S&P Global
Commodity Insights

Bio-Chemicals 2025

An evolving sustainability stream

2025

Credits

Contributors: Daniel Pelosi, Dias Kazym, Barbara Fernandez-pita, Geraint Moody, Mujidah Yahaya, Alex Fiedosiuk, Jiryes Haddadin, Iris Poon, Finlay O'Riordan, Chichi Ubani, Kayley Mills, Heng Hui

Editors: Benjamin Morse and Bill Montgomery

Design: CI Content Design

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Foreword

Sustainability remains a critical component of the current and forward-looking petrochemicals and plastics markets' attention. As global efforts move forward to reduce the environmental impact of a fossil-based economy, governments and public discourse are seeking a way to transition to a more sustainable, carbon-neutral future.

Within petrochemical and polymer industries, one path toward broader environmental and energy transition goals is the use of biomaterials, which hold the same or similar properties as fossil-based products while addressing environmental concerns.

Since Platts last published a special report on the bio-chemical and polymer industry in 2021, interest in bio-chemicals and polymers has grown, with stakeholders commonly citing the segment as a critical component of industry sustainability targets.

Despite the interest, bio-commoditization in the industry has been hampered by strong pricing premiums, limited scale, broader geopolitical and supply/demand pressures that have impacted its adoption in the first half of the decade.

As a result, biochemical markets sit at a crossroads in the current landscape, constrained to small trading volumes and relegated to a small portion of overall market activity. But the sector has not given up and is looking to situate itself in the future of a circular, cleaner global marketplace and to become a major contributor to the development of sustainable industrial practices.

The following report from S&P Global Commodity Insights offers in-depth insight into this sector. It covers the development of bio-chemical industries across the value chain – from feedstock bionaphtha and LPG markets down to derivative polymer applications – alongside comprehensive details of the current state of the industry and its outlook for the rest of the decade.

Bio-feedstocks

Bionaphtha, biopropane can provide building blocks for the biochemical industry

- **Spot values fall since Platts assessments launch in 2023**
- **Strong premiums over fossil hamper demand from petrochemical sector**
- **Regulatory support required to facilitate demand**

Bionaphtha and biopropane are produced from renewable feedstocks such as plant and vegetable waste. They are chemically similar to their fossil-based counterparts, enabling their use in the traditional petrochemical industry to create biochemical products.

Reflecting the growing use of these products and market participants' interest in greater price transparency, Platts, part of S&P Global Commodity Insights, launched FCA NWE biopropane and FOB NWE bionaphtha price assessments in February and September 2023, respectively.

Bionaphtha remains a premium product

Bionaphtha is typically produced as a byproduct from second-generation hydrotreated vegetable oil biorefineries, where hydrogen is used as a feedstock to refine waste oil streams to produce renewable distillates or sustainable aviation fuel as the main products.

Among the several methods used to produce renewable diesel and SAF, the most common is through the hydroprocessed esters fatty acids (HEFA) pathway. The bionaphtha yield in a HEFA plant tends to be 2%-15% and varies with feedstock, operating mode, technology provider and hydrogen supply.

Bionaphtha can be used as a petrochemical steam cracker feedstock to produce sustainable chemical products and as a transport fuel blending component, with an expected lower carbon footprint than fossil material.

Platts bionaphtha assessments, published as an outright price and differential to fossil naphtha, reflect open specification material with a minimum 65% paraffin content produced from non-palm-based feedstock.

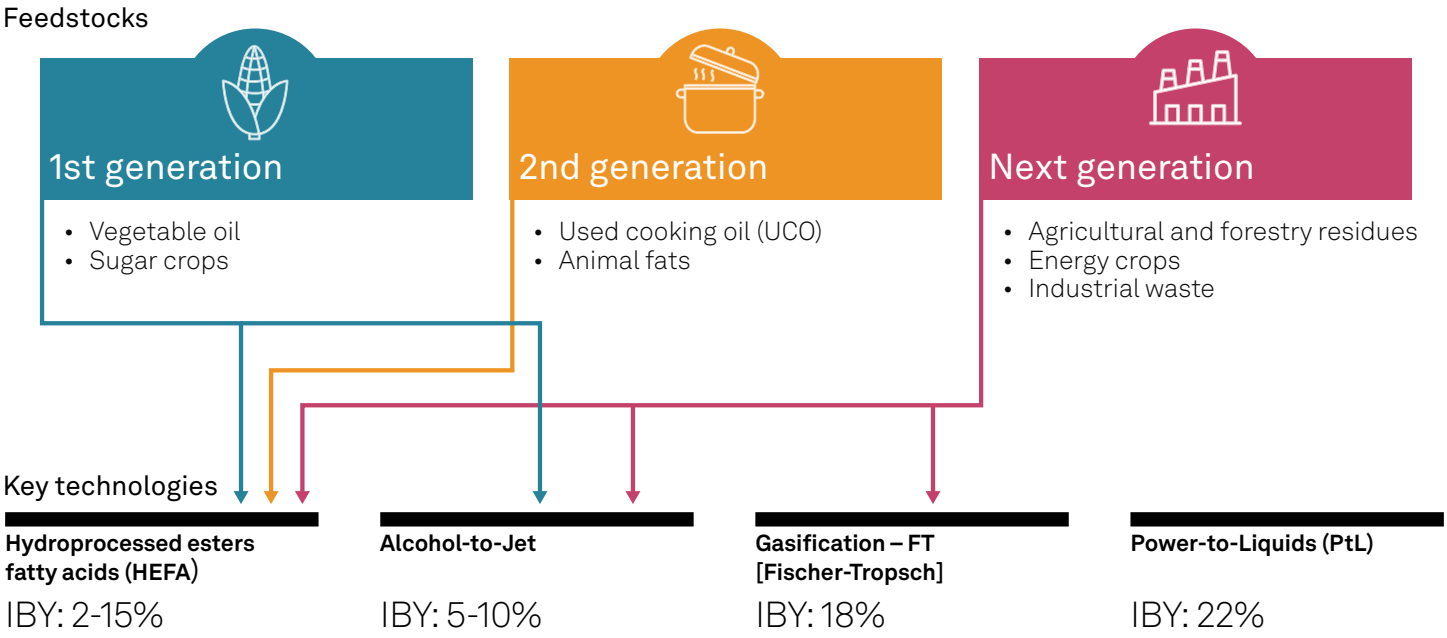
The premium of Platts FOB NWE bionaphtha to Platts CIF NWE naphtha benchmark averaged $1,300-$1,400/mt during the first three months of the assessment, subsequently narrowing slightly and reaching $800-$900/mt range in H2 2025. In July 2025, the premium of NWE bionaphtha over CIF NWE naphtha averaged $850/mt, with an average outright level of $1,403.51/mt for FOB NWE bionaphtha.

The reduced premiums have been partly due to increased supply following higher renewable diesel and SAF production, driven by strong biofuel mandates in Europe. The current global supply capacity of bionaphtha is 750,000 mt/year to 1 million mt/year, S&P Global Commodity Insights analysts estimated. The analysts forecast supply growth could reach 12 million mt/year by 2050, as investments in SAF production proceed due to the aviation sector's strong carbon neutral mandates and no scalable alternative for decarbonizing jet fuel.

However, due to the high cost of HVO and SAF, bionaphtha is expected to remain a premium product compared to its conventional alternative. Market participants consistently reference a rule of thumb where the bionaphtha spot price will be three times that of fossil naphtha.

Bionaphtha production flow

Bionaphtha is a side product of SAF (Sustainable Aviation Fuel) and RD (Renewable Diesel) which can be produced using a number of pathways. The most common currently is the HEFA pathway.



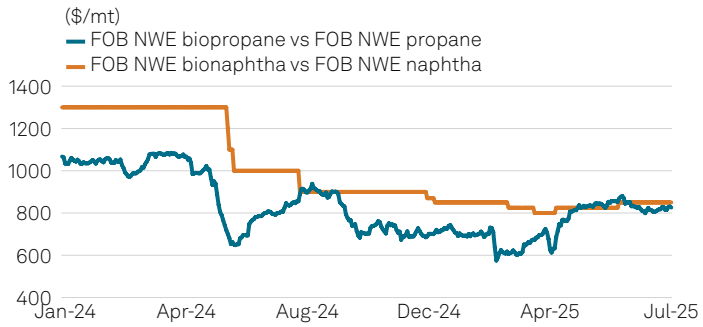
IBY: Increasing bionaphtha yield (indicative)

Source: S&P Global Commodity Insights

Volatility in supply and high costs of bio-refinery feedstocks, including HEFA-pathway, are significant drivers of bionaphtha costs. The average of Platts FOB ARA Used Cooking Oil (UCO) prices over July 2025 was $1,206/mt. UCO prices rose considerably in late autumn 2024 on the back of supply disruptions in Asia and have remained at relatively elevated levels. For comparison with crude oil as a fossil feedstock, the average of Platts Dated Brent prices over July 2025 was at $539.37/mt, which explains considerable premiums bio-based products have over their fossil counterparts.

Despite increased supply from biofuels expansions, bionaphtha's high premium over fossil naphtha is a hindrance to demand from petrochemical companies, especially in the absence of regulatory mandates on bionaphtha usage. As the petrochemical industry grapples with affordability, oversupply and demand concerns, even via the use of lower cost fossil feedstocks, the use of non-competitive bionaphtha in its supply chains remains entirely dependent on voluntary actions from stakeholders.

Bio-feedstock premiums cement lack of comeptitiveness across downstream chemical value chains



Source: S&P Global Commodity Insights

Bio-LPG use in chemical production depends on regulatory support

Bio-LPG, another byproduct of biofuel production and chemical feedstock streams, also continues to see strong premiums over its fossil equivalent. Platts assessed biopropane at $1,347.75/mt July 31, an $895/mt premium to CIF NWE propane large cargoes. Since the launch of the price assessment, the highest outright level for Platts FCA NWE biopropane was reached at $2,785.75/mt on Aug. 10, 2023, a $2,254/mt premium to CIF NWE propane large cargoes, on the back of strength in bio-based feedstock prices.

Sectors seeing the most demand for bio-LPG have been cosmetics and residential heating in winter, which have been able to absorb pricing premiums and pass on most of the costs to customers where demand is more inelastic than in other markets. There has also been occasional interest from the petrochemical sector, but slim profit margins in the segment have limited demand for biopropane.

An important factor weighing on bio-LPG fundamentals has been the complicated legislative landscape, with market players feeling exposed to limited voluntary frameworks. Demand for biopropane appears split between the ISCC EU and ISCC plus certifications, which have geographical and product variations. ISCC EU mainly focuses on biofuels and bioenergy within the EU, while ISCC plus also looks at a wider range of bio-based products, not limited to the EU. The range and complexity around ISCC certifications mean that some buyers take more stringent views on what biopropane feedstocks should be, hindering overall growth. For instance, there could be questions on what type of used cooking oil is used, such as rapeseed or palm oil.

“Volatility in supply and high costs of bio-refinery feedstocks, including HEFA-pathway, are significant drivers of bionaphtha costs.”

The introduction of participation mandates into the voluntary bio-LPG market will be essential to boost demand. The EU’s circular economy ambitions could be decisive in promoting the use of bio-LPG in the medium and long term. Until regulators take action to incentivize the use of bio-LPG, the high costs associated with it will keep demand for the bio-based liquid tepid at best.

Bio-olefins & bio-aromatics

Commoditization slowed by weak industry demand

- **High prices hinder bio-ethylene use**
- **Infrequent bio-propylene derivative trades**
- **Bio-butadiene constrained to narrow application pool**

Bio-ethylene

Bio-ethylene is a sustainable version of conventional ethylene, produced from renewable biological resources such as plant materials, rather than from fossil fuels. The production of bio-ethylene typically involves the fermentation of biomass to produce ethanol, which is then dehydrated to yield ethylene or through bionaphtha cracking.

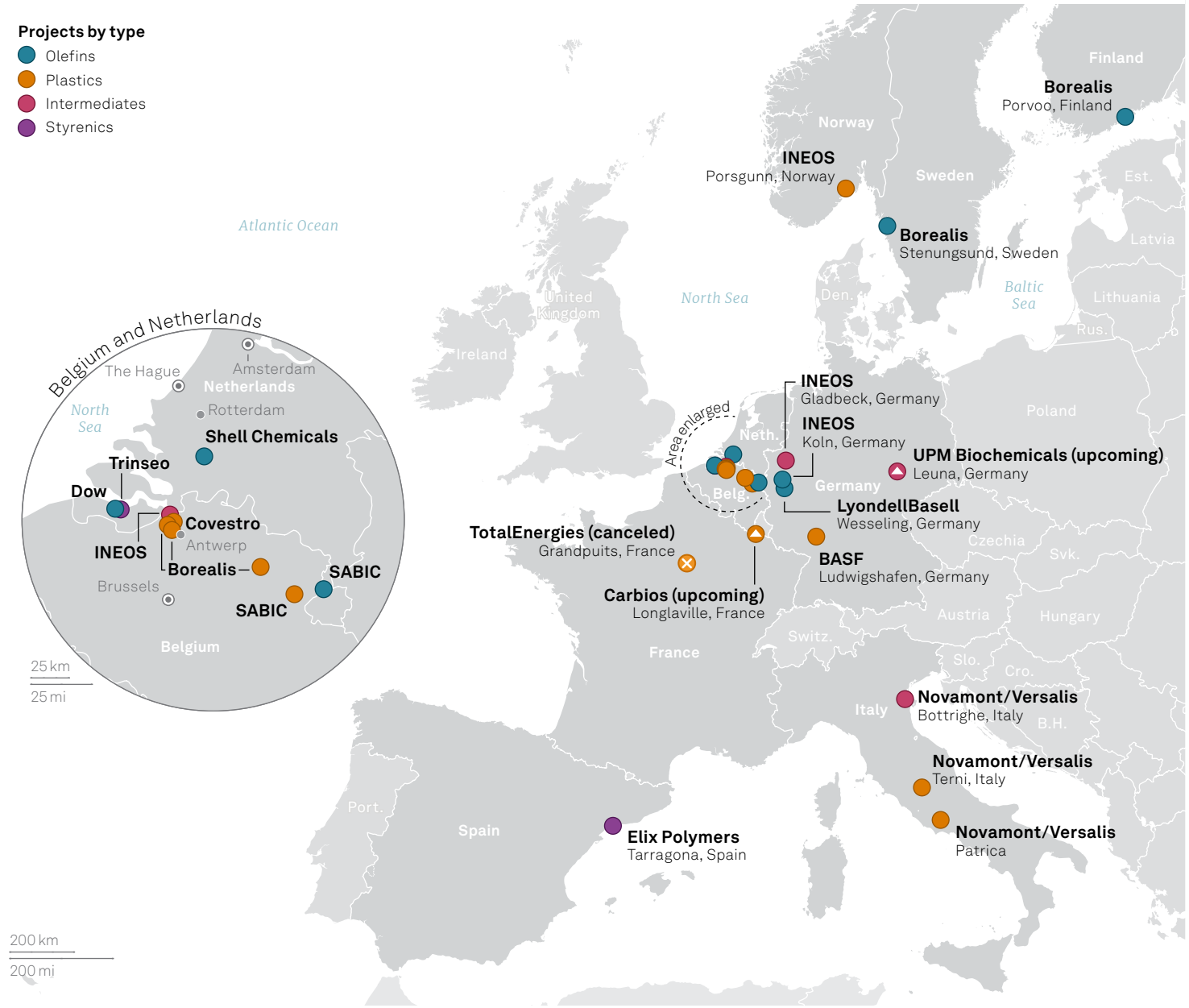
With ethylene a key building block in the production of various chemicals and plastics, consumer interest in bio-market status and availability has been a consistent, albeit relatively nascent, underlying trend.

Some domestic European producers have developed positions and offerings of bio-ethylene to consumers but have been met with limited and decreasing transactional discussions for the material. This waning interest has primarily been provoked by a lack of affordability due to significant premiums over fossil-based material. Furthermore, the changing supply landscape of European chemical markets and uncertain sentiment from volatile geopolitical trends has diverted market players' attention away from sustainability.

"On the demand side, there is very little interest, as [bio-ethylene] always comes at a premium," a producer, who could not be named by Platts due to agreed source anonymity, said.

"At this time, it is only specific products, such as fancy phones, running shoes that want to be fully circular, who have demand for this, but they are small volumes. For big bulk applications, there is no demand."

Major European bio-chemical projects



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Source: S&P Global Commodity Insights, company information

Bio-propylene

Bio-propylene faces similar headwinds due to its lack of price competitiveness.

Bio-propylene can be produced through the dehydrogenization of biopropane or the cracking of bionaphtha. Amid ongoing sustainability commitments, chemical producers have continued to develop bio-propylene production capacities through PDH and steam cracking technologies. Also, though not yet commercially established, bio-propylene can be derived from sugarcane or corn-based ethanol.

Because of the weak market conditions, demand for bio-propylene and its primary derivative, bio-polypropylene, has been restricted to high-margin plastic goods, such as children's toys. There

has been a drive in these high-end sectors for the use of more sustainable materials, with manufacturers able to absorb some of the additional costs of the bio-plastics when sustainability can be utilized as a marketing strategy in the sale of end-use goods.

Yet, these derivative players represent a small segment of the overall downstream landscape, and traded volumes of bio-polypropylene derivatives remain negligible. Orders for the material are often limited to small quantities of 5-100 mt, according to one bio-propylene producer. At the same time, bio-propylene pricing indications are consistently heard at up to two to three times the price of fossil-fuel based material.

Bio-butadiene

Bio-butadiene is technically proven but commercially elusive. Most European producers have adopted a drop-in approach via processing bionaphtha and accounting it via an ISCC PLUS credit transfer along the value chain, but some also decided to experiment with more unorthodox routes using bio-ethanol as feedstock. Yet the high cost of renewable feedstocks and the limited scale of existing units leave production costs far above the fossil benchmark.

Supply is limited to proof-of-concept output. Michelin, IFPEN and Axens switched on their BioButterfly demonstrator in Bassens, France, in January 2024 with a stated capacity of 20-30 mt/year. Beyond that, two of Evonik's C4 complexes now hold ISCC PLUS mass-balance certificates covering both MTBE and butadiene, evidence that the paperwork is ready even if commercial volumes are not. On the demand side, Synthomer has announced ISCC PLUS accreditation across eight plants, positioning itself to claim renewable content once bio-butadiene becomes available.

But again, demand has been impacted by cost—spot FD NWE bio-butadiene prices are consistently quoted at Eur1,800-2,100/mt in July, a large premium to fossil butadiene which averaged at Eur847.83/mt FD NWE across the month. As a result, use is restricted to niche downstream uses. New regulations could shift the picture. A European Commission draft implementing act published July 14 proposes formalizing mass-balance accounting for bio-based and chemically recycled feedstocks at crackers. Clearer rules would lower administration costs and could pave the way for recycled- or bio-content quotas in upcoming packaging law revisions.

However, until then, market players expect bio-butadiene to remain more of a buzzword rather than a bulk commodity.

"Amid an uneasy balance of affordability issues and aims to maintain sustainability objectives, a mass balanced approach has become more prevalent."

Chemical aromatic markets continue to see little demand for bio-based and related products due to cost, leading to broadly pessimistic views from stakeholders on the longer-term viability of such material.

High bio-costs across aromatic markets

High costs have slowed bio-aromatic commoditization to even lower levels than bio-olefin markets, with only small volumes trading in an opportunistic spot environment.

Platts has consistently been quoted spot pricing levels at a minimum of double the price of fossil-based product for bio-benzene and styrene, with outright premiums indicated at a minimum of $1,000/mt.

For reference, Platts M1 spot benzene spot price assessment averaged at $769.70/mt CIF ARA across H1 2025, and the spot styrene price averaged $1,219/mt FOB ARA over the same period. To pay double those prices for bio-material was simply too much for buyers.

Similar trends are present in the MTBE toluene, and xylene markets, where trading for bio-based materials also remains fringe and constrained to small volumes.

The exception remains the ETBE market, where its ethanol feedstock allows the product to be utilized in meeting biofuel mandates. Nonetheless, chemical derivative demand for bio-ETBE remains weak, like the illiquidity across the wider bio-based aromatics space.

While stakeholders acknowledge the critical need for improved circularity and sustainable practices in their operations as a marketing tool for final products for a variety of big end-user brand owners, stakeholders remain in agreement that any substantial increase in the use of such materials remains unattainable in the current environment.

Bioplastics

Ongoing projects, scaling struggles to mitigate structural demand weakness

- **Strength in premiums to virgin continues to clip demand**
- **Medical-to-brand owner applications see stronger levels of bio-consumption**
- **EU calls for assessment on need for bio-based legislative requirements**

The modern bioplastics industry began to emerge in the 1990s with the commercial production of polylactic acid. In 2025, the global bioplastics market is estimated to represent a 0.7% share of the plastic market, compared to 8.6% for post-consumer recycled (PCR) grades and 0.1% share for chemically recycled grades, according to Plastics Europe.

Initially driven by environmental concerns, the bioplastics sector is now attracting interest from the wider chemical industry, as major petrochemical producers explore innovative methods to replace fossil-based feedstock with bio-based raw materials.

This shift is being facilitated through a mass balancing mechanism that attributes bio-content through credit transfers, but the key question remains: Can this approach inject new demand in high-cost regions like Europe

What are bioplastics?

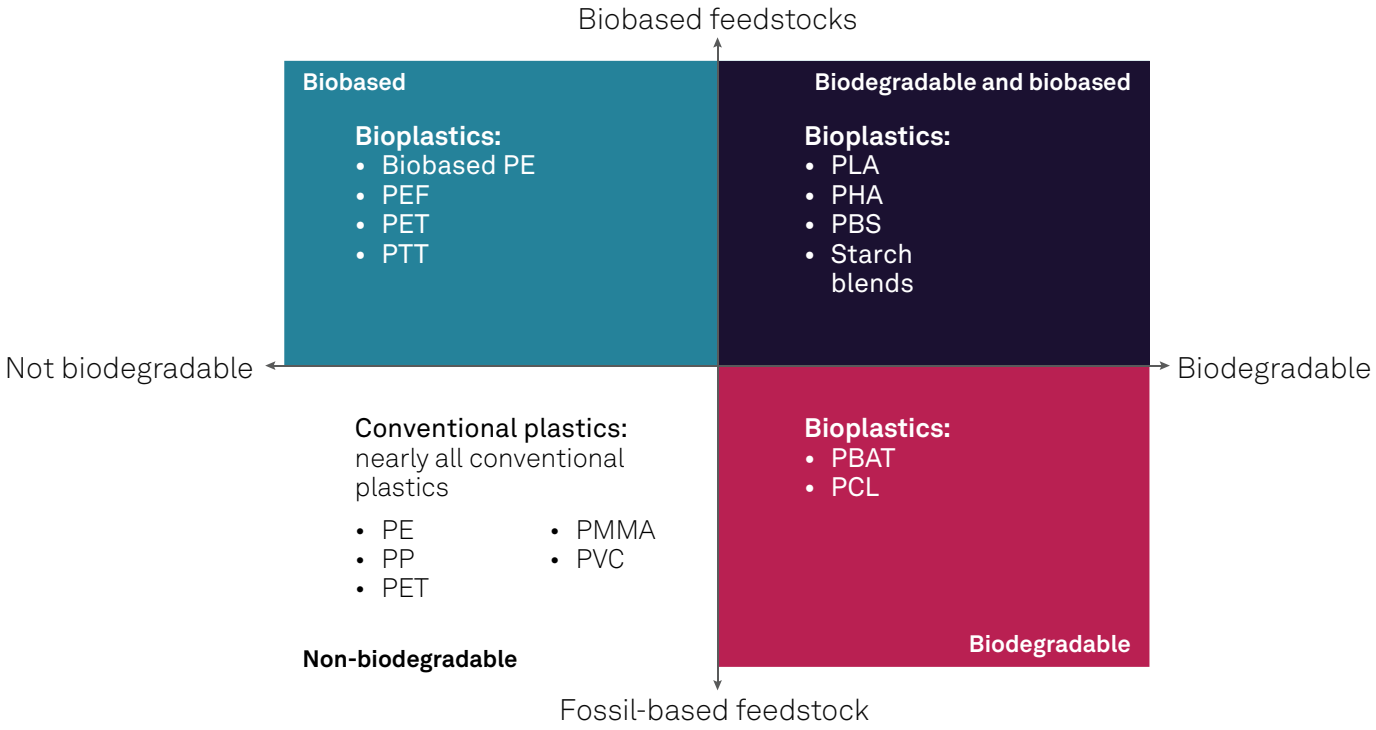
Bioplastics currently hold less than a 1% share of the 414 million mt/year global plastics market, according to trade association European Bioplastics.

European Bioplastics classifies bioplastics into three categories – biobased, biodegradable, and those which are both biobased and biodegradable.

Despite the diverse range of biopolymers, substantial trading is typically limited to a few key product groups – polylactic acid, bio-PET and bionaphtha-based polymers.

Material coordinate system for bioplastics

Bioplastics are classified by biodegradability and feedstock origin. Biodegradability indicates a material's ability to break down naturally. Recognizing these differences is essential as demand for eco-friendly alternatives increases.



Source: Institute for Bioplastics and Biocomposites (IBB) and European Bioplastics (EUBP)

Polylactic Acid

PLA is derived from renewable resources like corn starch and sugarcane. It is widely used in applications including food packaging, fabric production, 3D printing, and medical nonwovens. PLA is produced through the fermentation of sugar and purification of lactic acid, which is then polymerized.

PLA can be biodegradable under specific circumstances. In recent years, recycling initiatives of this nature have been piloted in East Asia

Major producers of PLA include NatureWorks and Total Corbion, which together account for over 50% of global capacity. NatureWorks operates a 150,000 mt/year facility in Blair, Nebraska, while Total Corbion runs a 75,000 mt/year plant in Rayong, Thailand.

NatureWorks is also planning a new 75,000 mt/year facility in Nakhon Sawan, Thailand, with operations expected to begin in 2025. Conversely, Total Corbion shelved plans for a second large-scale PLA plant in Grandpuits, France back in 2023, due to a review of its investment case.

Bio-PET

Bio-PET is a version of PET that incorporates biofeedstock in its production and is primarily used for beverage bottle and fabric production. It is estimated to be the most used bio-based polymer according to Bioplastic Feedstock Alliance due to its wide usage in rigid packaging applications.

Bio-PET's sustainable feedstock stream is primarily derived from monoethylene glycol. Major bio-MEG producers include UPM, India Glycol and Avantium.

The other PET feedstock, purified terephthalic acid, derived from paraxylene, is developing its bio—equivalent through a partnership with beverage brand Coca-Cola, and Virent, a bio-chemical company. While Virent's technology has been made readily available, commercializing the technology at a feasible cost has proven to be a major hurdle, echoing broader limitations of commoditization across the bio-chemical industry.

Coca-Cola has already developed a 100% plant-based plastic bottle prototype, with plans to explore scalability of a 100% bio-based PET resin and bottle (excluding bottle-caps and labels), according to its 2022 sustainability report.

The development of bionaphtha-based polymers brought new interest in bio-PET in 2024 particularly from Asian markets. In July 2024, Japanese brandowner Suntory announced plans to produce sustainable PET bottles using bio-PTA derived from bionaphtha, in partnership with ENEOS, Neste and Mitsubishi.

Elsewhere, Indorama Ventures launched the first commercially available bio-PET bottle Oct. 31, 2024. The material will be made from ISCC+ certified bio-paraxylene, from used cooking oil derived bionaphtha.

Bioplastics currently hold less than

1% share

of the global plastics market

Bionaphtha-based polymer

Bionaphtha, the by-product of sustainable aviation fuel production, has garnered market attention in the past five years due to its potential to incorporate bio-content in polymer production with relative ease and flexibility.

Consumer interest in this bio-based material has been consistent, stemming from increased sustainability practices in company operations that are fueling the innovation and development of bio-polymer projects. For example, bio-ABS has garnered increased interest in Europe, particularly from toy and medical appliance manufacturers. In March 2025, Spanish producer Elix Polymers announced the development of bio-ABS, produced using bio-acrylonitrile, bio-butadiene, and bio-styrene from bio-circular feedstocks.

An evolving value chain, and a burgeoning legislative scene

Despite the growing interest in sustainable materials, many customers remain hesitant due to their lack of affordability. Toy manufacturers are generally more willing to absorb these bio-costs, but automotive customers often prefer mechanically recycled materials, which are less expensive.

This is a trend echoed by players across different polymer groups, particularly amid a weak global market underscored by weakness in key polymer end-user industries like automotive and construction. Consumers cannot afford to commit to a less advantageous pricing position.

Higher costs have been a roadblock to wider adoption, but demand and consumption are steadily climbing, driven by greater concern for the environment from consumers and sustainability goals from corporations. To support wider adoption along the value chain, legislation has also made progress.

The European Union had provisionally agreed on the terms of the Packaging and Packaging Waste Regulation on March 6, 2024, which looks to encourage the use of sustainable materials in packaging. In light of a push for bioplastics adoption, “the agreement also calls on the Commission to assess, three years following the entry into force of the regulation, the state of technological development of bio-based plastic packaging and, on the basis of that assessment, to lay down sustainability requirements for bio-based content in plastic packaging.”

However, in Europe in 2025 so far, chemical producers and policymakers have prioritized discussions on chemical recycling and the methodology of recycled content, while legislative progress about bioplastics has taken a backseat.

Interview – Braskem

Positives to draw in outlook despite sector hurdles

Despite the continued challenges, stakeholders remain optimistic on the state of the industry and the measures required to ensure long-term growth.

Platts interviewed Roger Marchioni, global commercial director of biopolymers at Brazil's multinational polymer producer Braskem, on the current state of play for biopolymer market players, regional divergences, and the sector's outlook for the second half of the decade.

Braskem produces bio-based polyethylene and ethylene-vinyl-acetate derived from bioethanol, which act as drop-in polymers for conventional fossil-based materials. Its bioethanol is derived from sugarcane, a feedstock chosen for its effectiveness in CO2 capture, and plentiful supply in Brazil.

Market conditions

Marchioni was upbeat on current bio-polymer market conditions and demand. While he sees a "hangover" in demand, slowing from the spike in growth during the pandemic, the company continues to see appetite for its bio-based products, even with demand currently limited to voluntary procurement.

"It's important to note that the main demand for bioproducts has been entirely voluntary"

— Roger Marchioni,
Braskem global commercial director of biopolymers

Corroborating wider market sentiment regarding the strongest end-user markets for bio-based consumption, Braskem sees a particularly strong pull for material from cosmetic, packaging, and food packaging sectors but Marchioni noted slow but steady growth in all sectors worldwide.

Machioni also pointed to a stronger appeal from consumers wanting bio-based materials rather than other sustainable products. For instance, post-consumer derived mechanically recycled material has negatives such as ceilings on the usage of the material due to quality concerns, inconsistent supply, and less flexibility in contributing to CO2 emission targets.

"Although post-consumer recycled materials address plastic waste problems, bio-based ones address a broader circular economy concept," he said.

Marchioni also played down the challenges of pricing premiums, emphasizing the differences between the two streams.

"This is not the way that you should address this point ... because the cost of the whole supply chain is very different," Marchioni said. "The dynamics are very different ... you cannot make a direct correlation between the price of the conventional plastic with the bio ... a better comparison is against other sustainable solutions."

Transparency required

Regardless of the steady growth in demand, Braskem stresses the need for legislative and accounting transparency to ensure further growth for bioplastics markets.

“It’s important to note that the main demand for bioproducts has been entirely voluntary ... We don’t have any specific regulation that mandates their use,” Marchioni said.

Marchioni highlighted a complex legal environment in which concerns surrounding plastic waste management, carbon circularity and sustainable practice are mixed and impede the progress of specific legislation for specific products. He called for a more harmonized approach to bio-plastic mandates, which set clear criteria for adoption, comparing them to the biofuels industry, where regulation is “much more straightforward.”

On mass balancing, he stressed the need for a consistent and transparent approach to such accounting methods to ensure a reliable process and standard that would facilitate growth.

“As a company we understand that the mass balance concept should have a role in this position as the more we can include biomass in our supply chain the better,” Marchioni said. “... It’s all about transparency, very strict audits and certification, such as ISCC Plus. We need to have a very bulletproof system to guarantee the traceability of feedstock which is used in the balance,” Marchioni said

Divergence between regions

Looking at the global industry, Marchioni sees “different levels of maturity” across Europe, Asia and the Americas with regard to Braskem’s approach to bioplastic markets and scale.

Stronger development of conversations surrounding sustainability in the European market was noted to have materialized from Japan, where sustainability discourse is more focused around carbon capture and emissions reduction, lending its local market more strongly to bio-products than recycled materials.

Subsequently, in Asia, Braskem sees growth from South Korean, Thai and Singaporean players in increasing their use of biomaterials.

Our ambition is clear:

to scale our bio-based polymer production

1 million tons

annually by 2030

Further divergence is exemplified in the American market, where a more politically driven environment is noted where adoption varies greatly from state to state.

Despite varied regional development, the company emphasizes the importance of a globalized approach to bio-production to allow for the sector’s growth, seeing this as a necessity in a volatile international trade environment.

“It is important to mention it is becoming more and more important due to the current trade war... for us to not just concentrate on Brazilian production but also develop projects elsewhere to deal with local demands and be prepared to supply in different directions,” Marchioni said.

Sustainability need offers hope for outlook

Looking forward, Marchioni offered an optimistic view on the outlook for bio-based adoption across global market in the second half of the decade.

He highlighted growing pressure to decrease carbon emissions and a pivot toward sustainable practice as concerns surrounding climate change become more of a factor in the strategies of key brand owners and consumers, “the clock is ticking so more and more companies need to adapt and use sustainable solutions.”

“In the next five years, I think it is a bright moment for bio-based materials, even with the challenges we face today regarding costs and inflation. I think that companies and society cannot deny the trend and need for these products. Our ambition is clear: to scale our bio-based polymer production to 1 million tons annually by 2030,” Marchioni said.

Competing Sustainability Streams

A race between pyrolysis oil, bionaphtha and mechanical recycling

As the global community grapples with the escalating crisis of plastic waste, the need for sustainable feedstock solutions in the chemical industry has never been more urgent.

Among the most promising options are pyrolysis oil derived from chemical recycling, bionaphtha as a by-product from sustainable aviation fuel production, and post-consumer mechanical recycling grades.

Each of these feedstock streams presents unique advantages and challenges that can shape the future of sustainable chemical production.

Wider acceptance from downstream applications slow to come for bionaphtha within its role as a crucial player in the transition to sustainable chemicals, growth in bionaphtha production is primarily as a by-product of sustainable aviation fuel's production growth.

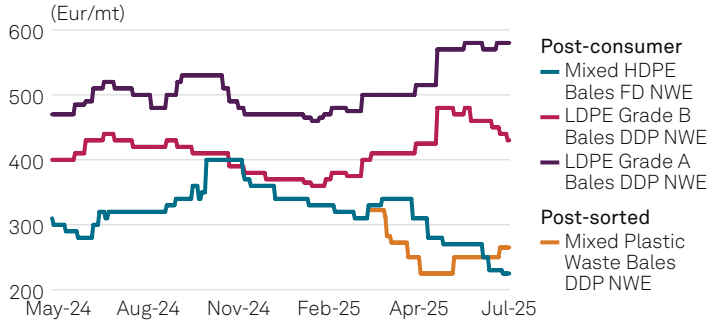
Petrochemical producers see merits in its compatibility with existing petrochemical processes, which makes it an attractive option for players looking to reduce their carbon footprint without substantial capital investment.

Currently, bionaphtha yields represent 2%-7% of total biofuels output in typical biorefineries. It serves dual purposes - as a feedstock for petrochemical producers and as a gasoline-blending component. The market for bionaphtha is still developing, but recent assessments indicate a growing interest, particularly in Europe, where stricter mandates for renewable content are expected to drive demand.

Bionaphtha, similar to pyrolysis oil, could be used as a drop-in solution in traditional steam cracking processes.

In addition to bionaphtha, biopropane could be also regarded as a chemical feedstock although it is currently used more from fuel sectors

Platts European plastic recycling feedstock prices diverge



Source: S&P Global Commodity Insights

Pyrolysis oil from chemical recycling

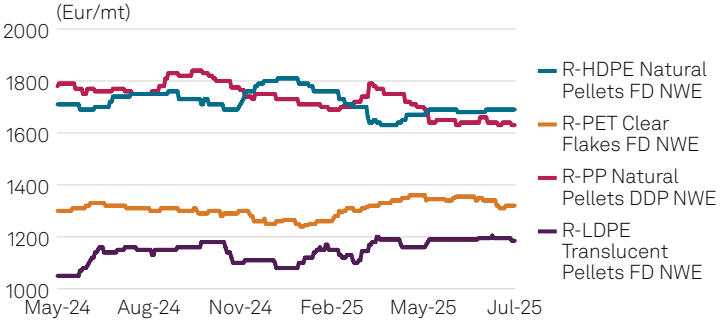
Pyrolysis oil is produced through the thermal decomposition of mixed plastic waste in an oxygen-free environment, typically at temperatures ranging from 300°C to 900°C.

This innovative solution allows for the conversion of film and flexible plastics that were hard to sort for recycling purposes into naphtha-like oil. It can then be upgraded and processed for steam crackers to be used in chemical production.

In Europe, significant advancements in chemical recycling are being made, supported by robust policy frameworks. The Packaging and Packaging Waste Regulation is the overarching upcoming regulation that stipulates by 2030, at least 10% content of contact-sensitive packaging materials are required to come from recycled streams. For now, PET is the only polymer widely recycled back into food-grade material. Mechanically recycled plastics such as PE and PP may pose contamination risks, and as a result there's a drive to develop chemically recycled streams for non-PET plastics to support Europe's wider use of mechanical recycling.

The legislative push is still under development, as chemical recycling is mainly at a consultation stage with the European Commission. Despite its promise, the technology has drawn criticism in the past on several fronts.

European recycled pellets see mixed pricing trends YoY



Source: S&P Global Commodity Insights

Its high energy consumption and low yield were two key points raised by those against pyrolysis technology. Some players in the European mechanical recycling segment also see mass balancing systems as unequal to the rigorous qualification and auditing mechanisms that the mechanical recycling industry utilizes. Mechanical recyclers, they said, would also have to face yield loss in the recycling process, in contrast to another kind of mass balancing approach that assigns credits only to polymer production processes

Post-consumer mechanical recycling grades

Companies such as SABIC, in collaboration with Plastic Energy, are developing facilities capable of processing 20,000 mt/year of mixed plastic waste, while LyondellBasell is constructing a plant in Germany with a planned capacity of 50,000 mt/year. Such developments highlight the potential of pyrolysis oil as a viable feedstock for reducing plastic waste but compared to the size of the industry there's still a long way to go.

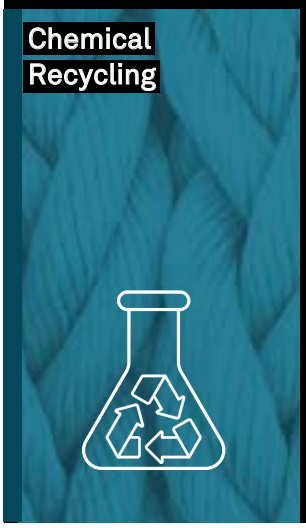
Mechanical recycling involves the physical processing of plastic waste into reusable materials, typically by waste managers sorting them into mono-material streams, and then recyclers re-grinding and re-pelletizing them.

The resulting products can vary in quality and consistency. The most valuable grade is often comparable to its fossil-based counterpart in physical appearance and chemical properties. In addition, carrying a post-consumer qualification is often a requirement by brand owners to comply with their voluntary commitments to sustainability.

For example, R-PET clear flakes and food grade pellets are commonly used in tray and bottle applications in Europe, Asia and America. R-HDPE natural and light pellets could be used to make detergent and sun cream bottles. R-PP natural pellets are often heard to be in limited supply and could be used for caps and closure applications.

Primary sustainable chemical and polymer methods

Chemical Recycling



Feedstock production route
- Pyrolysis of mixed plastic waste, tires
- Dissolution or depolymerisation for polystyrene
- Molecular recycling of PET

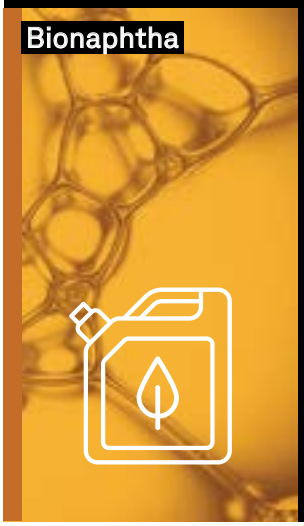
Strength
- Produces virgin-quality polymers for contact-sensitive packaging
- Achieves sustainable share through mass balancing
- Integrates as a drop-in solution in fossil-based production

Weaknesses: High cost relative to traditional materials, limited availability of feedstock, potential contamination issues

Suitable downstream applications: Food packaging, automotive

Primary sustainable chemical and polymer methods

Bionaphtha



Feedstock production route
- SAF production of a HEVA model, often regarded as a by-product for that process

Strength
- Produces virgin-quality bio-content polymers
- Achieves sustainable share through mass balancing
- Integrates as a drop-in solution in fossil-based production

Weaknesses: Lack of mandatory mandates from regulation at present

Suitable downstream applications: Toy, medical applications

Primary sustainable chemical and polymer methods

Post Consumer Mechanical Recycling

Feedstock production route
- Recycling plastic waste in a mechanical process typically involving sorting, shredding, extruding, and pelletising steps

Strength
- Established market with proven commercially viable applications
- Greater capacity than bio and chemically recycled alternatives

Weaknesses: Limited food grade applications outside of R-PET, amidst ongoing certification and regulatory approval processes for R-PE, R-PP, and R-PS

Suitable downstream applications: Consumer packaging, major brandowners

Interview – European Bioplastics

Ongoing projects, scaling struggles to mitigate structural demand weakness

In the biochemical and biopolymer industries, market participants continue to grapple with a sector with high growth potential but various hurdles that stand in the way of broader commoditization and scale.

Platts spoke to European Bioplastics (EUBP), an industry association which advocates for policies that promote the development and market adoption of bio-based, biodegradable, and compostable plastics and the necessary measures needed for growth and the key challenges they need to address.

European Bioplastics engages with EU institutions and acts as an information hub for policymakers, businesses and consumers. EUBP also supports research and innovation efforts contributing to EU projects by engaging with EU-funded research projects under Horizon 2020, Horizon Europe, BBI JU and the Circular Bio-based Europe JU. These programs have collectively mobilized more than Eur 5.7 billion in support for biobased materials and bioplastics research and development.

Market state of play

EUBP sees the current European bioplastics industry as "characterized by dynamic growth and diversification," noting that while the sector sees increased scale and growth potential from broader pushes for sustainability from packaging to high-end electronic and automotive industries, the sector faces challenges including regulatory uncertainty, competition from fossil-based plastics, and higher production costs. Despite these challenges, there is ongoing expansion and innovation, with the association highlighting an expected increase in global production capacity from 2.47 million mt in 2024 to approximately 5.73 million mt by 2029.

They add that packaging remains the largest consuming sector, accounting for 45% (1.12 million mt) of global bioplastics consumption, driven by consumer preferences for eco-friendly products while noting particularly strong growth potential from consumer goods, textile and automotive applications.

Measures to increase competitiveness

EUBP acknowledged that for some products there may be a cost concern, noting that "without ... reforms, Europe risks losing ground to regions like the US and China, where proactive industrial policy is already accelerating bioplastics deployment.

"Legislative and regulatory support is a critical determinant for the success of the bioplastics industry, but current EU policy frameworks remain fragmented and inconsistent, often falling short of creating an enabling environment," EUPB said. "While there is growing high-level political recognition of the bioeconomy's potential, such as through the European Green Deal, the upcoming European Biotech Act in 2025, and the proposed Circular Economy Act, key structural barriers persist."

Consequently, the association highlights several measures for European stakeholders and regulatory bodies to undertake to ensure stronger competitiveness for bioplastic material, including:

- **Access to sustainable biomass:** Establishing fair economic conditions for all market players against non-European regions, ensuring that sustainable biomass is prioritized while balancing between bioenergy and biobased products.

- **Financial support for innovation:** Expansion of EU funding for research and innovation to improve production efficiency and reduce costs, particularly through programs like Horizon Europe and other EU financial instruments, in a policy making environment which reflects future growth to scale in the bioplastics industry.

- **Increasing market uptake:** The creation of a level playing field for bioplastics through market incentives, such as subsidies, to make them more attractive compared to conventional plastics.

- **Fair regulatory framework:** Harmonizing EU legislation to remove barriers hindering bioplastics, which currently offer a competitive advantage to other regions.

- **Mandating dedicated targets:** Ambitious targets, supported by robust sustainability criteria, should be set for the use of biobased and compostable plastics in key applications.

- **Increasing consumer awareness:** Promote the environmental benefits of bioplastics to consumers, facilitating stronger demand.

Broader European sustainability

Within the push for stronger competitiveness and increased industry scale, the European Bioplastics association stresses the importance of developing a complementary approach to sustainability in Europe across different production streams

Global production capacity is expected to increase to

5.73 million mt by 2029

"Achieving Europe's sustainability goals requires a combined strategy that includes organic, mechanical and advanced recycling alongside biobased alternatives to reduce reliance on fossil-based plastics," the association said. "This position is central to EUBP's advocacy ... Each recycling method offers unique advantages depending on the application, infrastructure, and material involved."

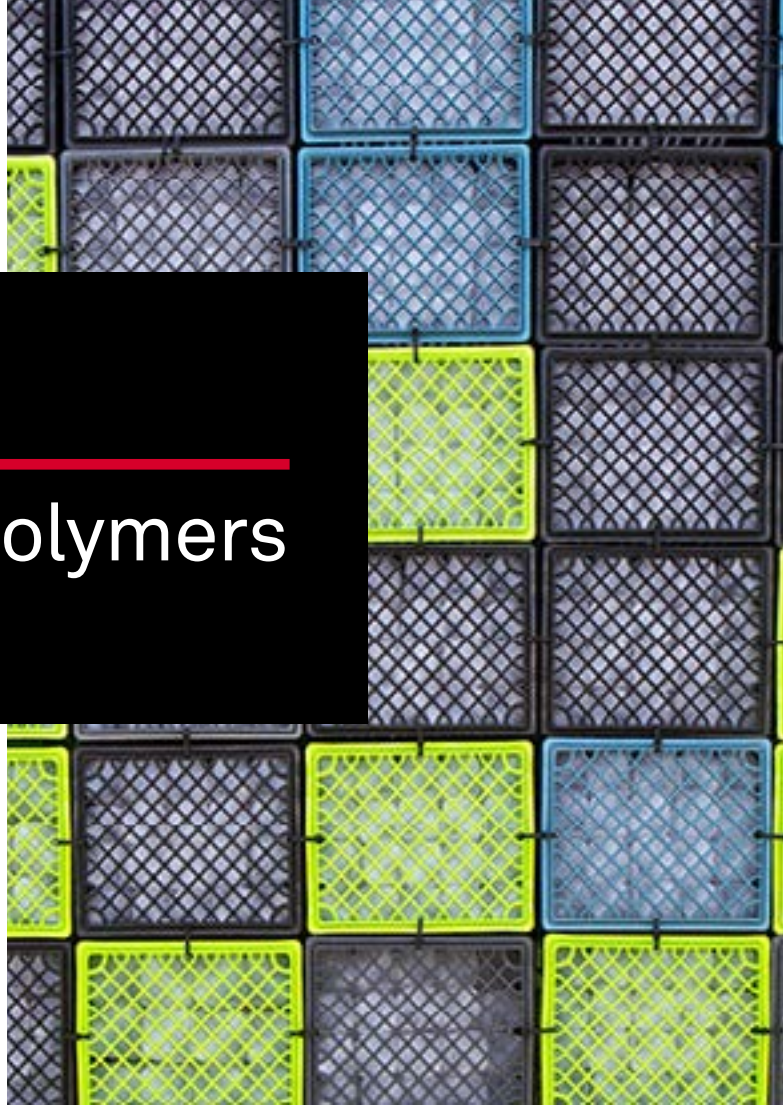
Within this approach, the association notes implementation gaps for bioplastics in the continent. It sees established use of drop-in bioplastics such as bio-polyethylene and bio-polypropylene within mechanical recycling processes, alongside growing importance for organic recycling following mandates for separate collection of bio-waste by the EU.

Outlook

Looking forward, EUBP emphasized the importance of an "integrated approach across policy, infrastructure, and market design" in shaping both long- and short-term market dynamics for Europe's bioplastics industry.

"To ensure that industry grows to scale there needs to be a positive uptake in policy making ... otherwise, the sector will be forced to abandon Europe, as has been already the case for other innovative technology," it said.

Shorter term, ahead of the close of 2025, EUPB anticipates the next phase of growth to remain a critical theme. The group anticipates discussions on policy, supply, intercontinental dynamics and consumer awareness to dominate their 20th annual European Bioplastics Conference, EBC25, in December, echoing broader concerns and talking points voiced by players across biopolymer and the wider chemical value chains.



Global Sustainable Polymers

Crude intentions, clean inventions

- **High costs in Asia, US limit recycling adoption**
- **Some brandowners pull back pledges**
- **Bio-based polymers increase as an alternative**

Recycled pellets in Asia and the US remained significantly more expensive than their virgin counterparts, limiting adoption amid other recycling challenges such as supply constraints due to collection inefficiencies and processing limitations.

Platts, part of S&P Global Commodity Insights, assessed the July monthly average of R-PET clear flakes prices versus virgin PET pellets at $74-$100/mt in Asia, while the spread of natural recycled PET natural pellets to virgin was $22.45-$128.36/mt in the US.

Prices for recycled plastics fluctuated based on demand for virgin plastics and regulatory changes. After crude oil prices fell in April and lowered virgin plastic costs, recycled options became less attractive.

Consequently, buyers began reevaluating the premiums they are willing to pay and the levels of recycled content they intend to include in their products.

Several prominent consumers have softened their sustainability pledges. Coca-Cola pushed its 2030 goals to 2035 and revised its recycled content target downward, according to its website. Pepsi followed suit, updating its packaging target to 40% recycled content by 2035, less ambitious than its previous commitment of 50% by 2030, according to its website.

Plastic packaging consumption has also plateaued, with recent data indicating no significant rise in demand, recyclers said. Brand owners increased recycled content in their packaging by up to 16% in 2024, resulting in reductions of about 3 million-4 million mt of virgin plastics, according to S&P Global Commodity Insights.

However, the broader impact of increased brand-owner recycling on global recycled demand remained limited. Major brands represented only around 5% of global plastic consumption in 2024, and those using approximately 12 million mt of packaging constituted roughly 10% of the global plastic packaging market, according to Commodity Insights.

One major brand reiterated to Platts that its commitment centered on reducing prime resin usage by 50% by 2030, not necessarily by replacing it with recycled content, but by employing strategies such as product lightweighting. The brand added that it is exploring paper-based alternatives to meet regulatory and sustainability requirements.

The lower prime price was only one factor under consideration, buyers said, with many converters citing the absence of recycling mandates in Asia and the Americas and the ease of using prime resin as key reasons for their preference toward virgin polymers.

Hurdles to overcome

The recycling sector also remained burdened by persistent supply constraints, particularly in collection inefficiencies, processing limitations and inconsistent material quality.

PET is the most recycled polymer in the world. Over two-thirds of recycled PET goes into fiber applications, which have less stringent quality requirements than packaging resins. They require less cleaning and are typically less costly than virgin materials, but cleaning and processing costs to make R-PET suitable for use in beverage containers could occasionally make it more expensive than virgin resin.

Another key challenge is ensuring quality consistency. Brand owners noted difficulties in switching suppliers, as their qualifications require stringent checks on quality and reliability, including the recycler's financial stability.

However, most recyclers are small businesses, and waste quality is often hard to control, sources said, adding that public misinformation leads to confusion about what can be recycled, resulting in improper disposal and contamination.

The lack of standardization also hinders recyclability. Many regions, especially in developing countries, lack the facilities for efficient collection, sorting and processing.

Overcapacity in the prime polymers space has a long-term impact on recycled polymers. Thin demand and upcoming capacity additions have hindered prime polymers' operations, presenting substantial challenges for recycled polymers.

It takes years to build a large-scale asset, yet despite numerous new sustainability-related products, large-scale capacity expansions are lacking.

Bioplastics show steady growth

Some traders are exploring bio-based polymers as an alternative to mechanically recycled polymers, which are challenging to collect in sufficient quantities, as well as to clean and sort for recycling.

By 2026, North American biopolymer demand is projected at

288,000 mt/yr

But while production is growing, the volumes pale in comparison to the overall market. India's capacity for polylactic acid production is anticipated to reach approximately 80,000 mt/year in 2026, and overall demand is expected to reach 16,000 mt/year, according to S&P Global Commodity Insights. The US and Canada are expected to reach around 150,000 mt/year in capacity in 2026, Commodity Insights data showed. Total demand for biopolymers in North America is projected to reach approximately 288,000 mt/year by 2026, with significant contributions from polylactic acid and starch-based polymers, according to Commodity Insights.

Globally, mechanical recycling penetration rates, calculated as recycled polymer production divided by total polymer consumption, remained low, between 5% and 15%, according to Platts data. The recycling ratio is likely to see a compound annual growth rate of around 5% by the end of 2025, S&P Global Commodity Insights analysts said.

The long-term outlook beyond 2026 for global recycled polymers is still positive, according to most recyclers interviewed by Platts. The recycled demand figures are small compared with the scale of the global plastics market -- estimated at over 300 million mt/year in demand, but this also highlights the potential growth of the recycled sector vis-a-vis global plastics demand.

Strategic investment, supportive policy frameworks and technological innovation remain critical, and more efforts are needed to close the pricing gap and advance the circular plastic economy.

Conclusion

From feedstocks to derivatives, bio-chemicals and plastics markets find themselves at a critical juncture. The sector continues to face commoditization challenges and a long journey to cement stronger cost competitiveness against fossil-based products and broader scale across regions. Despite this, tentative optimism continues to underscore sector sentiment and stakeholder outlook.

Across this report, the need for stronger legislative frameworks, increased scale and a pivot to more sustainable operations from players across chemical segments have been stressed as critical necessities in driving the growth of bio-chemical and plastic sectors. While the industry continues to grapple with structural challenges, outlook consequently remains bright, cementing the sectors' position as a crucial component in sustainable practice.

Learn More

Platts Chemicals Specifications Guides: S&P Global Commodity Insights' global chemical assessment specifications

Platts Refined Products Specifications Guides: Platts bionaphtha and biopropane specifications, alongside our refined products specifications suite

Sustainable Polymerscan: Platts' Sustainable Polymerscan publication, covering pricing, assessment rationale and commentary for global sustainable chemical markets

Recycled Polymers – Platts Connect: Platts real time news coverage and pricing on sustainable polymer markets.