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Argus Recycled Polymers

Weekly price supplement and market update

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rPP market heading for tougher times

EDITORIAL: Declining prices and margins for virgin PP may be a sign of leaner times to come for Europe's PP recycling industry

What goes up must come down, and the hangover following a strong post-pandemic recovery appears likely to be a significant one for the polypropylene (PP) industry.

Demand for PP from the durable goods sector has hit the buffers. Record-high eurozone inflation of 8.6pc in June has shaken consumers' confidence, with the Eurostat consumer confidence index falling to its lowest level since the beginning of the pandemic.

Eurostat's headline manufacturing and plastic production output numbers have held firm up to now, but they are two months in arrears. The S&P Global Purchasing Managers' Index — often seen as an indicator of sentiment — showed a drop in manufacturing output in June for the first time in more than two years.

Recyclers are split on the subject of rPP demand. Some report that it is holding up, but plenty note customers cutting back on production, taking longer summer shutdowns and holding back on orders, particularly in the durable consumer goods sector. A construction downturn is also likely considering that industry's sensitivity to economic fluctuations.

And falling virgin PP prices are squeezing rPP in markets where first and second-generation material compete. Prices for the low-end rPP grades have fallen considerably since peaking in spring, in order to maintain a discount to the virgin PP price.

The pressure on virgin PP prices is partly driven by demand, but long-term supply pressure is also expected because of rising global capacity. Global PP production is expected to rise by 32mn t/yr between last year and 2026, with a significant portion of this increase due in late 2022 and 2023. Capacity is mainly being built outside Europe, but the region will not be immune from the effect on global prices. In markets such as crates and flower pots, where manufacturers use recyclates historically to save money, recyclers seem likely to feel the squeeze from more competitive virgin prices for some time.

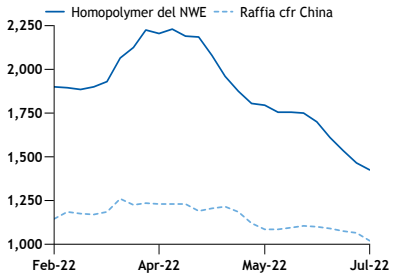
Aiming high

Outside of the low-end markets, there are still opportunities for recyclers to sell rPP at a premium. Availability of material that is suitable for high-end consumer packaging is unlikely to suddenly increase, and automotive companies are reportedly more interested in developing new products incorporating high-quality recycled plastic since the European Commission began to signal the possibility of recycled content targets outside of the packaging industry. But in the absence of a firm announcement from the commission, the cost of recycled relative to virgin material is still likely to feature heavily in buyers' decision making.

The decline in rPP prices has narrowed recycling margins, amid solid bale prices and unusually high energy costs. The PP bale market is also coming under pressure, but prices for post-consumer material may not return to the levels of 1-2 years ago, as sorting firms are also struggling with higher costs. And new recycling capacity start-ups could increase competition for feedstock and support bale prices, as is currently the case in the UK.

Even if the pressure on margins is passed up the chain to the sorter level, there will be a concern that lower profitability and a slower economy could stifle the multi-stakeholder investment that is needed to raise the supply, quality and yield of material for the recycling industry in the long term.

Polypropylene spot $/t



CONTENTS

Editorial	1
Europe market commentary	2-3
Petrochemical markets	4
Sustainable feedstocks	4
Borealis on mass-balance	5-6
Analysis: SEA rPET market	6-7
News	8-11
Supply/demand	8
Legislation/Associations	8
Mechanical Recycling	9
Chemical Recycling	10
Sustainable feedstocks	11
News in brief	12

MARKETS UPDATE

Europe rPET bale prices fall

The European rPET market is quiet at the end of July, with summer holidays across the region, and reduced flake production pressuring bale prices lower.

Prices for colourless bales have continued to decline from the heights seen over the past few months. This is particularly true in southern and central Europe, where tightness in the market had lifted prices to parity with other regions, but prices have fallen further because the bale material available is typically of lower yield.

Tightness in the bale market has eased, with more bottles entering the waste stream during the peak beverage consumption season. And demand for bales has waned with flake producers reducing operating rates to an average of around 70pc owing to high feedstock and energy costs eroding margins.

The reduction in flake production has supported prices in that market in the second half of July, widening producers' margins. But this has not spurred more buying activity as they are generally eager to use up the inventories that they built up at high cost in the second quarter while flake prices remain solid, in anticipation that the market could decline as demand weakens seasonally in the winter.

Lower bale demand in continental Europe may have a knock-on effect on UK bale prices in the coming weeks and months, because demand for bale exports from the UK will be reduced. UK bales are typically lower-yield than in most of Europe, but tightness in the market had driven more flake producers to turn to the UK for supply during the spring and early summer.

Flake consumption in the thermoforming industry has softened, because virgin PET remains the most economical choice for converters. But solid demand from the bottle-to-bottle sector is propping the market up, with food-grade pellet prices and production margins remaining strong. Tight availability of food-grade pellets shows no sign of easing, particularly with record-high temperatures that have boosted beverage consumption on top of existing competition for material from companies working towards sustainability goals.

Food-grade pellet production capacity is expected to increase in the next 12 months, which should help to alleviate some tightness. But the impact will be delayed by brand owners' need to obtain internal approvals for new material, which can take six months or more from the start-up of a new plant.

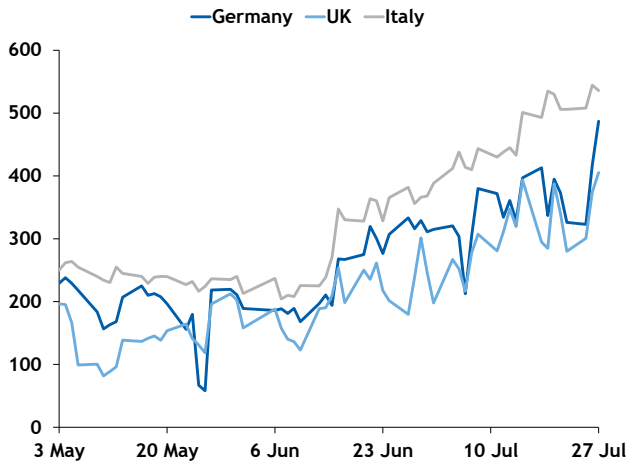
Market sources stated that some food and beverage players are beginning to readdress sustainability commitments and recycled content targets, in particular in southern and central Europe, because of difficulties with availability and high costs compared with virgin prices. This may lead to weakening across the value chain.

August is typically a quiet month, when many factories slow or stop production for holidays and maintenance. This year, market participants enter this period with an eye on increasingly weak economic data, suggesting that prices may come under pressure, but also on rising energy and logistics costs that are squeezing margins throughout the industry. Against this backdrop, many feel the time is right to wait and see how the market develops after the holiday season.

rPET market prices

	Timing	Low	High	Midpoint	Δ
Bale prices					
PET bottle colourless, del W Europe	29-Jul	1,050.00	1,250.00	1,150.00	nc
PET bottle colourless, del N Europe	29-Jul	1,200.00	1,350.00	1,275.00	nc
PET bottle colourless, del UK	29-Jul	775.00	850.00	812.50	nc
PET bottle colourless, del CEE	29-Jul	900.00	1,200.00	1,050.00	nc
PET bottle colourless, yel-	3Q22	700.00	961.00	830.50	nc
Flake prices					
Bottle flake colourless, del NWE	29-Jul	1,950.00	2,050.00	2,000.00	nc
Bottle flake colourless, del S Europe	29-Jul	1,900.00	2,100.00	2,000.00	nc
Bottle flake colourless,	29-Jul	2,050.00	2,250.00	2,150.00	nc
Food grade pellet					
del NWE	29-Jul	2,400.00	2,650.00	2,525.00	nc
del S Europe	29-Jul	2,400.00	2,600.00	2,500.00	nc

OTC base load day-ahead electricity prices *€/MWh*



MARKETS UPDATE

Europe rPE, rPP demand slows

European recycled polyolefin markets are coming under pressure from slowing economic activity in the region and as virgin polymer prices weaken.

Durable consumer goods demand has been hit particularly hard by a fall in consumer confidence, amid record-high eurozone inflation. The automotive and construction industries are also strongly linked to economic fluctuations, making them likely to suffer if the economy continues to decline. And the initial July estimate of the S&P Global Purchasing Managers' Index (PMI) shows the wider eurozone manufacturing sector entering into decline for the first time since the early days of the Covid-19 pandemic.

This slowdown in the economy is feeding through to lower polymer demand. And it is causing converters to anticipate further drops in polymer prices, leading them to tightly control their stocks heading into August, when many will wholly or partially shut down for maintenance and holidays. Many recyclers reported lower sales in July as a result, and there is limited expectation of an uptick in August, given the holiday season.

Weaker demand has also caused virgin polymer prices to decline, which is particularly damaging for demand in markets where recyclates are typically used as a cost-saving measure by converters. And the outlook is gloomy with significant upcoming global capacity additions that are only likely to add to pressure on virgin prices, particularly for PP.

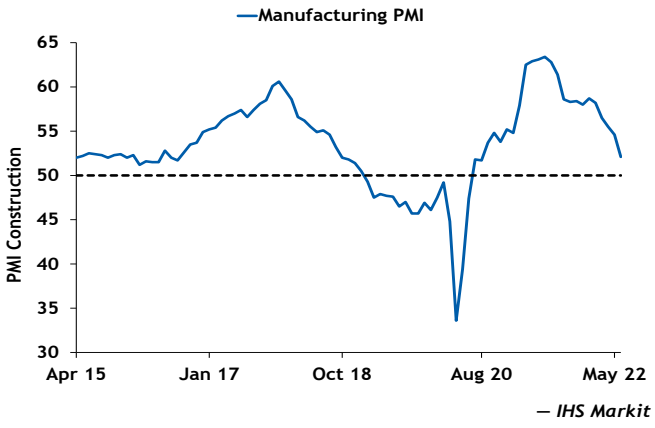
rHDPE and rPP prices have fallen in recent months, retaining a discount to virgin PE and PP spot prices at the low end of the market, but the gap has narrowed. And it has become increasingly difficult for recyclers to claim a premium for higher-quality grades that require more processing, resulting in higher costs.

This combination of factors is squeezing recycling margins. Electricity prices have risen sharply in Europe in the past two months, lifting recyclers' costs. And bale prices remain solid, with some support in July from a turnaround at a large German sorting site. The bale market softened slightly towards the end of July and some pockets of oversupply seemed to appear, including unconfirmed reports of some cheaply priced material available in southern Europe to recyclers in a position to buy and with access to transport. But the decline in price has been limited, and some areas remain tight. This includes the UK, where prices are well above those in mainland Europe as a lack of feedstock has reportedly limited production at some recycling sites.

As always, the market for regranulates into home and personal care packaging remains an outlier, with prices at a significant premium to virgin polymers and showing little sign of coming down. Availability is still far outweighed by demand, which is driven by the targets of large brand owners to increase their recycled content. But even in the high-quality packaging market, there are signs that the rising premium of recyclates to virgin polymer prices is dampening the appetite of some buyers of plastic packaging to prioritise new initiatives aimed at increasing recycled content. This could lead to pressure on prices in the coming months.

Recycled polyolefins	Timing	Low	High	Midpoint	Δ
Bale prices					
High purity PCR HDPE bale, del NWE	29-Jul	500.00	550.00	525.00	nc
High purity PCR PP bale, del NWE	29-Jul	600.00	700.00	650.00	nc
Mixed polyolefin bale, PCR, del NWE	29-Jul	375.00	425.00	400.00	nc
Regranulate prices					
rHDPE BM white, from PCR, deodorised, del NWE	29-Jul	2,350.00	2,550.00	2,450.00	nc
rHDPE IM black, del NWE	29-Jul	1,200.00	1,300.00	1,250.00	nc
rPP grey, from PCR, deodorised, del NWE	29-Jul	1,850.00	2,150.00	2,000.00	nc
rPP IM black, del NWE	29-Jul	1,250.00	1,300.00	1,275.00	nc

IHS Markit Eurozone manufacturing PMI



Sustainability target tracker

Download our regularly-updated tracker of sustainability targets from global brand owners, which is available on Argus Direct at https://direct.argusmedia.com/dataanddownloads
Search Data and Downloads from your dashboard to find out more.

PETROCHEMICAL MARKETS

Europe

There is pressure on prices in the European PE and PP markets, with PE market participants largely using the summer to reduce stock, and PP affected by lower consumer demand for durable goods and a rise in homopolymer imports.

PET producers are cutting back operating rates because of struggle to pass on high feedstock costs downstream, with buyers' price expectations impacted by the arrival of cheaper imports from Asia-Pacific

Americas

US PE contract prices are expected to decline by 3 cents/lb in July, amid ample availability, declining demand and sharply falling global prices. And PP contract prices for July are also expected to decline, by as much as 7 cents/lb, 3c/lb more than the drop in feedstock propylene.

Shell and Baystar Polymers are extpected to start up new PE capacity in the next 3-4 months.

PET resin prices are underpinned by tight supply and rising freight prices, with some buyers booking 3-5 months in advance to ensure supply.

Asia-Pacific

Falling crude prices weighed on demand for PE in China, which was also limited by lockdowns in several cities during the month. And sentiment weakened in the PP market in the country in the second half of July, with most converters buying only on an as-needed basis.

Olefin monthly contracts & Polymer spot

	Timing	Midpoint	Δ
Ethylene contract			
del NWE	Jul	1,495.00	-100.00
cfr Taiwan	Jul	1,045.00	181.00
Pipeline USGC	Jul	42.50	-0.50
Polymer grade propylene (PGP) contract			
del Europe	Jul	1,480.00	-120.00
del Taiwan	Jul	990.00	163.00
fob US	Jul	47.00	4.00
HDPE IM spot			
del NWE	29-Jul	1,453.50	-24.00
cfr China*	29-Jul	970.00	-30.00
fas Houston bagged	29-Jul	1,069.00	-143.50
Polypropylene spot			
homopolymer del NWE	29-Jul	1,415.0	-29.0
raffia cfr China	29-Jul	965.00	nc

**Main origin*

Argus Chemicals coverage

Please see Argus' global olefins, aromatics, PE and PP reports for more prices, commentary, news and analysis from the chemicals markets.
Visit www.argusmedia.com/chemicals to find out more

SUSTAINABLE FEEDSTOCKS

Bionaphtha prices soften in July

European prices for used cooking oil (UCO)-based bionaphtha softened through most of the month, losing $375/t from 1 July to a low on 21 July, then recovering marginally. Demand was primarily driven by petrochemicals rather than road fuels.

In Asia, Covid-19 lockdowns in China have reduced petrochemicals demand, while higher crude prices have forced northeast Asian cracker operators to reduce runs and thus demand for bionaphtha. Few end-users seem willing to pay extra for the benefit of the more expensive bio component currently, and bids were heard as low as $1,200/t above regular naphtha compared with a $2,000/t premium previously.

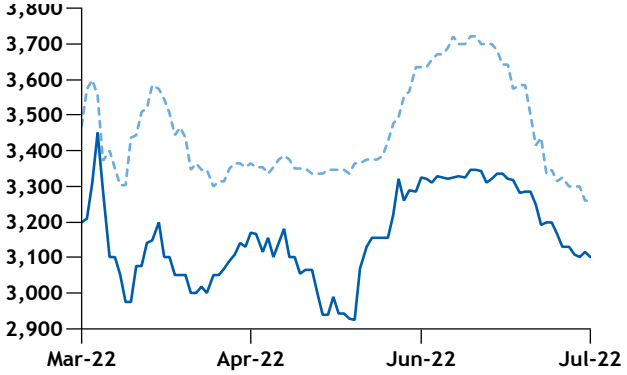
Argus Biofuels coverage

Please see Argus Biofuels for daily bionaphtha prices, and prices, commentary and analysis from the global biofuels market.
See https://www.argusmedia.com/en/bioenergy/argus-biofuels to find out more.

Bionaptha Snapshots

	Timing	Low	High	Δ
Bionaptha fob ARA	Jun	3,310.00	3,320.00	nc
Bionaptha cfr Notheast Asia	Jun	3,090.00	3,110.00	nc

Bionaphtha $/t



NEWS AND ANALYSIS

Mass balance key for sustainability targets: Borealis

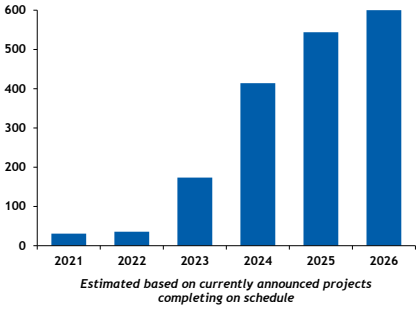
A mass balance approach to tracing feedstock from chemical recycling through the petrochemicals chain is critical for the development of the industry, Borealis' Lucrece Foufopoulos told Chloe Kinner

The adoption by regulators of a mass balance approach to chemical recycling and non-fossil fuel-based sustainable petrochemical feedstocks is "critical" to pushing the industry towards its sustainability goals, Austrian chemical producer Borealis' executive vice-president for polyolefins, circular economy and chief technology officer, Lucrece Foufopoulos, tells *Argus*.

Feedstock from chemical recycling is typically blended with fossil fuel feedstock in the steam cracker, and mass balance accounting is a way to trace the flow of materials throughout the value chain to ensure that the volume of polymers attributed as recycled matches the recycled feedstock volume used. This allows for the production of chemically recycled polymers without the requirement for dedicated plants to process only recycled feedstocks.

Many of the small number of existing projects in which pyrolysis oil or bionaphtha are used as a feedstock for polymers have been certified by the ISCC, an independent body that audits the mass balance approach. But mass balance is yet to be ratified by the European Commission, a move that would guarantee that products made in this way could contribute to circular economy and carbon emissions reduction targets in the EU.

EU, UK pyrolysis oil output ***'000 t/yr***



Estimated based on currently announced projects completing on schedule

"We believe that recycled content allocated using mass balance should be treated as equivalent to directly allocated recycled content as they equally advance the circular economy. We support the creation of a regulatory framework and widely accepted standards... that support the unified use of the mass balance approach", Foufopoulos says.

The commission's deputy director-general for research and innovation, Patrick Child, told the recent AMI Chemical Recycling Conference in Cologne that the commission is carrying out its own investigation into the carbon-intensiveness of pyrolysis before making a ruling on its definition and on the mass balance approach. A decision on this is thought to be unlikely until next year.

Borealis is involved in three chemical recycling projects in Europe, which are at various stages of development, in addition to plans to expand its use of renewable feedstocks, based on organic waste and residue streams. Both routes to production would contribute to Borealis' ambitious target to produce 600,000 t/yr of polymers from non-fossil fuel-based means by 2025, and both lend themselves to mass balance-based certification.

Foufopoulos indicates that Borealis sees the fragmented nature of European legislation as a complication for the development of the recycling industry. "We need to strengthen and reinforce the harmonised single market, which is key to accelerate towards a circular economy of plastics across Europe," she says. Wider adoption of policies such as deposit return schemes (DRS), which are currently in place in 11 European countries, has been mooted as a potential avenue to increase the availability and quality of plastic waste for mechanical and chemical recycling.

Focus on emissions

The conversation around plastic recycling has shifted from a focus on waste leakage towards a multi-faceted approach where resource inefficiency, emissions and waste in the environment are considered equally.

Foufopoulos reflected the growing focus on emissions in her answers to *Argus*' questions. She confirms that Borealis shares the commission's view that less-carbon intensive mechanical routes to recycling should be favoured over chemical recycling where possible. But she adds that pyrolysis would importantly allow adoption of recycled plastic in more industries, allowing for wider emissions reductions to be achieved.

NEWS AND ANALYSIS

"We have been working on [the 600,000 t/yr target] for several years. We started with a focus on packaging, but we are now looking also at other applications," Foufopoulos says. "Every industry is taking responsibility for reducing their carbon footprint," with recycling helping Borealis' clients to reduce Scope 3 emissions, she says.

A slew of virgin polymer capacity expansions around the world will only add to the sense of urgency for Europe and other regions to address the issues holding back the plastics circular economy.

Borealis has an ambitious target for around 40pc of its European polyolefin production — around 1.8mn t/yr — to be based on recycled and renewable sustainable feedstocks by 2030. This would require an 18-fold increase from its current recycled and sustainable output.

And with the cumulative annual growth rate of global virgin polyethylene and polypropylene production capacity projected at 4-5pc in the period to 2026, including major Borealis expansions in Europe and the Middle East, the company is looking for prompt action from legislators to pave the way for recycling to expand.

"Policy makers need to recognise the rapid pace of change in the industry and need to act fast... to create conditions that support investment in tomorrow's infrastructure and discourage the loss of valuable plastics out of the circular economy," the company says.

NEWS AND ANALYSIS

Southeast Asian rPET initiatives slow to bear fruit

Issues with regulation and informal collection infrastructures remain key obstacles to the growth of PET recycling in the region, write Jorlyne Ong and Will Collins

Southeast Asia, with its population of over 682mn represents a significant growth opportunity for the recycled polyethylene terephthalate (rPET) industry, but the penetration of rPET into the bottle market has historically been low compared with some other regions.

Singapore-based company GA Circular — which specialises in the circular economy and waste management, and has partnered with organisations such as the World Bank to study recycling industry in the region — reported that southeast Asia consumed almost 900,000t of PET bottles in 2018, but had only 10,000-30,000 t/yr of local rPET food-grade pellet production.

The past couple of years have seen a relaxation of restrictions on rPET use, and a focus on improving collection, which a spate of rPET capacity increases suggest is bearing fruit. But even these capacity increases are relatively small in comparison to the "potential" volumes, given the amount of PET packaging that the region produces annually, and the possible demand if there were more penetration of recyclates into the bottle market. GA Circular projects that food-grade rPET demand could grow to nearly 400,000 t/yr by 2030, if PET consumption climbs as expected and if the region was able to move to 25pc recycled content by that time.

Southeast Asia rPET bottle-grade pellet plants			*t/yr*
Company	**Location**	**Start up**	**Capacity**
Veolia/Danone-Aqua	Rembang District, Indonesia	2021	25,000
Duy Tan Recycling	Long An, Vietnam	2021	22,000*
Coca-Cola/Indorama	Cavite, Philippines	2022	16,000
Coca-Cola/Dynapack	Amandina, Indonesia	2022	15,000†

**input capacity; plan to increase to 100,000 t/yr †rising to 25,000 t/yr by 2023*

NEWS AND ANALYSIS

Access to feedstock is holding back recyclers, with uncertain domestic supply and tightening international and domestic laws making imports more difficult

Access to waste feedstock is one issue holding back recyclers in southeast Asia, with uncertain domestic supply and tightening international and domestic laws making imports more difficult.

Poor local waste segregation practices and a lack of design for recycling mean that southeast Asian recyclers often struggle to source regular high-quality domestic feedstock supply in sufficient quantity, according to GA Circular. And the often informal nature of waste collection makes volumes less predictable. Feedstock contamination may also have worsened post-Covid, owing to increased consumption of takeaway containers and the shutdown of some commercial premises, which were often sources of cleaner feedstocks, during lockdowns.

Gone to waste

This pushes recyclers towards imports, but these have been increasingly tightly controlled in recent years. Southeast Asian countries received significant amounts of waste after China's 2018 ban on waste imports, but management systems were not always able to cope. This prompted tighter waste import regulations in Malaysia, Thailand and Vietnam.

And the movement of plastic waste between countries was further restricted by a plastic-specific amendment last year to the Basel Convention — an international agreement governing the movement and disposal of waste materials. This means that PET waste can only be imported with the informed consent of the importing country, if it is "destined for recycling in an environmentally sound manner and almost free from contamination and other types of wastes". The amendment created additional administrative concerns for importers.

One solution to the feedstock issue is improvements to local collection and sorting systems, which several countries are moving to address. The Philippines and Vietnam, two countries in which plastic recycling is largely conducted informally, have implemented Extended Producer Responsibility (EPR) schemes to improve the efficiency of the sector. The plastic recovery targets outlined in the schemes will take effect from 2023 and 2024, respectively. Schemes such as these should help increase waste segregation and reduce contamination rates.

Compelling argument

Southeast Asia has no targets in the vein of Europe's obligation for a minimum 25pc recycled content in PET bottles by 2025

The most obvious way to drive rPET demand in the region would be mandatory recycled content targets.

Legislation restricting the use of rPET in food-contact material (FCM) has relaxed in the region in recent years. rPET remains banned for Halal food packaging in Malaysia, but Coca-Cola already offers bottles containing rPET in Vietnam, the Philippines and Singapore. And the company plans to offer rPET bottles in Indonesia this year, using material produced at the recycling plant that it jointly owns with packaging firm Dynapack in the country.

Thailand also changed its laws to allow recycled content in FCM applications last month, which should add impetus to a market where just 3pc of PET packaging was recycled back into food-grade pellets in 2018, according to GA Circular.

But, as yet, there are no targets in the vein of Europe's obligation for a minimum 25pc recycled content in PET bottles by 2025.

Without mandatory targets, it may prove uneconomical for local bottle manufacturers to secure supply from the spate of new rPET plants coming on line. Prices for food-grade rPET pellets in some western markets are extremely high, with companies competing for material ahead of the deadline for the 25pc target, as well as for their own voluntary goals. It may take more than voluntary commitments to compete for material in a global market, hampering the development of a true regional circular economy.

NEWS AND ANALYSIS

Supply/demand

Supply shortages impact Pepsi's UK rPET use

US-based food and beverage firm PepsiCo has scaled back from using 100pc recycled material in bottles for some of its UK brands, citing supply issues for recycled PET (rPET) food-grade pellets.

PepsiCo had made progress towards its target of switching all its UK ready-to-drink bottled beverages to 100pc rPET by the end of 2022, the firm told *Argus*, but has had to lower the percentage of rPET in some products after "facing some supply issues."

"We are working hard to establish additional supply," the firm said.

UK and European rPET food grade pellet markets are tight, with a lack of available high-quality sorted material and high competition among buyers. This has been exacerbated by the UK's implementation since April of a £200/t ($239/t) levy on all manufactured or imported plastic packaging that contains less than 30pc recycled plastic.

High bale prices and rising energy and logistics costs have eroded reclaimer margins, leading some to reduce flake production. With companies trying to increase recycled content, some suppliers are facing a shortage of plastic flake to feed food -grade production facilities.

PepsiCo is not alone in scaling back its plastic packaging pledges. UK grocery retailer Iceland recently said it would not achieve its goal to eliminate plastic packaging from its own brand ranges by the end of 2023. Its chief executive Richard Walker cited an increase in plastic use during the pandemic, along with a slowdown in investment in plastic alternatives and its need to maintain low prices during a "major cost of living crisis."

Iceland has also said it will not achieve its goal to become "plastic neutral" in 2022, which it was to do by recovering and recycling a weight of nature-bound waste plastic equal to its residual plastic footprint each year. It partnered with Clean Seas, an ocean clean-up organisation, which is designing a programme for Iceland, for this purpose.

Many large brands are reaching for ambitious recycled content and plastic reduction targets, often by 2025. Collection infrastructure needs to develop for supply to keep up with demand.

By Chloe Kinner

Chemical recycling emerging quickly: Neste

Finnish refiner Neste said it sees the chemical recycling industry "emerging quickly in Europe", as different liquefaction technologies are developed.

The firm, which last week received EU funding for processing of liquefied waste plastic (LWP) at its 205,000 b/d Porvoo oil refinery, said it plans to add capacity to purify LWP from thermochemical liquefaction plants, such as pyrolysis oil, to enable the purified oil to be processed in the refinery into a suitable fossil-feedstock substitute for steam cracking.

The planned pretreatment and upgrading capacity is 400,000 t/yr, which would be a significant contribution to Neste's goal of processing over 1mn t/yr of waste plastic by 2030.

Neste told *Argus* it expects LWP availability to increase because of technology developments and "the commercialisation of chemical recycling" to combat climate change and pollution. The company is co-operating with different suppliers of LWP, it said.

Neste is also planning its own pyrolysis unit at Vlissingen, the Netherlands, in partnership with Belgian firm Ravago, which it expects to recycle around 55,000 t/yr of plastic waste into pyrolysis oil. It said there "might be additional [sites]" to come as a result of its partnership with Ravago.

The pyrolysis oil processing project, known as PULSE, was selected by the EU Innovation Fund last week to receive a grant of up to €135mn to build chemical recycling capacities.

"Following the positive grant decision, individual grant agreements will be prepared with the European Climate, Environment and Infrastructure Executive Agency," Neste said. "PULSE is currently in the feasibility study phase. Investment decision readiness is targeted for 2023 and gradual implementation is expected to start in 2024."

Thermochemical liquefaction involves breaking down plastic waste into an oil that can be processed and fed back into the petrochemical process. Pyrolysis, which involves heating the waste in an oxygen-free environment, is one process being used for this by a large proportion of companies that are developing chemical recycling plants in Europe. Europe's thermochemical liquefaction capacity is small, but will increase significantly in the next 1-2 years if a number of projects that are in the pipeline are realised on schedule.

By Chloe Kinner

Legislation/associations

US legislators urge chemical recycling caution

Citing concerns about increased pollution from pyrolysis and gasification processes, 35 US legislators, including senators and members of congress, have signed an open letter calling for the two chemical recycling methods to remain regulated as waste combustion units.

The letter states that there is no way to guarantee feedstocks created through gasification and pyrolysis will be used to produce new plastics, and that therefore they could not advance a circular economy.

“Instead of leading to the recovery of plastic and supporting the transition to a circular economy, pyrolysis and

NEWS AND ANALYSIS

gasification lead to the release of more harmful pollutants and greenhouse gases," the legislators said.

The letter also calls for a transition to a circular economy and supports the US Environmental Protection Agency's (EPA) goal to reach a recycling rate of 50pc of all materials by 2030.

The letter, addressed to EPA Administrator Michael Regan, expresses concern with recent investments in chemical recycling. A number of companies have announced large expansions and investments into pyrolysis and other forms of chemical recycling in 2022, including Nexus Circular, New Hope Energy, and Eastman Chemical.

By Zach Kluver

Virginia loosens, delays SUP restrictions

Virginia's commitment to phase out state usage of single-use plastics has been rescinded, and the planned ban of expanded polystyrene was pushed back to 2028.

The measures represent a significant loosening of plastics laws in Virginia, after an executive order from the governor's office had planned to phase out usage of single use plastics (SUP) and ban polystyrene food containers.

Former governor Ralph Northam (D) signed an executive order in March 2021 that prohibited the use of SUP such as plastic bags and plastic food containers in state agencies and public universities. The executive order came into effect 120 days after the signing, and the phase-out was scheduled to complete in 2025.

But current governor Glenn Youngkin (R) rescinded that executive order with Executive Order 17 in April, and called for more investment into chemical recycling to reduce plastic pollution.

This July, an amended state budget pushed back the enforcement of the expanded polystyrene ban by five years. The ban was originally set to go into effect in July 2023, but will now take place in July 2028.

Aside from withdrawing from the phase-out of SUP, Executive Order 17 requires the Virginia Department of Environmental Quality, along with other state agencies, to find ways to encourage post-consumer recycling (PCR) within Virginia.

"Recognizing and promoting the importance of recycling has the potential to positively impact the Commonwealth's environment, providing cleaner air and water, as well as create new clean technology jobs," Youngkin said.

By Zach Kluver

UK govt urged to take action on plastic waste

UK waste management and recycling company Cory has stressed the need for the UK government to take action to correct the conditions for plastic reprocessing and reduce the amount of plastic waste that enters the non-recyclable waste stream.

Cory operates an energy from waste plant in Belvedere, southeast London. The company commissioned in depth analysis of the residential, non-recyclable waste that it processes, which showed that plastic packaging film makes the top ten by weight of processed materials despite being a lightweight material.

Only a small proportion of plastic film is recycled, because of challenges with its collection, sorting and recycling as well as end markets, and development in the industry is needed to increase the recycling of this waste. This sentiment was echoed by the British Plastics Foundation this month.

Cory said that "Where there are fewer alternatives to plastic film used as packaging, efforts to make its recycling more commonplace are essential. This includes the government's proposal that plastic film should be collected at the kerbside for recycling as soon as is practical, with the costs of achieving it being paid by producers."

The company also called for a reduction in production and consumption of another problematic material, expanded polystyrene (EPS) which also represents a large proportion of the residual waste stream.

Cory supports the proposed government schemes such as the extended producer responsibility (EPR), but suggested that policies should go further in tackling plastic waste. Cory chief executive Dougie Sutherland said "Capturing the plastics is key and UK government policies that are intended to do this — consistent collections, the deposit return scheme, and EPR — will be crucial. We were disappointed to learn that EPR will not include business waste and the introduction of the scheme has been delayed by at least a year."

By Chloe Kinner

Mechanical recycling

Ghana to get first bottle-to-bottle rPET unit

Ghana will get its first bottle-to-bottle recycling plant supplying food grade recycled PET (rPET).

Plastic and packaging producer Mohinani Group will install the plant at the site of its subsidiary Polytank Ghana. The bottle-grade rPET produced at the plant will go to Polytank's preform production and will be made available for other packaging producers.

The plant will source post-consumer PET bottles through partners and its own collection network. The extrusion and pelletising equipment is provided by Starlinger, and the sorting equipment by Tomra. The recycling line is expected to be installed by 2023.

"Waste management is a huge topic all over Africa," Mohinani said. "It is a logical step for us to enter the plastics recycling industry".

According to the Global Plastics Action partnership,

NEWS AND ANALYSIS

Ghana generates around 1.1mn t/yr of plastic waste, of which around 5pc is collected for recycling.
By Chloe Kinner

Japan's Toyotsu to produce rPET for Kirin

Japanese bottle recycler Toyotsu PET Recycle Systems will produce recycled polyethylene terephthalate (rPET) for beverage firm Kirin's bottle-to-bottle recycling scheme.

Kirin has partnered with rail company Tobu Railway to collect used PET bottles through recycling boxes at 33 stations on the Tobu Tojo Line, from 3 August. Japanese waste management firm Kinoshita Friend will process the bottles to bales, from which Toyotsu will produce rPET.

Toyotsu PET Recycle Systems has a production capacity of 40,000 t/yr of rPET, and aims to start commercial operations in October.

Kirin plans to extend the scheme to all lines of Tobu Railway depending upon the results of its implementation on the Tobu Tojo Line.
By Jorlyne Ong

Chemical recycling

Infinity's CPF invests in Itero pyrolysis

The Circular Plastics Fund (CPF), an investment fund operated by Netherlands-based Infinity Recycling and supported by large petrochemical producers, has invested €5mn ($5.1mn) in chemical recycling technology provider Itero.

The CPF investment accounted for the bulk of €6mn raised by Itero to "support the design and construction of our first at-scale demonstration [pyrolysis] plant" in Geleen, the Netherlands, the company said.

London-based Itero said in January that it would build a pyrolysis unit with an annual input capacity of 27,000 metric tonnes/yr in Geleen that is expected to begin operating in 2024.

Itero can handle relatively high impurity levels in the waste stream while maintaining a "high quality output," making it attractive to Infinity Recycling, Infinity managing partner Jan-Willem Muller told *Argus*. This stems from Itero considering non-plastic biowaste as feedstock during its initial design phase, Muller said.

The make-up of the plant, with a large single 27,000t/yr capacity reactor rather than a number of smaller units, was another factor in the investment decision, he said. The larger reactor size makes it easier to scale up to meet high demand for pyrolysis oil from the petrochemicals industry, Muller said.

On demand, Itero cited a projection by consultancy McKinsey that 30pc of global polymer demand would be met by advanced recycling, including pyrolysis, by 2050.

The investment in Itero was the second carried out by Infinity Recycling's "Dark Green Fund," which is focussed on companies looking to scale up chemical recycling. The company has also invested in Pryme, which is constructing a 40,000t/yr pyrolysis unit in Rotterdam that is scheduled to begin operations later this year.

CPF's investors include LyondellBasell, Chevron Phillips Chemical and Indorama.
By Will Collins

Dow signs string of recycling agreements

US chemical firm Dow has announced three agreements with companies in Europe and the US, relating to mechanical and chemical recycling.

These included a deal with London-based technology provider Mura Technologies, under which the firms intend to significantly extend their existing agreement by adding up to 600,000t/yr of chemical recycling capacity globally.

The firms intend to "construct multiple world-scale 120,000t/yr advanced recycling facilities in the US and Europe", using Mura's HydroPRS technology. Mura's hydrothermal recycling process uses steam to break down the molecules and produce an oil that can be refined for use as a petrochemical feedstock.

Mura's technology is distinct from pyrolysis. The company is currently building a 20,000t/yr unit in Teesside, UK, which would be its largest plant to date and is scheduled to start up next year. Dow has an offtake agreement for the petrochemical feedstock produced by this plant when it enters production.

In addition to the Mura agreement, Dow announced an offtake agreement with US firm Nexus Circular, to secure the output from a newly constructed pyrolysis unit in Dallas, Texas with 26,000t/yr input capacity of waste plastics. While there was no firm start date, Nexus Circular told *Argus* that the facility would start on a near-term accelerated basis.

Nexus Circular and Brazil-based Braskem announced a similar partnership last month with a recycled polypropylene facility under construction near Chicago.

And Dow announced that it had invested in Valoregen, which is building a hybrid mechanical/chemical recycling plant in Damazen, France. As a result, Dow will be the main off-taker of post-consumer recycled resins from the site, which it will use to develop new recycled plastic products.

The combination of mechanical and chemical recycling at the site will give a waste-to-recyclate yield of around 80pc, compared with an average of 60-70pc for post-consumer recycling in Europe, Dow said. The site may be scaled up to 70,000t/yr input capacity, the firm said, although it is expected to have an initial production capacity of 28,000t/yr when it comes online in the first quarter of next year. The plant will be the largest hybrid recycler in Europe.

NEWS AND ANALYSIS

The three agreements are intended to contribute towards Dow's target to incorporate 100,000t/yr of recycled plastics into its offerings in the EU by 2025.
By Will Collins and Zach Kluver

SK to enter Chinese depolymerization market

South Korean producer SK Chemicals plans to enter the Chinese depolymerization market in a partnership with Chinese green materials company Shuye Environment Technology.

The companies have signed an initial deal to set up a joint venture to build a 200,000 t/yr chemical recycling plant at Shantou in south China's Guangdong province. The plant is expected to produce 100,000 t/yr of recycled Bis(2-Hydroxyethyl) terephthalate (BHET), as well as chemically recycled polyethylene terephthalate (PET) and co-polyester. It will have a processing capacity of 200,000 t/yr of raw materials.

The firms aim to sign a main contract by this year, start construction early next year and start production as early as the end of 2024.

SK Chemicals will hold a 51pc stake in the joint venture. Shuye will provide the plant construction site, which is next to an existing depolymerization plant.

SK Chemicals last year acquired a 10pc stake in Shuye through investing 23bn won ($17.5mn). It also secured an offtake agreement to purchase 20,000t of chemically recycled plastics from Shuye.

The South Korean company is also considering investing in domestic "green" facilities to produce 50,000t of such materials in 2025.

Sister company SK Geo Centric announced last year that it has signed an initial deal to build a W600bn depolymerization plant in Ulsan, South Korea.
By Jorlyne Ong

Sustainable feedstocks

Ineos Oxides launches bio-attributed EO

Ineos Oxides, a subsidiary of UK-based petrochemicals firm Ineos, has announced the launch of ethylene oxide (EO), which is attributed to contain 100pc bio-based feedstock by a mass-balance accounting process.

Mass balance accounting is a way to trace the flow of materials through the production chain, ensuring that the volume of product attributed as bio-based matches the bio-feedstock volume used, even where bio and fossil-based feedstocks are combined. Ineos' new bio-attributed EO is certified by two independent bodies, the Roundtable on Sustainable Biofuels (RSB) and ISCC+, on this basis.

Ineos signed an agreement with Finnish firm UPM in 2020 to supply a bio-based naphtha substitute to its steam cracker in Cologne, Germany, and has announced a range of bio-attributed olefins and polymers from the same site. Cologne is also one of its European EO production sites.

Another Ineos subsidiary, Ineos Phenol, also recently launched a bio-attributed product range, including phenol, acetone and alphamethylstyrene (AMS). At the time, the firm told *Argus* that "bio feedstocks are currently available in limited quantities" compared with fossil-based feedstocks, but production volumes would "gradually increase supported by demand and legislation on sustainable carbon cycles."

EO is a precursor for intermediates such as glycols, ethanolamines, glycol ethers and ethoxylates, which Ineos Oxides also manufactures. The company said that the new product contributes towards its target of achieving carbon neutrality by 2050.
By Will Collins

LG Chem to ship bio-based phenol, acetone

South Korean petrochemical producer LG Chem will ship its first bio-based phenol and acetone to the Asian factories of a German renewable polymer producer.

LG Chem will export 4,000t of phenol and 1,200t of acetone from its Daesan plant to the Chinese and Thai factories of the unidentified German producer, for polycarbonate production.

The phenol and acetone are produced from bio-feedstock such as waste cooking oil and biomass. The products are certified under the International Sustainability and Carbon Certification (ISCC) system and mark the highest volume of ISCC-certified products ever exported from South Korea, according to LG Chem.

LG Chem's Daesan plant has a phenol capacity of 300,000 t/yr, *Argus* data show.

The firm announced plans in 2020 to switch from fossil to renewable feedstock from Finnish refiner Neste by the second half of 2021 for the manufacturing of chemical products.
By Jorlyne Ong

NEWS IN BRIEF

Coca-Cola has announced plans to transition brands such as Sprite away from green PET to colourless material, in order to improve recyclability. Sprite has already been switched to clear bottles in Europe. The firm also announced that its US water brand Dasani would switch to 100pc rPET.

US packaging manufacturer **Berry Global** has partnered with coffee producer **Tchibo** and Finland's **Neste** to produce PP coffee capsules made from 70pc renewable raw materials, such as used cooking oil. And elsewhere in the world, Chinese beauty brand **onTop** is launching a facial cream package using **Eastman's** Cristal Renew polyester with 50pc chemically recycled content. In both cases, the materials were attributed as renewable by mass balance accounting.

Several polymer producers announced developments relating to mechanical recycling in the past fortnight. These included US firm **Dow Chemical** receiving recycled content and traceability certification from ANEOR for two polyethylene compounds, containing 30pc and 70pc mechanically-recycled material.

And **LyondellBasell** announced that it has joined **Nextloopp**, a consortium focused on the development of tracer-based sorting of PP food packaging to allow the development of food-grade mechanically-recycled PP.

Meanwhile, **Ineos**, which became a **Nextloopp** member in January, has joined up with **HolyGrail 2.0**, a digital watermarks initiative driven by the AIM European Brands Association. An Ineos spokesperson told *Argus* that the HolyGrail 2.0 and Nextloopp initiatives "operate in different spaces".

"HolyGrail 2.0 can be applied to all kinds of packaging, enabling high accuracy in sorting even if the packaging is broken into pieces, which improves the efficiency and quality of the sorting, [while Nextloopp] focuses on improving the complete recycling process to create a circular economy specifically for food-grade recycled PP", they said.

In Asia, two influential participants in the plastic industry have made moves into sustainability. South Korea's **SKGC** has signed an initial agreement with waste management firm **Veolia** to expand chemical recycling as a solution for hard-to-recycle plastic waste. The companies plan to build on SKGC's existing plans to create a recycling cluster in Ulsan, and expand into neighbouring markets. And Singapore-based investment firm **GIC** has announced plans to open a dedicated sustainability office, which will "push to integrate sustainability into all investment and corporate processes".

In the UK, supermarket **Morrisons** announced the opening of a "lower environmental impact store", stocking 366 products in loose containers to reduce plastic packaging.

And last week's record-high UK temperatures led waste management firm **Divert.co.uk** to rent out its wheelie bins to would-be bathers looking to stay cool. Spokesperson Mark Hall said that the sterilised bins meant that customers would not have to worry about "bin juice and banana skins". "And with [bins] from £10 a week... you won't be shivering at our prices!"

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