

# Argus White Paper: Assessing the impact of sustainability efforts on virgin polyolefin demand



*The environmental impact of plastic waste is something that the plastic industry cannot – and does not – ignore. The force of public opinion is piling pressure on the industry to address what happens to its products once they have been used.*

This rising emphasis on sustainability has the potential to affect virgin polyolefin demand in two major ways:

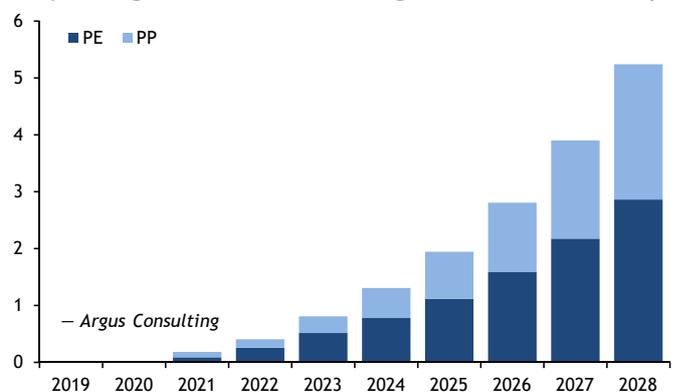
1. Avoidance — consumers could avoid plastic because it is seen as harmful to the environment, and legislators may act to restrict the use of plastic
2. Converters could increase their use of recycled polyolefins in place of virgin material

Consumers and brand owners have shown interest in using less plastic, particularly in packaging, but are finding there is a lack of viable alternatives in many cases, and legislation is immature in the EU and — to a large degree — unco-ordinated elsewhere in the world. Targets have been set to increase the use of recycled plastic, particularly in the EU, but a large number of technological and logistical challenges will need to be overcome for significant progress to be made to meet them.

Argus believes that it is too early in the journey to confidently assess the impact that a focus on plastic waste will have on virgin polyolefin demand growth. But it would be wrong to assume that there will be no impact. Ultimately, the pressure will lead to a dilution of virgin plastic demand growth, whether through avoidance, legislation or replacement. The industry risks greater regulation if it is not seen to be working towards tackling the issue, and the consequences of this for long-term demand could be more severe.

Argus projects that demand growth for PE and PP will increasingly be curtailed, but the majority of the impact will be

Projected global loss of demand growth mn t/yr



delayed by 4-5 years in order for technological and legislative solutions to be developed, and attitudes throughout the supply chain to change in favour of using more recycled material.

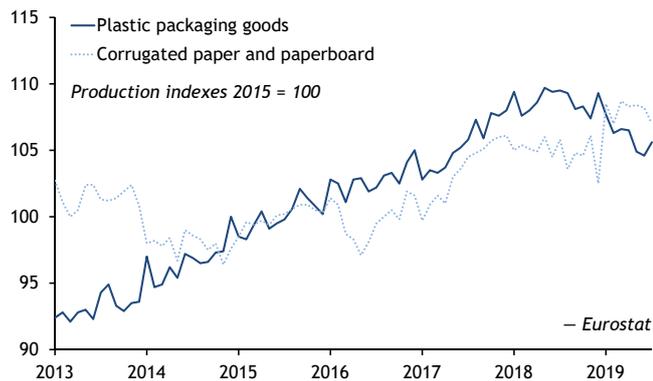
### Consumer avoidance

Packaging and other single-use items have been the main focus of plastic avoidance by consumers. This reflects the fact that they take up a disproportionately large share of the waste stream — compared with longer-life products — and consumers view them as the most environmentally damaging.

Where viable alternatives exist, consumers have shown their willingness to switch. Examples include the rising popularity of multi-use coffee cups and water bottles, as well as pledges from brands and retailers to cut down or phase out plastic packaging in their products.

There is some evidence that this is affecting underlying demand in the packaging industry. In the 12-18 months since the pressure on plastic intensified, the Eurostat index for plastic packaging production has slipped, while paper and cardboard production is up. The scale of substitution is not immediately clear, and it is likely to be small. The downturn in plastic

### Plastic and paper production indexes



packaging has been relatively modest — at around 2.6pc on the year in the EU 28 so far in 2019 — and it cannot be entirely attributed to avoidance, given that it coincides with a general slowdown in the manufacturing sector. But it tallies with reports from European packaging companies, some of which have noted rising interest from their brand owner and retailer clients to simplify plastic packaging or replace plastic altogether in an effort to increase “sustainability”.

Packaging company DS Smith’s chief executive Miles Roberts talked as early as 2018 about a “tailwind” for the company’s paper packaging products, attributed partly to the erosion of plastic’s market share, which he estimated could be 0.5-1.0pc. This may be a small percentage, but given the size of the European plastic packaging industry — around 20mn t/yr — any change will be noticeable.

Getting beyond a marginal level of substitution, without unintended consequences, will be the challenge. Plastic is used in packaging for a reason, and the benefits that it offers in terms of weight-saving in transport and food preservation are well documented, as are the potential negative environmental impacts of increased production of other packaging materials. Further product development is likely to be needed to produce a viable, sustainable alternative to plastic in many applications. Consumers may need to adjust their lifestyle habits to avoid plastic, for example by shopping more regularly to counteract the loss of plastic’s high barrier qualities, which keep food fresh for longer. In most cases, it seems that consumers are still willing to buy products in plastic packaging when no simple alternative is provided.

### Legislation

As with consumer avoidance, legislation will also take time to develop. In the EU, the EU Plastics Strategy lays out bans on some single-use products — albeit not products that are likely to have a significant impact on polyolefin demand — as well as ambitious targets for recycling rates and the use of recycled plastics. In global terms, this is probably the most co-ordinated approach to dealing with the plastic waste issue that currently exists. But elements of the legislation remain

vague — such as a target for all plastic packaging to be “recyclable” by 2025 — and the EU is yet to develop a transparent system for measuring progress towards its recycling targets in a prompt way.

Avoidance and legislation are less developed in other parts of the world. Any major change in the US is likely to be led by consumers, but so far there is no broad mandate of support. In a 2018 survey of 2,012 US consumers completed by the Harris Poll for the Flexible Packaging Association, 86pc said they cared about sustainability in general, with 82pc saying they cared about the sustainability aspects of packaging. But only 27pc said that they actively seek out products in sustainable packaging, while 21pc said they often pay more for products in sustainable packaging.

Eight US states and a handful of major cities — including Boston, Chicago, Seattle and Washington, DC — have banned single-use plastic bags or require fees for their use. Other types of plastic are being targeted too, with Maine and Maryland banning foam food packaging. But there is no cohesive national plan. Further north, Canada in June 2019 announced a plan to ban single-use plastics, although it gave no hard deadlines and the government has said that it will begin analysis in 2021 on which plastic products to ban.

In Asia-Pacific, India is expected to enforce a ban on plastic bags and straws in the fourth quarter of 2019, and this is already affecting resin polymer demand. The ban is an initiative of prime minister Narendra Modi, who is expected to announce more comprehensive measures on single-use plastics next year. Momentum elsewhere in Asia is slower. Thailand has outlined ambitious plans that include a ban on styrofoam packages and single-use bags, straws and cups, which is expected in 2022. Given Asia’s enormous and fast-growing plastic demand, bans and restrictions could have a significant impact on global polymer demand if they become widespread. But the approach is not co-ordinated at this stage, and urbanisation is likely to continue to drive demand growth.

Bans and legislation may be at an early stage for now, but the plastic industry as a whole knows that scrutiny will intensify unless something is done to tackle the issues around plastic waste. Consumers’ aversion to plastic will increase unless progress is seen to be made. But there is time to act, with legislation still at an early stage and consumer avoidance still relatively limited. This will drive further research and investment into recycling initiatives.

### Increased use of recyclates: What are the targets and how will they be achieved?

The EU is the most developed region in terms of its recycling industry. According to the most recent figures from trade association PlasticsEurope, 31.1pc of European plastic waste was recycled in 2016, although more than a third of this was

## Global definition of recyclability

- Made with a plastic that is collected for recycling, has market value and/or is supported by a legislatively mandated programme
- Must be sorted and aggregated into defined streams for recycling processes
- Can be processed and reclaimed/recycled with commercial recycling processes
- The recycled plastic becomes a raw material that is used in the production of new products

exported, so it remains to be seen how China’s 2018 ban on plastic waste imports will affect this figure. The most recent capacities reported by Plastics Recyclers Europe were around 4mn t/yr for polyolefins and 2.1mn t/yr for PET, along with smaller amounts for other plastics.

Europe’s recycling rate compares with 9.1pc in the US in 2015 — a figure that is likely to have declined since China’s waste import ban — while in Asia there is a lack of definitive data around recycling. Some countries such as South Korea and Taiwan are among the most efficient recyclers in the world. But statistics about the origin of discarded plastic found in marine environments demonstrate that there are significant deficiencies in waste management in parts of the Asia-Pacific region.

Along with the EU’s relatively strong recycling performance, it is also the region with the most co-ordinated recycling targets. The EU Plastics Strategy sets out goals for 55pc of plastic packaging to be recycled by 2030, up from 42pc in 2016, as well as for a fourfold increase in sorting and recycling capacity over the same timeframe. Rules to ensure that packaging designers consider recyclability have also been mooted, although concrete development in this area is unclear and the globally agreed definition of “recyclability” is broad and somewhat vague.

The strategy sets a target to increase the usage of recycled plastic in the EU to 10mn t by 2025 from 3.9mn t in 2016. It encourages recyclers, converters and brand owners to pledge to produce or consume more recycled plastic, to increase its overall use. Pledges from recyclers have been bullish — they are confident that they will be able to supply more than 10mn t of recyclate into the European market by 2025. This is despite the need for significant increases in the current recycling capacity of around 4mn t/yr for polyolefins and 2.1mn t/yr for PET, particularly since mechanical recycling can typically only yield around 0.75t of product per tonne of waste feedstock.

Progress from the demand side has been much more limited so far, and there will need to be a substantial improvement

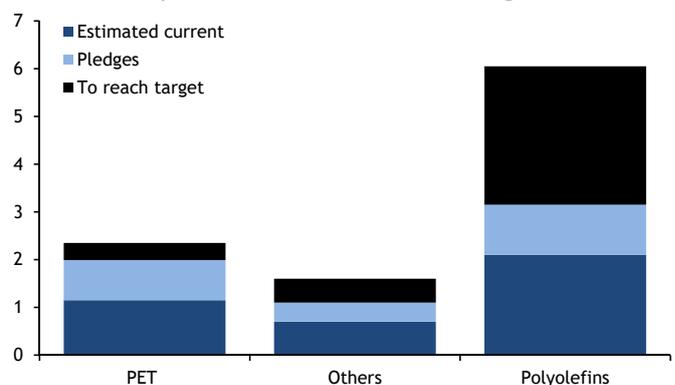
for the target to be achieved. In the latest update, from April 2019, plastic buyers only pledged to use a combined 6.4mn t of recycled plastic in 2025 — well short of the target. There will be a particular onus on the polyolefin industry to bridge the gap between the target and the current demand pledged by the market. But converters in the polyolefin industry have been particularly cautious over their pledges to use recycled material. The EU does not break the results down fully by plastic type, but says that it collected pledges that would raise the use of recycled polyolefins — estimated at around 2.1mn t in 2016 — by just 50pc by 2025.

In the PET industry, converters and brand owners have already pledged to increase their use of recyclates to more than 2mn t/yr by 2025. Raising this much further — in a market that is currently at around 5mn t/yr in total (combining virgin and recycled material) — is likely to be difficult. Among other polymers, the PVC industry has made significant progress with more than 700,000t/yr recycled in 2018, and industry body Vinylplus has pledged to recycled 1mn t/yr by 2025. But other polymers are generally hampered because the longer lifespan of many of their products mean that they are less present in the waste stream. PE and PP combined make up more than half of the plastic waste collected in the EU, making them prime targets for the recycling industry. In a scenario in which 10mn t of recycled plastic is used in the EU by 2025, the use of recycled polyolefins may need to increase by as much as 4mn t compared with the 2016 level — much more than what has been pledged so far.

Converters say that innovation in the industry to create new recycled plastics — such as new colours or food-grade polyolefin recyclates — could substantially increase demand. Many also cited the need for market acceptance of new (lower) material standards and clarity around definitions of recyclability and recycling, as well as suggesting that incentives should be introduced to drive demand. All of these things will inevitably take time to develop.

Converters have concerns about ensuring the stable supply of high-quality recyclates. Europe’s largest packaging manu-

Modelled requirements to meet 10mn t target *mn t*



Mechanical recycling vs chemical recycling		
	Mechanical recycling	Chemical recycling (pyrolysis)
Pros	Technology/capacity widely available (around 1.7mn t/yr rigid polyolefins, 2.3mn t/yr flexible polyolefins)	Generally more flexible on feedstock
	Low start-up cost compared with pyrolysis, economically viable on a small scale	Recyclate indistinguishable from virgin polymer — no restrictions on use
	Less carbon intensive	Lots of targeted investment and early-stage projects (10+ projects at demo/pilot/early commercial stage in Europe)
Cons	Inflexible feedstock requirements (needs homogenous input stream)	Technology yet to be widely demonstrated on a commercial scale
	Innovation needed to avoid “downcycling”	Carbon intensive — seen as an option only when mechanical recycling is impossible
	Safety/technical requirements limit the end-user markets for recyclate	In order to harness economies of scale, logistical challenge to find a steady stream of difficult-to-recycle waste to feed a large-scale plant must be overcome

facturers use in excess of 100,000 t/yr of plastic resin — and far in excess of this, in some cases — and would need a large volume of guaranteed supply of consistent quality to replace even a small percentage of their total material needs. The results of the campaign for pledges so far suggest that it will take some time, and potentially considerable development in recycling technology and infrastructure, for them to be confident that this would be available. Our view is that bridging the gap will be difficult and progress is likely to be focused towards the end of our forecast period.

The definitive target set in the EU contrasts with the US where, without the same kind of governmental mandates, the impetus for change is coming from consumer-facing brand owners that are being compelled by customers to respond to concerns about sustainability. This can be seen in pledges from companies such as Procter & Gamble, which has announced a goal of having 100pc of its packaging recyclable by 2030, with an interim step of having 90pc of all its packaging recyclable in 2020. This would theoretically lead to more recyclate coming onto the market. But action will need to be taken at the governmental level to ensure enough recycling infrastructure is available to process this new stream of sustainable packaging, as well as demand for the recycled plastic when it is produced.

### How will the recycling industry develop?

Progress towards recycling targets in the EU and globally is, in the first instance, likely to require development in mechanical recycling, which accounts for the vast majority of current European capacity. Mechanical recycling technologies are already widely available, have been demonstrated at commercial scale and shown to reduce carbon emissions. But the technology is restricted by the need for a homogenous, sorted feedstock stream, as well as limitations on how the end-product can be used. In order to expand mechanical recycling significantly, investment would be needed in collection systems and

sorting infrastructure, hard-to-recycle products would need to be phased out, and innovation would be needed to improve the quality of mechanical recyclates. Again, all of these will take time to be achieved.

In the longer term, chemical recycling technologies are likely to play a larger role. Chemical recycling, such as pyrolysis — converting plastic waste to pyrolysis oil that can be refined to cracker feedstock or other products — offers a lot of supplementary advantages to mechanical recycling. It can be more effective than mechanical recycling in terms of allowing for a more flexible input stream — it has been widely touted as a solution for dealing with difficult-to-recycle waste — and it produces a recycled product that is indistinguishable from virgin plastic. But pyrolysis of plastic waste is yet to be demonstrated on a large commercial scale, and questions remain about the carbon intensity of the process and the logistics of feeding a large-scale unit. It is likely to take a number of years for pyrolysis to start making a meaningful contribution towards European recycling.

### How has this fed into our demand forecast?

We feel that it is too early to adopt a strictly volume-based project-by-project approach to forecasting the impact on virgin polyolefin demand from consumer avoidance and increased recycling. The quality of available data relating to the recycling industry, particularly outside of the EU, is insufficient to allow for a forensic analysis of this type.

We have taken a high-level approach, starting with Europe, which we assume will continue to lead the way. We base our assumptions on existing EU targets, revised to make allowances for the gap between the targets and existing pledges and judgments on the achievability of scaling up infrastructure. There is also an understanding that not all recycled material will replace virgin polymers — Conversio (2018) states that as much as 50pc of German post-consumer recyclates replace

non-plastic materials — and that recycling has already grown alongside virgin polymer demand in the years leading up to the start of the forecast. Because of Europe’s position as a major importer in some polyolefin grades and a major exporter in others, we are considering the impact on the global balance as a whole.

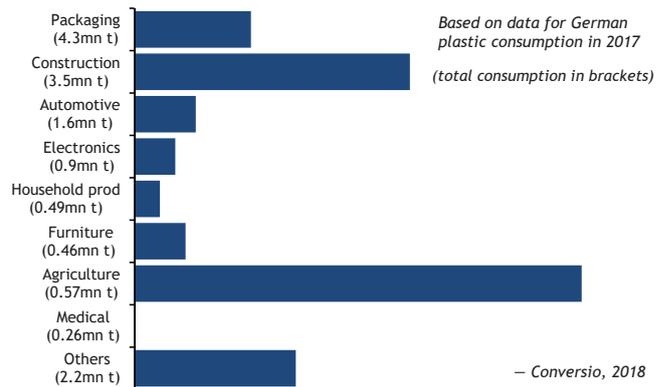
In volume terms, we have adjusted our combined PE/PP demand forecast down by around 2mn t/yr by 2025 on a global basis. This may seem low when compared with the expectation that the use of recycled polyolefins in the EU alone would have to increase by up to 4mn t/yr by 2025 to meet the EU’s 10mn t/yr plastic recyclate target, but takes into account the adjustments described above.

The adjustment rises to over 5mn t by 2028. We expect growth in the recycling industry to accelerate as investment in infrastructure and recycling technologies bears fruit. And if recycling is not seen to be developing, the risk of rising consumer avoidance will also grow. The acceleration after 2025 is likely to include further development in other regions. Progress elsewhere is less clearly mapped out, but there are examples — such as Thailand with its Plastic Waste Road Map — where ambitious plans have been announced.

Capacity increases are likely to focus on mechanical recycling in the early years of the forecast. But we expect that significant investment and research will lead to development in chemical recycling technologies, which can have more of an impact after 2025. More use of cracker feedstocks made through pyrolysis of plastic waste could increase “replacement” without materially impacting virgin polyolefin demand.

We have not differentiated by product grades in this forecast, but note some expected trends.

Recycled plastic consumption vs total plastic %



Rigid grades are currently much more likely to be replaced by recycled plastic than film grades, because of their use in products that have laxer aesthetic requirements and their higher thicknesses, which make it far easier for converters to deal with resin impurities. This trend is likely to continue, but recyclers are also keen to develop grades for higher-value markets, and particularly to increase penetration in the films market, where secondary packaging and industrial films are a likely target.

Achieving more recyclate use in consumer packaging films — an obvious target because of the focus of public opinion — will be an important goal.

The recycling industry, and attitudes towards plastic and sustainability globally, are changing fast, and we will update this projection annually to take account of changes that have occurred in the time between the publication of our global supply/demand balances.

**For more information:**

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