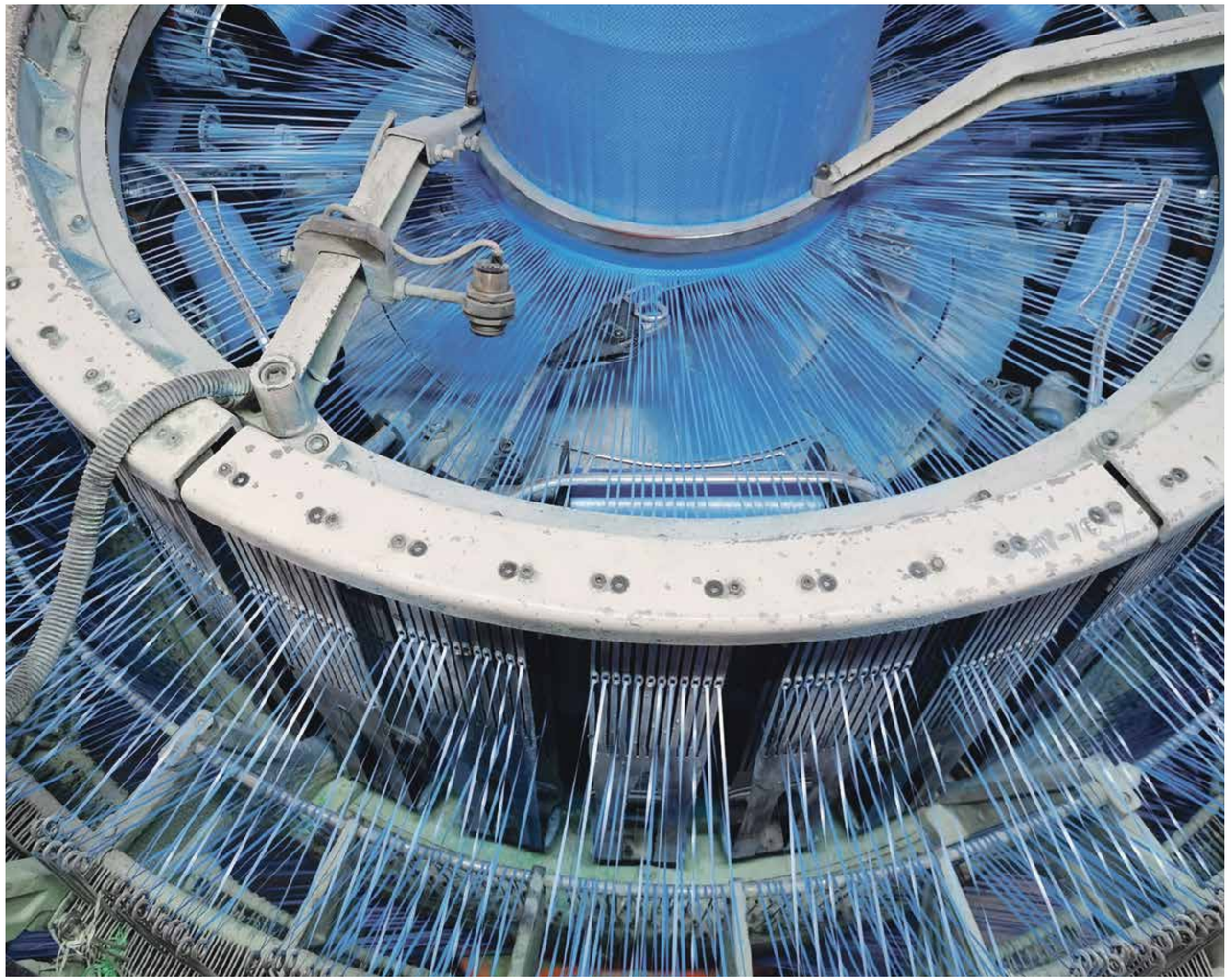
As the UN's strategic development goals take centre stage in corporate policy, prominent companies in a range of industries are eager to implement carbon-reducing solutions throughout their supply chains. In the past 18 months, UBQ Materials has introduced its climate-positive material to Mercedes-Benz premium auto parts and McDonald's serving trays, among others. The company is expanding to the Netherlands with a large-scale facility in Q4 2022 to meet growing demand.

Bigio says "we can leave this Earth better than we received it." UBQ Materials symbolizes the dawn of a new era in manufacturing - one that goes beyond climate neutrality and strives for climate positivity.

For more information, visit ubqmaterials.com

Unpacking the circular economy for plastic

Plastics can be recycled into countless new products, but what happens during each phase of the circular economy? Avery Dennison explores the role of sustainability in the plastic life cycle



Plastic is one of the most maligned yet miraculously lightweight materials on the planet. The environmental costs of disposing of it improperly have rightly been highlighted in recent years. But without it, it would be hard to keep food fresh or transport liquids home from the shops.

It's a tricky problem to solve. There is a solution, however: a closed loop circular economy for plastics.

Instead of treating plastic as waste, the circular economy treats it as a valuable resource that can be endlessly recovered, recycled and remade into new products – and not just of the same kind. Polyethylene terephthalate (PET) bottles, for example, can be turned into anything from furniture to carpets. But a lot of work still needs to be done to scale up the circular economy and ensure that plastic no longer pollutes the environment.

Avery Dennison, a Fortune 500 global material science company specialising in labelling, tapes, adhesives, graphics, reflectives, tags, RFID and digital solutions, is meeting this challenge head-on. It is committed to scaling materials that improve the recyclability of consumer goods, increasing the amount of recycled content used in its products, and building a global system for recycling used labelling and packaging materials.

The company's efforts span three key phases of the plastics lifecycle: design, product life and afterlife. And each of them plays a major role in driving the circular economy for this vital but undervalued material.

78%

of consumers believe companies should be helping them 'make decisions that improve environmental outcomes

Kearney Earth Day Survey 2020

26%

increase in the amount of recycled materials per capita between 2008 and 2019 in the EU

Eurostat

Design

Avery Dennison's labels can be found on millions of shampoo bottles, food containers, boxes and bags. And while these labels may only account for a small proportion of plastic packaging, they make a big difference to how easy it is to recycle.

For example, using adhesives specially formulated for the recycling process enables the proper recycling of millions of food-grade PET packages every year [See 'Sustainable labels for a floating farm']. The information on the label – three green arrows in a triangle, or numbers and letters that help recycling teams to identify different materials – also ensures that items are recycled properly. Labels with a high level of recycled content, such as Avery Dennison's rRange, can make items more sustainable and circular too.

However, there's often a disconnect between stakeholders in the supply chain. Designers and brand owners, for example, might want to use a yellow, green or fuchsia plastic to maximise a product's shelf appeal. But this decision could make the item harder to recycle, potentially adding to recyclers' costs and reducing their yields.

> **If you look at recyclability, it's a function of two factors. One is the solutions and systems for recycling. The second is consumer education**

"What's good for the eyes or marketing might not always be useful for recycling," says Flor Peña Herron, sustainability project manager at Avery Dennison, "so we also need to design according to the whole lifecycle of the product."

Avery Dennison has developed eco-design guidelines to help brands address this issue. Peña Herron believes it's also vital that companies talk to their peers, suppliers and customers to find out where more recycled materials could be used and how consumer attitudes are changing.

Take PET bottles, for instance. Although it may take time for consumers to adapt to the idea of 'different look' recycled bottles that don't come in the range of shades available today, she says, as with recycled paper, quality and customer adoption will continue to improve. "Those different looks might disappear, or maybe the public will simply accept them."

But changing opinions on shelf appeal and recyclability is only part of the solution to the plastic conundrum; you also need to help consumers engage with recycling.

Product life

Designing for recyclability is important, but so is what happens to the product once consumers used it. "There's a huge effort needed on awareness," says Hassan Rmaile, vice president and general manager of label and graphic materials for EMENA.

He adds: "So, if you look at recyclability, it's a function of two factors. One is the solutions and systems for recycling. The second is consumer education. So, even if the label is fully recyclable and the plastic is fully recyclable, if consumers put everything in one trash bag – mixing plastic with glass or paper – you need to put in a lot of effort on the collection side to separate everything mechanically. So for me, the other factor, consumer education, is a very important one."

> **Collaboration is the key to success. One company alone can create a spark, but real change comes from society, companies and governments all working together**

Many people aren't aware that different types of plastic need to be sorted properly during the recycling process. Labels can help to inform consumers what kind of plastic they're dealing with, and whether it can be recycled or not. However, some packaging features more than one material, or both rigid and flexible plastic, which is harder to recycle efficiently.

Avery Dennison believes mono-material packaging can help to solve this issue. For instance, it recently participated in a project that sought to remove the rigid plastic mouth found on packets of baby wipes. "If you look at the more recent packets, it's now a flexible 'tongue' of plastic. It has a medium-strength adhesive so it sticks enough to close, but it's not too strong to resist opening," says Rmaile.

Ensuring that labels are like for like with the item they are attached to – plastic for plastic, paper for paper – also means recyclers don't need to worry about separating them. "But the challenge with the label is that it's not just the face, it's the adhesive too," says Rmaile. "So, when you say mono-material, it's a little more complicated than it sounds. The label needs to have the same material as the bottle, and then the adhesive that's gluing the face of that label to the bottle also needs to match as well."

Afterlife

Once plastic leaves a consumer's home or a business's premises, it is sorted and separated from other recyclable materials before being baled and transported to specialist plastics recovery facilities. Different types of plastic such as PET, high-density polyethylene (HDPE – the kind used for milk or detergent containers) or polypropylene (PP); different coloured plastics; or the rigid or flexible kind all require different recycling processes, so mixed bales require further sorting once they reach the plastic recovery facility.

The plastic also needs to be cleaned to remove any contaminants that might affect the quality of the recycled material. Once the plastic is ground down into flakes, it is washed and sorted again, ready to be melted down and made into new products. But none of this is possible without good plastic collection schemes.

"Even if you have a brand new recycling facility, if plastic isn't collected properly you won't have any feedstock," says Burak Sahbaz, senior director of marketing and sustainability at Avery Dennison. The maturity of these collection programmes tends to vary from country to country, and even municipality to municipality. "Some countries are a little more advanced, while some are still in the early or intermediate phases," says Sahbaz. "But everything needs to go hand-in-hand."

He notes that real-world sustainability should always be at the forefront of any recycling scheme. "Imagine that you have a good recycler on one side of Europe, and you're collecting plastic at the other side," he says. "Transporting those products to that site might not be sustainable in terms of CO_2 emissions."

Responsibility for reusing and recycling plastic ultimately lies with everyone in the value chain, which is why Avery Dennison is an active member of several industry consortiums – including the Circular Economy for Labels (CELAB), which is dedicated to eliminating label waste. "Collaboration is the key to success," says Sahbaz. "One company alone can create a spark, but real change comes from society, companies and governments all working together."

For more information please visit label.averydennison.com

AVERY DENNISON

Case study

Sustainable labels for a floating farm

As the name suggests, Floating Farm is a literal floating dairy farm in Rotterdam, Netherlands. This innovative company wanted its packaging to align with its ambitious goals for urban food production, animal welfare and the circular economy. But standard polyethylene (PE) labels weren't removable from their containers, which limited the recyclability of the package and sustainability of their finished product.

To solve the problem, Floating Farm turned to Avery Dennison's CleanFlake label solution. CleanFlake technology features a switchable adhesive that sticks firmly during the package's use but 'turns off' in the hot caustic bath that's part of the recycling process.

As a result, the label material separates from the PET flakes and floats cleanly to the surface, leaving no label and adhesive residue in the PET stream. The PET flakes can then be processed into food-grade recycled PET, contributing to a global supply that still lags behind demand.

Tackling the liner waste challenge

Companies in Europe consumed some 470 kilotons of label liners in 2019, yet just over one-third were recycled. AD Circular, a new Avery Dennison program for recycling used paper and filmic label liners in countries across Europe, aims to change that.

Any company with label liners can sign up for the service and arrange a time for the collection of the liners through a simple digital web-based app. Avery Dennison then works with its partners to collect them and ensure they're properly recycled. It hopes that by 2025, 75% of the label waste it brings to the European market will be recycled in this way.

"Our goal is to create a circular economy that works for everybody," says Hassan Rmaile, vice president and general manager of label and graphic materials for EMENA. "So even if you're using other producers' materials, we'll collect their liner and ensure it's recycled properly."

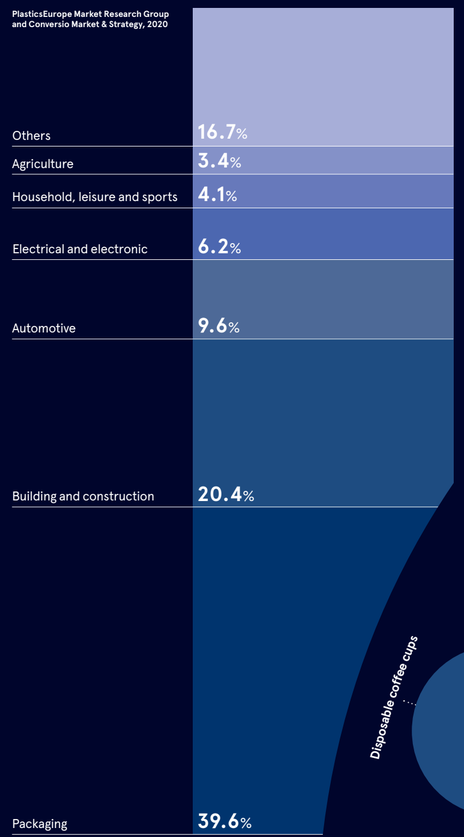
THE PERCEPTIONS OF PLASTIC

The first synthetic plastic was created in the early 1900s. Since then, production has exploded from 1.5 million tonnes in 1950 to 368 million tonnes in 2019. The cumulative production is now at close to 9 billion tonnes, which has generated 6.3 billion tonnes of waste, of which 9% is recycled, 12% is incinerated and 79% is simply discarded. Given the disastrous impact this is having on the natural environment, why do we keep using it and how are consumer perceptions of it changing?

THE USE OF PLASTIC IS UBIQUITOUS ACROSS SECTORS, BUT THE BIGGEST DEMAND COMES FROM PACKAGING

% share of plastics converters in Europe in 2019

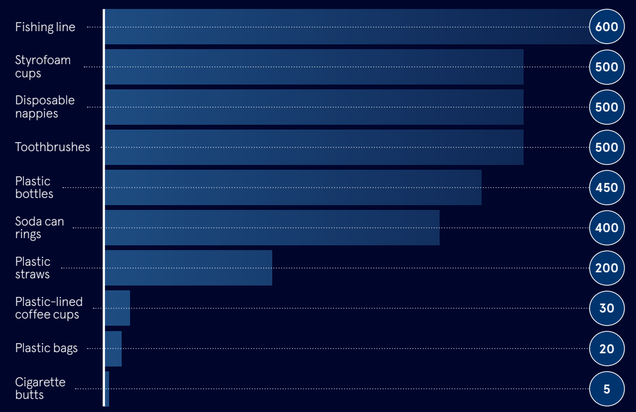
PlasticsEurope Market Research Group and Conversio Market & Strategy, 2020



PLASTICS THAT ARE NOT RECYCLED OR REUSED CAN TAKE A LONG TIME TO BREAK DOWN NATURALLY

Estimated decomposition time (years)

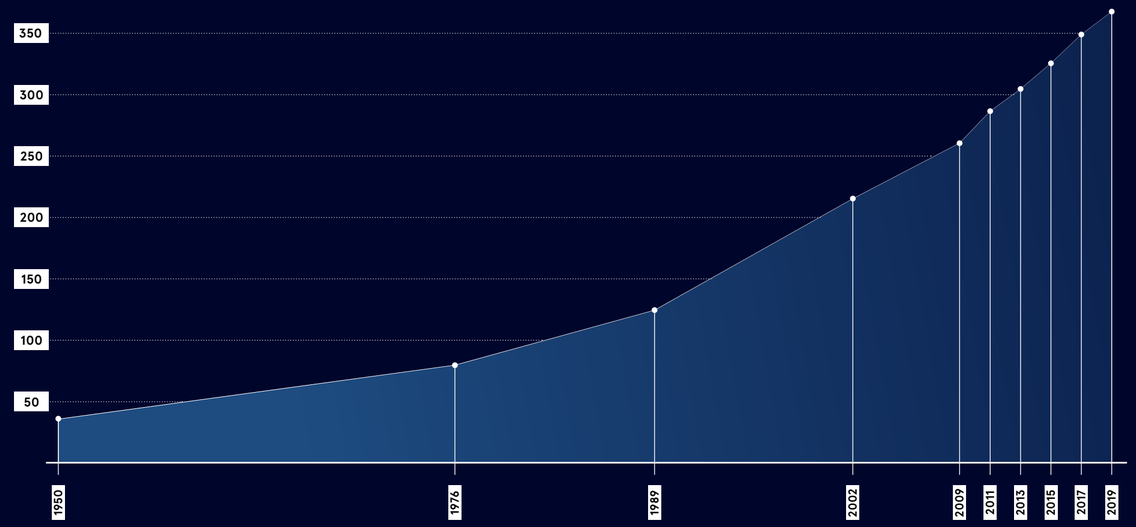
WWF, 2018

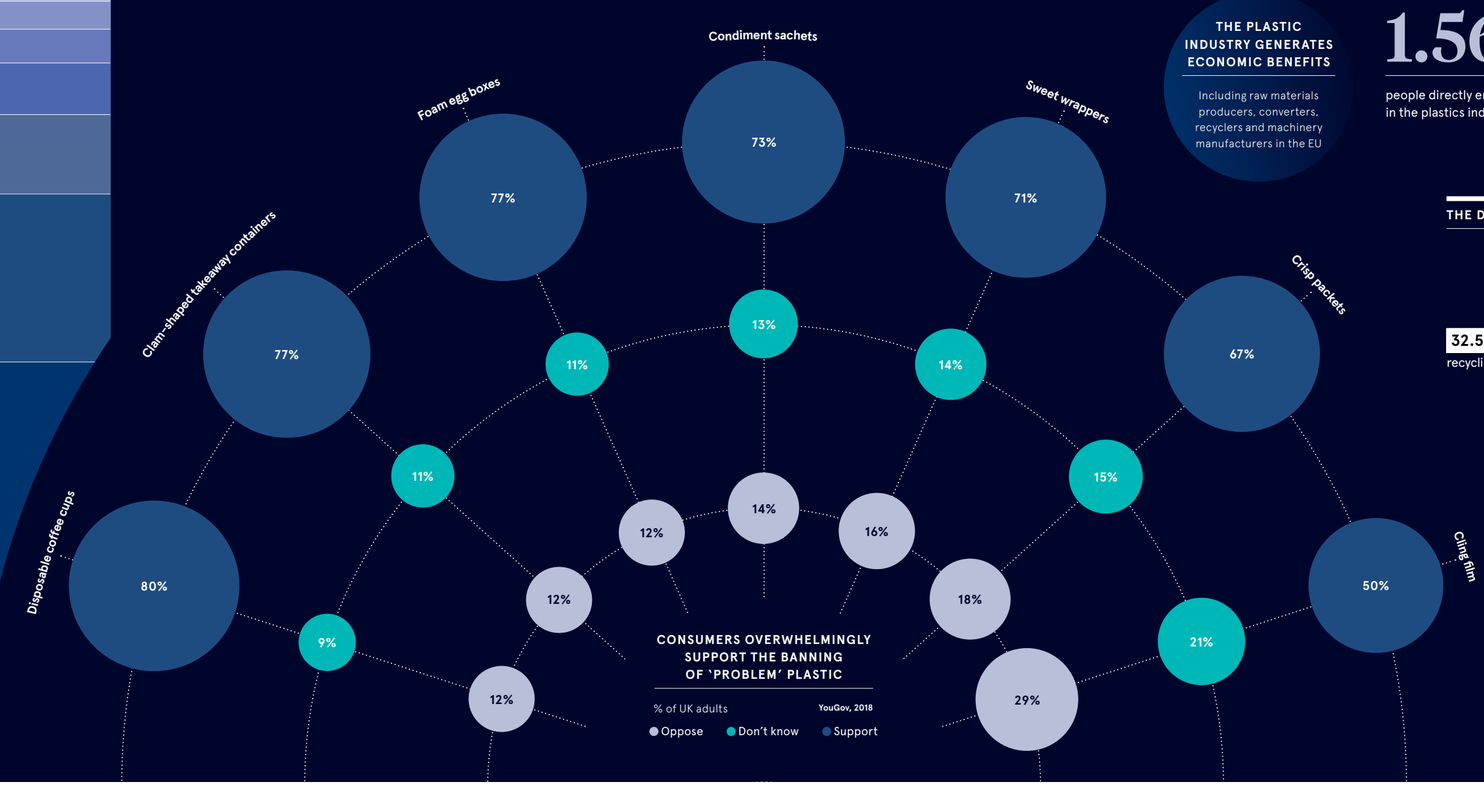


PRODUCTION OF PLASTIC HAS SOARED OVER THE PAST 60 YEARS

Million tonnes

PlasticsEurope Market Research Group and Conversio Market & Strategy, 2020





CONSUMERS OVERWHELMINGLY SUPPORT THE BANNING OF 'PROBLEM' PLASTIC

% of UK adults

YouGov, 2018

Oppose · Don't know · Support

THE PLASTIC INDUSTRY GENERATES ECONOMIC BENEFITS

Including raw materials producers, converters, recyclers and machinery manufacturers in the EU

1.56m people directly employed in the plastics industry

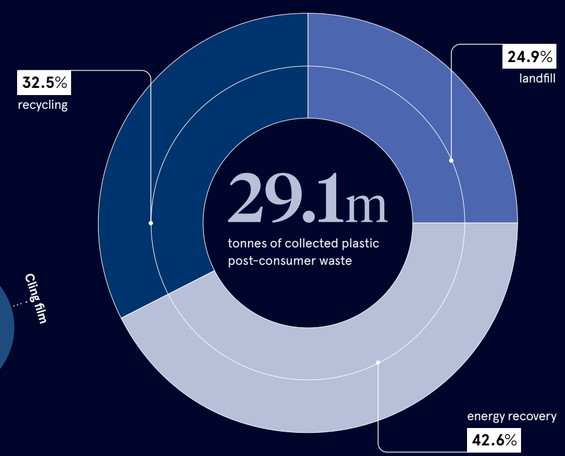
£11bn the plastics industry's positive trade balance

55,000 companies operate in the plastics industry

PlasticsEurope Market Research Group and Conversio Market & Strategy, 2020

THE DESTINY OF PLASTIC WASTE COLLECTED IN 2018

PlasticsEurope Market Research Group and Conversio Market & Strategy 2020



CIRCULAR ECONOMY

Current liabilities

A growing number of corporate partnerships are supporting a circular economy for discarded plastic in coastal regions of the developing world. Does this signal the start of a sustainable solution to global marine pollution?

Heidi Vella

The image of rubbish floating in an otherwise pristine ocean has become a defining one for plastic's detrimental impact on the natural world. It's a complex problem, but one that a fledgling industry, based on creating a circular economy for waste otherwise destined to become marine flotsam, is starting to tackle.

In April, Sainsbury's and packaging supplier Sharpak entered a partnership with Bantam Materials to use its Prevented Ocean Plastic in 34% of the supermarket chain's fish packaging and 80% of its Berry Garden strawberry punnets. It's estimated that nearly 40 million items purchased from Sainsbury's this year will be packaged using recycled plastic bottles, retrieved from coastal regions around the world. This waste would otherwise be ocean bound.

Sainsbury's follows Lidl UK, which uses Prevented Ocean Plastic for half of its fresh fish packs. Booths and Waitrose are also among a number of food retailers using the recycled material in their packaging.

The term 'ocean-bound plastic' derives from a 2015 paper by Jenna Jambeck, professor of environmental engineering at the University of Georgia. She determined that any refuse discarded within 30 miles of a coast, in an area without a formal waste management system, is at high risk of ending up in the water if not collected.

This is distinct from the term 'ocean plastic', stresses Raffi Schieir, director at Bantam Materials UK. "There is no such thing as recycled ocean plastic. No one can take plastic that's been degraded by salt and sunlight from the water and recycle it," he says. "It doesn't exist, even if some companies make an overreach by claiming that it does."

Prevented Ocean Plastic is made by recycling discarded PET bottles that are collected by coastal communities in developing nations such as Indonesia. The recycling is done locally and the product is certified to European standards by OceanCycle, a social enterprise that also conducts audits to ensure that child or forced labour, for instance, is not involved.

Ryan Schoenike is the co-founder and president of OceanCycle. He says that, while it is the largest scheme of its kind (Bantam Materials claims to sell approximately 1,400 tonnes of OceanCycle-certified recycled plastic every month), it still represents only "a drop in the ocean" compared with overall plastic use.

> **There is no such thing as recycled ocean plastic. No one can take plastic that's been degraded by salt and the sunlight from the water and recycle it**

5.25 trillion
is the estimated number of pieces of plastic debris that have entered the world's oceans, of which...

244,000
tonnes float on the surface

4 billion
microfibres litter each km² of deep sea on average

5 Gyres, 2014

8 million
The weight, in tonnes, of plastic that finds its way into the ocean each year

Science, 2015

Schoenike notes that OceanCycle receives many product enquiries from prospective buyers, "but there can be an issue getting past their procurement departments", he says, alluding to the reservations that companies often have about using recycled PET.

These range from concerns about the cosmetic appearance of the product – it can be slightly discoloured – to those about cost and quality. There is a common perception that material sourced from developing countries is inferior to that from the West and should therefore be cheaper.

"That is nonsense," Schieir says. "We properly control good-quality recycling and we want the same price as for material sourced from Europe. That's what makes these programmes work."

Providing detailed information on aspects ranging from collection to decontamination has been the key to gaining the trust of packaging manufacturers and users. Waitrose's packaging development manager, Nikki Grainge, says that the business started thinking about using ocean bound plastic two-and-a-half years ago, but wanted to use a supplier that was fully certified.

"We require traceability, because we'll never want to sell anything we don't have full confidence in," she says. "It's reassurance for us that we can pass on to the consumer."

Although there is a certification cost attached to Bantam Materials' product, it's priced at a comparable level to that of other recycled plastic, according to Schieir.

"Our partnership with Lidl shows that this isn't a cost issue," he says. "New plastics are only a 10th of a penny less expensive than recycled ocean-bound plastic."

For retailers, on the other hand, the price may be significantly higher, mainly because they are often buying a finished product rather than the polymer.

Joanna Jensen is the founder and chairwoman of Child's Farm, which makes children's skincare products and packages them with Prevented Ocean Plastics. She says that these are about 20% more expensive than the non-recycled equivalent, but her choice is "a moral one. This is about ethical sourcing and creating local employment in developing nations. Looking at it under the lens of cost alone is ignoring the reasons why we're doing this."

Bola Lafe, founder and MD of Opus Innovations, which recently launched a hand sanitiser bottled in 100% Prevented Ocean Plastic, believes that companies can switch to recycled packaging without harming their profits unduly. "The cost is not prohibitive – if companies choose not to be greedy," he says.

Mike Webster is programme director at Project Stop, which helps to build sustainable waste management systems where there aren't any. He says that enterprises such as Bantam Materials and OceanCycle and can ultimately make it easier for executives to switch from virgin to recycled plastic.

"We need robust end markets for this material, which will lead to more being collected and less leaking into the sea," Webster says. "Go for it, buy it, spend that extra bit of time investigating it. That's the only way we can create a circular economy for this stuff."

Schieir says the market has picked up considerably in recent months, largely because of the forthcoming tax in the UK on plastic packaging that doesn't contain at least 30% recycled material.

But there is still a way to go. According to research compiled by ReportLinker, the volume of illegally disposed plastic waste rose by 280% worldwide during the pandemic, while the recycling rate fell by about 5%. Many of the big corporate users of plastic – Coca-Cola, Johnson & Johnson and Unilever, for instance – still have plastic recycling content rates of below 10%.

"You can't put 100 units of something into the world, buy back only four and expect recycling to work," Scheier argues. "With some bigger brands coming on board, we are showing that we can clean up what's out there and move companies away from single-use plastic and towards recycled content." ●

Commercial feature

New packaging levy spurs innovation

The forthcoming plastic packaging tax is forcing firms to adopt sustainable solutions, while accelerating the move towards polythene containing recycled post-consumer waste

The environmental impact of packaging materials is a complex issue that's too often simplified by media coverage, which incorrectly casts plastics as the problem. The real problem concerns the end of life of packaging materials. Discarded irresponsibly, plastics harm the environment, but so does paper, which requires about four times more water than plastic in production and produces three times more greenhouse gas. At landfill, paper decomposes into methane, one of the most harmful greenhouse gases in our atmosphere.

A solution for both paper and plastic is therefore needed, but, since the latter is a more useful material and therefore much more widely used, it receives more attention. Look no further than the government's introduction of a plastic packaging tax, which will take effect in 2022. The forthcoming levy, payable at £200 per tonne for material with less than 30% recycled content, will apply to all plastic packaging made in the UK or imported here.

The tax is playing an important role in forcing change in the supply chain. Despite growing consumer demands, expressed passionately through social media, for an alternative to plastic packaging, the lack of a more sustainable solution of comparable quality and cost has hindered progress. The tax now means that inaction is the costliest option.

The Challenge

Suchin Talwar is commercial director at Polystar Plastics, an independent manufacturer, printer and converter of flexible polythene packaging. He recalls that the company's biggest challenge used to be trying to change "the ingrained attitudes of the supply chain. There were few proactive buyers who cared as much about the environmental benefits of polythene products as they did about price."

But now, owing to the accelerated government targets and the packaging tax, Talwar says that "a reduced carbon impact is as important, if not more so, than the associated financial savings that come with buying products that use post-consumer waste or reduced amounts of fossil-fuel-based low-density polythene. Carbon reduction is no longer an optional luxury or life choice; it's an essential responsibility that everyone must embrace."

The plastic packaging tax provides a clear economic incentive for businesses to use recycled material, or post-consumer waste (PCW), in the manufacture of packaging, which will create greater demand for it. In turn, this will stimulate the recycling of plastic waste, diverting it away from landfill or incineration.

Product Innovation

As a reprocessor of PCW, with contracts in place with some of the country's leading supermarkets, Polystar responded to the government's announcement of the tax by unveiling an exclusive new PCW material called PCWflex. This low-gauge, high-strength, high-clarity film delivers a reduced carbon footprint, which supports environmental goals as well as meeting the target for 30% recycled content.

PCWflex represents a positive step in the reduction of single-use plastics. Non-shrink films start at 30% PCW, but can contain up to 100% PCW polymers, while shrink-film recipes can include 50% PCW polymers without losing any of the robust performance, optical clarity and line efficiency expected of virgin-grade films.

"Our PCWflex films are some of the greenest products on the market," Talwar says. "They reduce the consumption of fossil fuels and dramatically reduce the amount of plastic packaging going to landfill and polluting the environment. Helping to remove the issue of single-use packaging, our closed-loop manufacturing process keeps resources in use for as long as possible, continuously recovering, recycling and reusing."

He continues: "Our Tristar and Biofilm materials, meanwhile, reduce the consumption of oil-based polymer, thereby improving the carbon footprint. They also offer substantial cost savings against standard materials because they are made using cutting-edge extrusion technologies that make them lightweight, maintain their performance and reduce their tax liability."

Wider Actions

The success of Polystar's three next-generation films has prompted the business to expand its operations dramatically to meet customer demand. Although the impending tax is pushing manufacturers to think of new ways to incorporate recycled materials, the main issue many companies will have concerns the origin of those materials. Producers will not be permitted to use their own production waste, as this wouldn't reduce the amount of plastic going to landfill. They will need to source external PCW material.

Polystar has invested heavily in a state-of-the-art recycling plant to collect scrap material from customers and process it for reuse. In the past three years it has invested £15m in impressive new buildings to house the extrusion technologies that have helped to make the company one of the UK's largest independent polythene producers.

"The creation of these new lines has propelled us into a new realm of polythene manufacturing," Talwar says. "We have a further 13,000 tonnes of additional production capacity soon to be added when we install the further new lines that are on order. We have invested in new conversion and print presses over the past two years too. This ensures that we can match all the flexible packaging requirements that our customers expect."

Leading Change

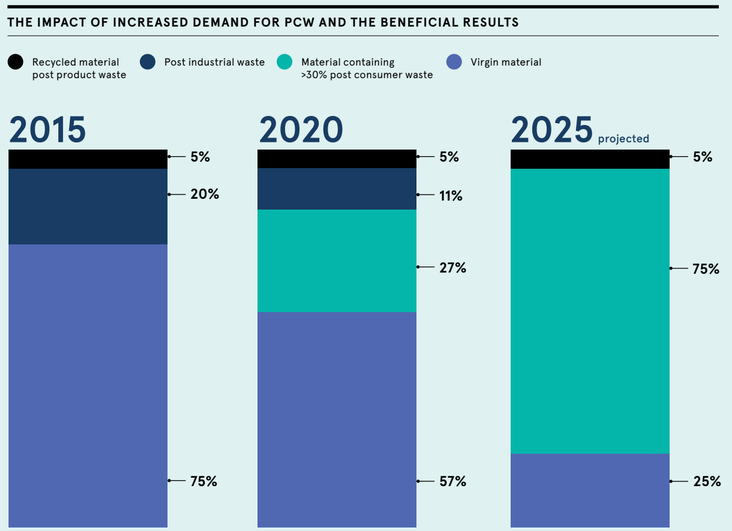
Polystar has also been piloting a scheme with a local council that will revolutionise kerbside refuse collections by overcoming non-compliance in household waste segregation. If it's found to contain even one contaminated bag, an entire load of recyclable material will be refused by a recycling centre and reclassified as general waste for landfill. Polystar has developed a system that assigns a unique QR code to each refuse bag, enabling non-compliant households to be traced easily.

"It has always been my intention to set environmental standards that others will follow. Consideration for our impact on the environment will continue to be my focus, from both operational and industrial viewpoints," Talwar says. "At Polystar, we're actively leading change within our industry. We are proving that the heavily criticised polythene industry can evolve with the needs of today's society to build a better world for future generations."

For more information, visit polystar.co.uk

Polystar PLASTICS

THE IMPACT OF INCREASED DEMAND FOR PCW AND THE BENEFICIAL RESULTS

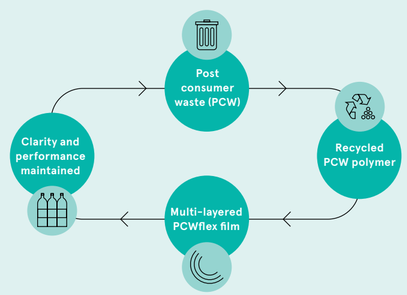


0
tonnes diverted from landfill

5,200
tonnes diverted from landfill

24,500
tonnes diverted from landfill

THE POST CONSUMER WASTE (PCW) LIFECYCLE



> **Going green is no longer an optional luxury or life choice; it's an essential responsibility that everyone must embrace**

manticello via Shutterstock

REGULATION

When the plastic levy breaks

As businesses prepare for a tax on plastic packaging, there are concerns that the government has done too little to stem the tide on pollution

Jim McClelland

All tax is political, especially a new tax. It tends to create winners and losers, at home, in business and on polling day. So, with less than a year to go before the plastic packaging tax (PPT) comes into force in the UK, the mood in this market matters – and it is mixed.

From April 2022, a new tax of £200 per tonne will apply to plastic packaging containing less than 30% recycled content. The government estimates that this will affect up to 20,000 packaging producers and importers. HMRC will spend £6.6m on developing a new computer system to manage the tax, plus £11.3m more on staffing.

The bureaucratic burden of the PPT could prove disproportionately heavy for smaller organisations, while the tax could have other unintended ramifications, predicts Professor Robert Holdway, a design expert at Brunel University London and director of environmental consultancy Giraffe Innovation.

"The argument is that the tax will stimulate demand for recycled plastics. But it's likely to drive up their price in the short to medium term.

> **The tax assumes there will be enough recycled content available for all types of plastic packaging materials. This isn't the case**

It could also disrupt well-established systems," he warns. "If oil prices remain low, that makes using virgin material more attractive."

An opposing view, from the end-of-life perspective, is that the tax will encourage innovation.

Roger Wright, waste strategy and packaging manager at Biffa, says: "Introducing a tax to increase recycled content *will* have the desired effect. An increasing number of businesses are approaching us for advice on this. We expect most of these to try using at least 30% recycled content and we've seen many do so already, although there may be issues for manufacturers of soft and flexible food packaging to solve."

While the tax could add impetus to the drive for greater sustainability in packaging, the industry is already innovating more than ever, suggests Susan Hansen, global strategist for food and agribusiness supply chains at Rabobank.

Hansen argues that there are reasons why progress cannot be rushed. "The tax assumes that there will be enough recycled content available for all types of plastic packaging materials. This isn't the case. It also anticipates that producers can swap recycled material for virgin material in an instant. That's not the case either," she says.

The task of reducing the nation's dependence on plastic packaging as a whole will, arguably, be made tougher by a tax policy that fails to distinguish between plastics that are relatively easy to recycle and those that are more troublesome. Tax is a notoriously blunt instrument in any case, but the problem that some people have with the PPT is that it will be plain indiscriminate.

Santiago Navarro, CEO of Garçon Wines, not only thinks that packaging is being singled out unfairly; he also believes that lumping highly recyclable plastics such as PET in with problem materials such as polystyrene is too simplistic.

"Grouping all polymers under the blanket term 'plastics' is like calling all vehicles 'cars' or setting income tax at the same level for everyone," he argues. "Not all plastics are created equal and not all have the same end-of-life performance when recycling for circular economy."

A pioneer of the sustainable, letterbox-friendly flat plastic wine bottle, Garçon Wines already uses 100% recycled material. Nevertheless, Navarro questions the maths underlying the tax.

"A tax of £200 per tonne on packaging that's usually very light is also quite lightweight when it comes to its financial impact. If the average plastic packaging product weighs 50g, a penny of tax would be chargeable on that unit," he says.

It's worth remembering that the purpose of taxation is not only to change behaviour, but also to generate revenue. The UK's record in this respect looks poor. The government raised just under £41bn via so-called green taxes in 2020. According to law firm Pinsent Masons, this sum represents only 6% of the £633bn raised through taxation overall – down from 8% a decade ago.

Jason Collins, partner and head of litigation, regulatory and tax at Pinsent Masons, expects to see "a certain amount of 'avoidance' of the PPT – which is actually a good thing. The 2018 levy on sugar in soft drinks demonstrates something approaching a best-case scenario here: many drinks manufacturers avoided paying that by reducing pack sizes and sugar content. That's the sort of behavioural change the government would like to see."

Many environmentalists are less convinced that the PPT will have the desired effects. A 2018 campaign run by the City to Sea group called for a tax on all single-use plastic items, with the revenue ring-fenced for initiatives to tackle pollution and boost the circular economy. Nearly 250,000 people signed its petition to the government.

Although she acknowledges that the PPT is a positive step, City to Sea's founder and CEO, Natalie Fée, believes that it doesn't go anywhere near far enough.

"This is another example of a policy aimed at the wrong end of the waste hierarchy. It focuses on resource efficiency and recycling rates when we desperately need the government to take action on reducing the amount of plastic produced," she says. "Until it does, this tax is just another drop in a very plastic-polluted ocean." ●

£200

The amount the UK government will charge per tonne of plastic packaging under the forthcoming plastic packaging tax

£670m

The revenue that the plastic packaging tax is expected to raise for the Treasury between 2022 and 2026

30%

The minimum amount of recycled plastic content needed in packaging to avoid the tax liability

UK government, 2021


Adidas

MANUFACTURING

A design for afterlife

In a circular economy, recycled plastic could become a global commodity. Convincing enough product designers of its viability as a material would be a big step in the right direction

Jack Apollo George

Plastic is a durable material. For decades, this has been a considerable benefit, allowing for the creation of versatile, hard-wearing products that can reach the furthest corners of the Earth. But this, of course, has proved disastrous from an environmental perspective.

According to the Organisation for Economic Co-operation and Development, about 6.3 billion tonnes of plastic waste were generated between 1950 and 2015, of which only 9% was recycled. The rest was burnt, put in landfill or left to litter land and sea.

If we want a world where consumer and industrial goods don't end up as pollutants, businesses need to be smarter about how they use and, even more crucially, reuse plastics. That transformation starts at the corporate level, with product designers, engineers and executives agreeing to prioritise recycled and recyclable materials in their manufacturing processes.

Adidas is one global brand that's been reviewing its approach in this respect. Marwin Hoffmann, its senior director of brand sustainability, reports that more than 70% of all the polyester used by the company last year was recycled. From 2024 onwards, Adidas is aiming to use only recycled polyester.

Since 2015, the sportswear giant has collaborated with the Parley for the Oceans campaign to sell "millions of pairs of shoes" made using recycled plastic waste from coastal regions around the world. In 2020, the project was responsible for the retrieval of 7,000 tonnes of refuse.

Considerations about the end of a product's life are increasingly informing the work of the company's designers. For instance, the Ultraboost DNA Loop shoe, which Adidas marketed for the first time in October 2020, is made from one material, from the sole to the laces, and is welded without glue. "Once the shoe reaches the end of its life, it can be shredded to pieces and reused," Hoffmann says.

As a major manufacturer, Adidas is acutely aware of the impact that activities in its supply chain can have on the wider industry, he adds. "We have worked with suppliers to create structures that make it possible to process recycled materials on a large scale. Such commitment not only makes Adidas more sustainable; it also drives the whole industry's development."

For big companies to create products fit for the circular economy, they first need access to appropriate materials, of course. The Good Plastic Company is a supplier of recycled plastic that has worked with Nike and Elle, among others. William Chizhovsky, its founder and CEO, refers to his business as an "R&D operation" – an important link in the chain between the recyclers that clean and shred, and the corporations that make and sell.

He foresees recycled plastic as a major commodity, one that can act as a viable substitute for virgin plastic and perhaps even wood. But costs first need to be brought down and processes rendered more efficient. To achieve this, the company hired engineering experts to develop what Chizhovsky's colleagues call "toastie machines". These heat and press recycled plastic into sheeting of various sizes, collecting valuable information in the process.

"Based on data such as temperature, pressure, time and so on, we can develop the best recipe for the recycling of different plastic types," he says.

Adidas has partnered with the Parley for the Oceans campaign to sell shoes made using recycled waste from coastal regions around the world

> **"Everything that you retail that's produced from wood or virgin plastic can be made from recycled plastic**


Chanchai phetdikhai via Shutterstock

6.3 billion
tonnes of plastic waste were generated between 1950 and 2015

9%
of the plastic waste that has been generated has been recycled

Organisation for Economic Co-operation and Development, 2019

At present, 1m² of sheeting is equivalent to 7,000 plastic bags. The company can work with most plastics (PVC being one notable exception) and is understandably keen for manufacturers to review their choices of raw material.

"Can you help to recycle a few 100 million tons of plastic by selling sunglasses?" Chizhovsky says, suggesting that brands could and should be more ambitious with their designs. "Everything that you retail that's produced from wood or virgin plastic can be made from recycled plastic."

Although companies are increasingly committing to sustainability targets, there is still some hesitation when it comes to recycled materials, he notes. Buyers often expect the materials to be cheaper, while some have even asked his firm to supply material that doesn't look obviously recycled, as they "want people to think it's virgin plastic".

That difficult relationship between waste and aesthetics particularly interests product designer Joost Dingemans. At the start of his career he adopted a mantra – "I exist, therefore I pollute" – that sums up the dilemma facing many environmentally conscious creatives: they feel guilty about wanting to carve out the new in a world that's already packed with products.

Dingemans realised that, unless he was working with waste and returning value to something unwanted, he "couldn't be happy with designing and making". Along with co-founder Marten van Middelkoop, he runs Plasticiet, a studio in Rotterdam that takes offcuts from industrial manufacturers and converts up to two tonnes of this material into sheets of recycled plastic each month.

Because these sheets have an aesthetic value, Plasticiet's corporate customers often put them on display in their shops and offices, rather than using them as materials in manufacturing. Dingemans believes that this practice tends to make the product more of a virtue signal than an agent of real change.

"We're basically helping a lot of these retailers in their greenwashing," he admits, although he does add that anyone visiting these firms' premises "will see that recycled plastic exists – that it's being used, it's beautiful, it works".

Dingemans and van Middelkoop are consciously designing for designers. Like the material sold by the Good Plastic Company, their product has built-in versatility "so that people can use their creativity. There is freedom in the way you apply it," Dingemans says. Indeed, it's been used in products ranging from worktops to fountain pens.

He adds that one of the biggest challenges for Plasticiet has been to find a consistently reliable supply of plastic waste that's sufficiently cost-effective to process. Scaling production up to a meaningful level can be hard if the waste needs a lot of "cleaning up". Mixing plastic with other materials – no matter how aesthetically pleasing they may be – is likely to make recycling far more arduous. On the other hand, an item made from only one type of plastic can easily be broken down and reassembled into something new.

Lastly, producers should look to educate users about alternatives to discarding what they no longer need. Plasticiet will take any offcuts sent back by customers and reuse them, for instance, while Adidas is piloting a rental service in France. Customers can use a range of sportswear, paying for clothes and shoes according to the duration of their use. Once an item has been returned, Adidas will clean and repair it before making it available again.

These changes are only the start. According to the UN, the world still produces 300 million tonnes of plastic a year. Nonetheless, designing with the circular economy in mind offers a radical new approach to the production-consumption paradigm. Adopting recycled plastic as a new commodity will eventually drive prices down and make customers more receptive to it. Rubbish can become treasure. ●

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