

Propylene and Polypropylene (PP) Market Study

Final Report For SIPCHEM

Table of Contents

1	Introduction	2
2	Executive Summary	4
3	Methodology	6
3.1	Supply and Demand Methodology	6
3.2	Supply	6
3.3	Demand	6
3.4	Hypothetical Capacity	7
3.5	Trade	7
3.6	Chart Explanations	8
3.7	Petrochemical Price Forecast Methodology	8
4	Market Analysis	11
4.1	Propylene	11
4.1.1	Global Overview	14
4.1.2	Saudi Arabia	17
4.1.3	GCC Excluding KSA	19
4.2	Polypropylene	21
4.2.1	Global Overview	21
4.2.2	North America	27
4.2.3	South America	33
4.2.4	West Europe	37
4.2.5	Central & Eastern Europe	43
4.2.6	Middle East	46
4.2.7	Saudi Arabia	51
4.2.8	GCC Excluding KSA	53
4.2.9	Turkey	55
4.2.10	Egypt	57
4.2.11	Other Middle East Countries	59
4.2.12	China	61
4.2.13	Northeast Asia Excluding China	70
4.2.14	Japan	73
4.2.15	Southeast Asia	75
4.2.16	India Subcontinent	80
4.2.17	Target Markets	85
4.2.18	Price Analysis	88
4.2.19	Netback Analysis	91
4.2.20	SWOT Analysis	93
4.2.21	Logistics- Shipping, Distribution	93
4.2.22	Tariff Issues	93
5	Appendix	94
5.1	Regional Coverage	94
5.2	Top End Users	94
5.3	Top Distributors	95

1 Introduction

SIPCHEM is evaluating to debottleneck its current Propane Dehydration (PDH) and Poly Propylene (PP) plants located in Al-Jubail by expanding its capacity. After debottlenecking, PDH unit capacity will be 529KTA and PP unit will be 600KTA (Hyco – 80% ad Homo - 20%).

The market study is based on SIPCHEM's total plant capacity after the expansion.

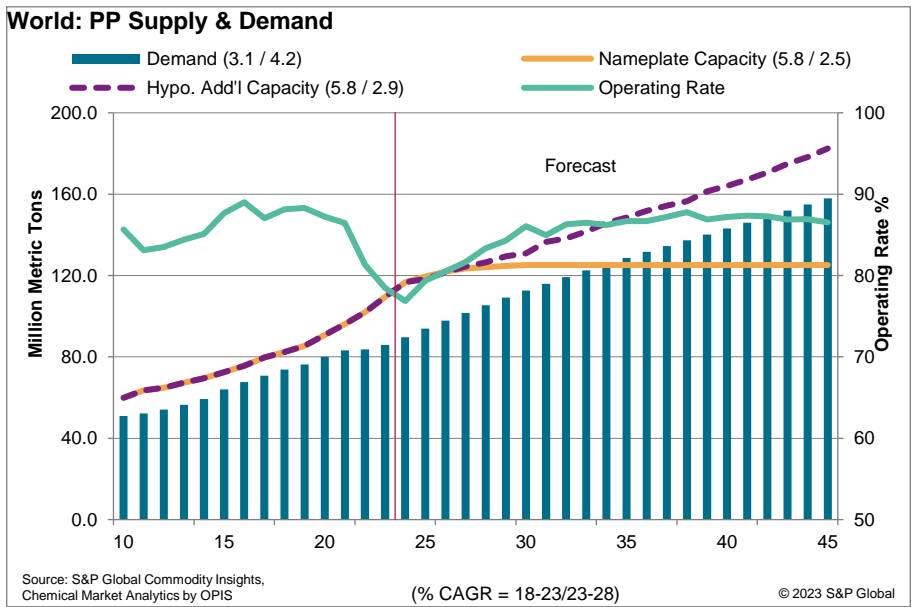
SIPCHEM wishes to obtain a detailed market study for Propylene and Poly Propylene. The report is intended to be used by SIPCHEM to facilitate the development of Final Investment Decision.

2 Executive Summary

International Diol Company (affiliated to SIPCHEM) in Al Jubail, Saudi Arabia is evaluating to debottleneck its current Propane Dehydration (PDH) and Poly Propylene (PP) plants located in Al-Jubail by expanding its capacity. After debottlenecking, PDH unit capacity will be 529KTA and PP unit will be 600KTA (Hyco – 80% ad Homo - 20%). Propylene will be captured by downstream PP; PP will be sold in merchant market.

Global nameplate capacity of polypropylene stands at around 109.5 million metric tons as of 2023. It is expected to reach around 124.1 million metric tons by 2028. Hypothetical capacity addition of 2.2 million metric tons is expected by 2028 and of around 57.3 million metric tons is expected by 2045. In 2023, nearly 85.9 million metric tons of PP product is estimated to be produced globally, at an average operating rate of 78%. In the 2021–23 period, new capacity of about 18.7 million metric tons, primarily in the developing regions such as mainland China, brought global PP capacity to 109.5 million metric tons.

While new applications continue to be developed for PP, it is still largely a commodity thermoplastic subject to economic fluctuations, especially in durable goods. In forecast time, the consumption will still grow healthy, and hypothetical capacity will be added.



In 2023, polypropylene resin demand is estimated to be 85.9 million metric tons, which is nearly the same as the previous year. In short term, between 2023-28, it is expected to grow at CAGR of 4.2% to reach around 105.4 million metric tons by 2028. In long term, between 2023-45, it is expected to grow at CAGR of 2.8% to reach around 157.9 million metric tons by 2045.

As of 2023, Injection molding is the largest market segment of polypropylene globally, accounting for 32.6% of the total consumption of polypropylene, followed by film & sheet, raffia and fiber, accounting for 25.5%, 20.8% and 14.9% of the total consumption respectively. Raffia is the fastest growing application, which is expected to grow at CAGR of 5.1% between 2023-28. The growth in raffia demand is primarily driven by increasing demand in Asian countries, notably China, India, and Southeast Asian countries. In China, raffia, particularly in the form of woven sacks, is extensively used in packaging construction materials, chemicals, fertilizers, and agricultural products. The health of the construction industry plays a crucial role in determining the demand for bulk cement, influencing the growth of woven sacks. In Southeast Asia, raffia is utilized in heavy-duty packaging bags, with woven sacks being a major component due to their moisture resistance, chemical inertness, and resistance to rotting and fungus. The SEA market also benefits from increasing disposable incomes and rapid urbanization, further boosting the demand for raffia. In India, polypropylene woven sacks have replaced traditional jute and paper bags for cement packaging, driven by rising disposable incomes and urbanization trends. Overall, the demand for raffia is expected to increase due to these factors in the forecast period. Followed by fiber and film & sheet applications, which are expected to grow at CAGR of 4.1% and 4.0% respectively during the same time frame.

In 2023, world PP trade is about 26.2 million metric tons, or about 30.5% of the polypropylene produced. Northeast Asia is the largest importer of PP, accounting for about 5.1 million metric tons or 19.4% of total PP is traded in 2023. Southeast Asia is the next-largest market, at 4.0 million metric tons.

The Northeast Asia is also the largest exporter of PP resins, with exports of more than 7.1 million metric tons, or nearly 27.2% of the world total in 2023. Middle East is the second largest exporter of PP resins, with exports of 6.0 million metric tons. Southeast Asia is also the third-largest importer of PP, accounting for 4.2 million metric tons. Indian Subcontinent and Africa are the largest net importers whereas Middle East and Northeast Asia are the largest net exporters in next five years.

By 2028, world PP trade is expected to increase to about 29.6 million metric tons or nearly 28.1% of polypropylene production and consumption. Northeast Asia will be the largest importer of PP, accounting for about 6.1 million metric tons, with mainland China still the most important destination. By 2028, the Middle East will account for 7.7 million metric tons of PP exports. The Middle East will also be a supplier to Africa, the Indian Subcontinent, and Southeast Asia and Northeast Asia.

Total Polypropylene: 600 KTA								
Target Market	Regional Market (2025)			Product Placement		Market Penetration		
Region	Domestic Demand (KTPA)	Net Imports (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand (%)	Addressable Market (% of Net Trade)	Addressable Market (% of Imports)
Indian Subc.	9514	3726	4376	239	40%	3%	6%	5%
China	40136	942	3942	61	10%	0.2%	6%	2%
Other MDE (including Turkey)	4548	3132	3564	169	28%	4%	5%	5%
C. Europe	2536	918	2331	80	13%	3%	9%	3%
W. Europe	8545	596	2933	51	9%	1%	9%	2%

Considering the net imports, netbacks and competitions, Indian Subcontinental, Other Middle East (including Turkey), China, Central& Eastern Europe and West Europe can be targeted by SIPCHEM for selling the volumes of PP they are planning to produce. The market penetration is range bound in order to minimize risk.

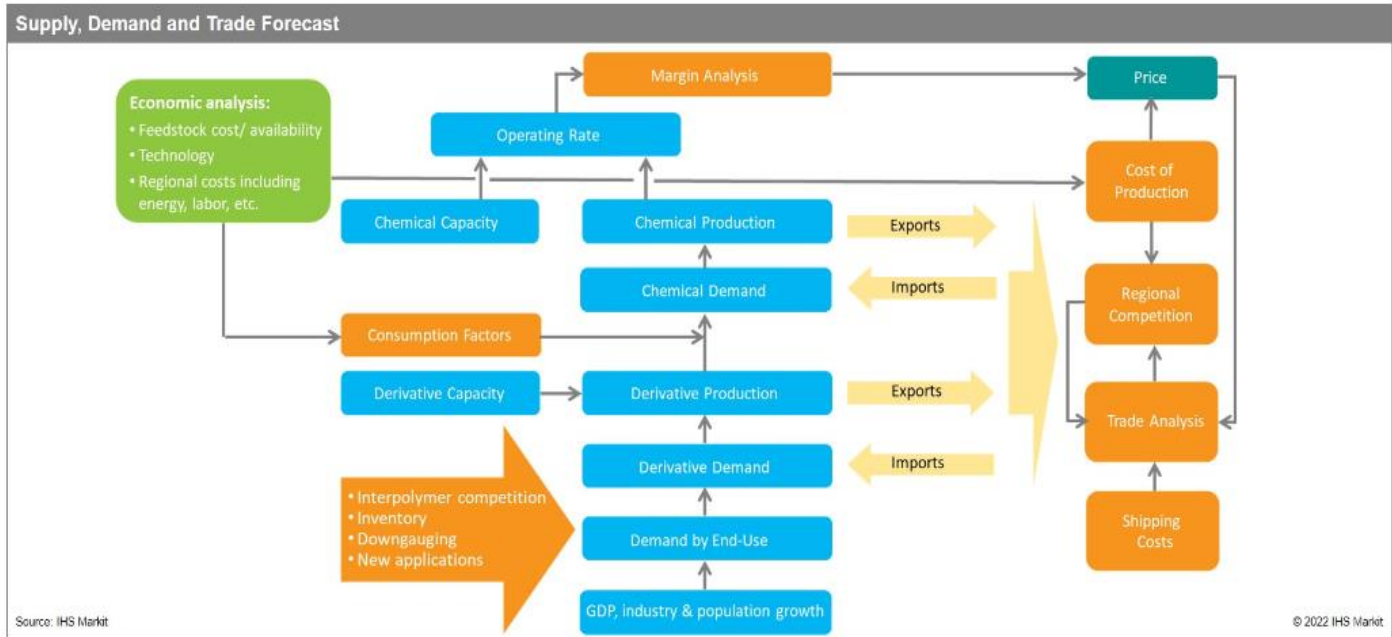
Considering supply-demand balances, global operating rates dropped to 78% in 2023 from average 86% operating rate since 2010. It is expected to recover and increase to around 83% by 2028, and back to above 86% from 2032. KSA is a low-cost producing region due to feedstock advantage and a potential region for setting up a new plant and exported PP to the markets with cost advantages.

3 Methodology

3.1 Supply and Demand Methodology

The methodology for analysing market dynamics and developing supply/demand forecasts for major commodity chemicals and plastics takes into account the complex interactions between consumption drivers, supply positions including capacity builds, and regional trade. The supply/demand forecast in the short-to-medium terms reflects the expected movements of the business cycle, followed by a trend forecast over the longer term. The highest levels in operating rates mark peaks in the business cycle, while troughs are characterized by low points in plant utilization. Driving the business cycles for most chemicals and plastics, apart from the impact of macroeconomic cycles, where downturns (recessions) alternate with long expansionary phases, is the timing of capacity additions. Investment decisions of producers in response to sustained higher cash margins often coincide, leading to overcapacity and lower operating rates, especially for high-cost producers once the new facilities come onstream. The ensuing lower margin environment effectively prevents investment in new capacity, which will tighten market conditions over time and again support higher prices and margins.

SPGCI builds its own in-house projections for supply and demand from the bottom up starting with individual countries/territories that are then aggregated to arrive at regional and global totals. Forecast changes in demand are typically based on factors such as fundamental economic drivers including GDP and population growth, end-use industry trends, the impact of substitution opportunities or threats emanating from other products, potential penetration of the product into existing and new markets, as well as government policies and regulations.



3.2 Supply

On the supply side, announced capacity projects are identified and added to the existing nameplate capacity based on feasibility considerations. Beyond announced investment projects, hypothetical capacity volumes are added in advantaged geographies in order to maintain production and operating rates at reasonable levels. Future production forecasts are based on the amount of product that must be produced for any given year to meet the anticipated demand arising from direct domestic consumption and/or exports (if any). Production levels are adjusted to reflect anticipated operating rates that may be impacted by capacity additions and the level of imports coming into the country. Production levels, therefore, are reflective of the amount of capacity available to produce the products in question and the competitive position of the country under study, as low-cost producers are generally given export preference.

Finally, trade flows are factored into the overall supply and demand framework to obtain a net balanced global position. Preference for exports is given to producers with access to low-cost feedstocks or sites located in close proximity to geographies with large demand. Market supply/demand dynamics thus are closely interrelated with the competitive economics of each producer and our in-house regional price and margin forecasts.

3.3 Demand

Chemical demand via intermediates or direct retail applications can be linked proportionally to broad industry segments, such as durable and nondurables goods, or specific industries, including automotive, construction, and electronics. Each end-use industry has its own market dynamics that can change over time in relation to GDP and population growth. Substitution based on functional requirements, consumer preferences, and cost considerations can also significantly alter product demand. In addition, government policies and regulations, either promoting or prohibiting the use of certain chemicals and polymers, can prompt sudden increases or decreases in demand, as well as step changes over time to reach policy targets at specific timelines. The growing utilization of recycled materials at various stages of the chemical product chain is expected to limit demand for virgin product over time, although the penetration of recycled materials depends on availability along with the functional requirements of end-use products. SPGCI considers each individual country/territory and builds up a demand profile for each product based upon:

- GDP outlook, historical economic growth rates, and GDP elasticities
- Major developments and trends in different sectors of the economy and end-use industries
- Chemical product per capita consumption of countries/territories at various stages of economic development (where relevant)
- Product penetration, including new applications, and substitution effects

- National and international government policies and regulations
- Recycling projections and sustainability initiatives

The demand in each country/territory is then aggregated at the regional and global level.

GDP is a robust measurement of the macroeconomic performance of a country/territory. The ratio of demand growth for a product to GDP growth is known as the GDP elasticity, which differs by product and also by country/territory. The GDP elasticity of a product can be calculated historically and is used along with other measures, detailed above, to forecast product demand.

3.4 Hypothetical Capacity

Demand for a product within a country/territory typically will continue to grow and at some point, exceed the installed plus announced capacity. Future demand increments can be met either by increasing imports/decreasing exports into or out of the country/territory, or by the addition of hypothetical capacity augmenting available supplies. Preferred locations for hypothetical capacity include the availability of low-cost feedstocks or proximity to large demand centres.

The additional demand volumes required to support medium- and longer-term end use and economic growth projections will increase plant operating rates beyond what is considered feasible based on historical production levels and anticipated technological advances. Reducing average plant operating rates at the global, regional, and national levels to reasonable levels requires a certain amount of hypothetical capacity that can be calculated and then allocated to individual countries/territories. The following considerations are taken into account when adding hypothetical capacities:

- Regions without competitive feedstock costs and without a growing domestic market are unlikely to install much or any new capacity; in these locations, small capacity increments typically are added via debottlenecking of existing facilities or creep.
- Regions with advantaged feedstock costs generally will grow their capacity to match the availability of feedstocks. Their low production cost, when compared with other regions, will allow them to build capacity well in excess of domestic demand, leading to higher export volumes.
- Regions with the highest netbacks for exporters, deriving from a combination of freight rates and prevailing market prices based on the local cost of production, are the most likely destinations.
- Regions with a fast-growing domestic market will typically install as much capacity as they can once the imports from lower-cost producing regions have been absorbed. Protective tariffs and duties can alter the competitive cost positions of regions and thereby the trade flows and market pricing mechanism.

Hypothetical capacity is also used to indicate the location and timing of future projects that are in the very early planning stages or still tentative in nature. Negative hypothetical capacity indicates expected future rationalizations and industry consolidations, where plants that will be closed have not yet been identified.

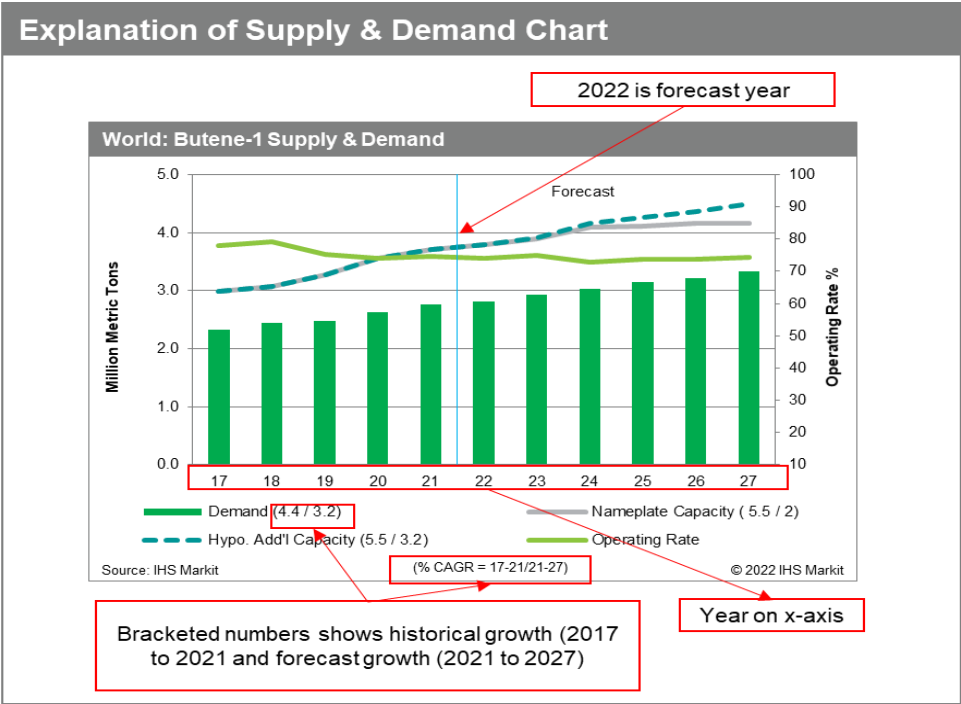
3.5 Trade

Imports and exports are an important component of the supply/demand balances as a sizable percentage of production is traded for most chemicals and plastics. Note that the regional import and export totals in the supply/demand balances are the summation of all national trade volumes, and therefore include shipments to other countries within the same region. The only exception here is the West Europe region, which is treated as a single country/territory in our supply/demand balances with all intraregional trade being excluded. A detailed view of trade flows between regions and countries/territories is included in our Trade Grid Excel files.

The difference between imports and exports indicates the net trade position of a country or region, which is represented in net export terms, so that net exporters show a positive net trade balance and net importers show a negative net trade balance. Our regional experts utilize global cost curves and other competitive production analyses to determine a country's/territory's export position or the amount of imports that will likely enter a country/territory in any given year. Particularly during periods of global surplus capacity, preference is given to low-cost producers as they will prevail in a more competitive international market environment. In contrast, import flows will be directed toward countries and regions with high production costs and may lead to rationalizations of older production units during downturns in the business cycle.

Tariffs and duties can limit or even prevent trade flows and lead to distortions in the relationship of pricing in regional markets. Generally adopted as a protection of higher-cost markets, regional prices tend to move more independently from each other and result in wider price ranges globally. High freight rates, as seen in 2021, can have a similar impact, although they tend to adjust more quickly with increasing supply.

3.6 Chart Explanations



3.7 Petrochemical Price Forecast Methodology

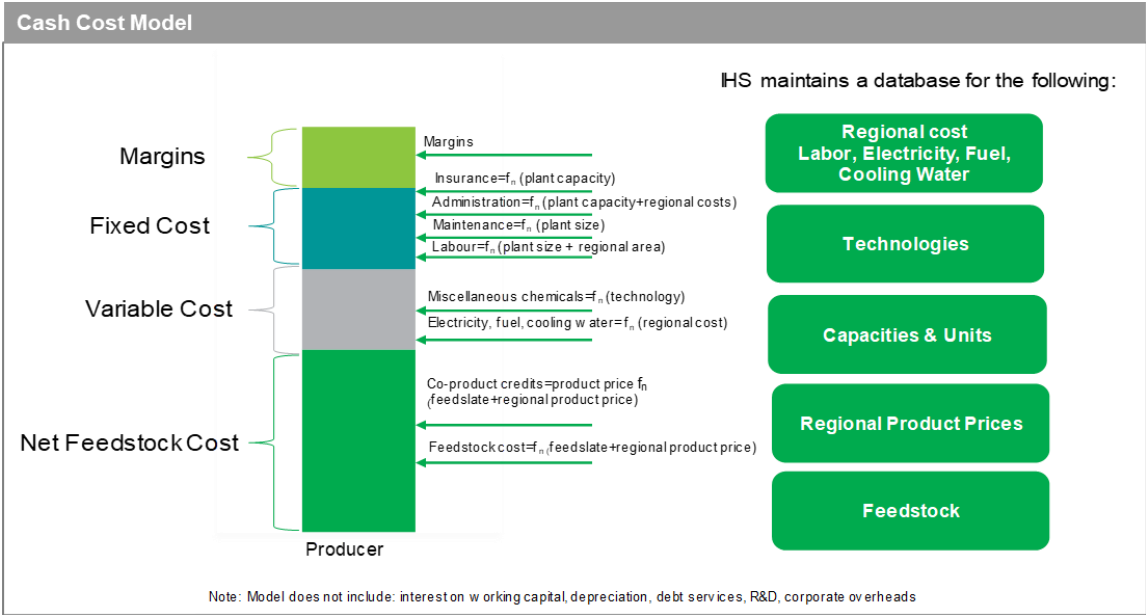
A complete listing of all prices used in this study can be found in the spreadsheets provided along with the report.

SPGCI’s consultants author product-specific reports and publish market related analysis on a regular basis. These analyses reflect SPGCI’s access to current market developments through the constant interaction of our consultants with industry participants. SPGCI reports contain current, historical, and forecast prices for each of the products in our product portfolio.

Refined product and petrochemical prices are impacted by many factors including energy costs, production margins, alternate values, and competitive pressures, availability of supply, demand growth, plant utilization rates, capital investment activity, industry consolidation, political actions, economic conditions, and market psychology.

Over the long term, international commodity petrochemical prices are ultimately a function of production costs plus some level of profitability for the high-cost producer. Three elements are therefore necessary to generate a price forecast.

- A production cost forecast
- A margin forecast



Ensuring price linkages between regions reflect the freight cost forecast.

To generate a forecast of production costs one must generate a forecast of feedstock cost, and, in most cases, these feedstocks are either other petrochemicals or petrochemical feedstocks, such as naphtha, propane and ethane. It is therefore necessary to generate a price forecast for the feedstock first that is related to basic energy values. Yet petrochemical demand, ethylene consumption of natural gas liquids, can impact the feedstock price forecast. As a result, some iteration is required.

Supply/demand balances are used to generate the forecast of margins and profitability. High operating rates lead to healthy margins and low operating rates lead to poor margins. Historic trends are used along with an outlook of the market to derive forecasts. For the short-term, competitive cash cost curves set the floor prices on both a world and regional basis. In the long-term price forecast, an understanding of supply and investment economics is essential.


For this reason, SPGCI generates a short-term cycle price forecast, generally five to seven years out, followed by a long-term trend line forecast. The typical corporate planning cycle, combined with design and construction schedules, allows for companies to announce firm investment plans only four to five years in advance of start-up. Supply/demand pressures and cash costs can therefore be evaluated to generate a margin forecast based on actual investment plans only five years out. The forecast based on actual investment plans inevitably results in a cyclic forecast.

Beyond five years SPGCI Chemical relies on consultant forecasts to determine where capacity will be added. Based on the availability of competitive feedstock and regional demand, a long-term forecast can be made based on an adequate level of investment cost return for the price setting regions.

An advantage of this type of forecast is that it provides an indication of the timing of the near-term cycles within the investment horizon of the petrochemical industry. An understanding of the cycles is necessary for profitable investment, as it has been SPGCI Chemical’s experience that starting up a petrochemical venture in a down cycle will result in low total investment returns and capital will not be recovered. The long-term forecast is useful in analysis of potential petrochemical projects, which should be economically viable in the future.

The third element of an international price forecast is linkage between regions. The petrochemical demand forecast provides an estimate of domestic requirements while cost structures are important in determining the level of domestic production, some iteration is necessary between supply/demand analysis and price forecasting.

Short-Term / Medium-Term / Long-Term
Different Timeframe, Different Factors



Short Term

- Influenced by current market situation and market momentum
- Absolute values more likely accurate
- Production cost often sets “soft” minimum
- Consumer profitability sets “soft” maximum

Medium Term

- Influenced by supply outages, demand surges, and market over/under build cycle impacting margins and pricing power
- Production cost sets “hard” minimum
- Historical profitability sets “soft” maximum

Long term

- Trend-line values tend to provide adequate returns to justify new investments in growing business
- Relative values to underlying hydrocarbons more likely accurate
- Technology, regulatory, demand, incremental producer shifts can greatly impact prices

Price Methodology - Short, Mid, & Long Term

SPGCI price forecast methodology provides a cycle forecast for one future cycle, generally 5-7 years, and then reverts to a trend forecast for the long term.

Petrochemical business cycles are influenced by periods of over and under-capacity. Since companies seldom make announcements for capacity additions greater than 5 years forward, SPGCI includes a cycle forecast, based on the correlation between margin and operating rate, only during the near-term forecast.

The cycle forecast is followed by a trend forecast based on a margin high enough to provide sufficient return to encourage investment in additional capacity as required, to meet demand growth.

SPGCI employs several different price forecasting methodologies depending on the timeframe in question.

Short Term - Defined as the period inside two years, SPGCI is looking carefully at current pricing in the regions, inventory levels, momentum, maintenance outage schedules and other market-oriented indicators. SPGCI will review the month-by-month energy prices and adjust their short-term petrochemical forecasts accordingly.

Mid Term – SPGCI considers the mid-term to be the next petrochemical pricing cycle. This cycle differs from product to product and thus the length of this term differs. Price forecasting within this mid-term is done by examining the factors used in the short term, but more emphasis is placed on the supply and demand fundamentals and the underlying cost structure of production. Within the mid-term consultants will also use historical data to apply the appropriate margin levels to the cost of production. These margins are a function of the supply and demand balances as well as an understanding of how these markets behave in different parts of the cycle. Changes in energy costs will flow through and affect these prices.

Long Term - The long term is the segment of the price forecast most obviously impacted by the underlying energy price change. After a complete price cycle, the product prices are forecasted on a trend basis. The cost of production for the price setting technology is examined regionally. To this cost a margin is added to derive a market price. The margin is determined by examining the returns on investment necessary to entice new construction without making them so attractive

as to encourage overbuilding. It is within this long-term segment where the true effect of a base energy change is seen on petrochemical pricing.

Price Forecast Approach

Pricing model generate a price forecast based on the Cash Cost + margin approach for key marker regions:

North America (NAM)	<i>Prices</i> = Cash Cost + Margin
West Europe (WEP)	<i>Prices</i> = Cash Cost + Margin
Northeast Asia (NEA)	<i>Prices</i> = Cash Cost + Margin

For the other regions/countries (listed below), the prices will be calculated and benchmarked to the regions listed above depending on whether the region/country is an importer (+) or exporter (-).

Southeast Asia (SEA)	<i>Prices</i> = NEA Prices +/- Freights
India (IN)	<i>Prices</i> = NEA /SEA Prices +/- Freights

4 Market Analysis

4.1 Propylene

In the past three years, the COVID-19 pandemic has affected the propylene market in very different ways, disruptions to global supply chains, and lockdowns in different countries such as Mainland China, among others, have impacted both supply and demand. During 2022, supply chain disruptions eased off, port congestions were reduced, and the east-west container freight rate returned to pre-pandemic levels, although some other constraints remain. Mainland China eliminated the zero-COVID restrictions at the end of 2022. Those policies affected production at Chinese factories, as well as demand in that country. The Russia Ukraine conflict since 2022 also impacted global supply chains, affecting propylene feedstocks trade, such as naphtha and vacuum gasoil (VGO, a feed for refineries FCC units that produce propylene).

Despite these unique challenges, global demand for propylene grew at 2.9% year over year in 2022 and an estimated 4.2% in 2023. Nevertheless, the overall growth expected to be 3.8% per year for the next 5 years. Polypropylene (PP) will continue to lead the growth trend, accounting for about 71% of global demand by 2028. However, given the significant amount of PP capacity additions in Asia during the next couple of years, a decline in PP operating rates is expected.

The following sections provide an overview of the major propylene consuming segments.

Polypropylene (PP)

In 2023, polypropylene represents about 69.6% of the total propylene consumed worldwide. Despite the COVID-19 pandemic, PP resin has been one of the fastest-growing commodity thermoplastic polymers worldwide, with an average annual growth rate amounting to 3.5% over the last five years. PP resins are only surpassed by polyethylene resins in total volume of consumption. Polypropylene presents several attractive features, including low density, high rigidity and hardness, high melting point and good fatigue resistance. PP is both dishwasher safe and microwave safe, which makes it an ideal material for food container production. PP is one of the most versatile commodity polymers and is therefore used in a wide range of applications from food containers to toys, auto parts, films, medical equipment, and fibers. PP demand has developed at relatively high growth rates over the past two decades, owing to growth in traditional applications as well as new developments and substitution of other materials. Its relatively low cost compared with other technical or performance polymers is a distinct advantage that has further pushed its usage globally. More recently, the use of polypropylene nonwovens for the production of disposable medical equipment (gowns, hairnets, and surgical masks) has gained significant traction because of the COVID-19 pandemic. High hospital occupancy rates as well as mask mandates have driven the increased use of PP for medical applications. The rapid growth of online shopping has also boosted PP markets, given the increased packaging requirements. Major global producers of polypropylene include Sinopec, LyondellBasell, CNPC, Saudi Aramco, Reliance Industries, Borealis, Borouge, ExxonMobil, INEOS and Shenhua.

PP resins are injection-molded into rigid packaging (such as caps and closures, containers, crates, totes, and pallets), home products (housewares and furniture), transportation (automotive interior trim, and bumper systems), appliances and medical products (syringes, medical kits and trays). PP resins are also extruded into fibers and sheet and can also be blown into film. PP fibers have a well-established position in primary- and secondary-carpet backing and have been increasingly used for face yarn production. PP fibers are also important in the nonwovens market, an area that continues to experience fast growth throughout the world (surgical masks and medical gowns have been key drivers for this segment during 2020). PP film competes effectively with other paper and plastic products, in particular high-density polyethylene, in a variety of film uses. Other uses include pressure-sensitive tapes, shrink-film overwrap, capacitor and other electronic industry films, photo and graphic arts applications, soft-goods overwrap, and disposable diaper tabs and closures. Thermoformed extruded PP sheet goes into food packaging and automotive applications. Other markets for polypropylene include blow-molded bottles and containers, extruded wire and cable, and compounds with other plastics.

Propylene oxide (PO)

Propylene oxide production is presently the second-largest propylene outlet, accounting for about 6.3% of the global propylene demand. PO is a highly reactive chemical intermediate with no direct application. Its primary usages are for the production of polyether polyols, propylene glycols and butanediol. PO production relies on three different processes (chlorohydrin, peroxidation and hydroperoxidation), all using propylene as one of their primary raw materials.

The largest markets for PO are polyether polyols for urethane production and propylene glycols. Polyether polyols are reacted with toluene diisocyanate (TDI) or diphenyl methane diisocyanate (MDI) to form urethane flexible and rigid foams as well as elastomers. Flexible polyurethane foam is used as a cushioning material in furniture, transportation and bedding applications. Rigid foam is utilized as an insulation material in construction, transportation and refrigeration applications. Nonfoam urethane products include surface coating resins, microcellular materials (including reaction injection-molded [RIM] materials), cast elastomers, sealants and adhesives. Propylene glycol is used in unsaturated polyester (UPR) resins for reinforced plastics, for de-icing aircrafts, and for other smaller applications including solvents, emollients, moisturizers and humectants in foods, drugs, cosmetics, pet foods and tobacco. Other applications of PO include glycol ethers (which are solvents for surface coatings and household cleaners), dipropylene glycol for unsaturated polyesters, polyoxypropyleneamines, isopropanolamines, propylene carbonate, non-polyol-based surfactants and 1,4-butanediol.

Acrylonitrile

In 2023, acrylonitrile (ACN) is the third-largest propylene market, covering about 5.8% of the global total. ACN is a commodity petrochemical used in the production of a wide range of chemical products (primarily ABS/SAN resins, acrylic fibers, acrylamide, nitrile rubber, adiponitrile, and carbon fibers). With the replacement of older ethylene oxide and acetylene technologies, catalytic ammoxidation of propylene, a process developed by Standard Oil of Ohio (known as BP, then Innovene, and now INEOS), has been the primary route for all of the world's acrylonitrile production since the mid-1960s. In 2020, ACN downstream markets were temporarily impacted by the COVID-19 pandemic and the many government-ordered lockdowns, which hindered manufacturing output. Moreover, most of ACN's major end markets — ABS/SAN resins, acrylic fibers and adiponitrile — are cyclical and therefore directly affected by economic downturns, especially when

consumer spending contracts. The acrylamide and nitrile rubber markets have nevertheless pursued their expansion during 2020 thanks to resilient end-markets as well as pandemic related trends (increased demand for nitrile rubber gloves for instance). In 2021–23, the global acrylonitrile market bounced back thanks to the lifting of pandemic-related restrictions across many economies as well as the deployment of vaccine programs to protect populations.

The ACN demand structure has evolved over the past decade as acrylic fibers, the historically foremost ACN outlet, has been gradually losing momentum, a victim of competition from low-cost polyester fibers. In the meantime, other applications such as ABS resins and acrylamide have been gaining significant traction, especially within the emerging world. ABS resins have now surpassed acrylic fibers to become the single largest ACN outlet, covering about one-third of the demand.

INEOS (formerly Innovene), Asahi Kasei and Mitsubishi Chemical have been developing a process for making acrylonitrile from propane that could offer significant production cost and environmental advantages over existing propylene-based routes. Nevertheless, as of today, only one plant in Map Ta Phut, Thailand uses this technology. The unit is operated by its subsidiary, PTT Asahi Chemical. This new propane-based process remains limited at this point, and propylene is still, by far, the feedstock of choice for the production of ACN.

Oxo alcohols

For the purpose of this report, oxo alcohols include butanols and 2-ethylhexanol (2-EH). Together, these two applications account for about 6.3% of global propylene demand in 2023. The addition of synthesis gas to propylene produces isomeric, normal-, and isobutyraldehydes in varying ratios. Several processes using rhodium or cobalt catalysts are employed at elevated temperatures and pressures. In most reactions, the C4 aldehydes are the initial products, although Shell, in its SHOP higher olefins process, converts propylene to a mixture of higher (C9-C15) oxo alcohols.

n-Butyraldehyde is converted to n-butanol or 2-EH. n-Butanol is used as a solvent for lacquers and coatings and an intermediate for several chemicals, such as glycol ethers and n-butyl acetate solvents, n-butyl acrylate and methacrylate monomers for surface coating resins, n-butyl amines, plasticizers and amino resins. 2-EH is commonly used as a plasticizer alcohol and is converted primarily to phthalate esters (such as dioctyl phthalate [DOP]) for plasticization of polyvinyl chloride (PVC). Other major 2-EH end uses include production of resins for acrylic surface coatings, diesel fuel and lube oil additives, and surfactants.

Isobutyraldehyde is converted to isobutanol, which is directly used as a solvent for surface coatings. Zinc dialkyl dithiophosphate (ZDDP) lube oil additives and diisobutylamine, which is a precursor for the corn herbicide butylate, are the principal derivatives of isobutanol. Neopentyl glycol, an isobutyraldehyde derivative, is consumed primarily for unsaturated polyester resins and polyester resins for surface coatings.

Cumene

This application accounts for about 4.3% of global propylene demand in 2023. While cumene is present in many crude oil and refinery streams, alkylation of benzene with propylene is the sole route to all commercial cumene. In this process, propylene and benzene are reacted at elevated temperature and pressure in the presence of a catalyst. The most commonly used catalyst for cumene production is solid phosphoric acid on an alumina support; sulfuric acid or aluminum chloride may also be used. In the mid-1990s, new catalyst technology based on zeolite chemistry was introduced for production of cumene, which reportedly increases yields, lowers production costs and allows greater debottlenecking capabilities in existing units. Cumene is one of the few chemicals that can be produced from refinery-grade propylene.

The vast majority of cumene (about 98%) is consumed for the production of phenol and acetone; in fact, cumene and phenol/acetone production are integrated in most part of the world, with very limited merchant volumes available. Direct uses of cumene (2% of the total) include paint thinner and high-octane additive for aviation fuel. Overall, cumene demand is almost entirely tied to the phenol and acetone markets.

Phenol demand growth has been driven by the production of bisphenol A (BPA) and phenol-formaldehyde resins (PF resins) over the past few years. BPA is used primarily in the synthesis of polycarbonate (PC) and epoxy resins. PC is a high-performance polymer that has seen its demand rise for automotive, construction, and appliance markets. PC was initially widely used for the production of optical media, growing at a high rate in the 1990s and early 2000s, but the change in consumer habits has actually led to significant reduction in compact discs (CDs) or digital video discs (DVDs) used globally. As a result, PC demand growth has moderated over the years. Epoxy resins are high-performance thermoset polymers, which are used in coatings, electrical/electronic laminates and adhesives, and in composites. PF resins are primarily used as wood adhesives, laminates, binders for insulation materials, composites for the automotive industry and appliances market, and the electrical industry (wiring devices). Construction and renovation activities, automotive output and furniture production are largely driving the demand for PF resins globally. Overall, cumene production was impacted during the 2020 recession because of its high dependence on cyclical markets (automotive and construction). This trend has recently reversed with pandemic-related restrictions being lifted and the improvement in economic activity in key consumer markets. Over the next five years, propylene demand for cumene production is therefore projected to rise at an average rate of 3.2% per year, driven by a growing production of PC, epoxy resins and PF resins.

Acrylic acid

This application accounts for about 4.1% of global propylene demand in 2023. Most acrylic acid is produced by the oxidation of propylene, although the Reppe process and acrylonitrile hydrolysis are still used to a limited extent. The initial reaction of chemical-grade propylene with oxygen produces acrolein, which can be further oxidized to acrylic acid. Crude acid is mostly esterified with an alcohol; ethyl, n-butyl, 2-ethylhexyl and methyl acrylates are the most common ester products. Acrylate esters are incorporated almost exclusively into functional low-molecular-weight polymers, where they impart specific properties to the resin formulation. Acrylic/acrylate polymers are consumed in surface coatings, textiles, adhesives, paper coatings, leather treatment, floor polishes, caulks and sealants, printing inks and other applications. Other markets for polyacrylic acid include dispersants, thickeners, scale inhibitors, sequestrants, textile warp sizes and flocculants.

About 40% of acrylic acid produced is consumed in the form of polyacrylic acid, mainly for the production of superabsorbent polymers, and the remainder as esters. Growth in demand for superabsorbents and polyacrylic acids has ultimately driven

an increasing consumption of acrylic acid. Acrylic acid is also used directly as a component for numerous copolymers. Over the past few years, the advent of new types of superabsorbents and increased use of sodium polyacrylate in detergents has led to a growth in acrylic acid consumption and capacity increases. The market was recently negatively impacted by the global recession. Over the next five years, propylene demand for this application is expected to rise at an average rate of 2.9% per year, driven by a growing acrylic acid output.

Isopropanol

This application accounts for about 0.9% of global propylene demand in 2023. Isopropanol (IPA) is produced by three different processes, two of which use propylene as a starting raw material. IPA is produced from propylene by either indirect or direct hydration processes. The indirect hydration process is used worldwide. This method is a two-step process where a C3 refinery off-gas stream containing about 65%-70% propylene reacts with sulfuric acid to form isopropyl sulfate, which is subsequently hydrolyzed with water to crude IPA (an azeotrope of 91% isopropyl alcohol and 9% water). The direct hydration method is a one-step process utilized in Europe and Japan. Reaction of a propylene stream (98% propylene) and water in the presence of a catalyst, such as phosphoric acid on bentonite, forms IPA. The direct hydration process eliminates the use of sulfuric acid, air pollution problems, and high maintenance costs caused by corrosion. The actual yield relative to theoretical is 85%. IPA can also be made by the hydrogenation of crude acetone, but this process does not use propylene.

A variety of solvent applications account for nearly 70% of global IPA consumption: surface coatings, printing inks, rubbing alcohol and household products such as glass cleaners and pine oil disinfectants, pharmaceutical production, cosmetics, pesticides and chemical processing. IPA provides the required properties of solvency and appropriate evaporation rate to most of these applications. Other end-use outlets for IPA include production of acetone, methyl isobutyl ketone (MIBK), isopropylamines and isopropyl acetate.

Other applications

Ethylene-propylene (EP) elastomers: EP elastomers have exhibited a relatively high growth rate over the past few years. There are two basic types of EP elastomers. Ethylene-propylene copolymers (EPMs) are produced by the polymerization of ethylene and propylene. Ethylene-propylene terpolymers (EPDMs) are produced by polymerizing ethylene and propylene with a small amount of nonconjugated diolefin, such as ethylidene norbornene, 1,4-hexadiene or dicyclopentadiene. These terpolymers (EPDMs) currently represent 80% of global ethylene-propylene elastomer production, with EPMs accounting for the remainder. Automotive applications are the major use for EP elastomers, consuming about 40%-45% of the overall volumes. Another major market for EP elastomers is in single-ply roofing, a market more developed in the United States than in Western Europe and Japan.

Allyl chloride/epichlorohydrin. Allyl chloride, $\text{CH}_2=\text{CHCH}_2\text{Cl}$, is produced by the high-temperature chlorination of propylene, with dichloropropanes and dichloropropenes formed as by-products. Allyl chloride is an intermediate to crude epichlorohydrin, which is refined to primarily produce epoxy resins. Other uses worldwide include polyamide-epichlorohydrin (PAE) resins, water treatment chemicals, and synthetic glycerin. Synthetic glycerin demand is extremely low, owing to the large volumes now produced as a by-product of biodiesel production. With the surplus glycerin resulting from the growing worldwide production of biodiesel, several companies have come up with glycerin-to-epichlorohydrin technologies.

Acrolein. Significant volumes of acrolein are used in producing DL-methionine and methionine hydroxy analogue (MHA), calcium salt. Both compounds are protein supplements in poultry feed, but only DL-methionine is used in medicinal preparations. Direct application of acrolein controls microbial growth in wastewater and process water systems, in jet fuels, and in distillate fuel tank bottoms. Acrolein also performs as a slimicide in paper manufacturing and to control aquatic weeds in irrigation and drainage systems. The protein cross-linking properties of acrolein suggest applications as a tissue fixative and leather tanning agent. Acrolein serves as an intermediate for the synthesis of acrylic acid. Because acrolein is not isolated as a purified intermediate in the manufacture of acrylic acid, estimates of propylene consumption for acrolein in this report exclude quantities of unisolated acrolein produced during acrylic acid manufacture.

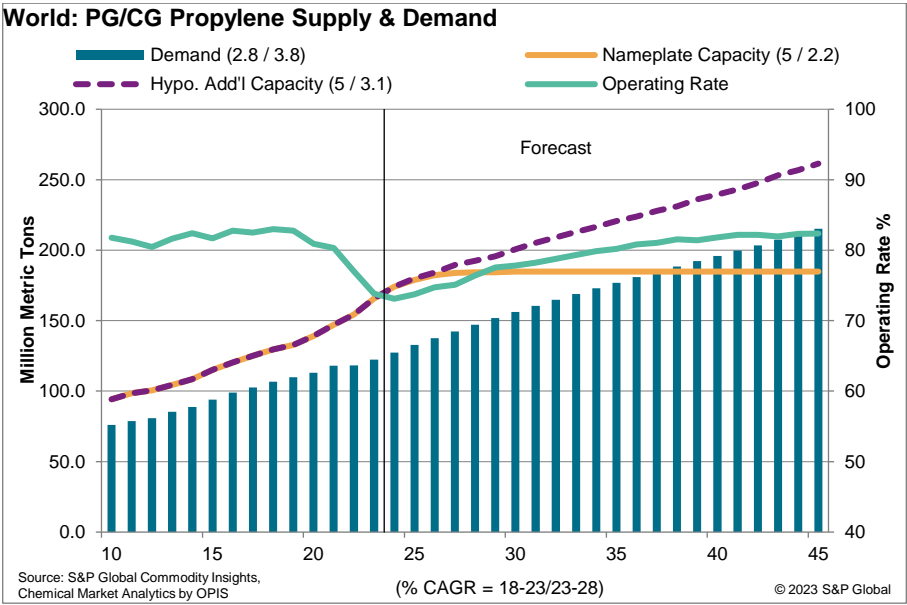
Hydroquinone. Hydroquinone is used as a rubber antioxidant, photographic developer, dye intermediate and polymerization inhibitor, and in a number of specialty applications that take advantage of its antioxidant properties.

Isopropylphenols. The alkylation of phenol with propylene yields isopropylphenols, which are intermediates in the manufacture of insecticides, triaryl phosphate plasticizers, lube oil additives and hydraulic fluids.

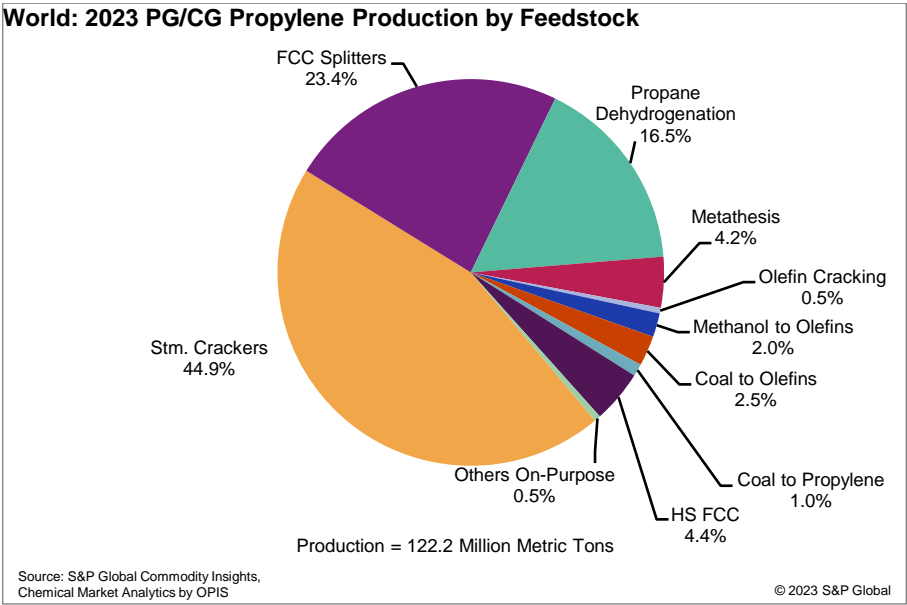
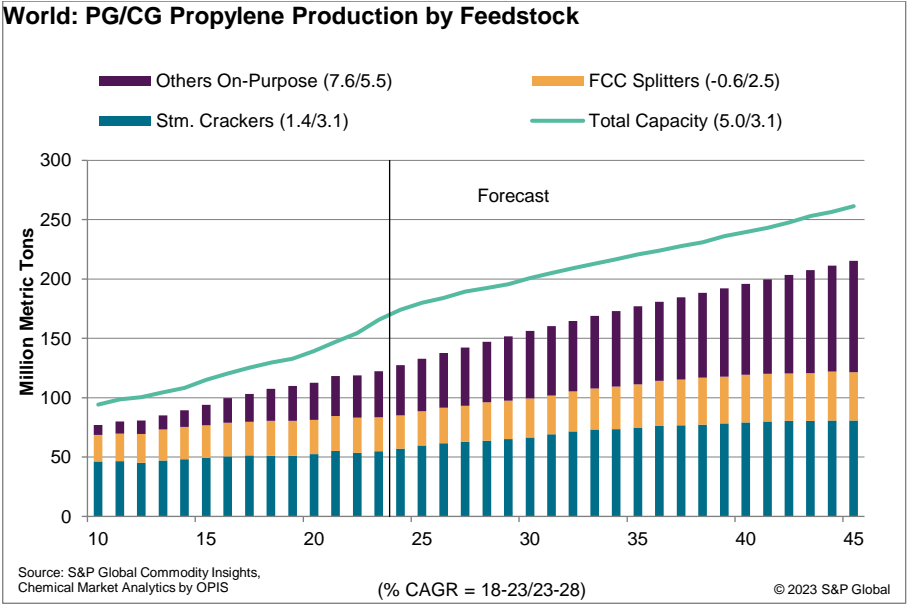
4-Methylpentene-1. Propylene can also be dimerized to form 4-methylpentene-1 (4-MP1) monomer. The overall yield of 4-MP1 from propylene is 91%, which translates to a conversion factor of 1.18 kilograms of propylene per kilogram of 4-MP1. 4-MP1 can be used as a six-carbon comonomer with ethylene, competing with hexene, in the production of linear low-density polyethylene. With a higher boiling point than hexene, it will not condense as easily as hexene in gas-phase reactor processes. Polymerization of 4-MP1 itself yields polymethylpentene-1 (PMP1), a plastic with a high melting point, very high clarity, an amorphous nature and low specific gravity. Because of these characteristics, PMP1 finds use primarily in medical and laboratory ware, small appliance parts, cosmetic containers and caps, and electrical/electronic parts.

4.1.1 Global Overview

Supply



On the supply side, propylene grew at about 2.8% year over year in last five years and an estimated 3.8% in next five years. Even with oil prices moving up to levels not seen since 2014, propylene from steam cracking grew at a similar rate, driven by new cracker start-ups in Asia.



Going forward, three supply dynamics inform the outlook. First, the drop in transport fuel demand will accelerate incremental shifts in FCC yields to boost olefins supply. Second, the proliferation of lighter feeds into the cracker feedslate will limit propylene coproduction despite continued capacity additions in mainland China. Lastly, the lack of propylene coproduction will remain a pressing concern and on-purpose production will have to fill the gap as these assets will represent more than 50% of the new capacity projected to be added during the forecast period.

In 2023, more than 68% of global propylene supply are produced as a coproduct from either steam crackers or refineries. Propylene production from steam crackers is influenced by the operating rates of crackers as well as the type of feedstock

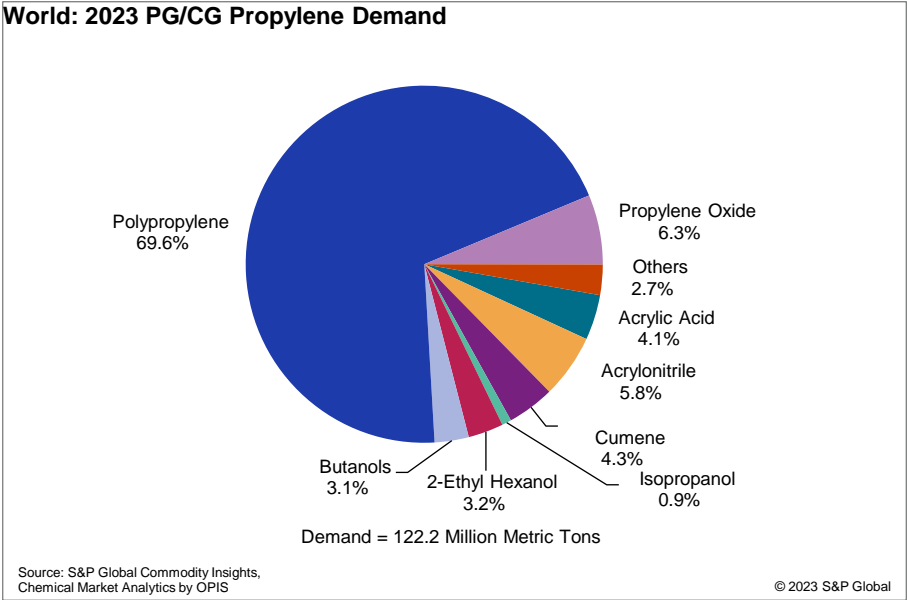
utilized. Regions that mainly utilize naphtha feedstock, such as West Europe and Northeast Asia, generate the greatest amounts of steam cracker coproduct owing to the high propylene yield of naphtha.

Before the recent preference of ethane-based steam crackers, aggregate propylene production from steam crackers grew at similar rates as ethylene production. However, growth rates for propylene output have fallen behind ethylene owing to the significant ethane-based capacity additions in the Middle East and North America that yield comparatively much lower propylene output, as well as the persistence of cost advantages for natural gas liquids (NGLs) throughout the world that will encourage flexible units to preferentially crack lighter feedstocks.

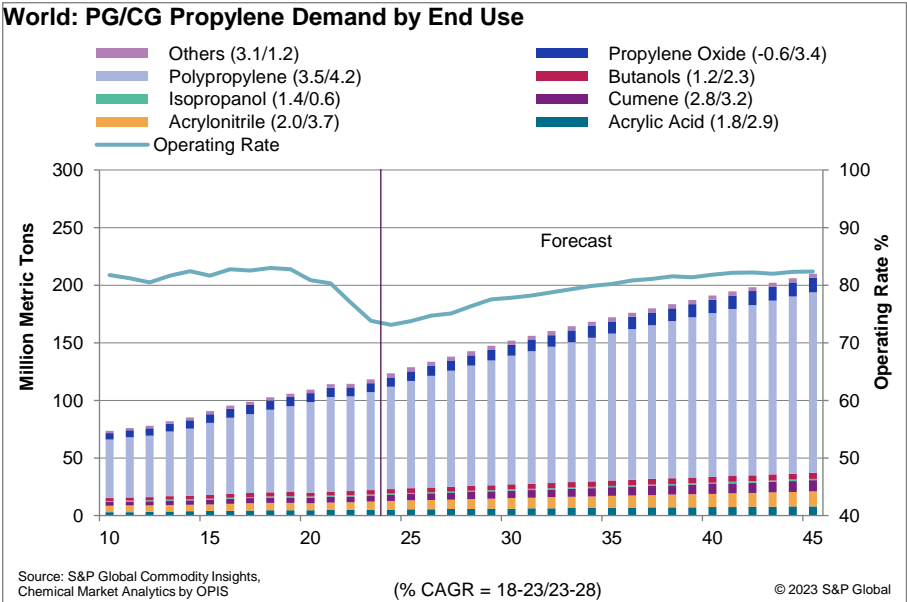
Refinery-based propylene assets, including FCC units, are the second-largest source of propylene worldwide, with propylene generated as a by-product of motor gasoline and distillates production. Therefore, propylene sourced from refineries accounts for the largest share in regions with high demand for motor gasoline, such as North America. Worldwide, this refining-based share is projected to account for 23% of the total propylene supply in 2023. This represents a decline during the last couple of years as refineries adjusted operating rates in response to the dramatic fall in transport fuel demand and on purpose production continued to grow its share of propylene supply. The supply share of refinery-sourced propylene is still expected to drop throughout the 10-year forecast period, as refineries look to shift FCC yields in response to a more tempered gasoline demand growth environment post-COVID-19 via increased telecommuting, adoption of higher-efficiency engines, and the electrification of transportation vehicles.

As a result, propylene from other “on-purpose” sources has become an increasingly important element of the global supply. These commercialized and proven on-purpose technologies include propane dehydrogenation (PDH), metathesis, high-severity fluidized catalytic cracking (HS-FCC), olefin cracking, methanol-to-olefins (MTO), methanol-to-propylene (MTP), coal-to-olefins (CTO), and coal-to-propylene (CTP). The technology of on-purpose plant additions is typically chosen based on the availability of the feedstocks in the respective regions. For example, PDHs became the on-purpose technology of choice where propane is expected to remain accessible, owing to an increase in shale oil and gas production predominantly in North America, but not limited to such region. PDH capacity growth will continue to be seen in other regions; however, the incremental supply of propane to feed this additional PDH capacity is at risk as the reduction of capital spend in the upstream sector still lags the pre-COVID spend, which will result in a comparatively more tempered propane supply growth trajectory (refer to the Strategic Insights section for more details).

Demand



In 2023, global propylene consumption is estimated at 122.2 million metric tons. Global propylene demand is dominated by PP production for automotive and mechanical parts (69.6%), containers, fibers, and films. Other important propylene consumption segments include acrylonitrile (5.8%), used in acrylic fibers and acrylonitrile-butadiene-styrene [ABS] polymers, propylene oxide (6.3%), used in propylene glycol antifreeze and polyurethanes, oxo alcohols (used in coatings and plasticizers), cumene/phenol (used in polycarbonates and phenolic resins), acrylic acid (used in coatings, adhesives, and super absorbent polymers), and oxo chemicals (used in surface coatings and plasticizers).

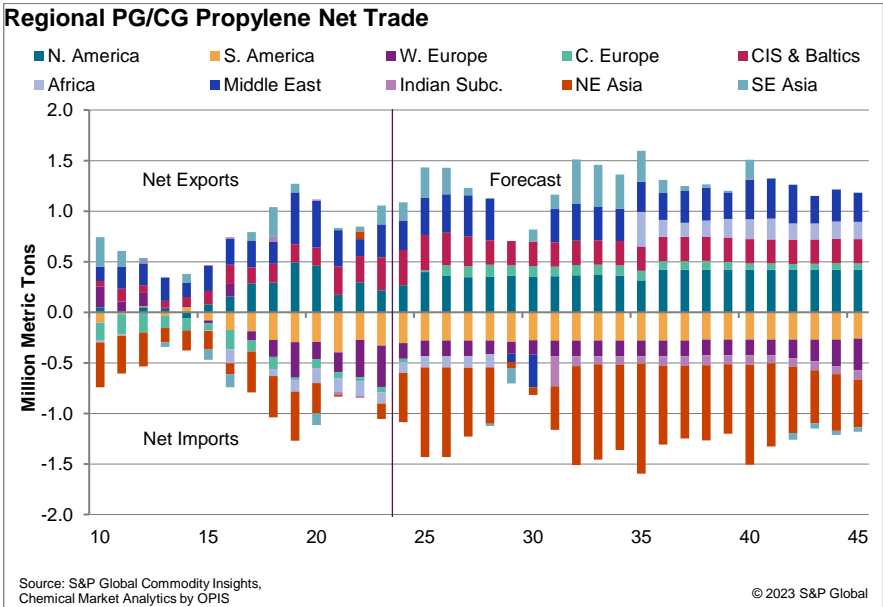


In the last 40 years, global demand for propylene has only declined once: once during the 2008/09 financial crisis plus the ensuing recession. And more recently, in 2020 to 2022 during the COVID-19 pandemic, the demand still grew year-over-year. During pandemic period, the loss in durable-goods demand was partially offset by the growth in demand from consumables, such as packaging and medical supplies. From 2018 to 2023, propylene demand had grown annually by about 2.8% but now growth is expected to speed slightly to 3.8% over the next 5 years s emerging markets, such as mainland China, which are currently driving demand growth.

Most of the downstream derivative demand lies in the developing regions increasing their per capita consumption as incomes rise. However, in several cases such as the United States, the demand from more developed regions is due to both inherent regional consumption growth as well as investment to monetize an advantaged position, typically feedstock, to manufacture products for export.

Overall PP demand is expected to grow annually by 4.2% during the next five years, driving most of the global growth for propylene. This relatively strong growth rate is due to its competitive cost and versatility within the thermoplastic resin industry. On the other hand, plastics recycling issues and concerns about waste are now beginning to impact the market, despite the temporary pause given the pandemic and resulting hygiene concerns. Nevertheless, as the recycling trend evolves with governments and companies increasingly inclined to address plastic waste issues, the impact on demand has the potential to become a game changer in the coming years. While other propylene derivatives, such as acrylonitrile, cumene, and acrylic acid, are expected to register substantial demand growth at rates near or above GDP over the next 5 years, these demand segments will remain small in comparison to PP.

Trade



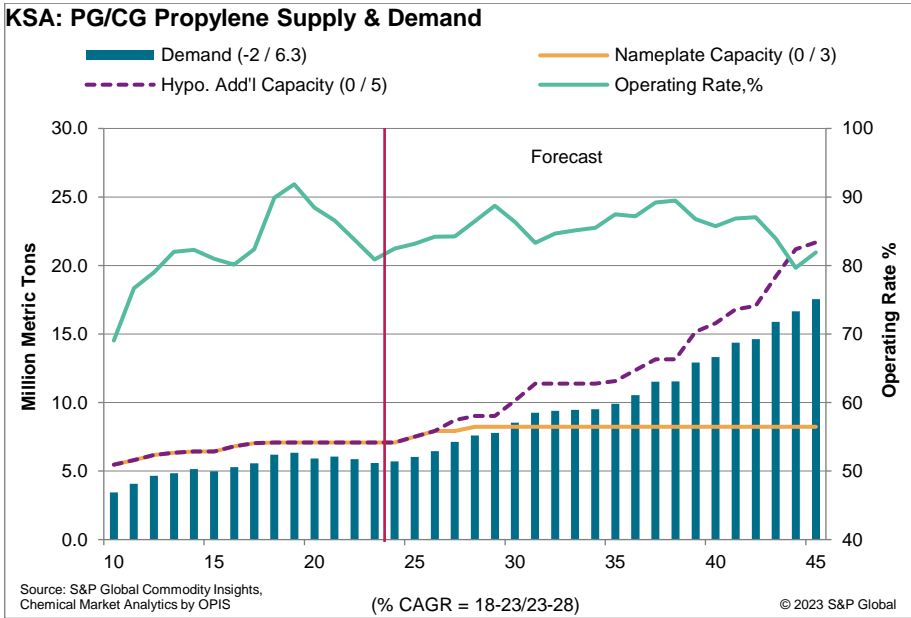
International trade of propylene monomer is quite limited because of the expense and limited scale of transporting pressurized or refrigerated liquids, which declines further in 2023 and represent less than 4% of total supply. Given such additional cost of transport, most of the propylene trade crossing international borders is in the form of easier-to-ship derivative chemicals, such as PP and acrylonitrile, or finished goods containing propylene.

Owing to the high costs associated with shipping propylene, it is more expensive for a propylene consumer to consistently import propylene rather than produce or buy it in the local merchant market. As a result, most global trade of propylene monomer occurs to cover planned and unplanned production outages. Japan, Taiwan, and South Korea will continue to export the largest quantities of propylene monomer, while mainland China will dominate imports of propylene. Other significant exporting countries are Canada (to the United States), the United States (to Mexico and South America), Saudi Arabia, the Philippines, and Thailand. North America’s net export position has sharply increased from 2015 with the expansion of logistics capability. Net exports of propylene from the Middle East are expected to increase owing to capacity additions in the region, although such growth has slowed as investment has cooled from its heated pace during the past five years.

Given the ample availability of cost-competitive feedstock, the Middle East, Northeast Asia (except for mainland China), and North America have been the leading exporters of propylene monomer and derivatives. However, as new on-purpose propylene and derivative capacity comes online in mainland China, trade flow patterns are likely to change. Overall, propylene net equivalent trade is projected to gradually decline until 2031 and remain more-or-less stable at a level of roughly 3.7 million metric tons in the long term.

4.1.2 Saudi Arabia

Supply



GCC has six Arab countries bordering the Arabian Gulf. They form most of the area of the Arabian Peninsula; Saudi Arabia (herein referred to as KSA for short), Oman, United Arab Emirates, Kuwait, Qatar and Bahrain. Here we will discuss KSA and GCC excluding KSA separately.

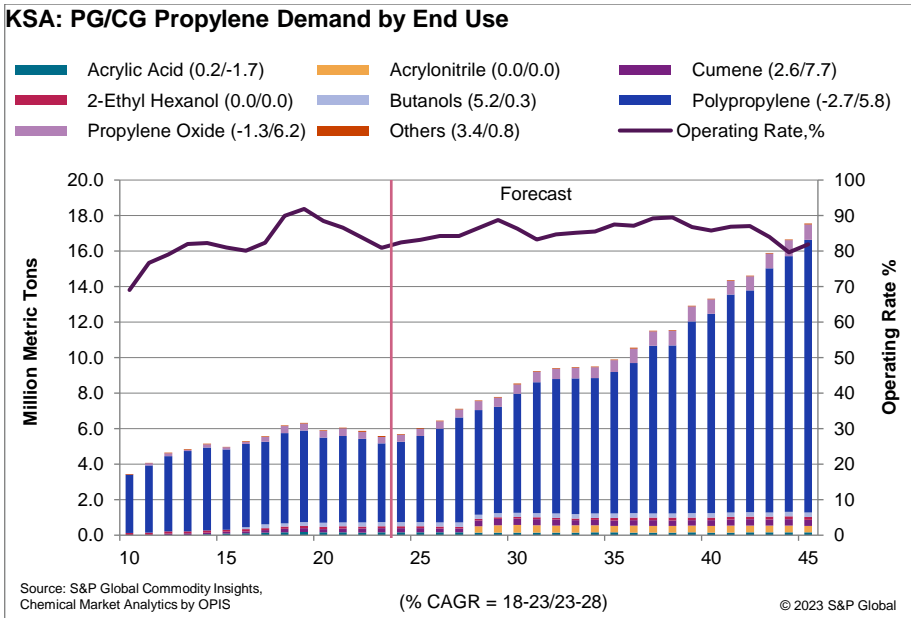
The pace of expansion was hindered by limited propylene supplies from mostly ethane-based steam crackers that generated little propylene coproduct. Over the past 15 years, rapidly increasing propylene production, with a gradual move to heavier steam cracker feedslates and new on-purpose production, has eliminated most of these supply constraints. However, that trend has started to reverse as additional sources of ethane become available and, in 2020 and 2021, deep crude oil production cuts caused pressure on overall feedstock supply and resulted in reduced output. One example is the Sadara cracker in Saudi Arabia, which started up in 2016. Based on a 50% naphtha feed, the cracker has added a significant amount of new propylene supply, but the allocation of discounted condensate and additional ethane has now lessened its propylene output.

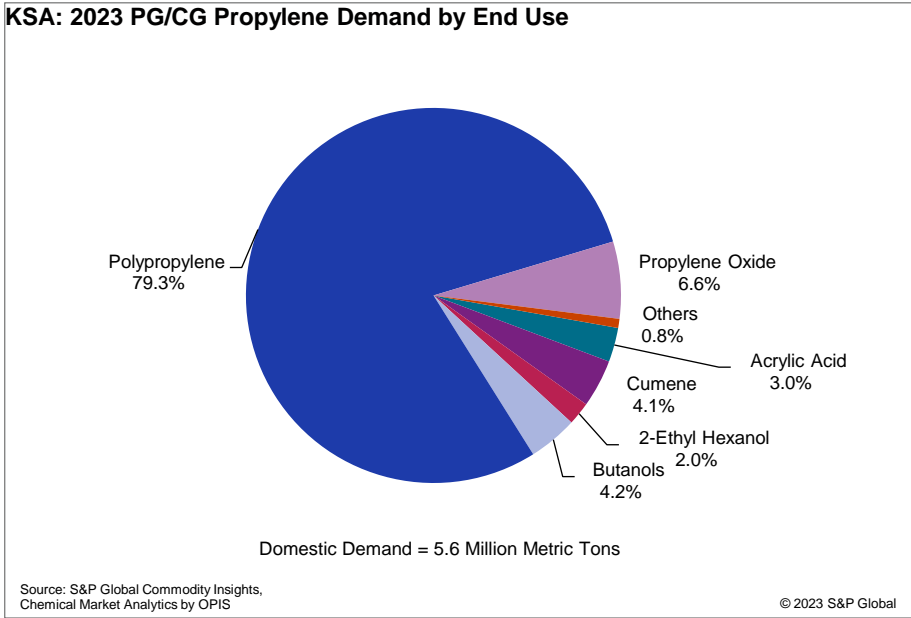
Alternate propylene production technologies account for a significant portion of the total propylene supply. Lots of propane dehydrogenation (PDH) units are located in Saudi Arabia, feeding associated PP assets. Much of Saudi Arabia's propylene production comes from steam crackers running on discounted liquefied petroleum gas or condensate feedstocks, as well as PDH units using discounted propane. In late December 2015, the pricing mechanism changed substantially, shifting from a naphtha-related formula to a propane-based one. For PDH operators, the pricing mechanism ensures a fixed discount on export values and, therefore, a steady cost advantage.

In Saudi Abria, there are total 7.09 million metric tons propylene capacity in 2023, accounts 57.7% of total Middle East propylene capacity. In next five years, Advanced Polyolefins Company will add 843 thousand metric tons new propylene capacity in middle of the year 2025. Amiral Petrochemical Complex will add another 300 thousand metric tons capacity around 2028, from its steam cracker unit.

Chemical/polymer grade propylene supply in the KSA is likely to grow quickly in the next five years (6.4% annually); beyond that, a fast growth rate is once again expected, 5.3% annually for the forecast time frame. Increases in supply from steam cracking primarily come from crackers running propane and heavier feedstocks in the Saudi Arabian industry. The current outlook assumes that the projects under consideration in the region may add about 4.3 million metric tons of propylene capacity by 2033.

Demand



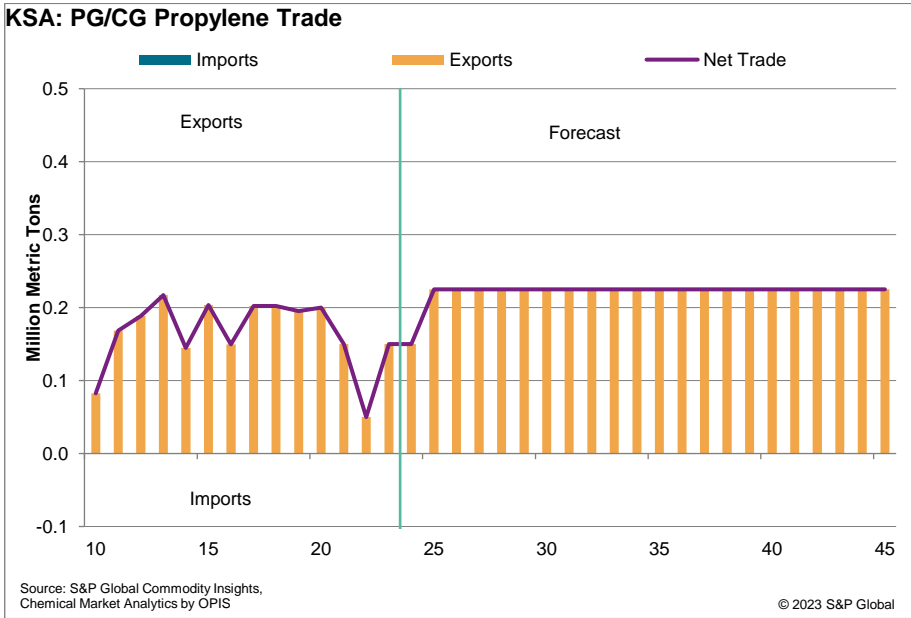


The last five years have seen no change in the use of propylene into non-PP applications. The start-up of an acrylic acid plant and an n-butanol unit in Saudi Arabia follow the addition of propylene oxide and cumene assets over the past 10 years and are signs of shifting emphasis within the region. In the past, lower logistics costs, readily available technology licenses, and sales portfolio considerations (complementing polyethylene) made PP the propylene derivative of choice. As regional producers continue to move toward the production of more advanced specialty products, the propylene derivative slate is becoming more diverse. Acrylic acid, cumene, propylene oxide, 2 Ethyl Hexanol and butanol are now produced in Saudi Arabia.

However, the majority of the KSA’s propylene production goes into PP, which accounts for 79.3% of the total demand in 2023 and will continue to drive regional consumption at high annual growth rates in the longer term. Consumption into other derivatives is also expected to advance at healthy rates, albeit from a smaller base. Driven by the start-up of new capacity in Saudi Arabia later in the current decade, the largest growth on a percentage base is projected to be seen in the acrylonitrile segment. As the domestic derivative slate becomes more varied over the next few years, it will provide a balance to the fast-expanding PP segment. Nonetheless, PP is currently projected to consume, on average, almost 79.3% of all regional propylene supplies more than 87.6% in the longer term.

Propylene demand will essentially grow with supply, as most of the new derivative capacity is tied to upstream propylene production. While nearly all of the new propylene production will be exported in the form of PP, other derivatives will also see export growth in the forecast period, and the country is projected to move to a net exporting position for acrylonitrile by 2028. Propylene oxide and cumene are also projected to have rapid demand growth in the forecast time.

Trade

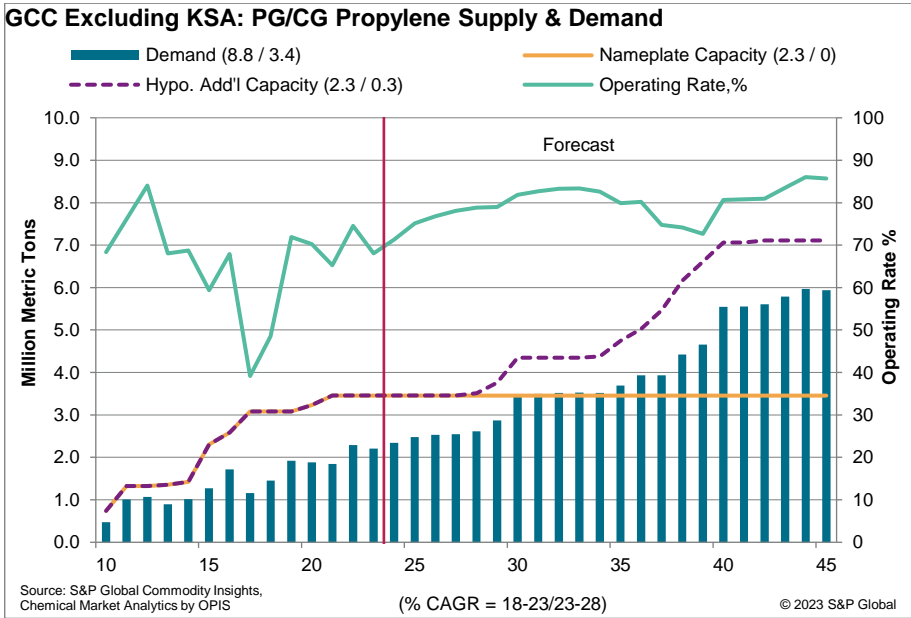


KSA has historically been a net exporter of propylene derivatives. Saudi Arabia has been PP exporters for several years.

Propylene monomer exports are also being seen, although in smaller volumes relative to the large derivative trade, mainly because of the much higher cost of transportation. Initially, these came from Jubail Chevron Phillips, which has no associated propylene derivative capacity. However, the sharply increasing derivative requirements have constrained export volumes from Saudi Arabia. The start-up of a metathesis unit in Rabigh (as part of Petro Rabigh’s second phase) has occasionally allowed the producer to export its propylene surplus; the scale of the unit is a little larger than needed for the associated cumene unit. Occasional exports were seen in 2018. In 2020 and 2022, propylene production and demand were below their pre-pandemic levels owing to shipping bottlenecks, which temporarily limited propylene monomer and propylene derivatives exports. In 2023, exports of propylene monomer are broadly increased, reaching 150 thousand metric tons. In the long term, KSA will remain as a net exporter of propylene, and the export volume will remain at 225 thousand metric tons per year during forecast time.

4.1.3 GCC Excluding KSA

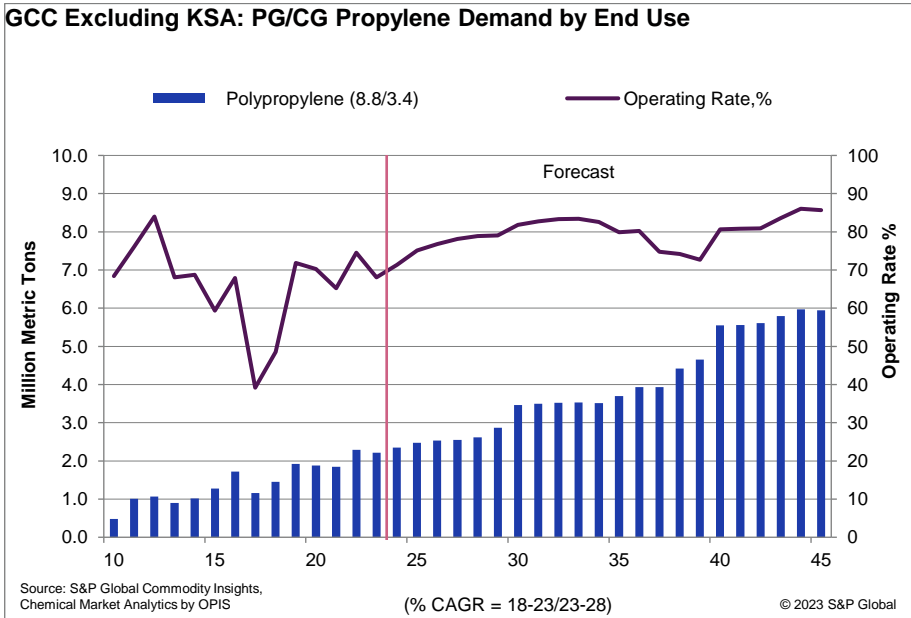
Supply

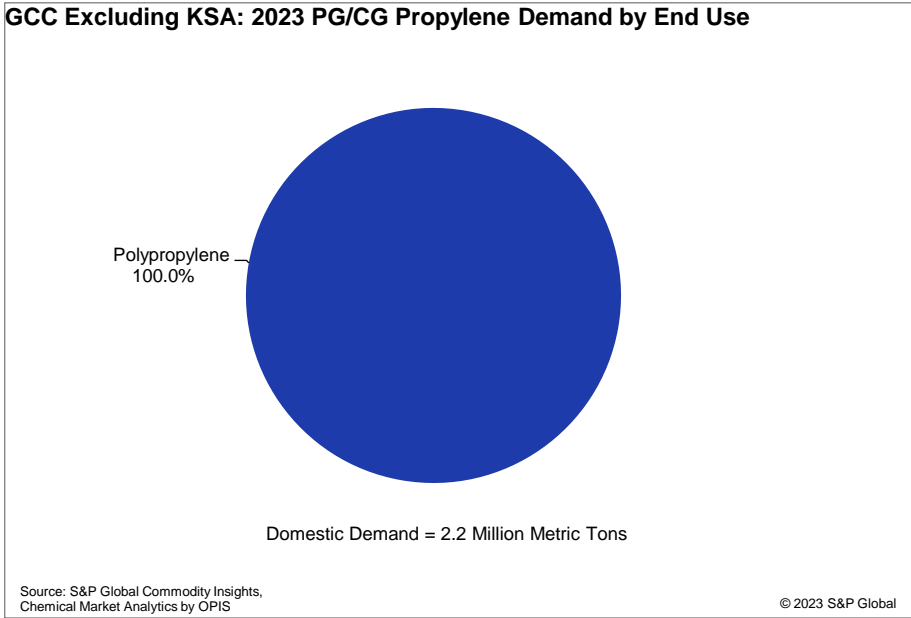


There is no propylene capacity for Bahrain and Qatar. In Kuwait, there is only one propylene producer in 2023, Equate Petrochemical Company has total 243 thousand metric tons propylene capacity. In Oman, there is only one propylene producer in 2023, OQ SAOC has total 710 thousand metric tons propylene capacity. In UAE, there are two propylene producers in 2023, Abu Dhabi Polymers Company Ltd (Borouge) has total 877 thousand metric tons propylene capacity, and ADNOC Refining Company has 1625 thousand metric tons propylene capacity.

Since 2010, regional propylene capacity has increased steadily, driven by the development of on-purpose, petrochemical, and refinery-based production. However, the production dropped in 2017 and 2018 due to a fire-hit refinery unit owned by Abu Dhabi National Oil Corp (ADNOC) in January 2017. Currently, the propylene capacity in the GCC countries (excluding KSA) is 3.4 million metric tons. By the end of the forecast period, this capacity is expected to double in GCC countries (excluding KSA).

Demand



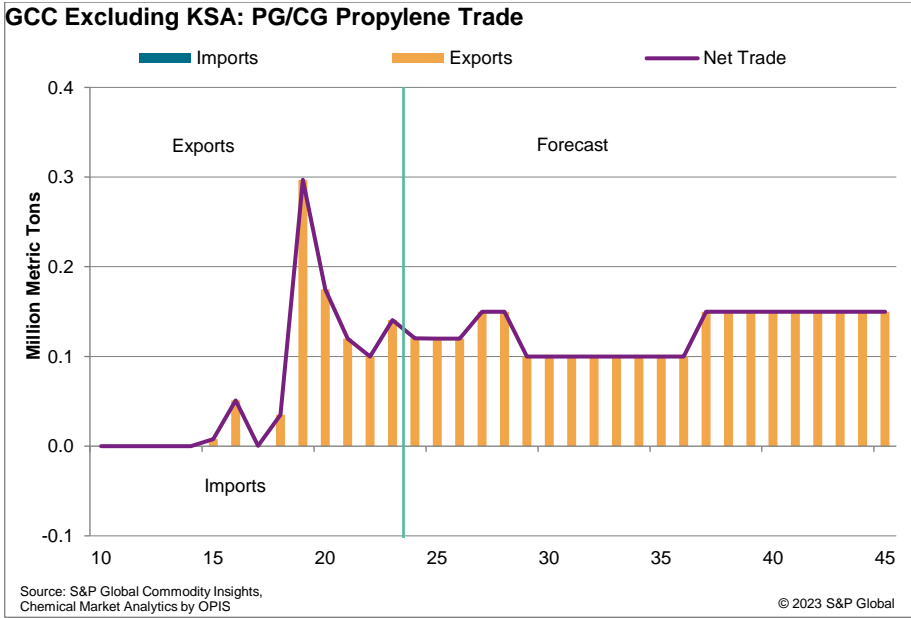


The GCC (Excluding KSA) countries faced limited access to technologies for manufacturing propylene derivatives such as propylene oxide. In the GCC (Excluding KSA) countries, propylene's only downstream demand is for polypropylene (PP).

In 2023, the total demand for PP is 2.2 million tons. In the UAE, the demand for propylene for polypropylene (PP) production is approximately 1.7 million metric tons. There is no demand for propylene in Bahrain and Qatar. Oman has a demand of around 0.4 million metric tons, while Kuwait's demand stands at only 125 thousand metric tons.

PP will remain the exclusive demand in these countries. The production of PP from propylene is expected to increase in tandem with propylene growth, exhibiting an annual growth rate of 3.4% in next five years.

Trade



The GCC (Excluding KSA) countries is a net exporter of propylene monomer, and UAE is the only exporter.

In the United Arab Emirates, the refinery/cracker complex in Ruwais moved to a longer position on propylene by 2015 after the refinery and metathesis start-ups—although the complex was seeking to move into structural exports of propylene, supply was unreliable and modest. Exports stabilized in 2016, but a fire at the Ruwais FCC unit in early 2017 limited production the following year and stopped further exports. However, after a PDH start-up in 2018 and the restart of the ADNOC’s refinery and metathesis unit in 2019, the United Arab Emirates exported regularly from 2019-2021. This export flow continues, though at reduced rates after the new PP unit started up earlier in 2022. Throughout the forecast period, the UAE is anticipated to be a net exporter, with export volumes expected to range between 100 to 150 thousand metric tons.

4.2 Polypropylene

4.2.1 Global Overview

Heightened health and safety concerns in response to the COVID-19 pandemic have increased the demand for PP-based food, bulk, and commodity packaging. Steep increases in food deliveries, a preference for smaller individual package sizes, and new packaging for green groceries have resulted in additional demand for food packaging. Furthermore, the shift in consumer spending toward goods rather than services (e.g., entertainment, restaurants, and travel) during the pandemic led to a surge in demand for electronics, computers, appliances, furniture, and sports equipment that were manufactured primarily in mainland China and other Asian economies and shipped worldwide. Another PP demand driver will be increased government spending on infrastructure, transportation, and building projects. PP is used in wires and cables, as well as pipes. Governments in the US, Europe, and Asia Pacific are considering or have already started to implement large infrastructure spending projects that will support the replacement of aging systems (mainly in developed economies such as the US) or the building of new transportation networks.

The most critical element in determining the future cost competitiveness of PP is the price of propylene feedstock. Propylene monomer can be produced in one of the following three ways: 1) as a by-product from refineries that primarily make motor gasoline, 2) as a coproduct of steam crackers that primarily produce ethylene gas, and 3) as a core product from on-purpose technologies, such as propane dehydrogenation (PDH). The shift in global steam cracker feeds toward lighter, natural gas-based feedstocks over the last decade has increasingly limited by-product propylene output. In response to decreasing propylene production volumes from the two traditional sources, steam crackers and refineries, capital projects for on-purpose production of propylene, such as PDH, have proliferated. PDH units' exclusive reliance on propane as feedstock will pose a dilemma: either propylene prices will need to rise in order for PDH units to compete with other propane end-use industries, or higher-cost PDH units will be forced to reduce operations or rationalize. In both cases, propylene cost for PP producers would rise, making PP less competitive than other plastic and non-plastics materials.

Health and safety concerns raised by the rapid spread and high contagion rates of COVID-19 have led to a resurgence in plastics demand. At the same time, the implementation of sustainability policies and recycling mandates has been delayed or limited. However, it is expected that the trends toward plastics circularity with a greater emphasis on mechanical and chemical recycling and outright bans on plastics goods, especially for single use, to resume. Apart from government policies, the trend toward sustainability is supported by growing consumer preferences for greener products and plastics waste reduction. In the financial sector, environmental, social, and governance (ESG) considerations have increasingly come to the forefront in making investment decisions.

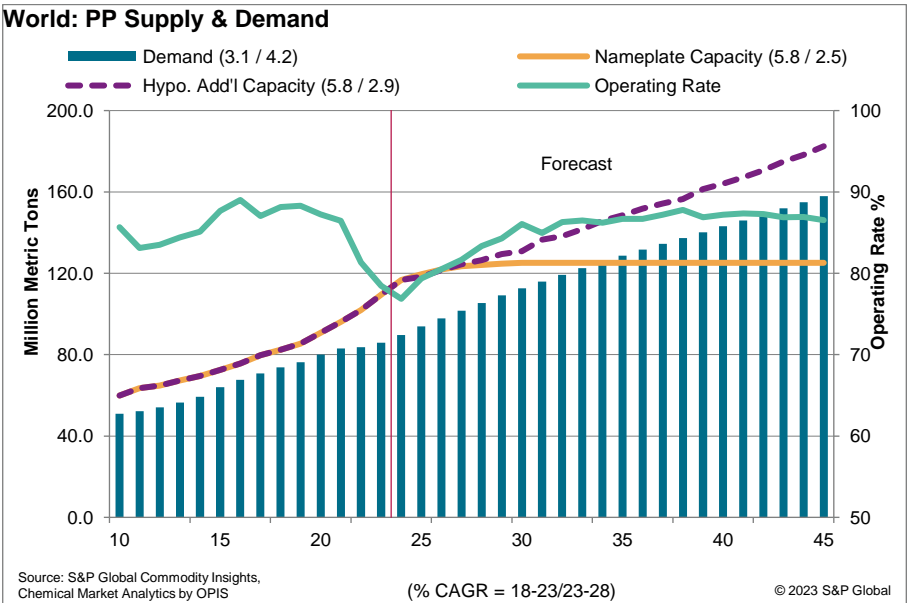
Over the years, polypropylene (PP) resin has gained popularity in all spheres of day-to-day usage to niche applications. A perfect combination of light weight, excellent chemical resistance, relatively high rigidity, and high cost-competitiveness, make it a preferred choice to cater to multiple requirements.

Polypropylene (PP) also has the second-largest market of commodity thermoplastic resins in the world after combined PE grades; PP homopolymer is the most-consumed single-grade plastic. With advancements in manufacturing technology and catalyst, there has been tremendous improvement in the properties of PP grades, which has allowed PP to successfully replace other non-polymer materials such as paper, metals, and wood in conventional applications over the years.

PP manufacturing assets, due to their heavy capital-intensive nature, remain dominated by big players in the oil and gas and petrochemical world, mostly operating the units in a refinery integrated setup, utilizing their vast market share and infrastructure synergies. SINOPEC, LyondellBasell, CNPC, Borealis (Abu Dhabi government), Reliance Industries, SABIC, Total, and ExxonMobil are the top producers of polypropylene; the top 15 producers represented majority of total global capacity.

At the global level, regions continue to invest in the PP market with different strategies. Where markets such as mainland China, India, and Canada, with huge supply deficits, are aiming to reduce their reliance on imports, the Middle East and Russia are investing to capture the global market with their cost-competitive product by leveraging low-cost feedstock availability.

Supply

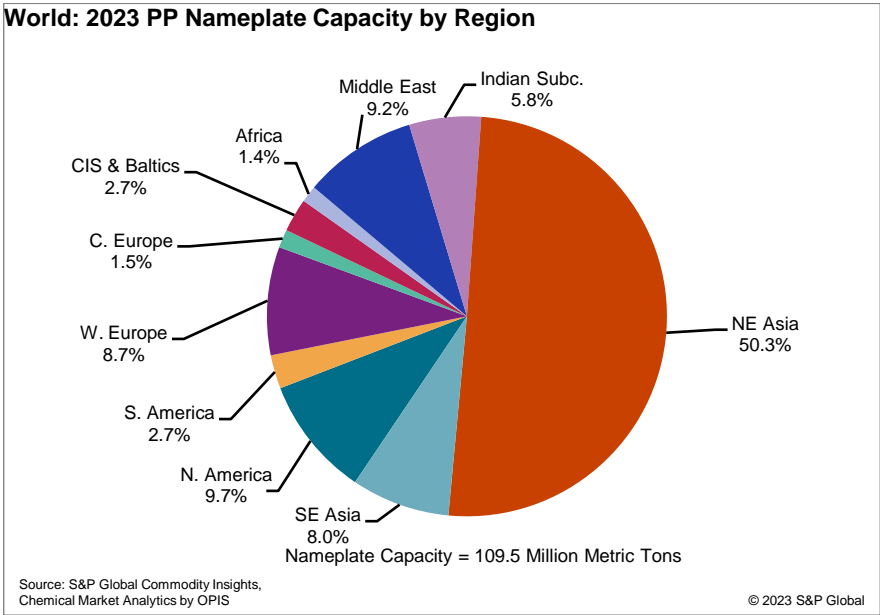


Global nameplate capacity of polypropylene stands at around 109.5 million metric tons as of 2023. It is expected to reach around 124.1 million metric tons by 2028. Hypothetical capacity addition of 2.2 million metric tons is expected by 2028 and of around 57.3 million metric tons is expected by 2045.

In 2023, nearly 85.9 million metric tons of PP product is estimated to be produced globally, at an average operating rate of 78%. In the 2021–23 period, new capacity of about 18.7 million metric tons, primarily in the developing regions such as mainland China, brought global PP capacity to 109.5 million metric tons.

In past five years, PP capacity has grown at an average rate of 5.8% per year. While the developed nations such as the United States and Western Europe remained low-key in terms of new investment, developing markets such as mainland China and India were at the top of their games. Asia and the Indian Subcontinent together added 23.3 million metric tons of new capacity to register a growth rate of 8.4% per year in the last decade. This trend is expected to continue, with developing nations standing at the forefront and driving developments in the PP resin market. Mainland Chinese PP capacity additions will be significant, with around 8.5 million metric tons of new capacity being added by 2028. This will represent more than 58% of the total new PP capacity expected by 2028. Total global capacity (including hypothetical capacity) for polypropylene is forecast to reach almost 126.4 million metric tons by 2028.

With the rise of shale gas and other light cracker feedstock, PP manufacturers around the globe have been struggling with the smooth availability of propylene feedstock, which is considered to be a coproduct of ethylene through the cracker. However, to secure an unhindered feedstock supply many companies like Interpipeline, Borealis, and several producers in mainland China are now investing in new on-purpose propylene technologies such as PDH, CTO, and MTO along with the PP units.



During the beginning of the century, regions such as North America, Europe, and Japan together accounted for more than 62% of global PP capacity. However, with the rise of developing nations, particularly in Asia, investment started to pour in and as of 2020, Asia and the Middle East together hold around 72.5% of total world capacity, with mainland China alone operating 38%. In 2023, the top three PP producers—Northeast Asia (50.3%), North America (9.7%), and Middle East (9.2%)—accounts for 69.2% of the world’s PP production capacity.

PP manufacturing assets, due to their heavy capital-intensive nature, remain dominated by big players in the oil and gas and petrochemical world, mostly operating the units in a refinery integrated setup, utilizing their vast market share and infrastructure synergies. In the Middle East, Saudi Aramco, and the Abu Dhabi government through its subsidiaries Borealis and Borouge are the major players on the global level.

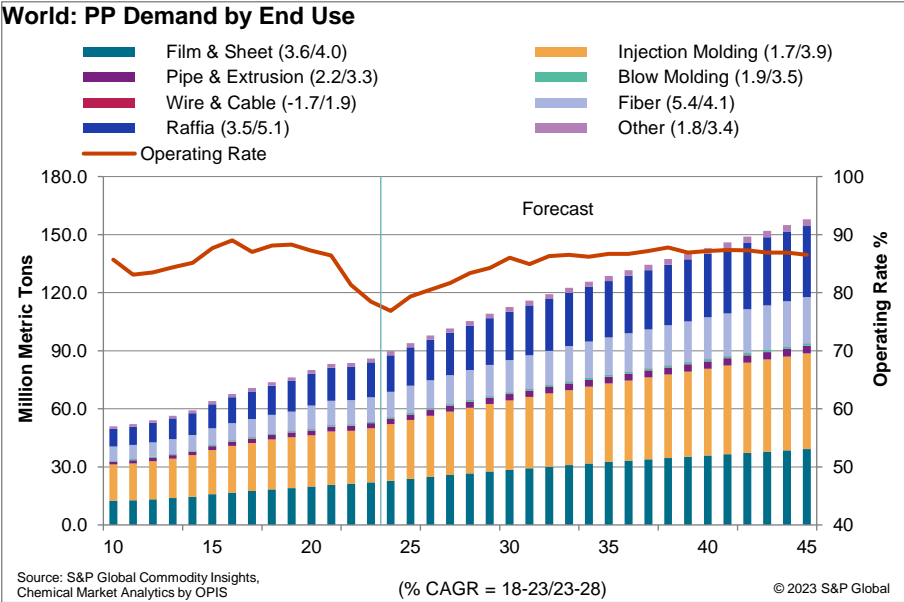
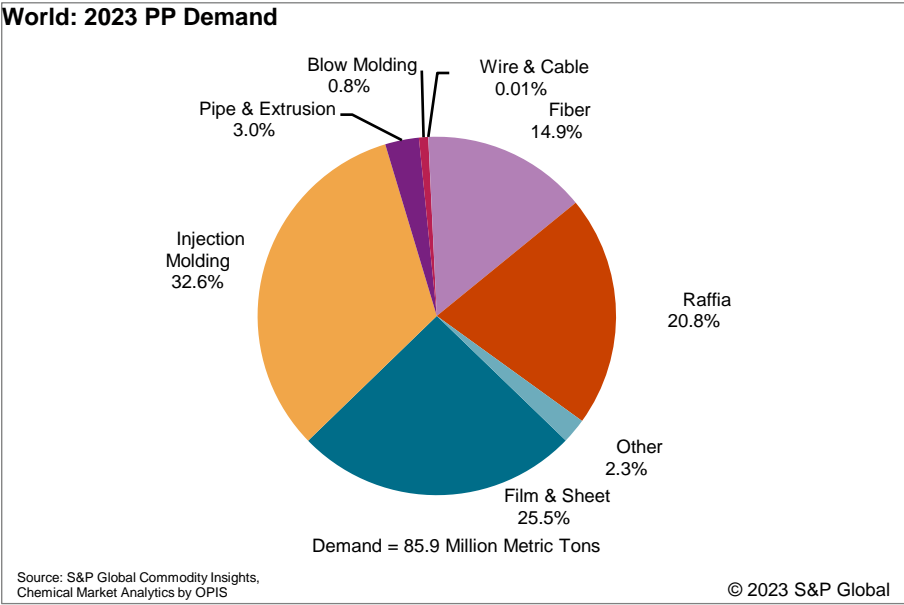
Most PP producers have no captive use for the resin, but a few large companies, such as LyondellBasell, operate downstream converting or compounding operations or own shares in companies that process PP. Many of the major PP producers are integrated upstream to propylene production.

While new applications continue to be developed for PP, it is still largely a commodity thermoplastic subject to economic fluctuations, especially in the area of durable goods. Producers continue to struggle with sustaining profitability, where cost volatility often undercuts the ability to recover pricing in tightly supplied markets. Competitors have consolidated, formed joint ventures and alliances in order to secure feedstock, and pursued broader commercial positions and/or technologies to streamline and hopefully reduce the profit volatility of their businesses.

The players in the PP industry are going through a series of restructuring and consolidations, primarily in mature markets such as Western Europe and Japan. Consolidation not only impacts scale and size but also influences control of and access to technology.

Demand

In 2023, polypropylene resin demand is estimated to be 85.9 million metric tons, which is nearly the same as the previous year. In short term, between 2023-28, it is expected to grow at CAGR of 4.2% to reach around 105.4 million metric tons by 2028. In long term, between 2023-45, it is expected to grow at CAGR of 2.8% to reach around 157.9 million metric tons by 2045.



As of 2023, Injection molding is the largest market segment of polypropylene globally, accounting for 32.6% of the total consumption of polypropylene, followed by film & sheet, raffia and fiber, accounting for 25.5%, 20.8% and 14.9% of the total consumption respectively. Raffia is the fastest growing application, which is expected to grow at CAGR of 5.1% between 2023-28. The growth in raffia demand is primarily driven by increasing demand in Asian countries, notably China, India, and Southeast Asian countries. In China, raffia, particularly in the form of woven sacks, is extensively used in packaging construction materials, chemicals, fertilizers, and agricultural products. The health of the construction industry plays a crucial role in determining the demand for bulk cement, influencing the growth of woven sacks. In Southeast Asia, raffia is utilized in heavy-duty packaging bags, with woven sacks being a major component due to their moisture resistance, chemical inertness, and resistance to rotting and fungus. The SEA market also benefits from increasing disposable incomes and rapid urbanization, further boosting the demand for raffia. In India, polypropylene woven sacks have replaced traditional jute and paper bags for cement packaging, driven by rising disposable incomes and urbanization trends. Overall, the demand for raffia is expected to increase due to these factors in the forecast period.

Followed by fiber and film & sheet applications, which are expected to grow at CAGR of 4.1% and 4.0% respectively during the same time frame.

The impact of COVID-19 was felt most keenly in the largest injection-molding segment, where growth from rigid packaging and medical products was more than offset by declines from durable goods such as vehicles and other industrial applications. In contrast, PP film and sheet used for packaging, raffia for bulk containers and shipping bags, and PP fiber for face masks and medical gowns benefited from higher demand during the pandemic. Persisting health concerns, as well as a shift in consumer preference toward ecommerce that has led to a step change in demand for packaging materials, are supporting the much more positive outlook.

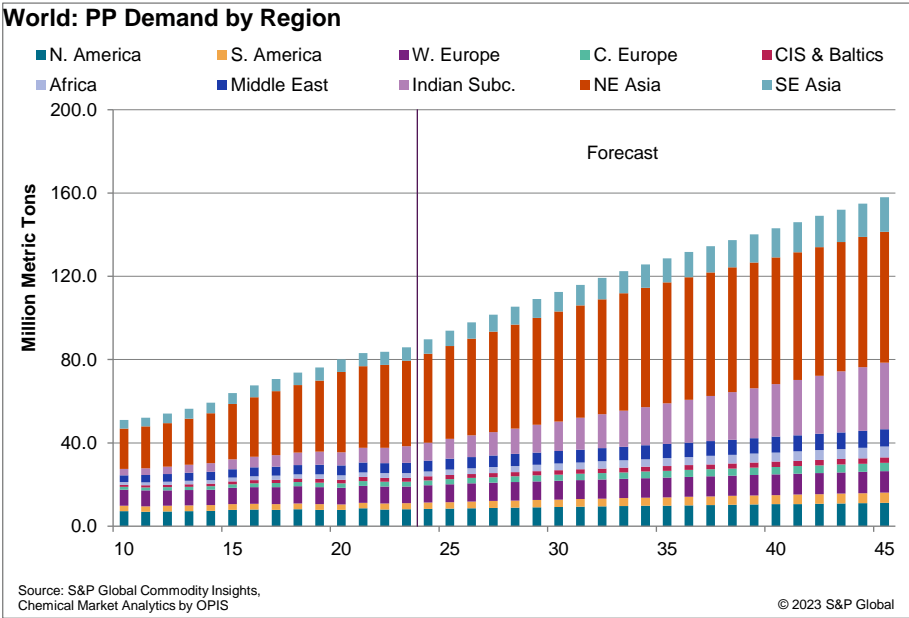
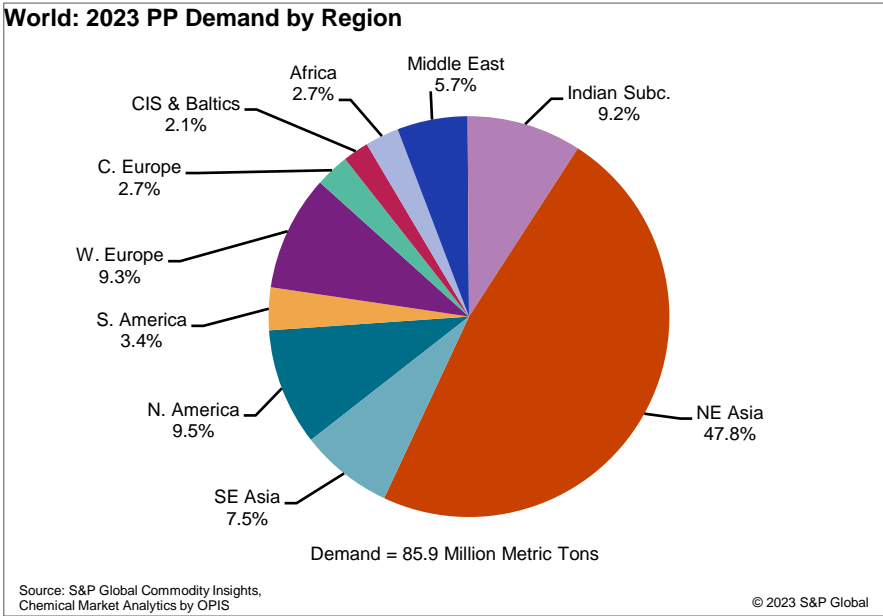
Through the forecast period, increases in consumption of PP are expected to result from a combination of growth in traditional uses and new applications, where PP can deliver a cost advantage and/or performance enhancement, such as in automotive or water pipes. Demand for both neat (100% PP) and compounded products (i.e., glass-filled, or enhanced thermoplastic olefins [TPOs]) is growing rapidly as light-weighting of vehicles to reduce fuel consumption remains an important goal for the global auto industry. The potential electrification of vehicles could be another opportunity for PP to replace higher-cost engineering resins under the hood once lower temperatures are achieved with the removal of conventional motor engines.

As of 2023, Northeast is the largest consumer of polypropylene in the world, accounting for 47.8% of global consumption followed by North America and West Europe with the share of 9.5% and 9.3% respectively.

The wide range of PP demand growth rates across countries and regions reflects the disparity between emerging-market economies and the more developed regions. Demand in Northeast Asia, which represents an estimated 47.8% of global PP demand and is forecast to grow by almost 4.0% between 2023 and 2028, will continue to drive global PP demand

growth. Growth during the forecast period will also be supported by Southeast Asia and India, although from much smaller bases.

By 2028, world consumption of PP is expected to reach 105.4 million metric tons. Growth will be fastest in the Indian Subcontinent with (9.1%), Southeast Asia (5.9%), Africa (4.5%) and Northeast Asia (4.0%), between 2023 and 2028. More significantly, of the nearly 19.4 million metric tons of consumption growth expected to occur by 2028, around 45% will be attributed to Northeast Asia (8.8 million metric tons), followed by the Indian Subcontinent with 4.3 million metric tons and Southeast Asia with 2.1 million metric tons. In contrast, the North America and Western Europe combined will account for only about 1.7 million metric tons of additional consumption between 2023 and 2028.



There are important differences in the major regional end-use patterns of PP across regions and countries. For instance, Asia consumes about 70% of polypropylene in extrusion applications; the rest of the world consumes less than 54% in the same applications. Fibers and fiber structures accounted for about 44.4% of the PP consumed in mainland China; only the Indian Subcontinent and Africa consume a similar proportion for fibers, primarily for raffia. Developed regions such as Europe and the United States consumed an average of about 20% for these applications, primarily for fiber. Mainland China holds more than 50% of world production of pipe extrusion grade PP.

The injection molding end-use category seems to be inversely related to the maturity and overall growth of consumption in countries and regions. That is, as country/region use matures and growth slows, the PP end-use breakdown shifts toward injection molding, perhaps because molding growth is a function of intermaterial substitution, which takes time to occur. Further, the fact that injection molding products are closely related to automobile, medical, and food storage applications makes the segment more aligned to mature economies.

Transportation constitutes one of the major end-use markets for injection-molded PP. PP’s very low density (0.89–0.91 gram per cubic centimeter) combined with its good mechanical properties (especially when filled or compounded) and injection-molding characteristics make it especially suitable for the large-volume cost- and weight-conscious automotive market. Numerous other types of products are injection molded from PP, including container caps and closures, appliance parts, disposable syringes, and a wide variety of household and miscellaneous products.

As fiber, PP is used in carpet backing and has a strong growth market in carpet face yarn, particularly in Turkey, Egypt, and Iran. PP fiber also plays an important role in the nonwovens market, an end use that continues to experience rapid growth in virtually every region in the world. Raffia (slit-film fiber) is used largely for woven sacks and jumbo bags used for shipping construction materials, fertilizers, commodities, and agricultural products.

PP film provides excellent optical clarity and low moisture-vapor transmission, enabling its use in snack-food packaging, pressure-sensitive tape backing, and labels. Smaller markets for PP films include a diverse group of product areas such as

shrink-film overwrap, capacitor and other electronic industry films, photographic and graphic arts applications, soft-goods overwrap, and disposable diaper tabs and closures.

Early difficulties in processing PP via thermoforming and blow molding were overcome by both process and resin improvements. As a result, significant growth in markets in packaging, appliances, and automotive applications should continue in the next five years.

In March 2022, the United Nations Environment Assembly adopted a resolution to develop a legally binding agreement to end plastic pollution. The resolution has a broad scope, aiming at the entire lifecycle of plastics from production to disposal. An intergovernmental committee has been tasked with drafting a legally binding agreement by 2024. However, ahead of the initial round of negotiations on a global treaty, differences in the approach to dealing with plastic waste have emerged. While a number of countries are favoring the development of national action plans, others are advocating for global standards, bans and restrictions on plastics.

The European Union (EU) is at the forefront of the global sustainability movement to transform the plastics economy and has announced bold regulations and initiated sweeping reforms to achieve 1) resource (fossil fuel) conservation, 2) prevention of environmental leakage, and 3) extension of the plastics life cycle by replacing more virgin resin with secondary raw material derived from plastic waste. One of the key initiatives is phasing out single-use plastics.

Under the EU Directive 2019/904, or the “Single-Use Plastics (SUP) Directive,” numerous plastic goods and packaging in the food and beverage segments have been prohibited from being distributed in the EU markets since 3 July 2021. Additional regulations in the EU Directive pertain to mandates for recycled content, Extended Producer Responsibility (EPR), and labeling requirements. While implementation will be uneven among EU member states, the EU Directive will have a significant impact on virgin resin consumption in the medium and long term. The impact will be amplified by a shift in consumer behavior and preference for “green” or recycled materials among consumer packaging companies. Under our base case scenario, we anticipate demand from PP recycle to approach 5 million metric tons by the end of the decade based on deselection in disposable packaging and a decisive shift in consumer behavior.

Outside of the EU, governments worldwide are adopting similar policies with a focus on single-use plastics bans. In addition, numerous countries are supporting investments in new plastics recycling plants and research into biobased polymers.

Brand owners have issued very ambitious targets for the reduction of virgin plastics content that could be achieved via increases in mechanical recycling, usage of biodegradables or compostables, and a switch to alternative materials such as glass or aluminum. Advanced/chemical recycling, achieved via depolymerization, cracking, gasification, or degradation, would provide another alternative, but it will likely take about 5–10 years before a commercially viable technology is developed. When considering carbon emissions for HDPE production, mechanical recycling compares very favorably against chemical recycling when excluding collection and sorting. In fact, chemical recycling via one of the most promising technologies, namely mixed plastics pyrolysis, may have even slightly higher emissions than the production processes of virgin HDPE resin from hydrocarbon feedstocks.

The EU carbon border adjustment mechanism (CBAM = carbon border tax) aims at establishing parity between plastics producers within and outside of the EU with regard to carbon emission charges. While EU plastics producers have to pay carbon taxes under the carbon emission trading scheme (cap and trade model), plastics exporters to the EU market generally are not (yet) subject to emission charges within their home countries. The competitive disadvantage of EU plastics producers could potentially lead to the relocation of plastics production outside of the EU, thereby undermining the intention of the EU carbon tax. A recent EU Parliament report on CBAM outlined the need to cover organic chemicals, hydrogen, and polymers from the outset, thereby broadening the original scope that had included cement, fertilizer, iron/steel, aluminum, and electricity.

The film and sheet segments are likely to be most impacted by deselection, followed by the injection molding and blow molding segments. There is an effective global movement against single-use plastics, including plastic straws typically made from PP, which are viewed as contributing to environmental pollution. The potentially biggest impact of deselection in the case of PP is expected to take place in the fiber and raffia segments. In particular, raffia that is used to make retail and bulk bags for commodity packaging is forecast to experience the biggest drop in volumes as other, more environmentally friendly products gain traction. In the Asia Pacific region, the expected shift from 25-kilogram bags to bulk (jumbo bags) and eventually to lined containers (like the European/American system) will significantly reduce demand for heavy-duty PP packaging. Furthermore, thermoformed PP trays and containers will be replaced with fiber-form trays and containers.

Recycled PP is already used in numerous applications including woven bags, handles, trash cans, sports equipment, trays, plastic baskets, toys, stationery, luggage, cosmetics boxes, and audio-visual products. The percentage of PP recycle content in raffia/yarn applications ranges from 15% to 40%, being especially high in mainland China and in PP woven bag applications. The percentage will typically reflect economic factors and grows with the supply of recycle. In India, owing to high downgauging, converters are not keen to use recycled PP for fear of quality failure. Therefore, the consumption of recycle-based raffia is moderate for cement and fertilizer packaging because of stringent technical specifications regarding mechanical properties. Medicine packaging is currently dominated by coated aluminum foil or paper but is anticipated to be replaced by PP/HDPE bottles given the ease of collection and recycling.

Trade

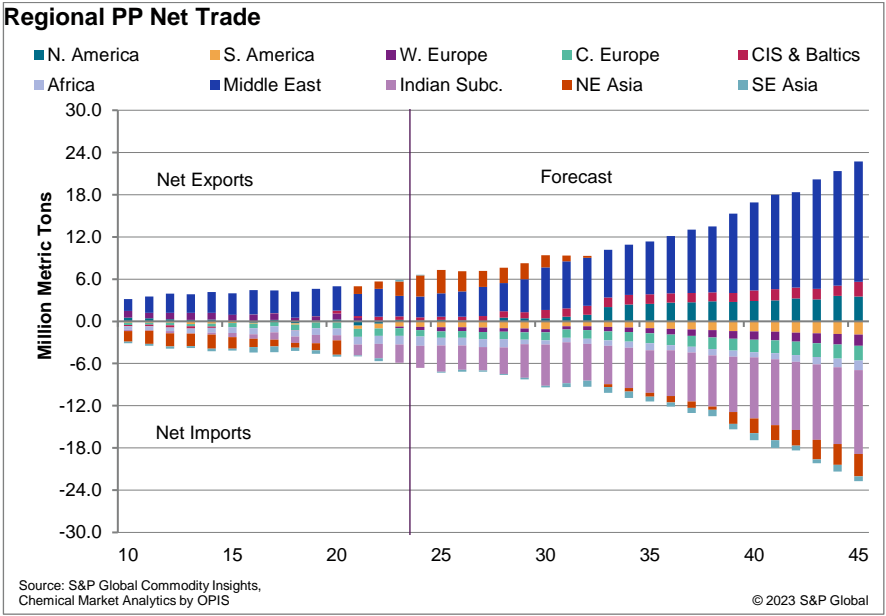
In 2023, world PP trade is about 26.2 million metric tons, or about 30.5% of the polypropylene produced. Northeast Asia is the largest importer of PP, accounting for about 5.1 million metric tons or 19.4% of total PP is traded in 2023. Southeast Asia is the next-largest market, at 4.0 million metric tons.

The Northeast Asia is also the largest exporter of PP resins, with exports of more than 7.1 million metric tons, or nearly 27.2% of the world total in 2023. Middle East is the second largest exporter of PP resins, with exports of 6.0 million metric tons. Southeast Asia is also the third-largest importer of PP, accounting for 4.2 million metric tons.

Indian Subcontinent and Africa are the largest net importers whereas Middle East and Northeast Asia are the largest net exporters in next five years.

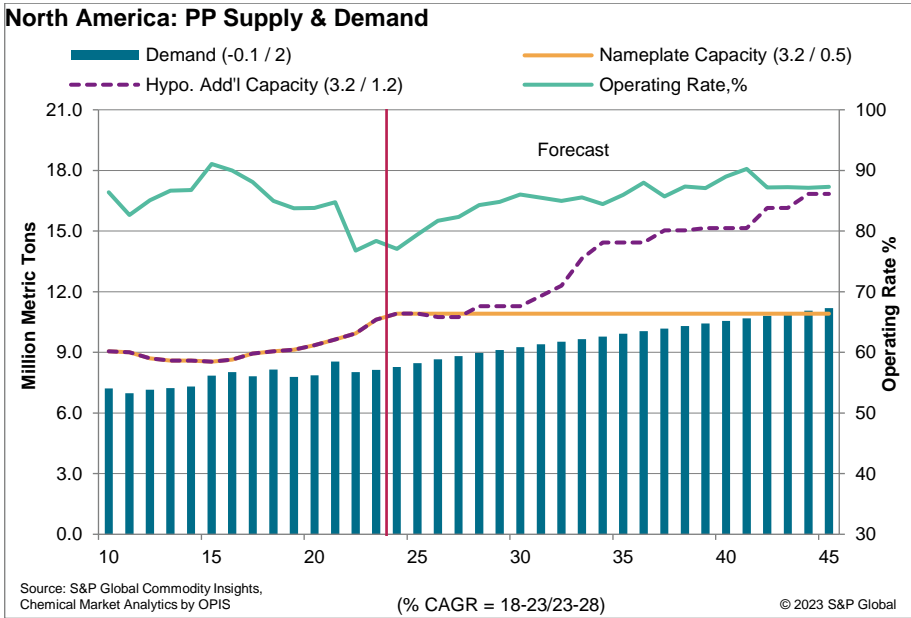
Northeast Asia has turned to a net exporter since 2021. Countries in the region including South Korea and Taiwan are expected to increase their production strongly, with domestic demand expected to remain the same. This clearly signifies that PP producers in the country are targeting buyers outside of the country.

By 2028, world PP trade is expected to increase to about 29.6 million metric tons or nearly 28.1% of polypropylene production and consumption. Northeast Asia will be the largest importer of PP, accounting for about 6.1 million metric tons, with mainland China still the most important destination. By 2028, the Middle East will account for 7.7 million metric tons of PP exports. The Middle East will also be a supplier to Africa, the Indian Subcontinent, and Southeast Asia and Northeast Asia.



4.2.2 North America

Supply



With an installed PP capacity of about 10.6 million metric tons equal to 9.7% of world capacity in 2023, North America continues as the second-largest PP producer in the world, following Northeast Asia. In short term, by 2028, the regional nameplate capacity is expected to increase to 10.9 million metric tons. United States and Mexico accounts for 88.6% and 6.5%, respectively, of total regional capacity in 2023. The remaining share is taken by Canada, around 4.9%. In 2023, Canada has re-entered the world of PP producers with the commissioning of its 525 thousand metric ton integrated PDH-PP Inter Pipeline project in 2022, which ramps up to its full capacity by 2023. ExxonMobil Chemical Company started a 450 thousand metric ton dual-reactor plant in 2023, which impacts copolymer capabilities. Additionally, in 2024 Formosa Plastics Corporation, U.S.A. plans to start a 250 thousand metric ton dual-reactor, impact copolymer-capable PP plant.

Top five shareholders of polypropylene in region as of 2023 include LyondellBasell Industries N.V (18.6%), Exxon Mobil Corporation (15.2%), Total Energies SE (10.9%), Formosa Plastics Group (8.3%) and INEOS Group Ltd (8.1%). Together, they make up around 61.1% of the regional production capacity.

Operating rates are estimated to be 78% in 2023 and production is estimated to be 8.3 million metric tons. In short term, between 2023-28, it is expected to grow at CAGR of 2.7% to reach around 9.5 million metric tons by 2028 and in long term, between 2023-45, it is expected to grow at CAGR of 2.6% to reach around 14.7 million metric tons by 2045. Historically, North America has accounted for at least 10% of global PP production, until 2020 when it dropped to 9.9%. It stayed at 9.9% in 2021 and dropped to 9.2% in 2022, and is estimated to drop to 9.7% in 2023, followed by an average of 9.1% from 2023 to 2028. This is mainly due to mainland China increasing their production. Operating rates are expected to average around 81% between 2023-28 and around 85% in long term, between 2023-45.

Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)													
Company.Name	Country/Territory.Name	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Heartland Polymers Ltd	Canada	Gas Phase	0	0	0	0	260	525	525	525	525	525	525
Indelpro, S.A. de C.V.	Mexico	Gas Phase	425	450	450	450	450	450	450	450	450	450	450
Indelpro, S.A. de C.V.	Mexico	Liquid/Gas Phase Comb.	240	240	240	240	240	240	240	240	240	240	240
Braskem America, Inc.	United States	Liquid/Gas Phase Comb.	336	336	336	336	336	336	336	336	336	336	336
Braskem America, Inc.	United States	Bulk Slurry	240	240	240	240	240	240	240	240	240	240	240
Braskem America, Inc.	United States	Multiple Gas Phase			152	450	450	450	450	450	450	450	450
Braskem America, Inc.	United States	Liquid/Gas Phase Comb.	354	354	354	354	354	354	354	354	354	354	354
Braskem America, Inc.	United States	Hydrocarbon Slurry	0	0	0	0	0	0	0	0	0	0	0
Braskem America, Inc.	United States	Multiple Gas Phase	207	207	207	207	207	207	207	207	207	207	207
Braskem America, Inc.	United States	Gas Phase	207	207	207	207	207	207	207	207	207	207	207
Braskem America, Inc.	United States	Multiple Gas Phase	227	227	227	227	227	227	227	227	227	227	227
Equistar Chemicals LP	United States	Liquid/Gas Phase Comb.	242	252	252	252	252	252	252	252	252	252	252
Equistar Chemicals LP	United States	Multiple Gas Phase	181	181	181	181	181	181	181	181	181	181	181
Equistar Chemicals LP	United States	Liquid/Gas Phase Comb.	242	252	252	252	252	252	252	252	252	252	252
Equistar Chemicals LP	United States	Bulk Slurry	220	232	265	265	265	265	265	265	265	265	265
Equistar Chemicals LP	United States	Bulk Slurry	220	232	265	265	265	265	265	265	265	265	265
Equistar Chemicals LP	United States	Multiple Gas Phase	110	110	110	110	110	110	110	110	110	110	110
Equistar Chemicals LP	United States	Liquid/Gas Phase Comb.	301	301	301	301	301	301	301	301	301	301	301
Exxon Mobil Chemical Company	United States	Liquid/Gas Phase Comb.	0	0	0	0	38	450	450	450	450	450	450
Exxon Mobil Chemical Company	United States	Bulk Slurry	405	405	405	405	405	405	405	405	405	405	405
Exxon Mobil Chemical Company	United States	Liquid/Gas Phase Comb.	225	225	225	225	225	225	225	225	225	225	225
Exxon Mobil Chemical Company	United States	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300
Exxon Mobil Chemical Company	United States	Bulk Slurry	120	120	120	120	120	120	120	120	120	120	120
Exxon Mobil Chemical Company	United States	Bulk Slurry	110	110	110	110	110	110	110	110	110	110	110
Flint Hills Resources, LLC	United States	Gas Phase	203	203	203	203	0	0	0	0	0	0	0
Flint Hills Resources, LLC	United States	Multiple Gas Phase	203	203	203	203	0	0	0	0	0	0	0
Formosa Plastics Corp	United States	Multiple Gas Phase	137	137	137	137	137	137	137	137	137	137	137
Formosa Plastics Corp	United States	Multiple Gas Phase	133	133	133	133	133	133	133	133	133	133	133
Formosa Plastics Corp	United States	Gas Phase	184	184	184	184	184	184	184	184	184	184	184
Formosa Plastics Corp	United States	Gas Phase	111	111	111	111	111	111	111	111	111	111	111
Formosa Plastics Corp	United States	Multiple Gas Phase	184	184	184	184	184	184	184	184	184	184	184
Formosa Plastics Corp	United States	Multiple Gas Phase	0	0	0	0	0	0	250	250	250	250	250
Formosa Plastics Corp	United States	Gas Phase	127	127	127	127	127	127	127	127	127	127	127
INEOS Americas, LLC	United States	Gas Phase	330	330	330	330	330	330	330	330	330	330	330
INEOS Americas, LLC	United States	Multiple Gas Phase	155	155	155	155	155	155	155	155	155	155	155
INEOS Americas, LLC	United States	Gas Phase	230	230	230	230	230	230	230	230	230	230	230
INEOS Americas, LLC	United States	Multiple Gas Phase	145	145	145	145	145	145	145	145	145	145	145
INVISTA, S.A.R.L..	United States	Multiple Gas Phase	0	0	0	0	203	205	226	226	226	226	226
INVISTA, S.A.R.L..	United States	Gas Phase	0	0	0	0	203	205	226	226	226	226	226
Phillips 66 Company	United States	Multiple Gas Phase	175	175	175	175	175	175	175	175	175	175	175
Phillips 66 Company	United States	Gas Phase	175	175	175	175	175	175	175	175	175	175	175
Pinnacle Polymers LLC	United States	Multiple Gas Phase	252	252	252	252	252	252	252	252	252	252	252
Pinnacle Polymers LLC	United States	Gas Phase	252	252	252	252	252	252	252	252	252	252	252
TotalEnergies Petrochemicals & Refining USA Inc	United States	Bulk Slurry	15	15	15	15	15	15	15	15	15	15	15
TotalEnergies Petrochemicals & Refining USA Inc	United States	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300
TotalEnergies Petrochemicals & Refining USA Inc	United States	Bulk Slurry	15	15	15	15	15	15	15	15	15	15	15
TotalEnergies Petrochemicals & Refining USA Inc	United States	Bulk Slurry	150	150	150	150	150	150	150	150	150	150	150
TotalEnergies Petrochemicals & Refining USA Inc	United States	Bulk Slurry	150	150	150	150	150	150	150	150	150	150	150
TotalEnergies Petrochemicals & Refining USA Inc	United States	Bulk Slurry	220	220	220	220	220	220	220	220	220	220	220
TotalEnergies Petrochemicals & Refining USA Inc	United States	Bulk Slurry	300	300	300	300	300	300	300	300	300	300	300
Total - North America			9,058	9,127	9,345	9,643	9,942	10,622	10,913	10,913	10,913	10,913	10,913

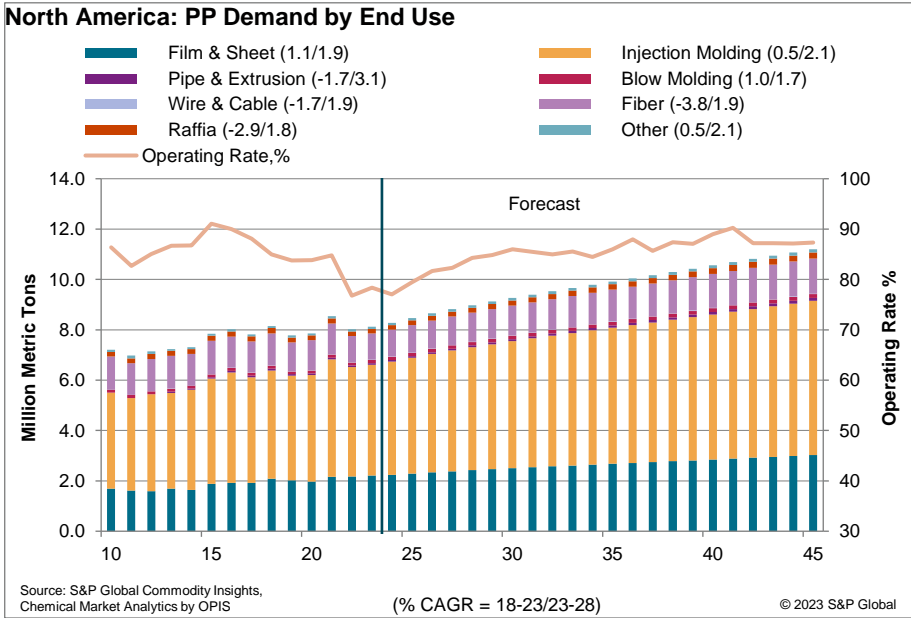
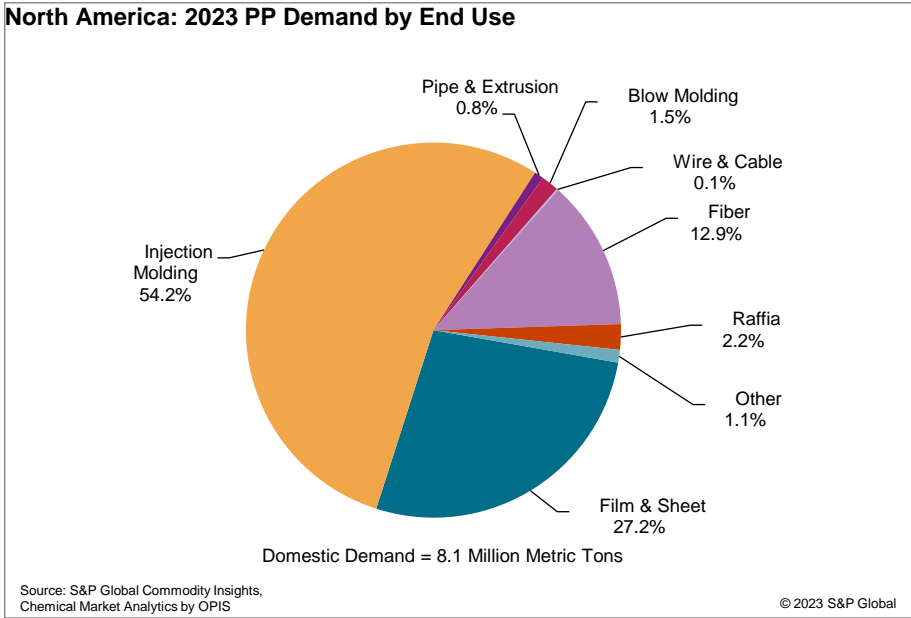
Demand

Around 8.1 million metric tons of polypropylene is consumed in the region as of 2023. The regional is expected to grow at CAGR of 2.0% between 2023-28 and in long term, between 2023-45, it is expected to grow at CAGR of 1.5% to reach 11.2 million metric tons by 2045.

In 2021, the economy emerged from the recession due to COVID and saw almost a 8.7% increase in domestic demand as more regular activities resumed and people working from home continued to purchase snack foods and bottled water, which has labels that contain biaxially oriented PP. However, steep increases in energy prices, fuelled by the Russia– Ukraine conflict that began in February 2022, high inflation, and rising interest rates have caused a global recession, and domestic demand for PP decreased by 6.1% in 2022 to a volume of 8.0 million metric tons. Inflation has caused people to cut back on spending, and since COVID-19 vaccinations have been widely distributed, there is no longer the same incentive for people to wear and buy face masks, eat at home, or only purchase individually packaged foods for sanitary reasons. In 2023, PP demand increases slowly, reaches 8.1 million metric tons, by 1.3% in 2023. PP is a very versatile plastic product, behind only polyethylene (PE) in its consumption in the region and worldwide.

In 2023, the largest market demand segments are injection molding at 54.2%, film and sheet at 27.2% and fiber at 12.9%. The positive demand effect from COVID-19 on fibers market was witnessed. Over the 2023–28 forecast period, demand of injection molding and film & sheet segments, is expected to grow at 2.1% and 1.9%, respectively, on an CAGR basis. Film and sheet encompass cast film, oriented film, as well as packaging sheet, which captures thermoforming. Meanwhile, injection molding represents various subsets led by consumer products (housewares and cups and containers) and automotive (both compounding and “neat” injection molding).

PP is 100% recyclable, “dishwasher top-shelf safe,” and microwavable, making it a big player in the market. Overall PP demand in the region is expected to grow modestly during the forecast period, mainly due to lower demand in some of the major end-use industries including automotive and packaging. Also, the volatility in PP prices is expected to affect the growth negatively. Decisions on material use for a project at the converter level are made one or two years in advance typically. Converters may look to other plastics or other alternative materials if they do not feel comfortable with the volatility in PP prices.



Film and Sheet

In 2023, consumption of polypropylene for film and sheet applications reaches 2.2 million metric tons and by 2028 is expected to account for 2.4 million metric tons at CAGR of 1.9% between 2023-28 and by 1.4% through 2045 to reach 3.0 million metric tons.

More than 20 companies are engaged in the manufacture of PP films in North America. Interplast is the largest producer in the United States. Jindal Films (formerly part of ExxonMobil Chemical Company) and Taghleef (formerly Applied Extrusion Technologies) are major producers with plants in both the United States and Canada.

BOPP films are used in a growing number of markets. Major BOPP applications include food packaging, labels, pressure-sensitive tape backing and tobacco product packaging. BOPP is increasingly replacing paper, foil, polyester, and cellophane, as well as rigid structures for packaging, labels, and overwrap.

Uses of BOPP outside of food and tobacco packaging are growing and include use in adhesive tapes; sheet protectors; overwrap for personal care products, pharmaceuticals, compact discs, tape cassettes, toys, games, auto parts, and office supplies; and non-food label stock. Specialized applications include dielectric film (as a power factor correction capacitor, an application where PP has displaced polyester film) and other electronics applications.

The other films like CPP are used in packaging of textile products (e.g., hosiery, shirts, sheets, and blankets) and display items where eye appeal is important. CPP use is also growing in medical applications, where it is used in medical disposables such as nonadherent facing for bandages and sutures and in lid stock. Other uses for CPP include pressure-sensitive tape backing, twist candy wrap, bakery wrap, flower wrap, photo album, retort pouches, sanitary cover stock, and disposable diaper tabs and closures. In the next five years, the market for PP film is forecast to grow at an above average rate, spurred by continued developments in label manufacture and the greater use of metallized BOPP, or opaque BOPP in food packaging applications.

PP sheet is used for thermoformed packaging applications including multilayer barrier containers, containers for margarine and whipped topping, yogurt and juice cups, cookie trays, microwavable food trays etc. Other range of applications of PP sheet besides packaging include refrigerator door liners, auto load floors and truck liners, foamed and corrugated protective sheet, slip sheets for pallet loading etc.

Injection Molding

Injection molding is one of the largest applications accounting for 54.2% or 4.4 million metric tons of the total consumption of PP in North America in 2023. It is used in variety of application with packaging and consumer goods accounting for nearly

72% of the total consumption of injection molded polypropylene. Automotive and electrical appliances constitute the remaining demand.

In the packaging industry, injection molding is used in the manufacturing of caps and closures and containers for food, toiletries, and cosmetics. The consumer segment constitutes items ranging from kitchen utensils (e.g., reusable microwave cookware and food storage containers), wastebaskets to flowerpots and furniture. Injection molded PP is used both interior and exterior automotive parts as well as in under-the-hood applications. In the electrical appliance segment, PP is used in the manufacturing of major appliances like washing machines, clothes dryers, and dishwashers and in the manufacturing of small appliances like air conditioner louvers, TV cabinets, food processors and steam iron.

The injection molded PP used in the automotive sector can be divided into two major sectors: automotive original equipment manufacturer (OEM) and automotive replacement parts. The products are filled with glass fibers, mica, or talc or blended with other polymers and thermoplastic polyolefin elastomers (TPOs). PP transportation resins are often modified with fillers and other polymers to enhance the resin's physical properties and to reduce the total cost per molded item. The largest OEM market for PP is in interior trim parts where it competes with ABS and other materials. TPOs constitute the major type of injection-molded PP consumed in bumper systems, primarily for bumpers and bumper covers. TPOs are gaining market share based on lower cost, potential recyclability and recently improved paintability.

In addition, smaller markets exist for battery cases (both OEM and replacement), automotive accessories and other transportation parts. Approximately, 0.6-0.9 kilogram of PP is used per battery and recycled resin is extensively used in the manufacturing of PP. Injection molding application is expected to grow at a CAGR 2.1% in the next five years (2023-2028) and 1.5% in the long term (2023-2045).

Pipe & Extrusion

In 2023, an estimated 65 thousand metric tons of PP is consumed in pipe and extrusion applications.

The applications for pipe and extrusion includes PPR (polypropylene random copolymer) pipes and pipe grade coatings, along with other types of PP pipes including PPH (PP homopolymer pipes). PPR pipes are used majorly for hot and cold plumbing systems and other heavy-duty applications including solar energy systems, compressed air systems, and industrial piping systems, while PPH pipes are suitable for application relying on chemical resistance of the pipes e.g., acid filling stations, refineries, electroplating plants, textile mills, water purification and bleaching lines, among others. Pipe grade coating are utilized for coating over primarily steel pipes for high temperature applications.

The total pipe and extrusion application is expected to grow at a CAGR of 3.1% in the near term (2023-2028) and at a CAGR of 2.5% in the long term (2023-2045).

Blow Molding

In 2023, an estimated 123 thousand metric tons of PP is consumed in blow-molding applications.

The market for PP in blow molding has only grown modestly. PP can be extrusion blow-molded, or injection stretch blow-molded into containers. PP containers compete with those made from HDPE, PET, PVC, and polystyrene. PP bottles with improved clarity and processing have been developed in the last few years and further improvements are being developed.

Approximately, 89.8% of the blow molded PP is used in the manufacture of bottles and containers; the other 10.2% is accounted for by medical grade bottles. Typical products packaged in PP blow-molded bottles and containers include noncarbonated beverages (e.g., juice), drugs, IV solutions, syrups, spices, cosmetics, detergents, mouthwashes, shampoos, liquid soaps, and certain household chemicals. These bottles are also widely used in the medical industry (infusion bottles).

In the near term (2023-2028), the use of blow molding is expected to grow at an CAGR of 1.7% and in the long term (2023-2045), it is expected to grow at 1.1%. This is due to use of blow molded bottles in the packaging industry and development of new application in the automotive industry. This kind of growth can be accommodated assuming the molders get more resin over the next few years. They will either need to import PP resin to meet the growing demand or the end use applications will suffer. The key blow molding applications such as those requiring heat resistance and PP copolymer impact properties will be safe, as these constitute for small volume, but considerable profit in the blow molding applications.

Fibers

In 2023, an estimated 1.0 million metric tons of PP is consumed in fibre applications and virtually all the PP used in the fibre is homopolymer. The main fabricators are Shaw Floors-Permacolor Fibers, BBA Fiberwed (now part of The Polymer Group), FiberVisions (part of the Indorama Ventures) and Propex Fabrics, and Kimberly-Clark Corporation.

The application for fiber includes filament, slit film fibers and nonwoven products. Filament, which accounts for 16.3% of the total fibre application, is consumed in apparel, agricultural, carpet, furniture and home furnishings, medical/hygienic products, packaging, and other industrials. Polypropylene slit film fibers are mainly used for industrial strapping solutions owing to their high tensile strength and accounts for 17.2% of the PP demand. Other non-textile applications account for the remainder 4%.

PP nonwoven fabric has gained acceptance in past few years due to its superior quality over other non-knitted textiles, mainly in the field of hygiene products and accounts for 62.5% of the total consumption of PP fibers. The main markets include sanitary cover stock for disposable baby diapers, feminine hygiene, and adult incontinence products. Nonwovens are also consumed in medical/surgical products, geosynthetic fabrics, construction sheeting (i.e., fabrics used as dust covers and cushion wrap in home furniture and in automotive seats and chair backs), industrial garments, agricultural fabrics, and filtration. Fibre has gained a high level of penetration in many nonwovens uses future growth will follow the rate of end-product growth. Disposable baby diaper cover stock will continue to be the largest market for PP nonwoven fibers. Kimberly Clark is a major producer of PP nonwovens.

Within nonwoven application, spun bound nonwoven and staple nonwoven fibers are the largest application areas together accounting for 80% of the PP fiber demand for nonwoven applications. Spun bound nonwoven fiber is utilized to provide the properties of directional tensile strength and tear properties, while staple nonwoven fiber is used to manufacture air filter, water filter and other industrial fabric.

The physical properties of PP fibers, especially tensile strength, abrasion resistance, and inertness to most chemicals including water, make them well suited for functional applications. The majority is consumed by the carpet industry, in nonwovens, and industrial uses and very little PP fibre goes into the apparel industry. The largest fabricator of carpet face yarn is Shaw Industries, followed by Beaulieu Canada and Mohawk Flooring.

The total fiber application is expected to increase at a CAGR of 1.9% in the near term (2023-2028) and at a CAGR of 1.3% in the long term (2023-2045).

Raffia

In 2023, an estimated 179 thousand metric tons of PP is consumed in raffia applications, all of which is accounted for by PP homopolymer.

The applications for raffia include woven sacks, container bags and other applications including. Woven sacks, which accounts for 50% of the total raffia application, is consumed in cement bags, jumbo bags, fertilizer bags and other industrial bulk bags. Container bags, which consume 30% of total PP raffia, are mainly used as FIBCs (flexible intermediate bulk containers). Other raffia application accounting for 20% of the demand include wrapping fabric and ropes. The physical properties of PP raffia, especially elongation and tenacity, are utilized for making industrial packaging out of this grade.

The total raffia application is expected to grow at a CAGR of 1.8% in the near term (2023-2028) and at a CAGR of 1.4% in the long term (2023-2045).

Other

In 2023, other accounts for about 89 thousand metric tons of total PP consumption, with very small volumes being accounts for by roto molding, wire & cable, and extrusion coating applications. A major share includes sales by resin producers to third party sellers (resellers, compounders, and distributors [RDC]). Sales of PP resins to third-party sellers have been in the range of 25–30% of US consumption. Because ACC reporting definitions require reporting of the producer's view of "first use" as the best-known category, sales for third-party use must be recorded as such. This, of course, masks third-party sales that are destined for the secondary end-use markets such as blow molding and injection molding, creating an incomplete picture of end-use consumption. RDCs sell heavily to injection molders, but some resins also end up in fibers, blow molding, sheet, and other extrusion applications.

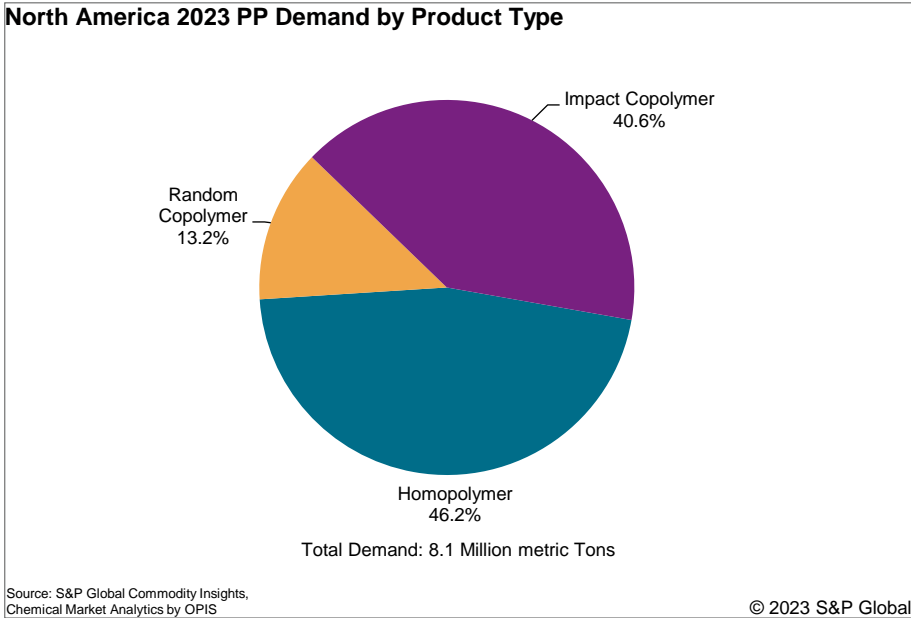
In 2021, recycle demand for PP increased about 47%, as COVID-19 waned, and the market started to focus on recycling again. It was declined by 3.4% in 2022 and is estimated increase 3.7% in 2023. The average annual growth rate of recycle demand through 2028 is 9.6%, significantly higher than that of virgin resin PP demand, although it is growing from a very small base. Currently, brand owners have ambitious targets for reduction of virgin plastics consumption in their products, but there is no clear indication of how they will achieve their goals.

On 20 June 2022, Canada issued its final Single-use Plastics Prohibition Regulations, which came into effect on 20 December 2022—the anticipated effect on straws, plastic cutlery, and stirrers will have the biggest impact on PP. The Canadian government has also proposed a minimum target of 50% recycled content in plastic products by 2030. Its goal is zero plastic waste by 2030.

On 1 January 2021, Mexico City implemented a ban on the commercialization, distribution, and delivery of single-use plastic products. The ban focuses on straws, plastic stirrers, disposable plastic cups, and plastic cutlery. Currently, Mexico has no established Extended Producer Responsibility (EPR) system.

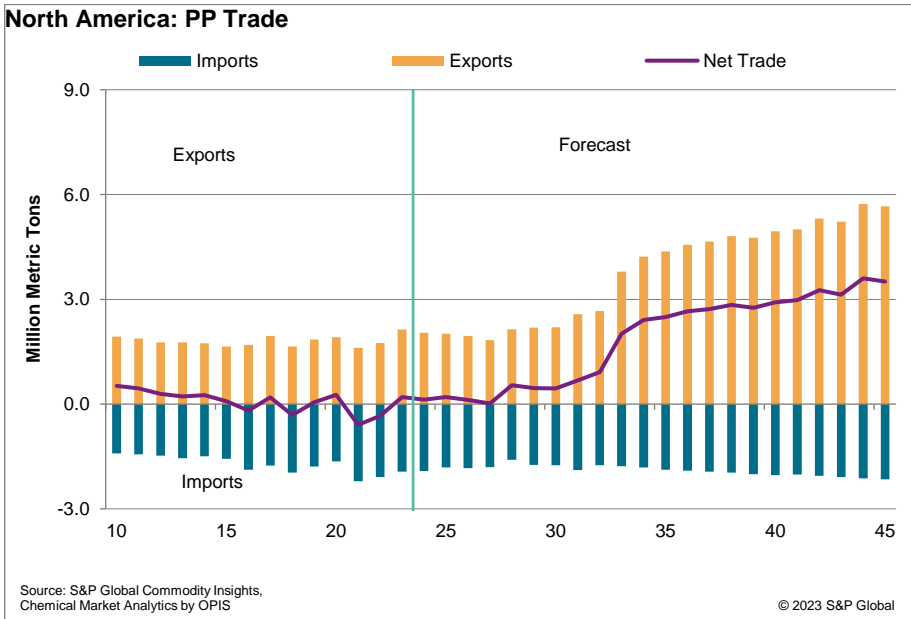
In the United States, the Break Free from Plastic Pollution Act of 2020 was reintroduced on 25 March 2021 as the Break Free from Plastic Pollution Act of 2021. If passed, this federal bill would amend the Solid Waste Disposal Act in three parts. Part one of the bill, Products in the Marketplace, establishes nationwide EPR and details how producer responsibility organizations are to operate. By 1 February 2023, responsible parties for covered products are to participate in a Producer Responsibility Organization (PRO) as well as meet established performance targets. Covered products include packaging, food service products, paper, some single-use products, and some beverage containers. Part two, Reduction of Single-Use Products, would prohibit single-use carryout bags by 1 January 2023 and reduce other single-use products such as plastic utensils and straws, which would have the biggest impact on PP. Part three, Recycling and Composting, would require products to contain recycled content. Currently, this bill has not been passed. However, Maine became the first state to sign Extended Producer Responsibility legislation into law for plastics and packaging material on 13 July 2021, and Oregon passed a similar law on 6 August 2021. Colorado became the third state to pass an extended producer responsibility law on 2 June 2022, specifically for packaging.

These were followed by California on 30 June 2022 signing into law the Plastic Pollution Producer Responsibility Act that included EPR. Many other states are heading in this direction. While the advancement of sustainability continues and grows significantly during the forecast period, we currently estimate that the majority of total PP demand will remain with virgin material. Chemical recycling technology, such as mixed plastics pyrolysis, is expected to play a bigger role in plastics recycling by 2030.



In 2023, homopolymer holds a predominant position, representing 46.2% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 40.6% of the market share. Random copolymer, on the other hand, constitutes only 13.2% of the total demand.

Trade



North America increased exports in 2020 by 3.2%, but because of uncompetitive propylene monomer prices and the impacts of Winter Storm Uri, exports declined by 15.6% in 2021 before increasing again in 2022 by 8.4%, and further increases 22.2% in 2023.

North America exports 25.6% of production in 2023 and is expected to export 22.5% in 2028. Most exports from North America are intraregional, primarily moving from the US to Canada and Mexico, with the rest mainly going to West Europe and South America. Leveraging the Canada-US Free Trade Agreement, almost 98% of Canadian PP imports come from the United States because it is the most economically viable source.

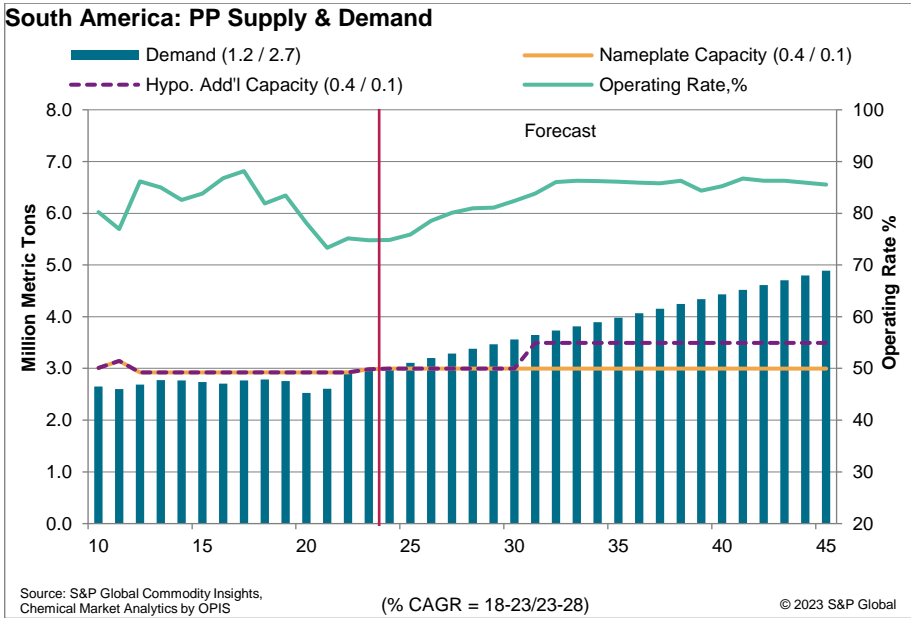
However, during the forecast period, higher volumes will begin to be shipped to the Indian Subcontinent and mainland China as more capacity additions start up in North America.

Imports to North America increased 34.4% in 2021 compared with 2020 and reach 2.2 million metric tons, a volume not seen since 2018. The average annual growth rate of imports from 2023 through 2028 is going to decrease by 3.6% on CAGR basis, with volumes averaging around 1.8 million metric tons. This is due to the capacity additions in North America supplying domestic demand. Canada and Mexico mainly import PP from the US, and that trend is forecast to continue through 2028. Historically, the US has imported PP from Northeast Asia and West Europe, but Canada has become a new source of import in 2022 after capacity addition.

North America has always been a net importer historically till 2022. It turns to a net exporter in 2023. From 2023-45, it is projected to remain as a net importer.

4.2.3 South America

Supply



Brazil is the largest market for PP in the region. More than 90% of capacity in the region is distributed among three countries — Brazil (62.0%), Colombia (18.7%) and Argentina (10.4%). The remaining 8.9% is operated in Chile and Venezuela. With no significant capacity expansions or closures planned during the forecast period, the capacity distribution is expected to remain almost the same through 2028.

In 2023, South America operates 2.98 million metric tons of polypropylene capacity. Approximately 43.7% of capacity is based on bulk slurry technology, while gas phase represents about 23.0%. As of 2023, South American PP assets are operated by five producers. Major highlights related to producers are discussed below.

Braskem is a Brazil-based petrochemical manufacturing giant. In 2023, the company operates a total global PP capacity of 4.42 million metric tons, of which 42% is in Brazil, 45% is in the United States, and the remaining 13% is in Germany. Braskem’s major shareholders are Odebrecht and Petrobras, holding 38.3% and 36.1%, respectively. Quattor (now part of Braskem) was created in 2008 through the merger of the PP assets of Suzano and Polibrasil into one group. In 2009, Braskem acquired Ipiranga and Petroquimica Paulinia. In 2010, Quattor was merged into Braskem. The 125,000 metric ton unit at Camacari was shut down in 2012.

In Brazil, Braskem is the only PP producer and is operating a total capacity of 1.85 million metric tons at four different sites.

ESSENTIA (formerly known as PROPILCO) is a subsidiary of the Colombian state oil company, Ecopetrol. Considerable developments in Colombia include speculation of new projects and expansions. However, to date, there have been no official news releases on the prospective structure of the new projects. ESSENTIA, the sole PP producer in the country, operates two lines in Colombia with a joint capacity of 559,000 metric tons. Total capacity is expected to increase to 570,000 metric tons by 2024.

PetroCuyo. In 2018, Petroquímica Cuyo finalized the acquisition of Petroquimica Ensenada (Petroken) to form PetroCuyo. The Argentina-based company is currently operating two PP plants; a Novolen technology–based 130,000 metric ton plant at Luján de Cuyo and a plant at Ensenada, Buenos Aires, with an installed capacity of 180,000 metric tons per year. PetroCuyo offers a complete range of polypropylenes: homopolymers, impact and random copolymers, special polyolefins and PP compounds. There is no indication of new projects on the horizon for the company.

PETROQUIM S.A. is Chile’s sole polypropylene producer, with a production capacity of 120,000 metric tons per year. The Spheripol technology–based plant has been in operation since 1999, and a major development is envisaged for the plant.

Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)													
Company.Name	Country/Territory.Name	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
PETROKEN Petroquimica Ensenada S.A.	Argentina	Bulk Slurry	44	0	0	0	0	0	0	0	0	0	0
Petroquimica Cuyo S.A.I.C.	Argentina	Bulk Slurry	136	180	180	180	180	180	180	180	180	180	180
Petroquimica Cuyo S.A.I.C.	Argentina	Multiple Gas Phase	33	130	130	130	130	130	130	130	130	130	130
Petroquimica Cuyo S.A.I.C.	Argentina	Multiple Gas Phase	97	0	0	0	0	0	0	0	0	0	0
Braskem SA	Brazil	Bulk Slurry	0	0	0	0	0	0	0	0	0	0	0
Braskem SA	Brazil	Bulk Slurry	310	310	310	310	310	310	310	310	310	310	310
Braskem SA	Brazil	Liquid/Gas Phase Comb.	450	450	450	450	450	450	450	450	450	450	450
Braskem SA	Brazil	Bulk Slurry	350	350	350	350	350	350	350	350	350	350	350
Braskem SA	Brazil	Liquid/Gas Phase Comb.	180	180	180	180	180	180	180	180	180	180	180
Braskem SA	Brazil	Liquid/Gas Phase Comb.	240	240	240	240	240	240	240	240	240	240	240
Braskem SA	Brazil	Bulk Slurry	320	320	320	320	320	320	320	320	320	320	320
Petroquim SA	Chile	Liquid/Gas Phase Comb.	120	120	120	120	120	120	120	120	120	120	120
Ecopetrol SA	Colombia	Multiple Gas Phase	250	40	0	0	0	0	0	0	0	0	0
Ecopetrol SA	Colombia	Gas Phase	250	40	0	0	0	0	0	0	0	0	0
Esenttia S.A.	Colombia	Gas Phase	0	210	250	250	250	309	320	320	320	320	320
Esenttia S.A.	Colombia	Multiple Gas Phase	0	210	250	250	250	250	250	250	250	250	250
Polipropileno de Venezuela, S.A.	Venezuela	Bulk Slurry	144	144	144	144	144	144	144	144	144	144	144
Total - South America			2,924	2,924	2,924	2,924	2,924	2,983	2,994	2,994	2,994	2,994	2,994

Demand

In 2023, South America produces about 2.2 million metric tons of polypropylene at an all-time low operating rate of 75%. The region struggled as the COVID-19 pandemic has had a severe impact on demand due to economic instability in the region. However, the region gained its stability and rebound back to reach its normal operating rate. The region has not added capacity in the last five years because of economic viability and political instability and also closed a few small units in 2012. The annual capacity will continue to remain in the next five years.

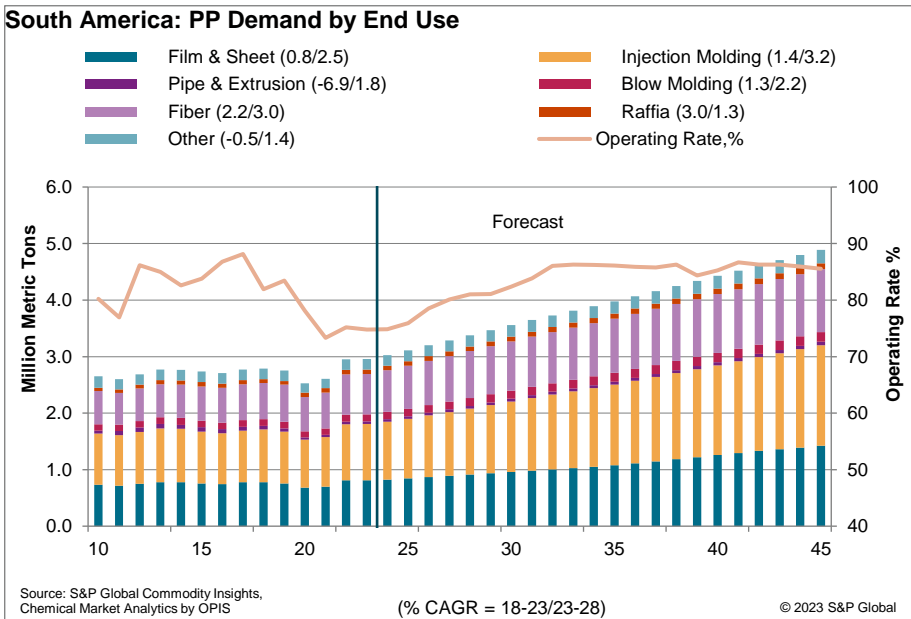
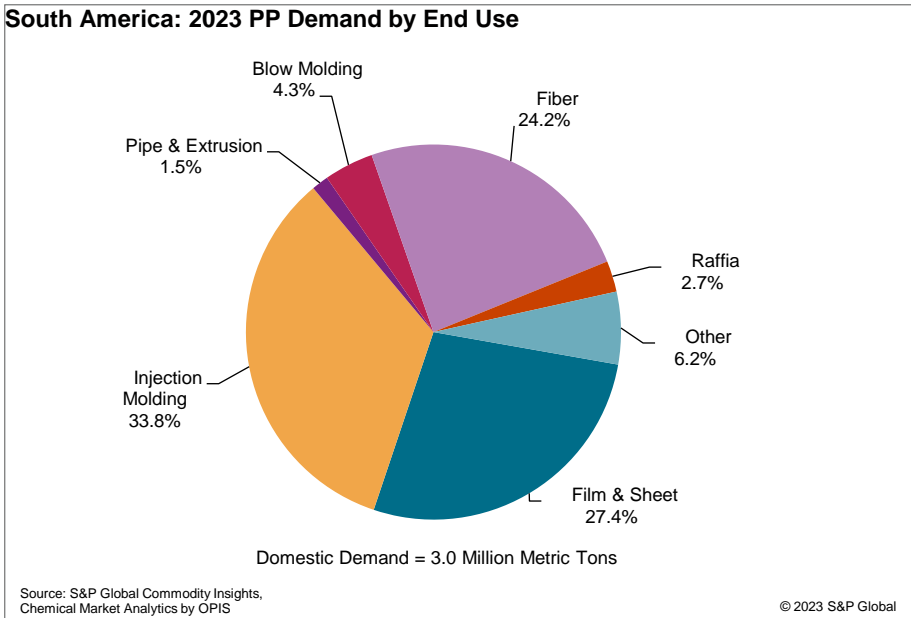
The region still imports PP, which supplies about 49.9% of the PP resin consumed in the region in 2023. About 33.6% of the region’s production is exported in 2023, with Brazil accounting for about half of the total.

In the next five years, PP production is expected to increase by 1.7%, with the operating rate expected to remain higher, 78% average. Demand is expected to increase at 2.7% per year. Exports will decline at 3.1% per year, with imports also increasing at 1.6% per year.

South America is a group of developing economies. However, unlike other major developing countries such as India and mainland China, the region is not showing robust demand growth projections. Currently, per capita PP consumption in the region is less than 5 kilograms against the global average of 10 kilograms. This per capita consumption is expected to grow marginally to 5.5 kilograms by 2028.

In 2023, South American PP consumption is 3.0 million metric tons. The COVID-19 pandemic made the region lose the growth of the previous 10 years. However, the demand growth is 13.2% in 2022 and 0.2% in 2023. Brazil is the largest market for PP in the region, accounting for 52.3% of total demand in 2023, followed by Argentina and Colombia with a share of 9.6% and 8.3% respectively.

In the next five years, PP consumption is expected to grow at a moderate rate of 2.7% per year. By 2028, total demand for PP in South America is expected to reach 3.4 million metric tons. And



Film and Sheet

In 2023, the South America market consumes about 810 thousand metric tons of polypropylene as film & sheet. Consumption of polypropylene in film & sheet applications is expected to grow at an CAGR of 2.5% in the near term (2023-28) and at an CAGR of 2.6% in the long term (2023-45).

Injection Molding

In 2023, the South America market consumes 998 thousand metric tons of polypropylene as injection molding. The demand of PP resin for injection molding is expected to grow at 3.2% annually in near term (2023-2028) and at around 2.7% in long term (2023-2045). Currently, injection molding is the largest polypropylene market segment in South America accounting for around 33.8% of the polypropylene demand. The injection molded PP resins find wide application in packaging and shipment containers (pallets, crates, caps and closures, suitcase, cases), auto parts (bumper, other exterior parts, door liner, batteries, and other interior parts), parts of electrical appliances, housewares, toys, and other parts. PP consumption has increased at the expense of traditional material (wood and metal for crates, aluminium for closures) as well as other polymers, particularly HDPE and PS.

Pipe & Extrusion

In 2023, the South America market consumes 43 thousand metric tons of polypropylene for pipe & extrusion application having an estimates growth rate of 1.8% in the near term (2023-2028) and 1.4% in long term (2023-2045).

Polypropylene has made inroads into the pipe market, replacing PVC in sewage pipe applications.

PPR pipes are designed for the transportation of portable hot and cold-water distribution system with a long lifetime. At present, in developed countries, the PPR Pipe industry maintains its market position in the main markets, e.g., EU and Middle East. Major demand for PPR continues to shift to Southeast Asia, India, and South America. The development of the industry was further supported by recovery of construction industry, wastewater management facilities, growing chemical and gas distribution network and cable protection industry which are the major end users of plastic pipes and fittings.

Blow Molding

In 2023, the South America market consumes 126 thousand metric tons of polypropylene for blow molded application. The consumption of polypropylene in blow molding applications is expected to grow at an annual growth rate of 2.2% in the near term (2023-28) and at an CAGR of 1.4% in the long term (2023-45).

Compared to others, use of PP in blow molding is relatively small, although some advances have been made in recent years. Packaging is the major sector where blow molded PP is consumed.

Fibers

In 2023, the South America market consumes 716 thousand metric tons of polypropylene for fiber application. The demand growth is expected to increase at an annual rate of 3.0% from 2023 to 2028 and at an annual growth rate of 2.0% from 2023 to 2045.

Polypropylene fibre is the most used fibre type in non-woven applications, other fibres being polyester, rayon, nylon, and others. Major application for polypropylene non-woven fabrics includes covers tock, filtration, and geotextiles. The consumption growth is slowing because of low construction activity in the region, weaker industrial markets, and approaching saturation in hygiene markets, in particular for feminine care and baby products. Nonwoven fibre comprises of staple, spun bond and high MFR melt blown fibres.

Raffia

In 2023, the South America market consumes 79 thousand metric tons of polypropylene for raffia application.

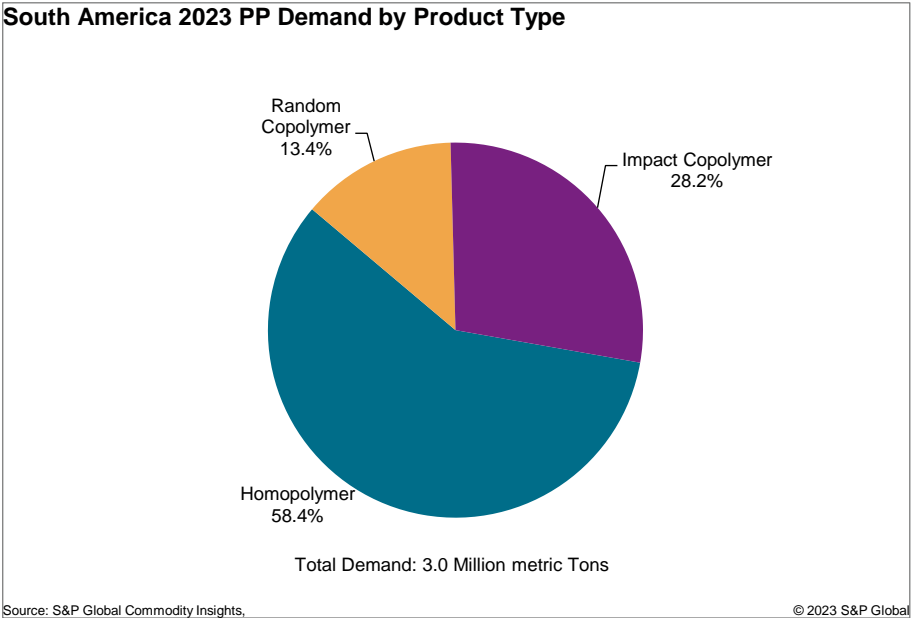
Woven sacks are widely used in packaging of construction materials (cement, grit), chemicals (soda ash, fertilizer, resins, and others, animal feedstuff and materials, cereal and other agricultural materials and products, etc.

Jumbo bags are used in transportation of bulk food and pharmaceutical items. These bags are durable and lasting, even in the toughest of weather and environmental conditions and are also economical to use. These bags are suitable for bulk handling of commodities and are strong and sturdy.

Consumption of polypropylene in raffia applications is expected to grow at an CAGR of 1.3% in the near term (2023-28) and at CAGR of 1.3% in the long term (2023-45).

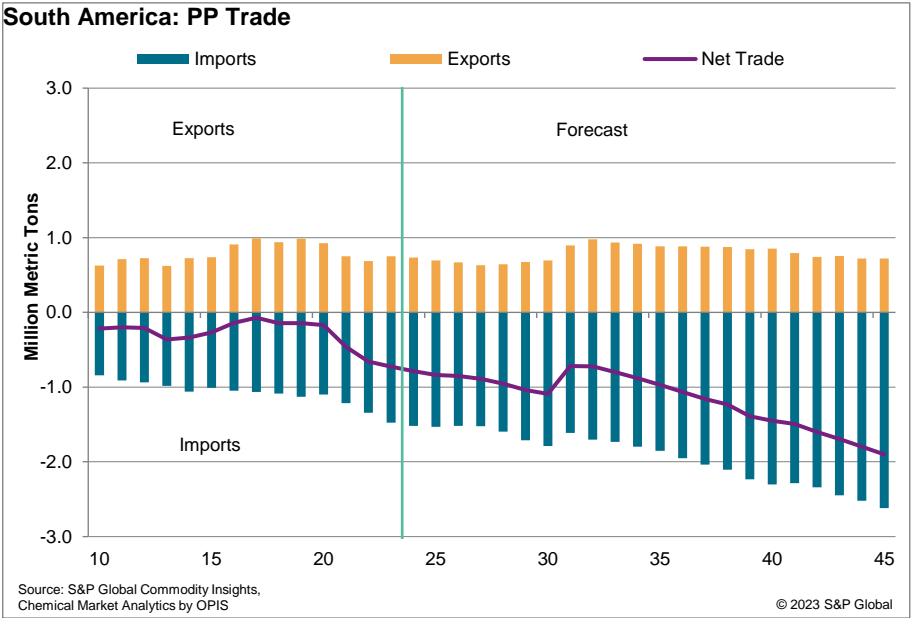
South America's PP recycle demand in 2023 is estimated to be about 132 thousand metric tons, a 2.1% increase over 2022. This demand comes from Brazil (101 thousand metric tons), Argentina (17 thousand metric tons), Peru (7 thousand metric tons), Colombia (4 thousand metric tons), and Chile (3 thousand metric tons). South America's PP recycle demand is forecast to remain mostly from these five markets. PP recycle demand is forecast to see an average annual growth rate of 3.0% through 2033, slightly higher than that of total virgin PP demand, although it is growing from a very small base that is just about 4.3% the size of the virgin PP market in 2023. The sustainability movement will continue, albeit at a slower rate because of the benefits plastics brought through single-use packaging in reducing the risk of exposure to COVID-19. By 2033, South America's recycle demand is anticipated to have grown by only 34% compared with 2023, the smallest growth rate of all the regions.

Brazil currently has no general framework specifically regulating packaging and plastic waste as a whole. However, it has a draft for Terms of Commitment for Circular Economy Actions and an Extended Producer Responsibility (EPR) for General Packaging. Additionally, Brazil has a draft for a Voluntary Agreement, developed by seven large companies, that sets goals for material collection and industry inspired targets regarding recycling in plastics through 2025. Other major South American countries have similar initiatives and proposals around recycling rates, bag bans, single-use plastics, recycle content, etc. While many countries in South America want to move toward more sustainability and increased EPR, more financing and legal infrastructure are needed for it to happen. The majority of PP demand is expected to remain with virgin material through the forecast.



In 2023, homopolymer holds the dominant position, accounting 58.3% of the market share. Impact copolymer followed as second largest position, accounting 28.2% of the market share. Random copolymer holds only 13.4% of the total demand.

Trade



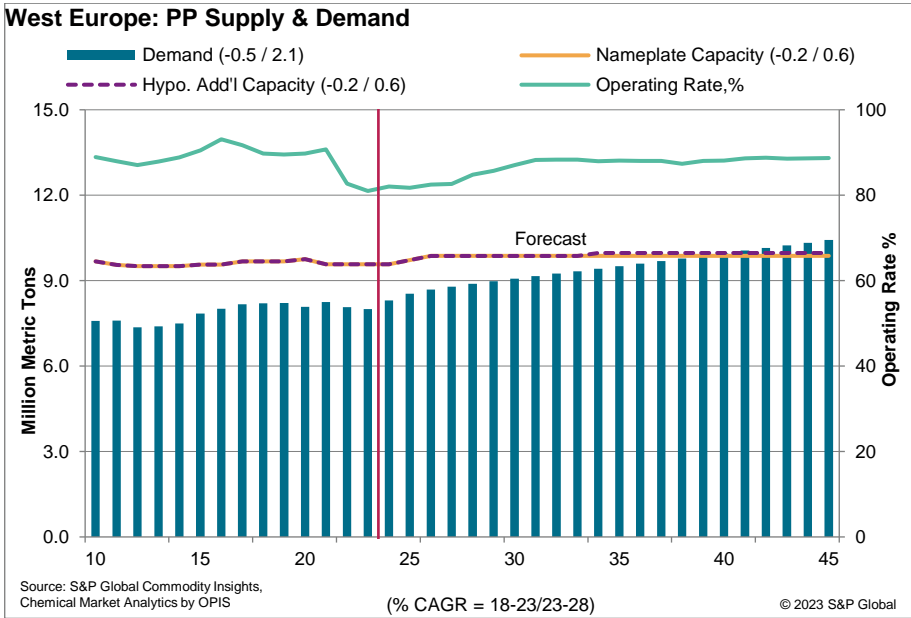
South America is another large polypropylene import market, with imports of about 1.5 million metric tons in 2023 supplying about 49.9% of polypropylene consumption. Of the total imported volume, around 55% is traded within the region. The United States is the largest exporting country to South America outside of the region, accounting for 16% of total imports. Brazil and Peru together consume around 56.7% of total PP imports in 2023.

The region also exports around 750 thousand metric tons of PP in 2023. About 73% of the total exported volume is within the region, followed by Western Europe and the United States. Brazil alone accounts 50.3% of exports in 2023.

South American PP consumption in the next five years will witness a growth of 2.7% on annual basis. By 2028, South America is anticipated to decrease its share of PP exports from 33.6% to 26.5%.

4.2.4 West Europe

Supply



The regional nameplate capacity stands at around 9.6 million metric tons as of 2023 and is expected to increase to 9.9 million metric tons by 2028. Between 2008 and 2022 there were no new capacity additions (only a few capacity expansions), and a lack of competitiveness caused plant closures (mainly older, smaller, high-cost plants) or reductions in capacity that combined to a net loss of 745,000 metric tons. The nameplate capacity in 2023 remains same as it was in 2021. The capacity had declined by 0.7% from 2020-21 due to the closure of Total Energies plant in Feluy SA, Belgium. The only capacity addition forecast in next ten years is the 300,000 metric ton plant by Repsol Polimeros, Unipessoal, Lda. in Portugal that is scheduled to start up in 2025.

Top five capacity shareholders in the region as of 2023 are LyondellBasell Industries N.V (25.08%), OMV AG (20.90%), Saudi Arabian Oil Company (11.81%), Total Energies SE (11.18%) and INEOS Group Ltd (8.36%). Together, they account for around 77.33% of regional production capacity.

Borealis plans to build a PDH unit in Belgium and INEOS has discussed similar intentions. The completion of these units could support PP capacity additions, which would also have the benefit of reducing the region's forecast net import profile. Hypothetical capacity additions of 100,000 metric tons are anticipated by 2034.

Four countries in Western Europe account for about 69% of polypropylene capacity in 2023. The largest producing countries in Western Europe are Germany at 23.2%, Belgium at 19.7%, and France at 15%. Another major producing country in the region is the Netherlands with a share of 10% of the regional production.

Production of PP in 2023 is 7.8 million metric tons with an operating rate of 81%. Operating rates are forecast to average 83% from 2023 to 2028. Production is expected to grow at CAGR of 1.5% between 2023-28 and around 0.6% between 2023-45.

Western Europe has not made any major advancements in PP facilities in the last decade, with no growth in capacity. However, throughout the decade the average operating rate has remained at a healthy 90%. The region faced a massive hit during the 2008 recession, which resulted in capacity closures equivalent to 0.8 million metric tons in the subsequent five years through 2012. With the presence of all the large PP manufacturing players in the region, Western Europe has always been the focus for the world. However, high oil prices and the inability of Europeans to compete against more competitive imports from low-cost producing regions has shifted the focus away from the region. Further, most of the units in the region are more than a decade old with hardly any revamping, resulting in assets that are not up-to-date and with the least optimized operations and small per-unit capacity. This has forced many producers in the region to consolidate their assets and downsize capacity.

Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)													
Company.Name	Country/Territory.Name	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Borealis Polyolefine GmbH	Austria	Liquid/Gas Phase Comb.	135	135	135	135	135	135	135	135	135	135	135
Borealis Polyolefine GmbH	Austria	Hydrocarbon Slurry	300	300	300	300	300	300	300	300	300	300	300
Borealis Kallo N.V.	Belgium	Liquid/Gas Phase Comb.	300	300	380	380	380	380	380	380	380	380	380
Borealis Polymers N.V.	Belgium	Hydrocarbon Slurry	155	155	155	155	155	155	155	155	155	155	155
Borealis Polymers N.V.	Belgium	Liquid/Gas Phase Comb.	240	240	240	240	240	240	240	240	240	240	240
INEOS Manufacturing Belgium NV	Belgium	Multiple Gas Phase	115	115	115	115	115	115	115	115	115	115	115
INEOS Manufacturing Belgium NV	Belgium	Hydrocarbon Slurry	0	0	0	0	0	0	0	0	0	0	0
INEOS Manufacturing Belgium NV	Belgium	Multiple Gas Phase	280	280	280	280	280	280	280	280	280	280	280
TotalEnergies Petrochemicals Feluy SA	Belgium	Hydrocarbon Slurry	180	180	180	0	0	0	0	0	0	0	0
TotalEnergies Petrochemicals Feluy SA	Belgium	Liquid/Gas Phase Comb.	240	240	240	240	240	240	240	240	240	240	240
TotalEnergies Petrochemicals Feluy SA	Belgium	Liquid/Gas Phase Comb.	480	480	480	480	480	480	480	480	480	480	480
Borealis Polymers Oy	Finland	Liquid/Gas Phase Comb.	220	220	220	220	220	220	220	220	220	220	220
Appryl SNC	France	Bulk Slurry	300	300	300	300	300	300	300	300	300	300	300
Basell Polyolefines France S A S	France	Liquid/Gas Phase Comb.	350	350	350	350	350	350	350	350	350	350	350
ExxonMobil Chemical France S.A.R.L.	France	Liquid/Gas Phase Comb.	250	250	250	250	250	250	250	250	250	250	250
INEOS Polymers Sarralbe SAS	France	Bulk Slurry	50	50	50	50	50	50	50	50	50	50	50
INEOS Polymers Sarralbe SAS	France	Bulk Slurry	65	65	65	65	65	65	65	65	65	65	65
Polychim Industrie SAS	France	Gas Phase	220	220	220	220	220	220	220	220	220	220	220
TotalEnergies Petrochemicals France	France	Bulk Slurry	200	200	200	200	200	200	200	200	200	200	200
Basell Polyolefine GmbH	Germany	Liquid/Gas Phase Comb.	240	240	240	240	240	240	240	240	240	240	240
Basell Polyolefine GmbH	Germany	Gas Phase	0	0	0	0	0	0	0	0	0	0	0
Basell Polyolefine GmbH	Germany	Gas Phase	40	40	40	40	40	40	40	40	40	40	40
Basell Polyolefine GmbH	Germany	Multiple Gas Phase	220	220	220	220	220	220	220	220	220	220	220
Borealis Polymere GmbH	Germany	Liquid/Gas Phase Comb.	330	330	330	330	330	330	330	330	330	330	330
Borealis Polymere GmbH	Germany	Liquid/Gas Phase Comb.	240	240	240	240	240	240	240	240	240	240	240
Braskem Europe GmbH	Germany	Liquid/Gas Phase Comb.	365	365	365	365	365	365	365	365	365	365	365
Braskem Europe GmbH	Germany	Multiple Gas Phase	260	260	260	260	260	260	260	260	260	260	260
SABIC Polyolefine GmbH	Germany	Gas Phase	330	330	330	330	330	330	330	330	330	330	330
SABIC Polyolefine GmbH	Germany	Gas Phase	200	200	200	200	200	200	200	200	200	200	200
Hellenic Petroleum SA	Greece	Liquid/Gas Phase Comb.	246	246	246	246	246	246	246	246	246	246	246
Basell Poliolefine Italia S.r.l.	Italy	Bulk Slurry	260	260	260	260	260	260	260	260	260	260	260
Basell Poliolefine Italia S.r.l.	Italy	Multiple Gas Phase	235	235	235	235	235	235	235	235	235	235	235
Basell Poliolefine Italia S.r.l.	Italy	Liquid/Gas Phase Comb.	185	185	185	185	185	185	185	185	185	185	185
Basell Poliolefine Italia S.r.l.	Italy	Multiple Gas Phase	100	100	100	100	100	100	100	100	100	100	100
Basell Benelux B.V.	Netherlands	Multiple Gas Phase	170	170	170	170	170	170	170	170	170	170	170
Ducor Petrochemicals B.V	Netherlands	Multiple Gas Phase	180	180	180	180	180	180	180	180	180	180	180
SABIC Petrochemicals B.V.	Netherlands	Gas Phase	250	250	250	250	250	250	250	250	250	250	250
SABIC Petrochemicals B.V.	Netherlands	Gas Phase	350	350	350	350	350	350	350	350	350	350	350
INEOS Bamble A/S	Norway	Liquid/Gas Phase Comb.	0	0	0	0	0	0	0	0	0	0	0
Repsol Polimeros, Unipessoal, Lda.	Portugal	Gas Phase	0	0	0	0	0	0	0	150	300	300	300
Basell Poliolefinas Iberica, S.L.	Spain	Multiple Gas Phase	290	290	290	290	290	290	290	290	290	290	290
Basell Poliolefinas Iberica, S.L.	Spain	Gas Phase	100	100	100	100	100	100	100	100	100	100	100
Repsol Quimica SA	Spain	Liquid/Gas Phase Comb.	160	160	160	160	160	160	160	160	160	160	160
Repsol Quimica SA	Spain	Liquid/Gas Phase Comb.	230	230	230	230	230	230	230	230	230	230	230
Basell Polyolefins Uk Limited	United Kingdom	Gas Phase	210	210	210	210	210	210	210	210	210	210	210
Petroineos Manufacturing Scotland Limited	United Kingdom	Bulk Slurry	280	280	280	280	280	280	280	280	280	280	280
Total - West Europe			9,671	9,671	9,751	9,571	9,571	9,571	9,571	9,721	9,871	9,871	9,871

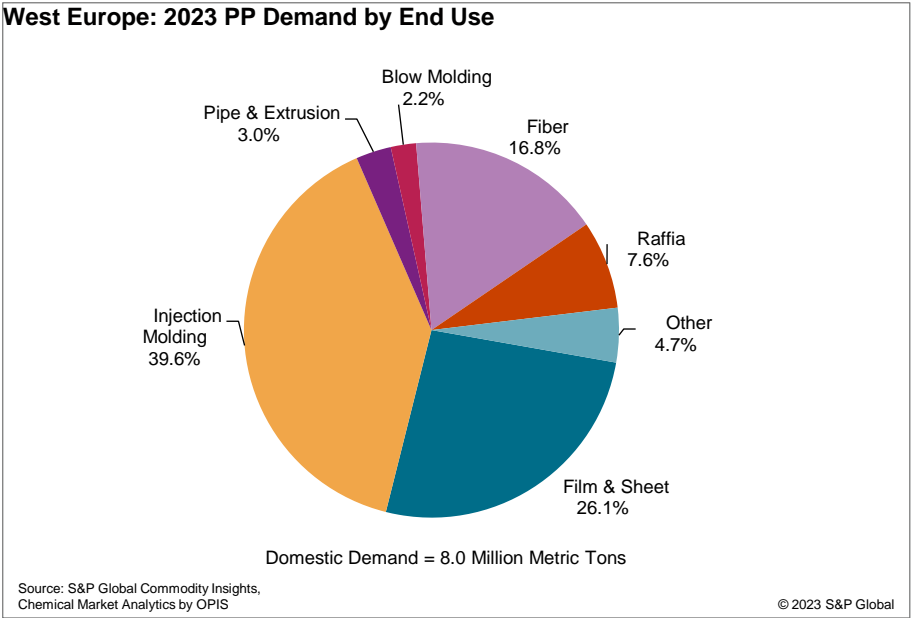
Demand

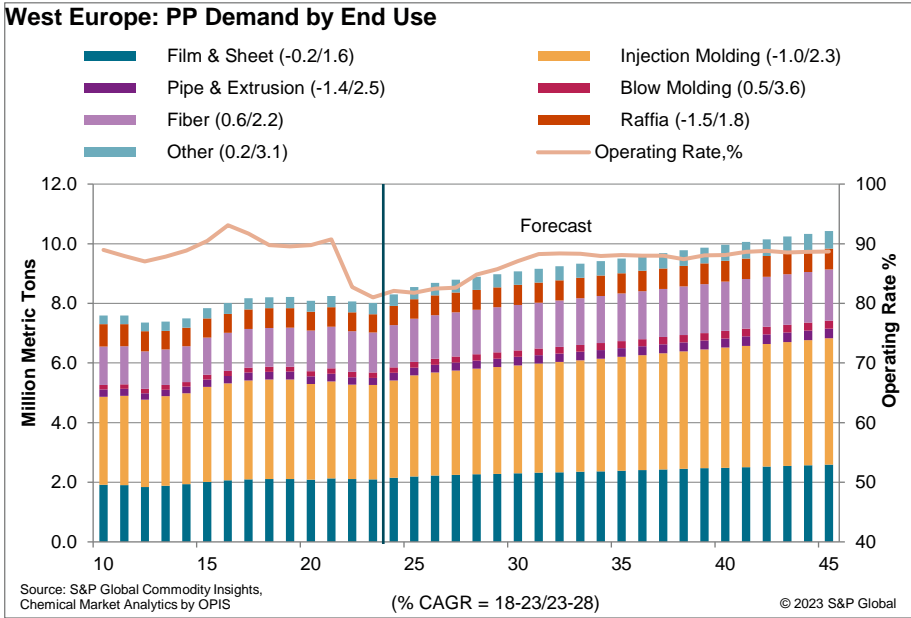
Domestic demand for PP in West Europe dropped by 1.6% in 2020 because of the economic recession from COVID-19 and its impact on the automotive industry. Worldwide lockdowns and severe supply chain disruptions caused the automotive business to experience double-digit declines in sales and production throughout the year, and even as the effect of COVID-19 has eased, the recovery of the automotive sector has been plagued by component shortages and shipping delays.

The Russia-Ukraine conflict that started in February 2022 led to international sanctions against Russia (these sanctions included exports, imports, energy, travel, finances, people, and more) that triggered a further escalation of oil and commodity prices and caused additional disruptions in the supply-chain.

Because of the high maturity of the market, PP demand is not expected to keep pace with GDP growth levels in the long term. Slow population growth and maturity of the market will limit the upward potential for PP growth in the forecast period. Apart from the maturity aspect of the market, there is one more reason for low growth levels in the future—the huge push for sustainability and recycling that has increasingly become the norm in Europe. Demand is expected to grow by 2.1% between 2023-28 and during 2023-45, it is forecast to grow by 1.2% to reach 10.4 million metric tons by 2045.

The largest consumer of polypropylene in Western European is Germany, followed by Italy and France. The Western European end-use distribution pattern for PP is very similar to that of North America.





Injection molding dominates end-use applications, accounting for around 39.6% of total regional demand. This is due to the presence of the huge automobile and durables markets in the region. Typical applications within this segment are housewares, furniture, caps and closures, crates, and automotive, which also includes compounds. The production of light vehicles in West Europe is expected to flatline at a level of around 15 million vehicles per year for the next five years as new production shifts to Central & Eastern Europe, where production costs are cheaper. This does not necessarily mean PP demand into light vehicles will decline because there will be a continuous push to move away from engineering resins, as well as ongoing light weighting efforts to convert heavier metal parts to plastics.

Film and sheet segment is the second-largest segment in 2023, with volume of 2.1 million metric tons, which accounts for a 26.1% of the domestic demand. The film segment is seeing relatively healthy demand from the BOPP segment, which manufactures films used for food packaging, electrical applications, and tobacco packaging. The fiber segment accounted for 16.9% of demand in 2022, and within the segment typical applications are for non-woven hygiene products, carpet backing, and textiles. Raffia and pipes are the next-largest segments, and they accounted for 7.6% and 3.0% of total market share, respectively. Raffia is typically used in the manufacture of bags, and most of this is now manufactured in Asia because it is considered a pure commodity product with low margins. PP pipes have a relatively low market share, with the biggest competition coming from the HDPE pipe segment, which occupies a far larger share of the overall pipe market.

Film and Sheet

In 2023, the West Europe market consumes about 2.1 million metric tons of polypropylene as film & sheet. Consumption of polypropylene in film & sheet applications is expected to grow at an CAGR of 1.6% in the near term (2023-28) and at an CAGR of 1.0% in the long term (2023-45).

In West Europe, within film application the largest market demand is for biaxially oriented polypropylene film (BOPP) accounting for around 59.1% of the total. The global packaging industry has moved from using cellophane, waxing paper, and aluminium foils, and replaced with BOPP films. This trend is expected to gain further traction in the coming years because BOPP films are more flexible and facilitate faster packaging with advanced sealing properties as compared to other packaging materials. Regions such as Western Europe and North America embody the mature markets for BOPP packaging films.

Cast or monoaxially stretched PP accounted for around 31% of PP used in film applications. It is mainly used in food packaging, stationary applications, lamination, and pharmaceutical and medical uses.

Sheets constitute around 6% of the PP application in film and sheet out of which 80% of the sheets are thermoformable sheets and the remaining 20% is the non-thermoformable sheets. Thermoformable sheets are used in pots and tubs for dairy products and for pre-packaged foods. Replacement of PVC and PS has been an important factor contributing to the growth as supermarket chains and multinational food companies specify PP in preference to other polymer materials because it is perceived as being more environmentally acceptable to the consumer. This trend is particularly noticeable in Germany, where PP is often preferred because it produces a lighter weight pack than PS and thus attracts lower levies under the “Green Dot” recycling scheme.

The non-thermoformable sheers are used in packaging, construction, automotive, household and engineering. This sector includes twin walled PP which mimics corrugated carton board extensively used packaging, point of sale advertising, stationery and display boards and graphic arts.

Injection Molding

In 2023, the West Europe market consumes 3.2 million metric tons of polypropylene as injection molding. The demand of PP resin for injection molding is expected to grow at 2.3% annually in near term (2023-2028) and at around 1.3% in long term (2023-2045). Currently, injection molding is the largest polypropylene market segment in West Europe accounting for around 39.6% of the polypropylene demand. The injection molded PP resins find wide application in packaging and shipment containers (pallets, crates, caps and closures, suitcase, cases), auto parts (bumper, other exterior parts, door liner, batteries, and other interior parts), parts of electrical appliances, housewares, toys, and other parts. PP consumption has increased at the expense of traditional material (wood and metal for crates, aluminium for closures) as well as other polymers, particularly HDPE and PS.

The market for crates and boxes is being driven by the development of more sophisticated logistics and environmental issues creating the demand for returnable transit containers. Thin-walled containers are mainly used for dairy packaging

but has been losing market share to thermoformed containers which are generally cheaper for longer runs. Injection molded containers are preferred for complex shapes or where the uniform wall thickness achievable with injection molding can be used effectively to lower the weight of polymer used. The market is driven by the replacement of metal and HDPE containers and the design and product differentiation plastics can offer to consumer brands.

West Europe also produces many electrical appliances and products (such as TV set, washing machine, air conditioner, electrical fan, refrigerator, coffee maker, dish washer, vacuum cleaner etc.), housewares and consumables (such as bowl, cup, plate, chopstick, skep, basket, drum, hoop, shelf, clothes rack, and hangers etc.) consumes significant quantity of injection molded polypropylene.

Second to closure and caps, injection molding PP is used in automotive, viz, around 20% of the total injection molding PP.

Under auto parts category, automotive compounding holds majority share i.e., around 90% whereas automotive battery casing holds only 10% share. The production of light vehicles in West Europe is expected to flatline at a level of around 15 million vehicles per year for the next five years as new production shifts to Central & Eastern Europe, where production costs are cheaper. This does not necessarily mean PP demand into light vehicles will decline because there will be a continuous push to move away from engineering resins, as well as ongoing light weighting efforts to convert heavier metal parts to plastics.

Pipe & Extrusion

In 2023, the Western Europe market consumes 243 thousand metric tons of polypropylene for pipe & extrusion application having an estimates growth rate of 2.5% in the near term (2023-2028) and 1.3% in long term (2023-2045).

Polypropylene has made inroads into the European pipe market, replacing PVC in sewage pipe applications. Production of PP pipes varies significantly across Europe depending on local building practices and legislation. It is mainly concentrated in Germany, Italy, and the Nordic countries where pipe producers focus on PP offerings in place of PVC for gravity pipe applications.

PPR pipes are designed for the transportation of portable hot and cold-water distribution system with a long lifetime. At present, in developed countries, the PPR Pipe industry maintains its market position in the main markets, e.g., EU and Middle East. Major demand for PPR continues to shift to Southeast Asia, India, and South America. The development of the industry was further supported by recovery of construction industry, wastewater management facilities, growing chemical and gas distribution network and cable protection industry which are the major end users of plastic pipes and fittings.

Blow Molding

In 2023, the West Europe market consumes 175 thousand metric tons of polypropylene for blow molded application. The consumption of polypropylene in blow molding applications is expected to grow at an annual growth rate of 3.6% in the near term (2023-28) and at an AAGR of 2.0% in the long term (2023-45).

Compared to others, use of PP in blow molding is relatively small, although some advances have been made in recent years. Packaging is the major sector where blow molded PP is consumed. Other reasons for growth of blow molding in West Europe are heavy investments in healthcare to offer a hygienic environment to the citizens and to cater to the demand for exports of lightweight automotive parts. In West Europe automotive industry, blow molding is the ideal manufacturing process for HVAC components and assemblies. It can achieve difficult part geometries with tight tolerances, produce high impact and structural integrity, and is more cost-effective than alternative molding methods such as roto molding. In consumer segment, blow molding is used in beverage industry for plastic bottles and it is also used in liquid detergent bottles.

Fibers

In 2023, the West Europe market consumes 1.3 million metric tons of polypropylene for fiber application. The demand growth is expected to increase at an annual rate of 2.2% from 2023 to 2028 and at an annual growth rate of 1.1% from 2023 to 2045.

Polypropylene fibre is the most used fibre type in non-woven applications, other fibres being polyester, rayon, nylon, and others. Major application for polypropylene non-woven fabrics includes covers tock, filtration, and geotextiles. The consumption growth is slowing because of low construction activity in the region, weaker industrial markets, and approaching saturation in hygiene markets, in particular for feminine care and baby products. Nonwoven fibre comprises of staple, spun bond and high MFR melt blown fibres.

Consumer staple account for about 46% of total staple fiber consumption, followed by spun bound nonwovens and High MFR melt blown, which account for about 35% and 19%, respectively. These end markets closely follow the GDP trend. Industrial nonwovens are the best-performing segment, with consumption for this type of fiber driven by the growing automotive industry. New automotive applications for engine compartment insulation, acoustic insulation, and under-door and under-seat panelling have been developed. Polyolefin staple is increasingly used in the manufacture of PP-fiber/glass fiber composites for automotive wheels. This is in line with the trend toward weight reduction occurring in the automotive industry. In contrast, demand from PP needle punched carpet continues to decline owing to poor demand for floor covering in exhibition and meetings rooms, as well as increasing preference for laminates. Disposable and consumer nonwovens are a mature sector and are expected to show only little growth. Moreover, spunbonded nonwovens are often preferred over staple-laid nonwovens in this end market at GDP level.

Slit film fibers comprises of slit films, split films and tapes used for textile applications. Slit film and tapes are used in manufacturing of geotextiles for civil engineering, agricultural nets, agricultural fabrics (twine bales, field covering fabrics), big bags, carpet backing, and synthetic turfs. PP tapes are used in the manufacture of FIBS (Flexible Intermediate Bulk Containers) bags. FIBC manufacturing is a very intense labor process, therefore significant quantities of slit films are

exported to low labor cost countries such as Turkey and Romania for FIBCs manufacturing. Big bags are mainly used in the construction industry and in the packaging of the fertilizers. Growth in the big bags market depends mainly on the fertilizers market, the weather, and the overall economy. PP slit films can also be used in synthetic turf manufacturing.

Demand for filament yarn comes mainly from the carpet face market and, to a minor extent, also from apparel and home textiles. The carpet market has been declining since 2000, leading to a downward trend for filament yarn consumption. Moreover, polypropylene faces the competition from polyester in this market.

Raffia

In 2023, the West Europe market consumes 610 thousand metric tons of polypropylene for raffia application.

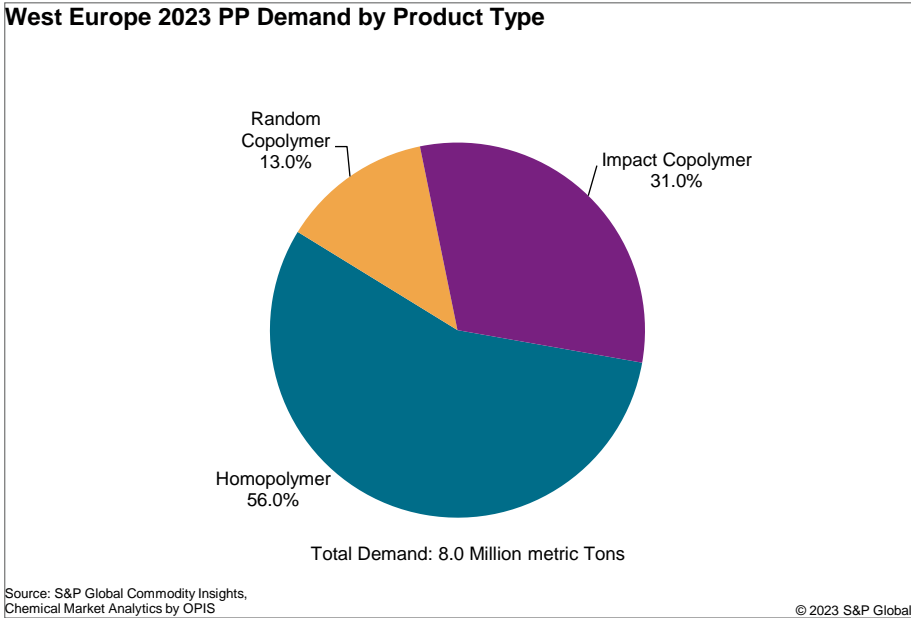
Woven sacks are widely used in packaging of construction materials (cement, grit), chemicals (soda ash, fertilizer, resins, and others, animal feedstuff and materials, cereal and other agricultural materials and products, etc.

Jumbo bags are used in transportation of bulk food and pharmaceutical items. These bags are durable and lasting, even in the toughest of weather and environmental conditions and are also economical to use. These bags are suitable for bulk handling of commodities and are strong and sturdy.

Consumption of polypropylene in raffia applications is expected to grow at an CAGR of 1.8% in the near term (2023-28) and at CAGR of 0.6% in the long term (2023-45).

Recycle demand increased by 15.1% in 2021, by 3.6% in 2022 and again increases by 3.7% in 2023 as the momentum for recycling returned after the slowdown during 2020 due to COVID-19. Our base case scenario for West Europe assumes a slow incremental evolution of the recycling industry based on the pace of recent progress. This means recycling rates will lag behind mandates issued by the European Union as the development of recycling and sorting infrastructure will advance more slowly. In the absence of standards, definitions (such as end-of-waste criterion) and global protocols, the adoption rate of post-consumer recycled (PCR) products will fall short of stated goals. West Europe is expected to maintain its position as the region with the second highest recycle demand, coming after Northeast Asia, whose recycle demand mostly comes from mainland China. It is anticipated that West Europe will hold that position in next ten years. By 2033, West Europe's recycle demand is forecast to have increased by about 85% compared with 2023; this volume change is the second highest of all the regions. The average annual growth rate of recycle demand through 2033 is 6.4%, significantly higher than that of virgin PP demand. While the region's recycle demand is growing from a smaller base that is about 16.5% the size of the virgin PP market in 2023. Even though the majority of PP demand is expected to remain with virgin material, West Europe has the highest percent of recycle demand through 2033, averaging at 25.6% (comparably, the world averages 13.6%). While there are a number of hurdles that impede the growth of plastic recycling, from the absence of proper standards to a lack of sorting and recycling infrastructure, the concerted move and passing of legislation is sensitizing the industry to authorities' resolve.

In 2018, the European Union adopted a Strategy for Plastics as part of the Circular Economy Package (CEP), which mandated that 70% of all packaging waste and plastic packaging in the EU be recyclable by 2030. The Strategy for Plastics is meant to help guide Europe's transition toward a carbon-neutral and circular economy. The CEP also included a Delegated Regulation on Plastic Waste Shipments, a Directive on Packaging and Packaging Waste, a Waste Framework Directive, a Directive on Single-Use Plastics, and a Directive on Plastic Bags. As part of the COVID-19 Recovery Package, the European Council adopted a proposal for a levy based on the weight of non-recycled plastic packaging waste. The levy will be an additional revenue source for the EU budget that took effect on 1 January 2021 (through 2027) and will act as a major incentive to reduce packaging waste and stimulate recycling, which may lead to further erosion of PP virgin demand in favor of consumption of recycled material. The EU Single-Use Plastics Directive (SUPD) came into effect on 3 July 2021 and includes Extended Producer Responsibility (EPR) schemes, recycling targets, a ban on single-use plastics such as straws, cutlery, and cups, and more. Since last year, a majority of EU member states are now on track to implement the SUPD, even though some loopholes were identified. In November of 2022 the EU joined the High Ambition Coalition to End Plastic Pollution that has a goal to end plastic pollution by 2040. The targets set out by the European Union will drive investment, innovation, and ultimately higher recycling rates for PP. It should also be noted that the recycling targets for the EU are for packaging. PP has less exposure to the packaging sector than several other resins, such as polyethylene (PE) and polyethylene terephthalate (PET); therefore, PP is somewhat less impacted by the EU sustainability policy than other plastics. Overall, European policy makers want to transform the plastic market from a linear to a circular economy and eventually to a green economy. They are focused on turning waste into resources or secondary raw materials through recycling, phasing out single-use plastics, and setting recycling targets. Separately, the United Kingdom introduced a Plastic Packaging Tax, effective April 2022, that taxes plastic packaging that contains less than 30% recycled material.

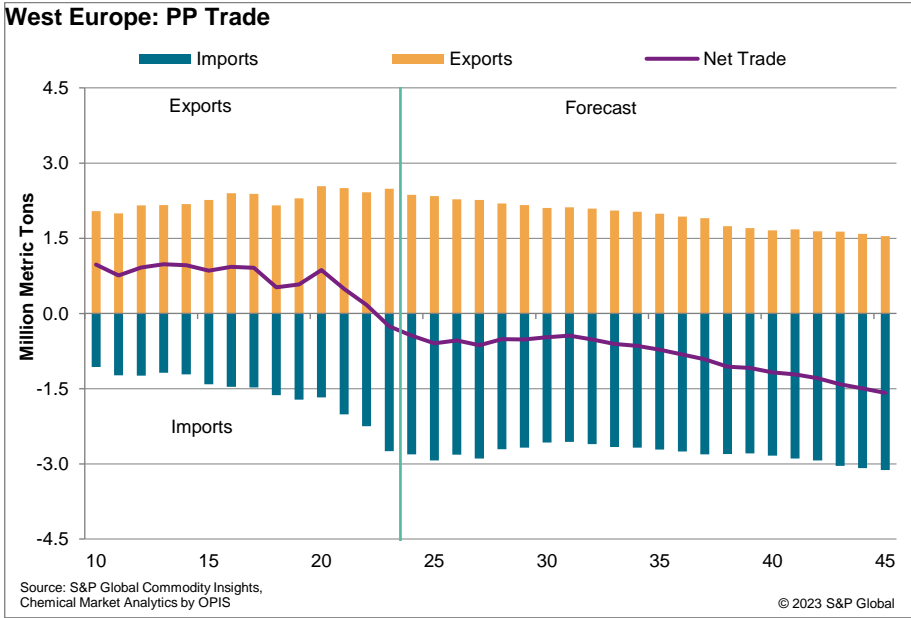


In 2023, homopolymer holds a predominant position, representing 56.0% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 31.0% of the market share. Random copolymer, on the other hand, constitutes only 13.0% of the total demand.

Trade

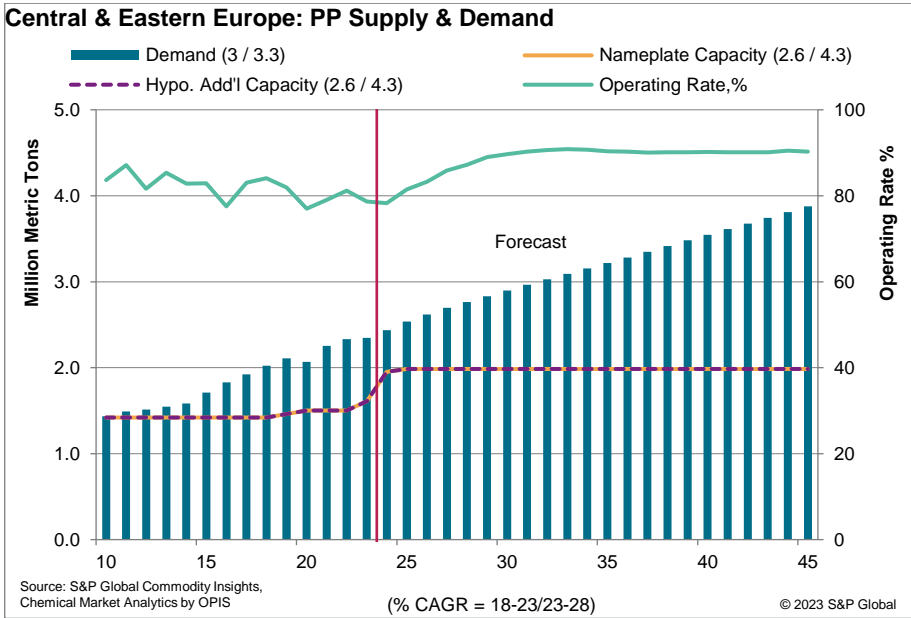
In 2023, the region exports 2.5 million metric tons of PP. A downward trend in exports is expected through the forecast period. The decrease in exports from 2023 through 2028 is caused by increased domestic demand. Historically, West Europe has been a net exporter of PP, but due to the demand growth outlook and expected larger import volumes, West Europe becomes a net importer by 2023 and remain one through the forecast period. Most PP exports from West Europe go to Central & Eastern Europe and the Middle East.

In 2023, imports increase to 2.7 million metric tons and are anticipated to increase further and reach 2.9 million metric tons by 2025. Historically, imports to West Europe were mainly from the Middle East, Central & Eastern Europe, and Northeast Asia, but beginning in 2023 and through the forecast period, larger volumes are expected to come from the Middle East, United States and the CIS and Baltic States.



4.2.5 Central & Eastern Europe

Supply



In 2023, Central and Eastern Europe (CEP) have a total PP capacity of 1.6 million metric tons. Poland has the largest capacity shares in the region, accounting for 36.7% in 2023. However, the new capacity come on in Poland will increase its share to 47.1% in 2024.

After the recession of 2008–09, the region did not see any development in its PP capacity until 2019, when Basell Orlen Polyolefins expanded its 400 thousand metric ton Spheripol line at Plock, Poland, by an additional 80 thousand metric tons to use the propylene feedstock available from its metathesis unit.

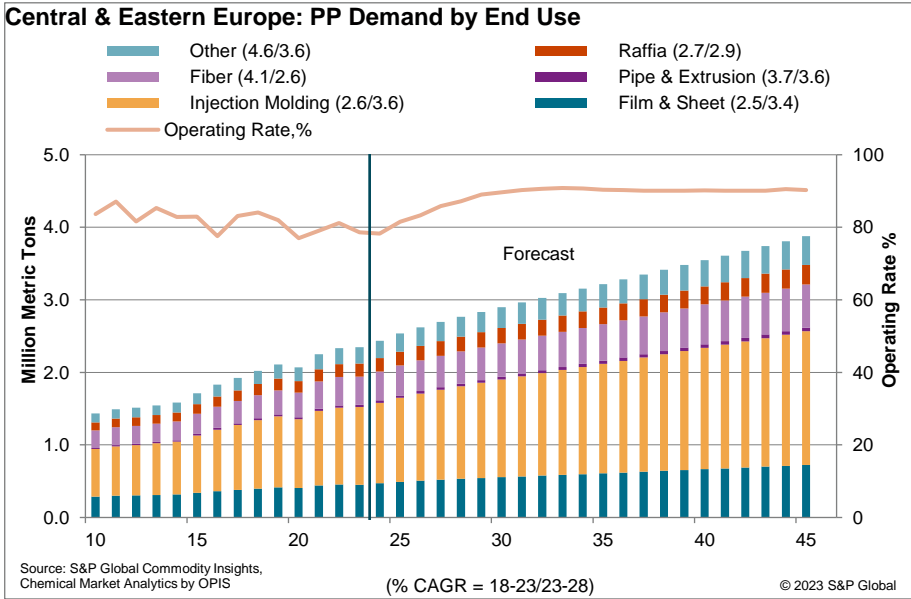
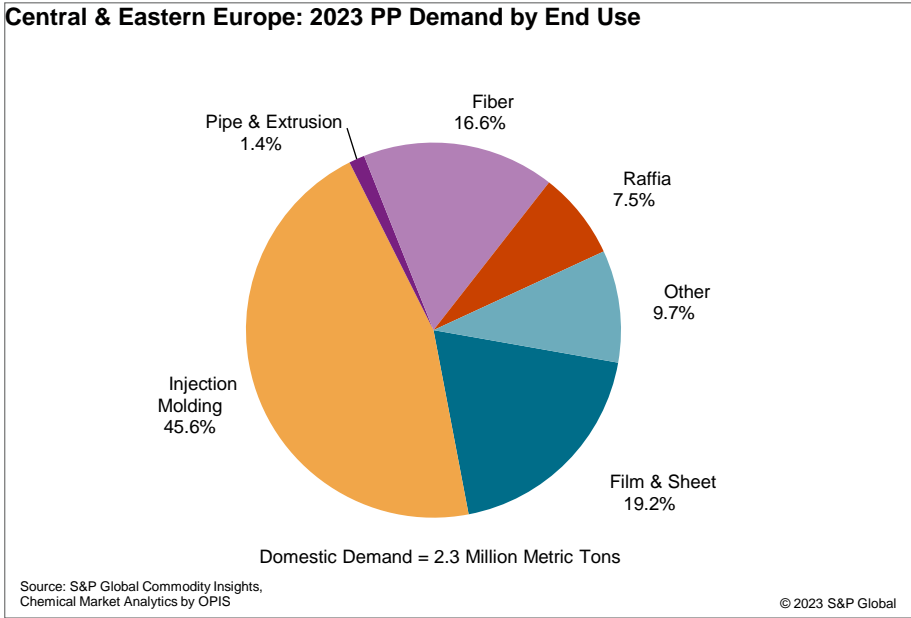
In 2023, there are eight players operating a total of 1.6 million metric tons of PP capacity in Central and Eastern Europe. Throughout the forecast period, the only capacity addition is scheduled for 2023, when Grupa Azoty S.A. will add a 440 thousand metric ton PP plant in Police, Poland alongside a propylene dehydrogenation unit. Currently, no hypothetical capacity additions are expected in Central and Eastern Europe. Capacity developments in the region have been tepid, mainly because of a lack of available feedstocks. The majority of propylene is supplied via steam crackers, with a smaller percentage being supplied from refinery sources.

Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)													
Company.Name	Country/Territory.Name	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Lukoil Neftochim Burgas AD	Bulgaria	Hydrocarbon Slurry	80	80	80	80	80	80	80	80	80	80	80
ORLEN Unipetrol RPA, s.r.o.	Czechia	Gas Phase	0	0	0	275	275	275	275	275	275	275	275
Unipetrol RPA, s.r.o.	Czechia	Gas Phase	275	275	275	0	0	0	0	0	0	0	0
MOL Petrolkemia Zrt.	Hungary	Bulk Slurry	0	0	0	0	0	0	0	0	0	0	0
MOL Petrolkemia Zrt.	Hungary	Liquid/Gas Phase Comb.	185	185	185	185	185	185	185	185	185	185	185
MOL Petrolkemia Zrt.	Hungary	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100
Basell Orlen Polyolefins Sp. z o.o.	Poland	Liquid/Gas Phase Comb.	400	440	480	480	480	480	480	480	480	480	480
Grupa Azoty SA	Poland	Gas Phase	0	0	0	0	0	111	440	440	440	440	440
Rompetrol Petrochemicals SRL	Romania	Bulk Slurry	95	95	95	95	95	95	95	95	95	95	95
Hipol Odzaci JSC	Serbia	Hydrocarbon Slurry	30	30	30	30	30	30	30	30	30	30	30
Slovnaft AS	Slovak Republic	Multiple Gas Phase	255	255	255	255	255	255	266	300	300	300	300
Total - Central Europe			1,420	1,460	1,500	1,500	1,500	1,611	1,951	1,985	1,985	1,985	1,985

Demand

Central and Eastern Europe produces nearly 1.3 million metric ton of PP in 2023 by running its plants at average operating rate of 79%. The last decade had been a period of very low activity for Central and Eastern Europe, with no major developments in PP capacity until 2019, when Poland added 80 thousand metric tons at its existing PP unit by utilizing the 100 thousand metric tons of propylene produced from its olefin metathesis plant at the same facility.

Producers in the region have faced multiple challenges such as availability of cheap feedstock and high competition from the international market, especially the Middle East and Russia, forcing Central and Eastern Europe to remain low-key and not expand its capacity further. Expansion of 440 thousand metric tons occurred in second half of 2023 which increases import at very low growth rate by 0.3% in 2023-28. The operating rate is also expected to decrease from as high as 87% by 2028.



If the decrease in PP demand caused by the COVID-19 pandemic is ignored, Central and Eastern European consumption was increasing at an average rate of 3.0% per year during the last five years. In 2023, the region consumes a total of 2.3 million metric tons of PP. Poland and Czechia are the two largest demand centers in the region, representing 42.3% and 25.8% of total demand, respectively, in 2023.

In the next five years, the region's PP consumption is expected to reach about 2.8 million metric tons, for a growth rate of about 3.3% per year. Poland will be the main driver of demand growth in the region.

Film and Sheet

In 2023, the Central and Eastern European market consumes about 451 thousand metric tons of polypropylene as film & sheet. Consumption of polypropylene in film & sheet applications is expected to grow at an CAGR of 3.4% in the near term (2023-28) and at an CAGR of 2.2% in the long term (2023-45).

Injection Molding

In 2023, the Central and Eastern European market consumes 1,071 thousand metric tons of polypropylene as injection molding. The demand of PP resin for injection molding is expected to grow at 3.6% annually in near term (2023-2028) and at around 2.5% in long term (2023-2045). Currently, injection molding is the largest polypropylene market segment in Central and Eastern European accounting for around 45.7% of the polypropylene demand. The injection molded PP resins find wide application in packaging and shipment containers (pallets, crates, caps and closures, suitcase, cases), auto parts (bumper, other exterior parts, door liner, batteries, and other interior parts), parts of electrical appliances, housewares, toys, and other parts. PP consumption has increased at the expense of traditional material (wood and metal for crates, aluminium for closures) as well as other polymers, particularly HDPE and PS.

Injection molding, which is the single-largest segment, is expected to be the fastest-growing PP application in the region. With the boom in the automotive industry in the region, which is also the largest end-use industry for injection molding.

Pipe & Extrusion

In 2023, the Central and Eastern European market consumes 32 thousand metric tons of polypropylene for pipe & extrusion application having an estimates growth rate of 3.6% in the near term (2023-2028) and 2.1% in long term (2023-2045). Polypropylene has made inroads into the pipe market, replacing PVC in sewage pipe applications.

Fibers

In 2023, the Central and Eastern European market consumes 390 thousand metric tons of polypropylene for fiber application. The demand growth is expected to increase at an annual rate of 2.6% from 2023 to 2028 and at an annual growth rate of 1.9% from 2023 to 2045.

Polypropylene fibre is the most used fibre type in non-woven applications, other fibres being polyester, rayon, nylon, and others. Major application for polypropylene non-woven fabrics includes covers tock, filtration, and geotextiles. The consumption growth is slowing because of low construction activity in the region, weaker industrial markets, and approaching saturation in hygiene markets, in particular for feminine care and baby products.

Raffia

In 2023, the Central and Eastern European market consumes 177 thousand metric tons of polypropylene for raffia application.

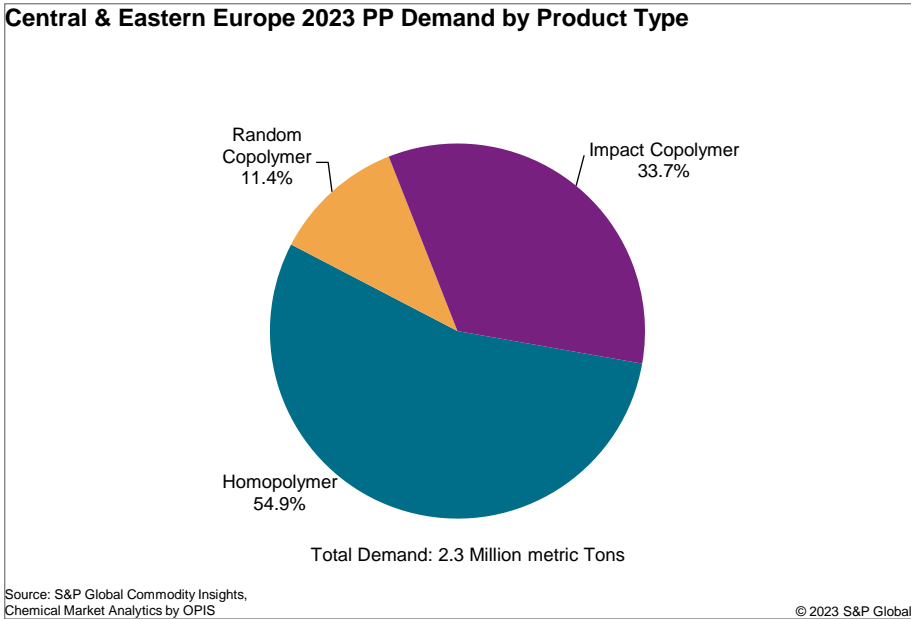
Woven sacks are widely used in packaging of construction materials (cement, grit), chemicals (soda ash, fertilizer, resins, and others, animal feedstuff and materials, cereal and other agricultural materials and products, etc.

Jumbo bags are used in transportation of bulk food and pharmaceutical items. These bags are durable and lasting, even in the toughest of weather and environmental conditions and are also economical to use. These bags are suitable for bulk handling of commodities and are strong and sturdy.

In 2021 recycle demand for PP increased by 14.8% and increased by almost 13.1% in 2022 and is about to increase by 3.2% in 2023. The average annual growth rate of recycle demand through 2033 is 7.5%, significantly higher than that of virgin resin PP demand, although it is growing from a very small base that is about one-fourteenth the size of the virgin PP market in 2023. Being a part of the EU, most countries in Central and Eastern Europe are facing significant scrutiny from a plastics perspective. Currently, they lag behind West Europe in terms of collection of packaging waste, apart from the less developed infrastructure for recycling and sorting. The amount of investment needed to bridge the gap to the required level is substantial, and companies are questioning how the costs will be covered, especially when the private sector lacks the means to act. Sustainability and recycling provisions will significantly increase the cost of packaging products, making brand owners devise ways to pass the increased costs onto consumers.

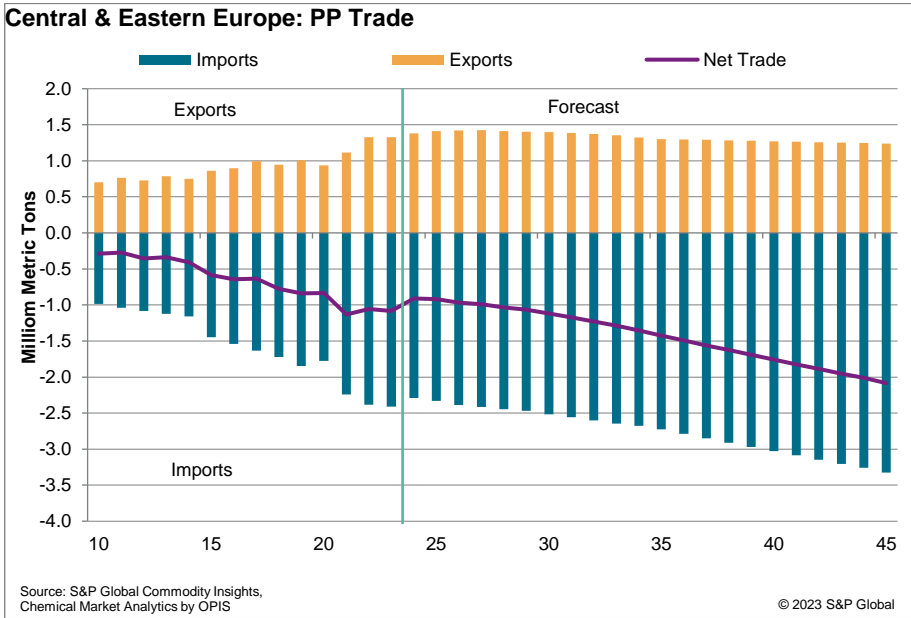
In 2018, the European Union adopted a Strategy for Plastics as part of the Circular Economy Package (CEP), which mandated that 70% of all packaging waste and plastic packaging in the EU be recyclable by 2030. The Strategy for Plastics is meant to help guide Europe’s transition toward a carbon-neutral and circular economy. The CEP also included a Delegated Regulation on Plastic Waste Shipments, a Directive on Packaging and Packaging Waste, a Waste Framework Directive, a Directive on Single-Use Plastics, and a Directive on Plastic Bags. As part of the COVID-19 Recovery Package, the European Council adopted a proposal for a levy based on the weight of non-recycled plastic packaging waste. The levy will be an additional revenue source for the EU budget that took effect on 1 January 2021 (through 2027) and will act as a major incentive to reduce packaging waste and stimulate recycling, which may lead to further erosion of PP virgin demand in favor of consumption of recycled material. The EU Single-Use Plastics Directive (SUPD) came into effect on 3 July 2021 and includes Extended Producer Responsibility (EPR) schemes, recycling targets, a ban on single-use plastics such as straws, cutlery, and cups, and more. Since last year, a majority of EU member states are now on track to implement the SUPD, even though some loopholes were identified.

In November of 2022 the EU joined the High Ambition Coalition to End Plastic Pollution that has a goal to end plastic pollution by 2040. The targets set out by the European Union will drive investment, innovation, and ultimately higher recycling rates for PP. It should also be noted that the recycling targets for the EU are for packaging. PP has less exposure to the packaging sector than several other resins, such as polyethylene (PE) and polyethylene terephthalate (PET); therefore, PP is somewhat less impacted by the EU sustainability policy than other plastics. Overall, European policy makers want to transform the plastic market from a linear to a circular economy and eventually to a green economy. They are focused on turning waste into resources or secondary raw materials through recycling, phasing out single-use plastics, and setting recycling targets.



In 2023, homopolymer holds a predominant position, representing 54.9% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 33.7% of the market share. Random copolymer, on the other hand, constitutes only 11.4% of the total demand.

Trade

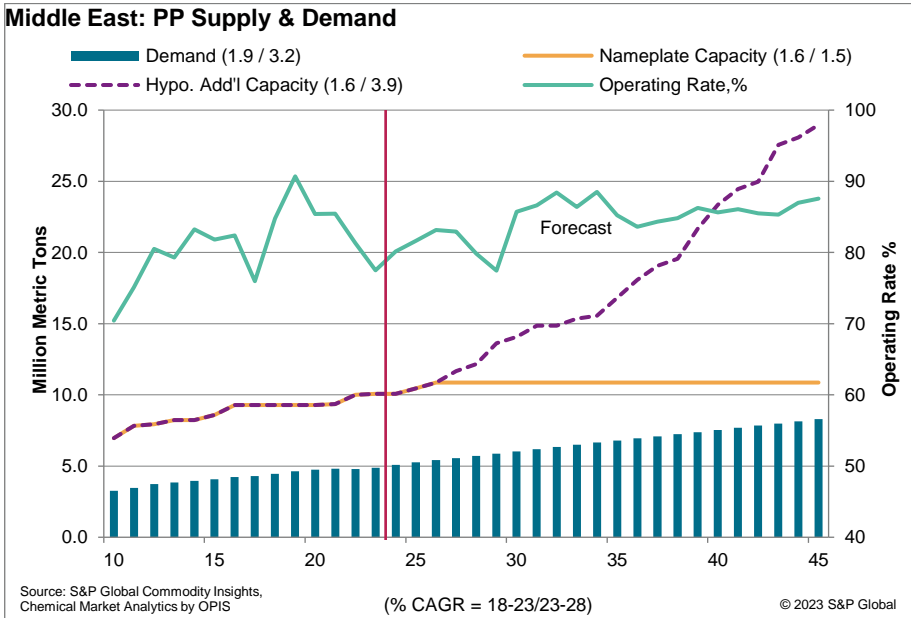


Central and Eastern Europe net imports about 1.1 million metric tons of PP in 2023, supplying nearly 46% of PP consumption. Poland (52.7%), Czechia (16.0%), and Former Yugoslavia (14.8%) are the largest importers of PP in the region, accounting for about 78% of the total. Western Europe was the main supplier of imported PP within the region, accounting for 83.5% of total imports. With the domestic demand growth, and no new capacity addition in this region, net imports of this region are expected to increase steadily and will reach 2.1 million metric tons by 2045.

The region exports about 1.3 metric tons in 2023. Of the total exported volume, 40% is exported within the region and 40% is exported to Western Europe.

4.2.6 Middle East

Supply



With the nameplate capacity of around 10.0 million metric tons, middle east is the second-largest PP capacity region after mainland China, representing 9.2% of global capacity, and almost on par with North America. It is expected to increase to 10.9 million metric tons by 2028. Advanced Polyolefins Company is projected to come up with capacity addition of 800 thousand metric tons by 2026 in Al Jubail, Saudi Arabia. Abu Dhabi Polymers Company Ltd (Borouge) also started a 480 thousand metric tons plant in 2023. Hypothetical capacity addition of around 1.3 million metric tons is expected by 2028 and around 18.1 million metric tons are expected by 2045. Within the region, Saudi Arabia is the largest producing country, estimated to account for about 54.1% of regional capacity in 2023.

Top five capacity shareholders of polypropylene in the region as of 2023 include Abu Dhabi National Oil Company (22.26%), Saudi Arabian Oil Company (21.73%), OQ SAOC (6.36%), National Industrialization Company (5.37%) and Advance Petrochemical Company (5.37%).

Recent capacity additions in the Middle East include OQ S.A.O.C. with a 300 thousand metric ton PP plant in 2021 that is linked to a mixed-feed cracker based on naphtha and natural gas liquids (NGLs) located in Oman. Abu Dhabi Polymers Company Ltd. (Borouge) started a 480 thousand metric ton PP plant in 2022 and run at full capacity in 2023, located in the United Arab Emirates, and the feedstock for the plant comes from the recently commissioned Takreer PDH plant. Total capacity in the Middle East is estimated to be just around 10.0 million metric tons in 2023. The investment draught between 2015 and 2021 was attributed mainly to the general slowdown in capital investment in the region; it also followed a pattern

of underinvestment in petrochemical developments, especially in polyolefin capacities in the region. However, recent development has shown that the gloomy investment picture is changing for PP, as several projects are being lined up in the coming years. There are several reasons for this shift. The first reason is that regional companies are realizing they need to regain the market share, which they had steadily lost during the investment draught. The second reason is the gradual shift from lighter to heavier feeds for crackers, leading to somewhat higher yields of propylene. The third reason is the drive of refineries to add value with the production of low-sulfur fuel oil and other fuel derivatives, which will also increase propylene supplies. The fourth reason is the availability of more associated gas, owing to investments in gas separation facilities, which is making local investments more attractive. Another big driver for longer-term investment is that upstream players are diversifying toward more investment in the chemical pool as traditional fuel markets face challenges from technology (such as electric vehicles) and sustainability initiatives.

The anticipated energy transition due to the rise in e-mobility will cause oil demand to peak soon and then gradually taper down. Upstream companies have started to rethink their energy-driven strategies and consider diversification in the chemical and petrochemical space. This strategy offers a more robust long term demand view despite pressure from sustainability and recycling.

Operating rates in the Middle East dropped to 85% in 2020, from 91% in 2019, resulting in a 6% decline in production in 2020. Currently, operating rates are around 77%, in 2023. Several PP units in the region have been operating at lower rates because of feedstock integration constraints and plant reliability factors that bring overall production volumes down. Among the grades produced, PP homopolymer still dominates production in the region, but regional producers have begun to expand their range of grades with the production of value-added grades, such as impact and random copolymer PP.

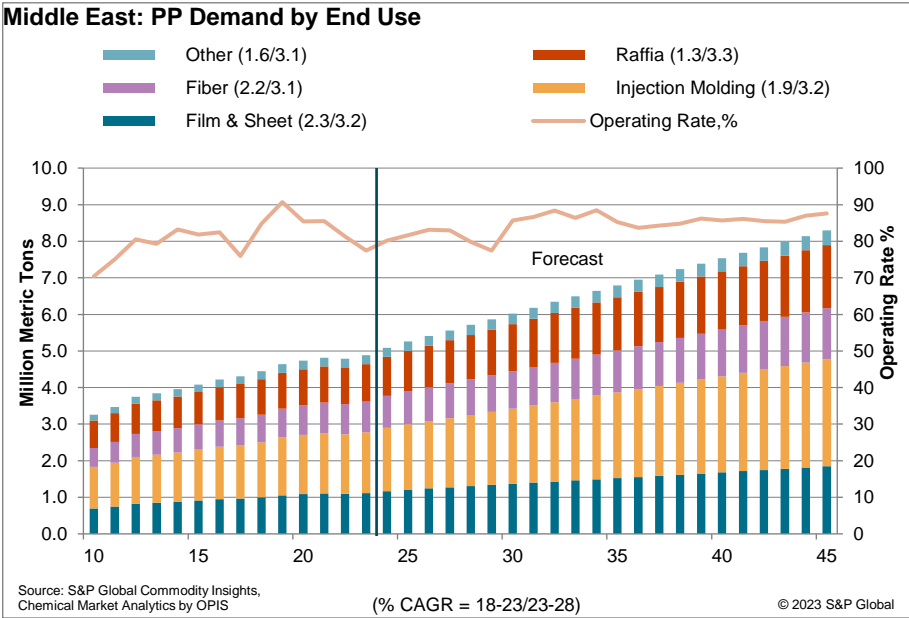
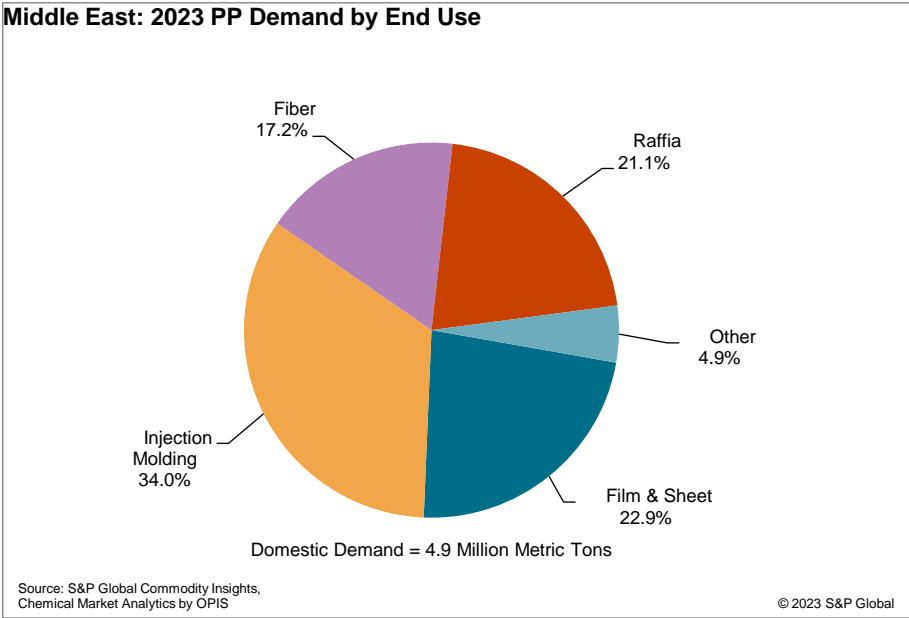
Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)														
Company.Name	Country/Territor	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
Basparan Bandar Imam Company	Iran	Hydrocarbon Slurry	55	55	55	55	55	55	55	55	55	55	55	
Jam Petrochemical Co (JPC)	Iran	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300	
Marun Petrochemical Company	Iran	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300	
Navid Zar Chimi Industrial Company	Iran	Liquid/Gas Phase Comb.	160	160	160	160	160	160	160	160	160	160	160	
Polynar Company Limited	Iran	Gas Phase	60	60	60	60	60	60	60	60	60	60	60	
Regal Petrochemical Company	Iran	Multiple Gas Phase	80	80	80	80	80	80	80	80	80	80	80	
Shazand Petrochemical Company	Iran	Liquid/Gas Phase Comb.	75	75	75	75	75	75	75	75	75	75	75	
Carmel Olefins Ltd	Israel	Gas Phase	200	200	200	200	200	200	200	200	200	200	200	
Carmel Olefins Ltd	Israel	Liquid/Gas Phase Comb.	210	210	210	210	210	210	210	210	210	210	210	
Petrochemical Industries Company K.S.C	Kuwait	Multiple Gas Phase	160	160	160	160	160	160	160	160	160	160	160	
Oman Oil Refineries and Petroleum Industries Co	Oman	Gas Phase	170	170	62	0	0	0	0	0	0	0	0	
Oman Oil Refineries and Petroleum Industries Co	Oman	Multiple Gas Phase	170	170	62	0	0	0	0	0	0	0	0	
OQ SAOC	Oman	Liquid/Gas Phase Comb.	0	0	0	71	300	300	300	300	300	300	300	
OQ SAOC	Oman	Multiple Gas Phase	0	0	108	170	170	170	170	170	170	170	170	
OQ SAOC	Oman	Gas Phase	0	0	108	170	170	170	170	170	170	170	170	
Advanced Petrochemical Company	Saudi Arabia	Gas Phase	270	270	270	270	270	270	270	270	270	270	270	
Advanced Petrochemical Company	Saudi Arabia	Gas Phase	270	270	270	270	270	270	270	270	270	270	270	
Advanced Polyolefins Company	Saudi Arabia	Bulk Slurry	0	0	0	0	0	0	0	201	400	400	400	
Advanced Polyolefins Company	Saudi Arabia	Gas Phase	0	0	0	0	0	0	0	201	400	400	400	
Al Waha Petrochemicals Co.	Saudi Arabia	Multiple Gas Phase	450	450	450	450	450	450	450	450	450	450	450	
National Petrochemical Industrial Co.	Saudi Arabia	Liquid/Gas Phase Comb.	400	400	400	400	400	400	400	400	400	400	400	
Petro Rabigh Company	Saudi Arabia	Multiple Gas Phase	350	350	350	350	350	350	350	350	350	350	350	
Petro Rabigh Company	Saudi Arabia	Gas Phase	350	350	350	350	350	350	350	350	350	350	350	
Saudi European Petrochemical Co (IBN ZAHR)	Saudi Arabia	Multiple Gas Phase	360	360	360	360	360	360	360	360	360	360	360	
Saudi European Petrochemical Co (IBN ZAHR)	Saudi Arabia	Gas Phase	500	500	500	500	500	500	500	500	500	500	500	
Saudi European Petrochemical Co (IBN ZAHR)	Saudi Arabia	Gas Phase	360	360	360	360	360	360	360	360	360	360	360	
Saudi Kayan Petrochemical Co	Saudi Arabia	Liquid/Gas Phase Comb.	350	350	350	350	350	350	350	350	350	350	350	
Saudi Polymers Co	Saudi Arabia	Gas Phase	400	400	400	400	400	400	400	400	400	400	400	
Saudi Polyolefins Company	Saudi Arabia	Multiple Gas Phase	360	360	360	360	360	360	360	360	360	360	360	
Saudi Polyolefins Company	Saudi Arabia	Multiple Gas Phase	360	360	360	360	360	360	360	360	360	360	360	
Saudi-Yanbu Petrochemical Co (YANPET)	Saudi Arabia	Gas Phase	260	260	260	260	260	260	260	260	260	260	260	
Yanbu National Petrochemicals Co (Yansab)	Saudi Arabia	Gas Phase	400	400	400	400	400	400	400	400	400	400	400	
Petkim Petrokimya Holding AS	Turkey	Gas Phase	144	144	144	144	144	144	144	144	144	144	144	
Abu Dhabi Polymers Company Ltd (Borouge)	UAE	Liquid/Gas Phase Comb.	400	400	400	400	400	400	400	400	400	400	400	
Abu Dhabi Polymers Company Ltd (Borouge)	UAE	Liquid/Gas Phase Comb.	400	400	400	400	400	400	400	400	400	400	400	
Abu Dhabi Polymers Company Ltd (Borouge)	UAE	Liquid/Gas Phase Comb.	480	480	480	480	480	480	480	480	480	480	480	
Abu Dhabi Polymers Company Ltd (Borouge)	UAE	Liquid/Gas Phase Comb.	480	480	480	480	480	480	480	480	480	480	480	
Abu Dhabi Polymers Company Ltd (Borouge)	UAE	Liquid/Gas Phase Comb.	0	0	0	0	410	480	480	480	480	480	480	
Total - Middle East			9,284	9,284	9,284	9,355	9,994	10,064	10,064	10,465	10,864	10,864	10,864	

Demand

In 2023, the Middle East consumes 4.9 million metric tons of PP. Domestic consumption is projected to grow at an average annual rate of 3.2% between 2023-28, and all the application segments are anticipated to follow the same growth trend during 2023-28. In long term, the demand is expected to grow at CAGR of 2.4% between 2023-45.

At the beginning of 2022, in late February, oil and energy prices escalated with the start of the Russia-Ukraine crisis and the sustained strength in oil prices started to produce a major positive impact on the economies and finances of GCC (Gulf Cooperation Coast) countries. However, by May oil prices began to edge lower and later stabilized to much lower levels, despite remaining high, and PP prices eventually disconnected from the oil price trend. Through the rest of 2022 and 2023, downstream demand became limited by rising inflation worldwide, and the consequent reduction of some non-essential purchasing amid strong over supply. Despite these challenges, the rapidly growing population and prosperity of the GCC region will continue to boost demand for several PP finished products. Regional governments, intending to diversify their economies away from oil and gas production for export, are increasingly offering incentives for the development of downstream industries beyond polymer production. Efforts are under way in Saudi Arabia, the United Arab Emirates (UAE), and Oman to develop a viable plastics converter industry. The goal is to create a large domestic converter base that will produce plastic products for the domestic market as well as exports to Europe, Africa, and North America.

A total volume of 4.9 million metric tons of PP is consumes in 2023. The region exports a significant volume of finished PP products such as film and fibers (woven products), which are easier to transport. The Middle East is the third-largest raffia-processing region, following mainland China and India, and produces about 1.0 million metric tons of raffia-grade PP in 2023. Within molding applications, injection molding represents 1.6 million metric tons.



In Middle East, approximately three fourth of the annual demand comes from Turkey and GCC countries (Saudi Arabia, Kuwait, United Arab Emirates, Qatar, Bahrain, and Oman). The remaining one- fourth comes from the other Middle East countries. Turkey is the major consumer of polypropylene approximately 50.5% of the regional demand comes from it, 13.8% from Saudi Arabia, while remaining 8.2% is from the GCC countries (Excluding KSA).

Film and Sheet

In 2023, the Middle East market consumes approximately 1.1 million metric tons of polypropylene as film & sheet. Consumption of polypropylene in film & sheet applications is expected to grow at a growth rate of 3.2% in the near term (2023-28) while it is expected to grow at a CAGR of 2.3% in the long term (2023-45).

Middle East majorly offers BOPP and CPP films for food packaging (e.g., snacks, confectionery, dairy, frozen foods and fresh-cut produce, label films designed for many types of labelling technologies such as In-Mold, WAL Roll-Fed, WAL Cut & Stack, self-adhesive/pressure sensitive (liner & face stock) and shrink Labels and technical applications (tobacco, overwrap, gift paper, flower wrap, adhesive tapes, etc.). In the Middle East, food packaging, labels are the major applications which are expected to grow at a rate of higher growth rate.

In Middle East, about 75% of the regional demand for film and sheet is from Turkey and Saudi Arabia. Turkey is by far the largest market for films and sheet as due to its strategic location, large population base and better developed converter industry. The Turkish film industry is made up of three producers, now with almost 405 thousand tons of BOPP and CPP film capacity: - Polibak Plastik Film San ve Tic. AS, Polinas Plastik San ve Tic AS and Superfilm San ve Tic. AS. Some of the other film producers in Middle East are Taghleef (UAE and Oman), Gulf Packaging Industries (Saudi Arabia), Rowad Plastics (Saudi Arabia), Technova Industries (UAE) etc.

Injection Molding

In 2023, the Middle East market consumes 1.6 million metric tons of polypropylene for injection molding applications. Consumption of polypropylene in injection molding applications is expected to grow at a CAGR of 3.2% in the near term (2023-28) and at a growth rate of 2.6% in the long term (2023-45).

In Middle East injection molding is mainly dominated by appliances, paint pails, food containers/crates, caps, and closure mainly. Turkey is the key market with more than 54.1% of the injection molding demand from there. Some of the key injection molding players in Middle East include MTN KALIP (Turkey), HPA PLastick (Turkey), Al Barsha Plastic Product Co. LLC (UAE), Zamil Plastic Products LLC (Saudi Arabia), Al Watania Plastics (Saudi Arabia), Genoa Plastic Industries(Kuwait), Obeikan Investment Group (Saudi Arabia), Harwal Group (UAE), Arab Gulf Manufacturing Co. (Saudi Arabia), Rowad Plastics Group (Saudi Arabia), and Takween Advanced Industries (Saudi Arabia),UAE Elan (UAE), Gulfmaid (Saudi Arabia), and Plastic industries Company (Kuwait).

Plastic pails produced in the region range from 0.5 to 20 liters, some sizes with Injection Molding Labeling print and rest with Dry Offset printing. Container packages for cater to having specific requirements in packaging the products for industries like paints, adhesives, inks, oil grease and fertilizers. Product offered from Injection Molded (IM) rigid plastic crates are made from impact-resistant materials suitable for various uses such as bakeries, poultry, and beverages.

Fibers

In 2023, the Middle East market consumes 838 thousand metric tons of polypropylene as fiber. Consumption of polypropylene in fiber applications is expected to grow at a CAGR of 3.1% in the near term (2023-28) and at a growth rate of 2.4% in the long term (2023-45). Demand for nonwoven geotextiles for erosion control and road construction in countries such as Saudi Arabia and the United Arab Emirates will drive growth in consumption in forecast years.

Iran and Saudi Arabia are also important players in the region. Both countries produce and consume fibers mainly for the carpet market. Production of staple fibers for nonwovens is increasing in Saudi Arabia. Turkey has historically been the major player in the region. The country has a long-standing tradition in the manufacture of carpets and carpet yarns, as well as the manufacture of FIBC (also called big bags) out of slit films. Significant amounts of slit films are believed to be imported from Europe into Turkey for the manufacture of FBICs. The finished product is then re-exported into Europe. Consumption of polyolefin staple for nonwoven applications is believed to be very small in Turkey; nonwoven producers seem to prefer polyester rather than polypropylene. The majority of polypropylene staple produced in the country is consumed to manufacture spun yarns for woven carpets and in concrete reinforcements or composites manufacture.

Hassan Group (Turkey), Kurt nonwoven (Turkey), Mogul (Turkey), General Tekstil (Turkey), Ribatek Tekstil (Turkey), are the major manufacturers of nonwoven PP fabrics. Saudi German Co, Mada Nonwovens, and SAAF are the major fiber consumers in the Middle East. Majority of fibers are used for consumer goods, such as carpeting and clothing.

The Dubai-based Mattex Group consumes slit films for carpet backing manufacture in Saudi Arabia and for woven geo- and agrotextiles in the United Arab Emirates. Abdullatif Carpets, part of Al Abdullatif Industrial Investment Company (AIIC), is a carpet manufacturer in Saudi Arabia back integrated into PP, BCF, and PP yarn fiber production.

Raffia

In 2023, the Middle East market consumes around 1.0 million metric tons of polypropylene as Raffia. Consumption of polypropylene in Raffia applications is expected to grow at a growth rate of 3.3% in the near term (2023-28) and at a growth rate of 2.4% in the long term (2023-45).

KIZIKLI ambalaj, Cesur, Daphne, Polimer plastik, Sunbag packaging, Artpack, isbir are the major woven sack producers in Turkey. Gulf Plastic Industries (Oman), Al matin group (Syria), Al Siraj, Lasheen (Egypt), Misrnour (Egypt), and Al Hasa are some of the manufacturers that use PP Raffia grade in the woven sack and container bag industry. The market is mainly driven by modern and efficient way of packing, handling, storage, and transport of lumpy and very fine materials in bulk quantities such as petrochemical by-products, fertilizers, cement, sand, minerals, grains, feeds, seeds, etc. These are mainly categorized under woven sacks and container bags. FIBC's are rated with a safe working load of 500Kg, 1000Kg, 1500Kg, or 2000Kg with 5:1 or 6:1 safety factor. Cement, sand, minerals, and grains industry directly drive the Raffia grade polypropylene market.

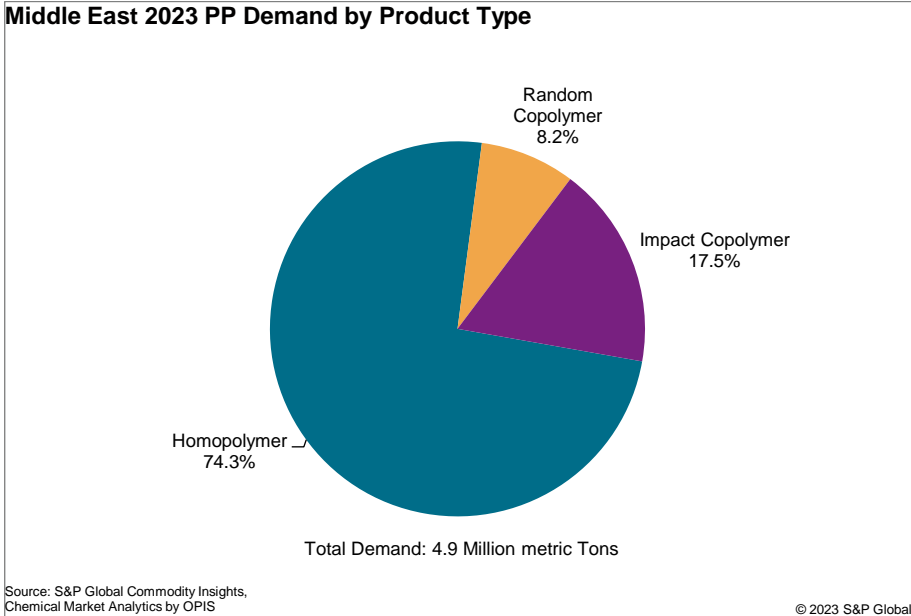
The GCC region has yet to see serious investment in auto or auto component manufacturing despite many promises. Currently, some auto manufacturers have displayed interest to start manufacturing components to serve the replacement market. When it comes to manufacturing potential, investors so far are only committing to assembling. The situation might change with local governments wooing potential investors by offering various concessions to encourage investment, and the region itself is becoming a big car market because of a higher number of cars per capita. However, demand is faring well in other segments such as bulk packaging, carpets, nonwoven applications driven by health and hygiene, films for food and non-food packaging, adhesive tapes and labels driven by consumer lifestyle demand, and furniture and other household product that drive urban middle-class demand.

Some of the resin producers in the region have ventured into making PP compounds both for domestic and export markets targeting automotive, durable goods, building and construction, and electrical and electronics applications in the region, as well the neighboring regions of India and Africa. Steady growth of domestic demand and low growth in capacities would lead to a shift from resin exports to supply for domestic demand. Because of its advantaged cost structure, the region is a price taker for sales to higher-cost regions such as Europe and Northeast Asia, where most of the Middle Eastern materials are exported. Within the region, ruling prices typically correlate with Asia and to some extent to Europe at free on board (FOB) level, factoring the freight and logistics with some discount. Open arbitrage incentivizes exports, while the domestic market is insulated by competitive resin prices from imports, which make it attractive for local converters.

Regional governments, intending to diversify their economies away from oil and gas production for export, are increasingly offering incentives for the development of downstream industries beyond polymer production. Efforts are under way in Saudi Arabia, the UAE, and Oman to develop a viable plastics converter industry. The goal is to create a large domestic converter base that will produce plastic products for the domestic market as well as exports to Europe, Africa, and North America. Saudi Arabia has made significant progress in this mission; its production and exports of BOPP films, fibers, and filaments as well as raffia products have grown rapidly over the last few years. However, the rest of the region has failed to boost the growth of the downstream conversion industry because of limited competitive advantage in setting up a production facility in these countries.

Recycle demand for PP increases by 6.9% in 2023. The average annual growth rate of recycle demand through 2033 is about 10.0%, which is considerably higher than that of virgin PP demand, although it is growing from a very small base that is less than one percent the size of the virgin PP market, the smallest of all the regions. The Middle East currently has the second lowest recycle demand of all the regions, at 43 thousand metric tons, and is expected to remain in that percentage through 2033. Saudi Arabia, the UAE, and Iran collectively hold about 86% of the region's total PP capacity. Saudi Arabia, holding 54% of the region's capacity, has prohibited the manufacture, advertisement, sale, import, or use of plastics intended for one-time use. The UAE, holding almost 22% of the region's capacity, has implemented a ban on plastic bags made from any material or composition beginning on January 1, 2024, and a ban on single use plastics, such as plastic

cutlery, straws, drink cups, and boxes, starting on January 1, 2026. Iran, holding 10% of the region’s capacity, has no current regulations on plastics but is developing a policy framework, which includes reducing single use plastics, that it hopes to implement in the near future. The remaining countries in the region range from having no policy in place to having bans and Extended Producer Responsibility (EPR).



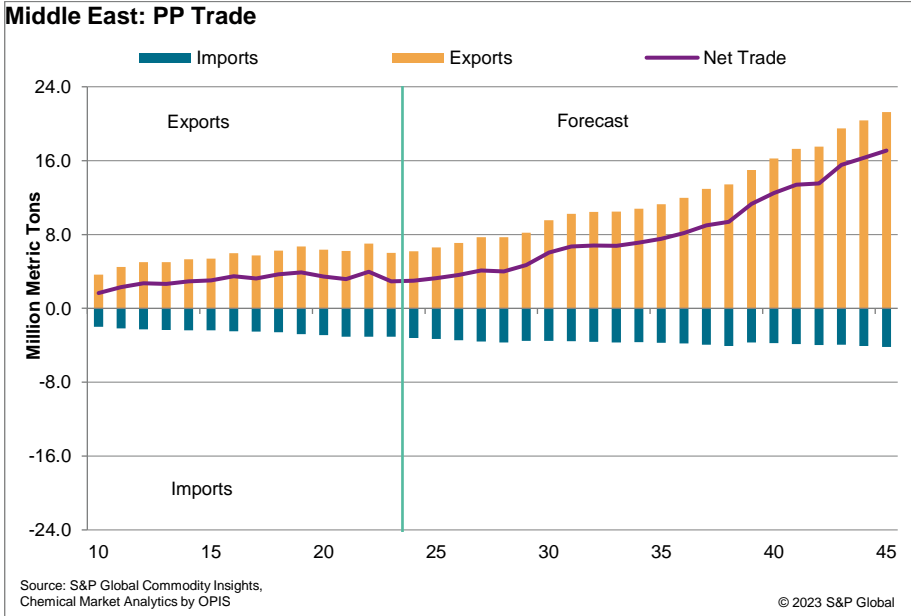
In 2023, homopolymer holds a predominant position, representing 74.3% of the market share. The homopolymer market share in the Middle East region is one of the highest globally. Following closely, impact copolymer secures the second-largest position, accounting for 17.5% of the market share. Random copolymer, on the other hand, constitutes only 8.1% of the total demand.

Trade

The Middle East is the largest exporter of PP, accounting for 23.0% of global PP trade in 2023. The region exports 77% of its domestic production, which is 7.8 million metric tons of PP in 2023. Total regional exports estimated to increase from 7.0 million metric tons in 2022, and decreased to 6.0 million metric tons, and will increase to 7.7 million metric tons in 2028: increasing in line with capacity growth. Indian Subcontinent, Northeast Asia, particularly mainland China, is the main importer of Middle Eastern PP followed by Southeast Asia.

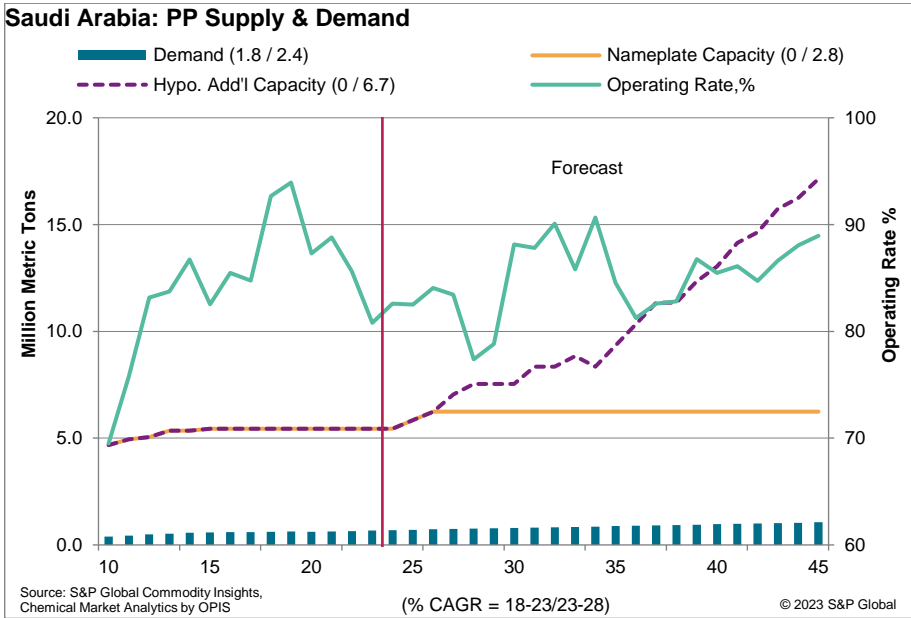
The region also imports 3.1 million metric tons of PP; more than half of that is sourced from within the region. Western Europe, Northeast Asia and CIS & Baltic States are the top exporters to the region as of 2023. Turkey alone consumes 78.1% of total regional imports. Turkey has very minimal production capacity, and thus provides for its entire domestic demand by importing from Saudi Arabia and other countries in Western Europe.

Over the next five years (2023-28), Middle Eastern imports and exports of PP are expected to increase by 3.7% and 5.1% per year, respectively. The region is expected to increase its capacity and production to meet increased trade and domestic consumption.



4.2.7 Saudi Arabia

Supply



With the nameplate capacity of around 10.0 million metric tons, middle east is the second-largest PP capacity region, while Saudi Arabia alone has total 5.4 million metric tons capacity, representing 54.1% of regional capacity. Advanced Polyolefins Company is projected to come up with capacity addition of 800 thousand metric tons by 2026 in Al Jubail, Saudi Arabia. Hypothetical capacity addition of around 1.3 million metric tons is expected by 2028 and around 10.9 million metric tons are expected by 2045. Within the region, Saudi Arabia will remain as the largest producer in forecast time.

The operating rate in Saudi Arabia witnessed a substantial decline, with operating rates plummeting from 94% in 2019 to 87% in 2020, culminating in a 7% reduction in production during that period. Presently, as of 2023, the operating rates declines further, settling at around 81%. Looking ahead into the forecasted years, there's an expectation that the average operating rate will persist at a comparatively subdued level, hovering at 85%.

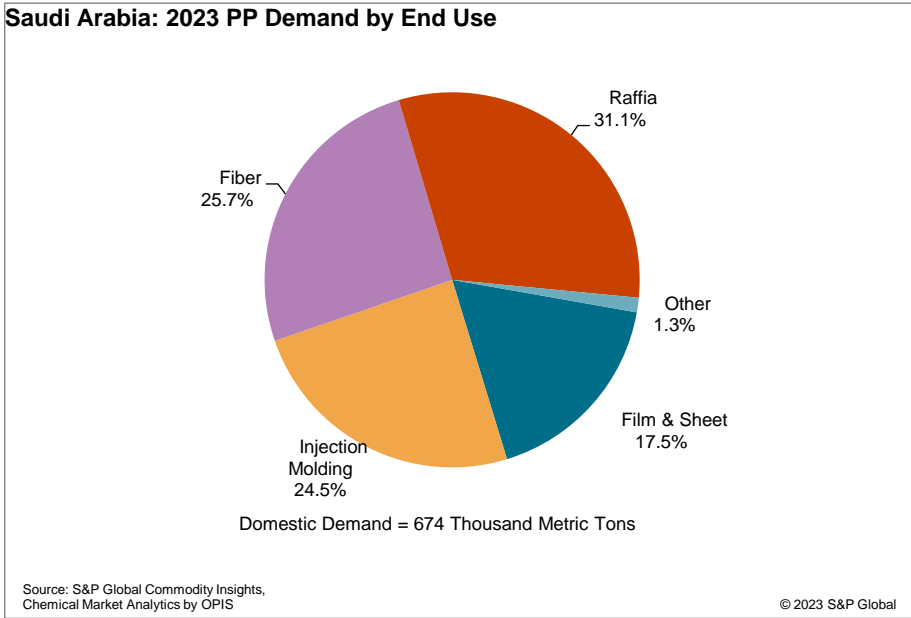
Around 4.4 million metric tons of polypropylene is produced in Saudi Arabia as of 2023. The production is expected to grow at CAGR of 5.8% between 2023-28. During the long-term forecast period, it is expected to grow by 5.8% between 2023-45.

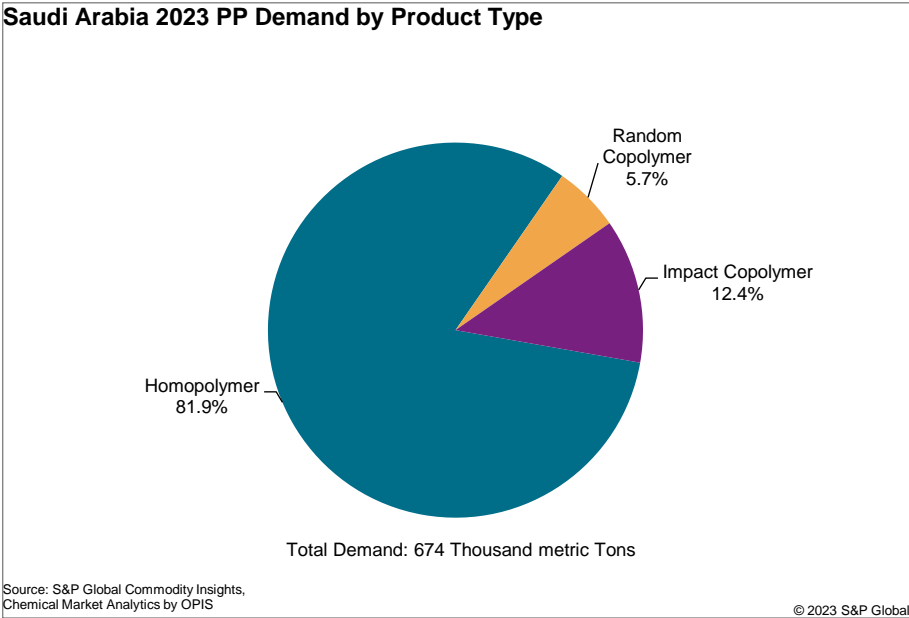
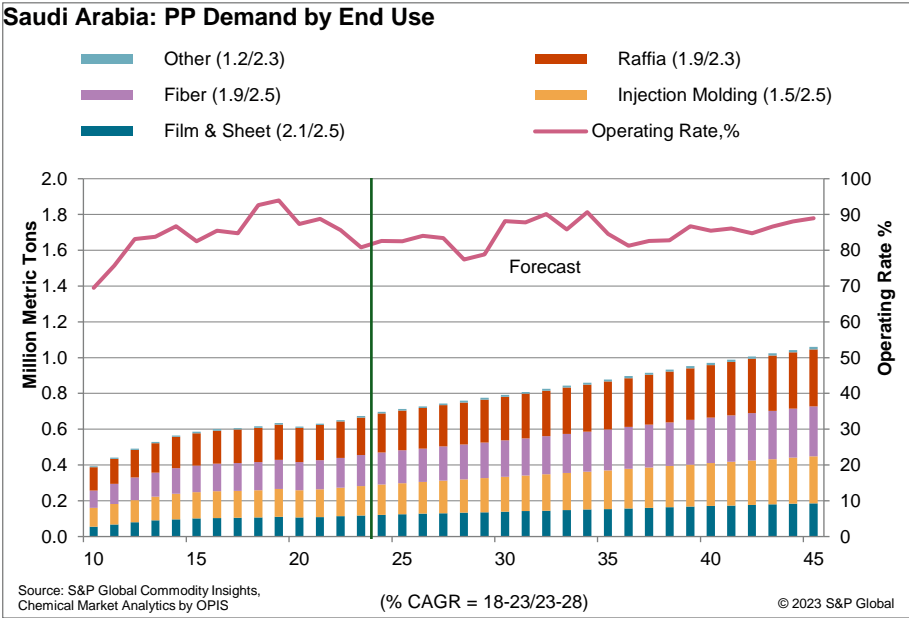
Demand

In 2023, the Saudi Arabia only consumes 674 thousand metric tons of PP. Domestic consumption is projected to grow at an average annual rate of 2.4% between 2023-28, and all the application segments are anticipated to follow the same growth trend during 2023-28. In long term, the demand is expected to grow at CAGR of 2.1% between 2023-45.

In 2023, the largest segment estimated is raffia, representing 31.1% of demand. Consumption of polypropylene in raffia applications is expected to grow at an CAGR of 2.3% in the near term (2023-28) and at an CAGR of 1.9% in the long term (2023-45).

Fiber is the second leading segment accounting for a share of 25.7% of demand, followed by injection molding with a share of 24.5% of the overall demand in the country. Consumption of polypropylene in fiber applications is expected to grow at an CAGR of 2.5% in the near term (2023-28) and at an CAGR of 2.2% in the long term (2023-45). Consumption of polypropylene in injection molding applications is expected to grow at an CAGR of 2.5% in the near term (2023-28) and at an CAGR of 2.1% in the long term (2023-45).





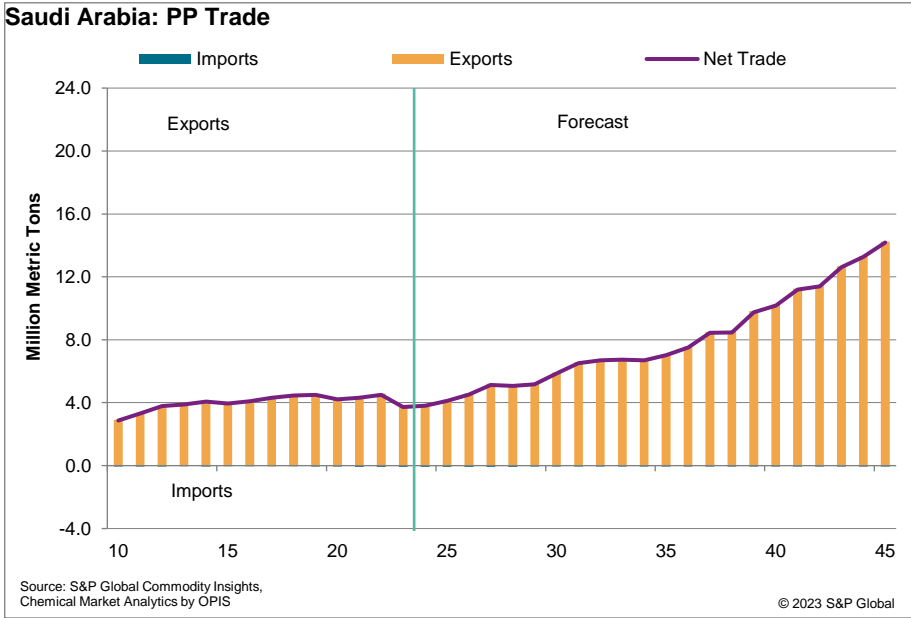
In 2023, homopolymer holds a predominant position, representing 81.9% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 12.4% of the market share. Random copolymer, on the other hand, constitutes only 5.7% of the total demand.

Trade

As of 2022, Saudi Arabia holds the position of the world's foremost exporter of polypropylene, constituting a significant 18.0% share in global PP trade. However, by 2023, this share slightly decreases to 14.5%. Impressively, the country exports a substantial 86.6% of its domestic PP production, amounting to 3.8 million metric tons in 2023. Projections indicate a notable expansion in total country exports, anticipated to reach 5.1 million metric tons by 2028, aligning with the growth in production capacity.

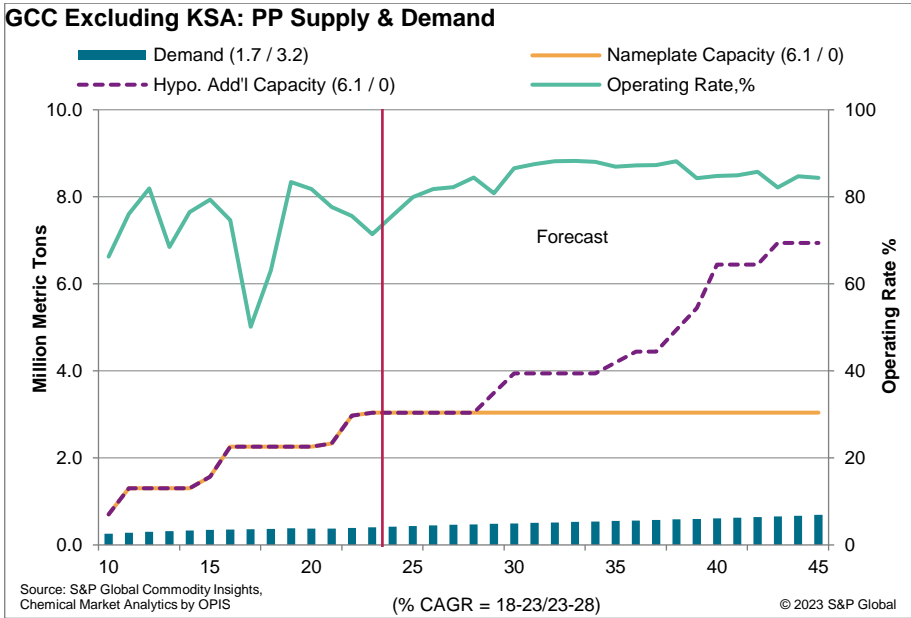
Key import regions for PP include the Indian Subcontinent and Northeast Asia, with mainland China being a primary importer. This underscores the pivotal role played by these regions in driving global PP trade dynamics.

In the upcoming five-year period (2023-2028), it is anticipated that Saudi Arabia's polypropylene (PP) exports will experience an annual growth rate of 6.2%. This growth is driven by the region's strategic efforts to expand both its capacity and production, aligning with the heightened demand for increased trade.



4.2.8 GCC Excluding KSA

Supply



GCC excluding KSA has total 3.0 million metric tons capacity, representing 30.2% of regional capacity. The latest capacity addition is in UAE, Abu Dhabi Polymers Company Ltd (Borouge) started a 480 thousand metric tons plant in 2022, which ramps up to its full capacity by 2023.

Hypothetical capacity addition is expected after 2028 and around 3.9 million metric tons are expected by 2045 and will reach 6.9 million metric tons capacity by 2045.

The operational efficiency in GCC excluding KSA experienced a significant downturn as operating rates dropped from 83% in 2019 to 71% in 2023, resulting in a notable 12% decrease in production during this period. Looking forward into the projected years, there is an anticipation of a rebound in the operating rate, poised to return to levels surpassing 85% in the long term.

Around 2.2 million metric tons of polypropylene is produced in GCC excluding KSA as of 2023. The production is expected to grow at CAGR of 3.4% between 2023-28. During the long-term forecast period, it is expected to grow by 4.6% between 2023-45.

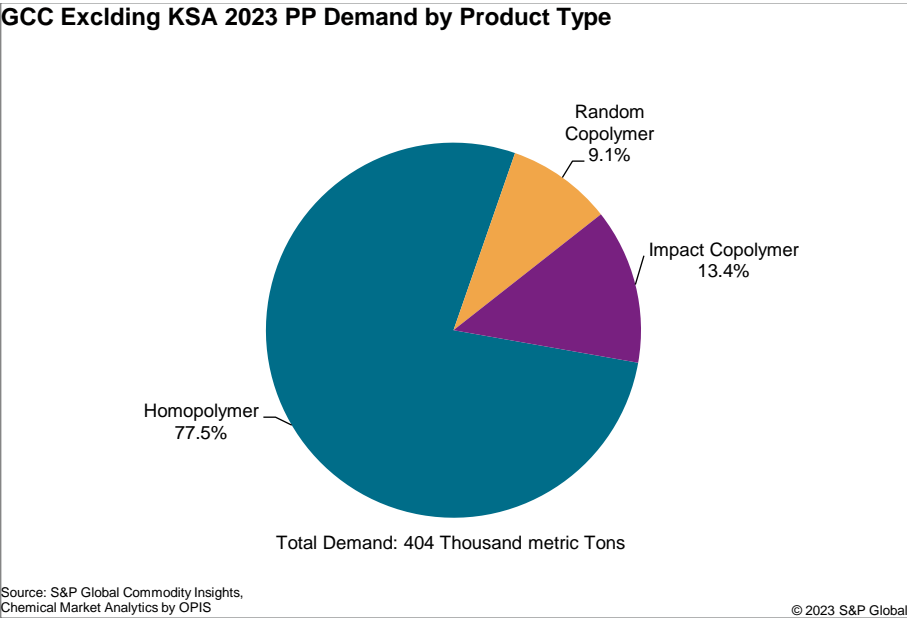
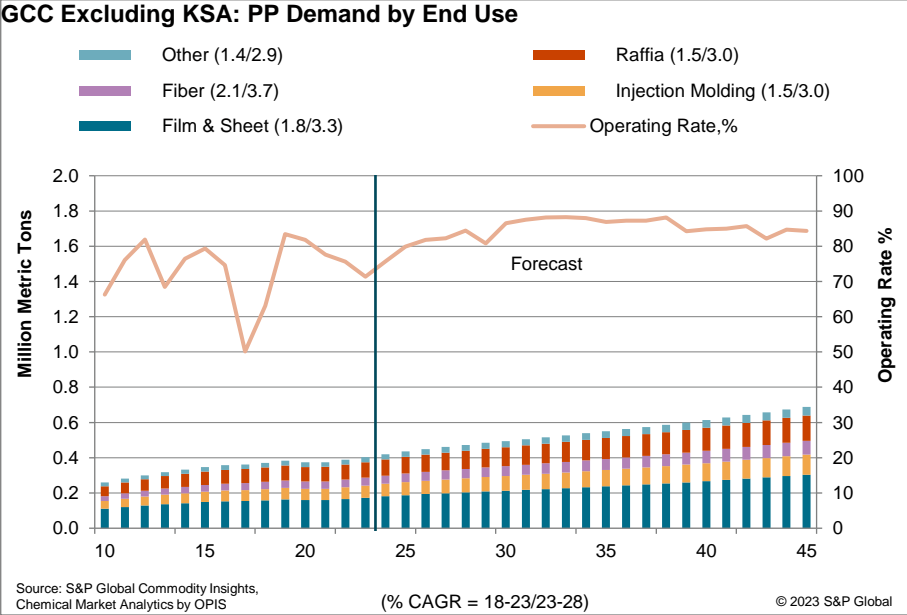
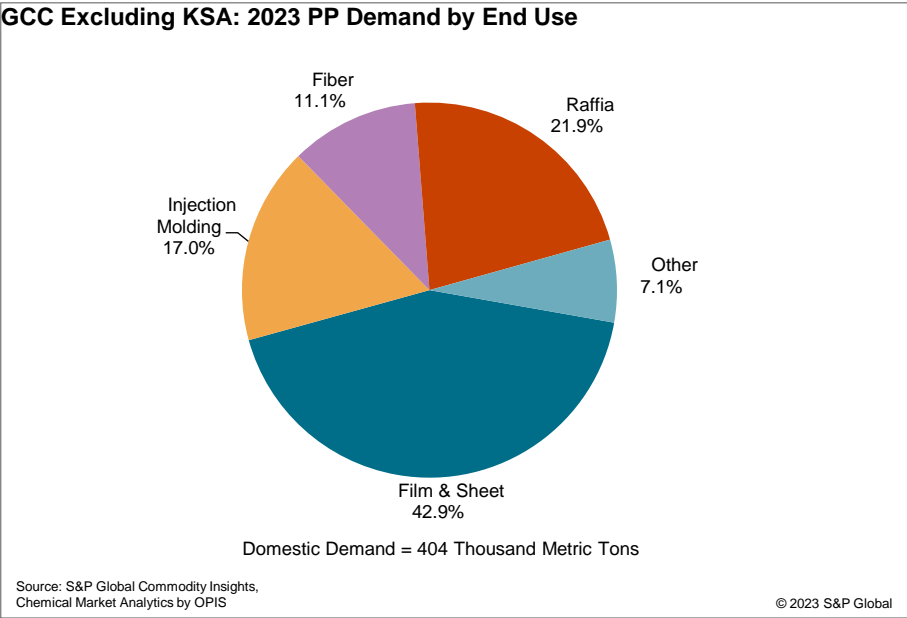
Demand

In 2023, the GCC excluding KSA only consumes 404 thousand metric tons of PP. Domestic consumption is projected to grow at an average annual rate of 3.2% between 2023-28, and all the application segments are anticipated to follow the similar growth trend during 2023-28. In long term, the demand is expected to grow at CAGR of 2.5% between 2023-45.

In 2023, the largest segment estimated is film & sheet, representing 42.9% of demand. Consumption of polypropylene in film & sheet applications is expected to grow at an CAGR of 3.3% in the near term (2023-28) and at an CAGR of 2.6% in the long term (2023-45).

Raffia is the second leading segment accounting for a share of 21.9% of demand. Consumption of polypropylene in raffia applications is expected to grow at an CAGR of 3.0% in the near term (2023-28) and at an CAGR of 2.2% in the long term (2023-45).

Injection molding with a share of 17.0% of the overall demand in the country is the third largest segment. Consumption of polypropylene in injection molding applications is expected to grow at an CAGR of 3.0% in the near term (2023-28) and at an CAGR of 2.3% in the long term (2023-45).

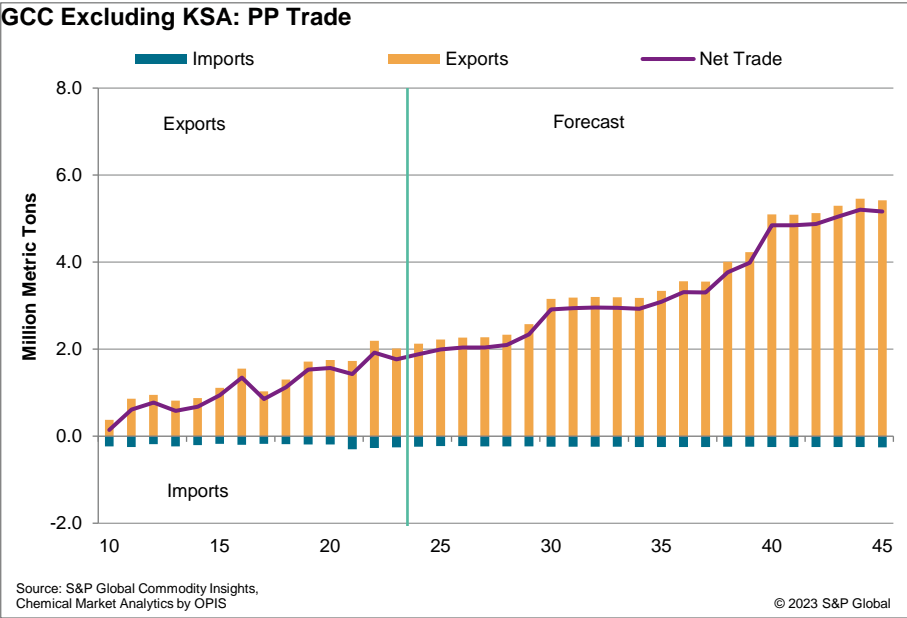


In 2023, homopolymer holds a predominant position, representing 77.6% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 13.4% of the market share. Random copolymer, on the other hand, constitutes only 9.1% of the total demand.

Trade

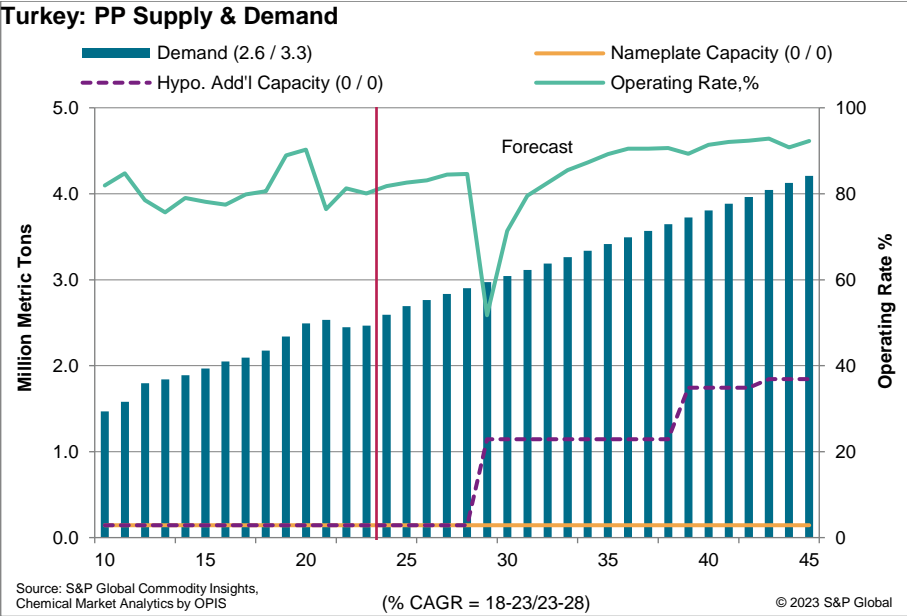
In 2023, GCC excluding KSA emerges as a major player in the global polypropylene export arena, commanding a noteworthy 7.7% share in the worldwide PP trade. Notably, the region exports a remarkable 93.1% of its local PP production, totaling 2.0 million metric tons in 2023. The UAE stands as the predominant net exporter in this region and is anticipated to maintain this position throughout the forecasted period.

Future projections point towards a substantial increase in overall regional exports, expected to grow at an CAGR of 2.9% in the near term (2023-28) and at an CAGR of 4.6% in the long term (2023-45). Further to reach 2.3 million metric tons by 2028 and 5.4 million metric tons by 2045.



4.2.9 Turkey

Supply



As of 2023, Turkey has 144 thousand metric tons of polypropylene capacity, with Petkim Petrokimya Holding AS standing as the sole producer within the nation. Currently, there are no slated plans for the introduction of new capacity in Turkey. However, considering the anticipated surge in domestic demand, we project a hypothetical expansion in capacity for the country. It is estimated that by 2045, a theoretical capacity increase of approximately 1.7 million metric tons will come into play. Throughout the forecast period, Turkey is expected to uphold its position as the foremost consumer within the region. Despite the absence of immediate plans for capacity augmentation, the projections reflect a forward-looking perspective, anticipating a significant boost in polypropylene production capabilities in response to the escalating demand scenario.

There has been a significant downturn in the operating rate of Turkey, marked by a notable decrease in operating rates from 90% in 2020 to 80% in 2023. Looking towards the future, the forecast indicates that Turkey will maintain a consistently high operating rate over the long term due to fast growing demand, surpassing 90% by the conclusion of the forecasted period.

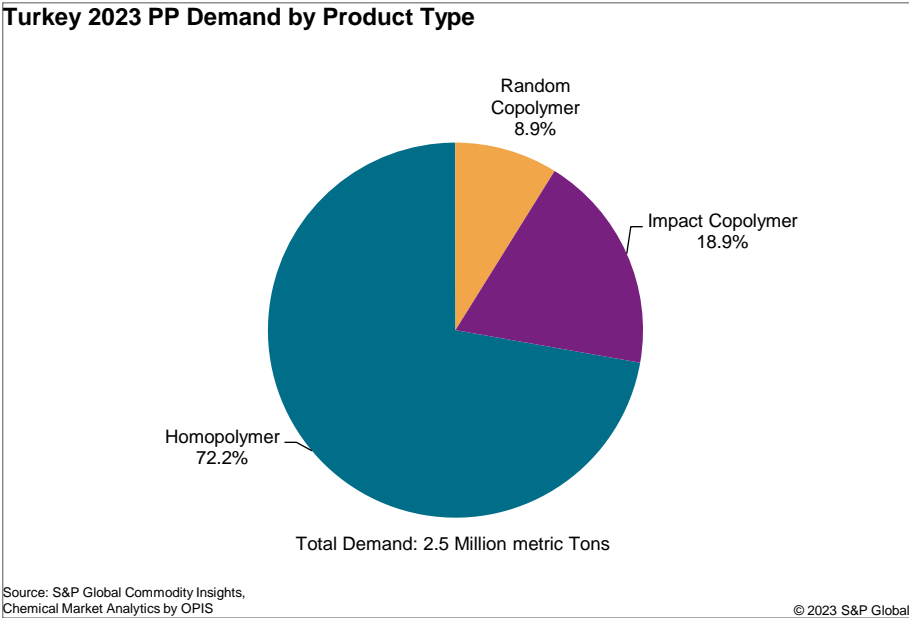
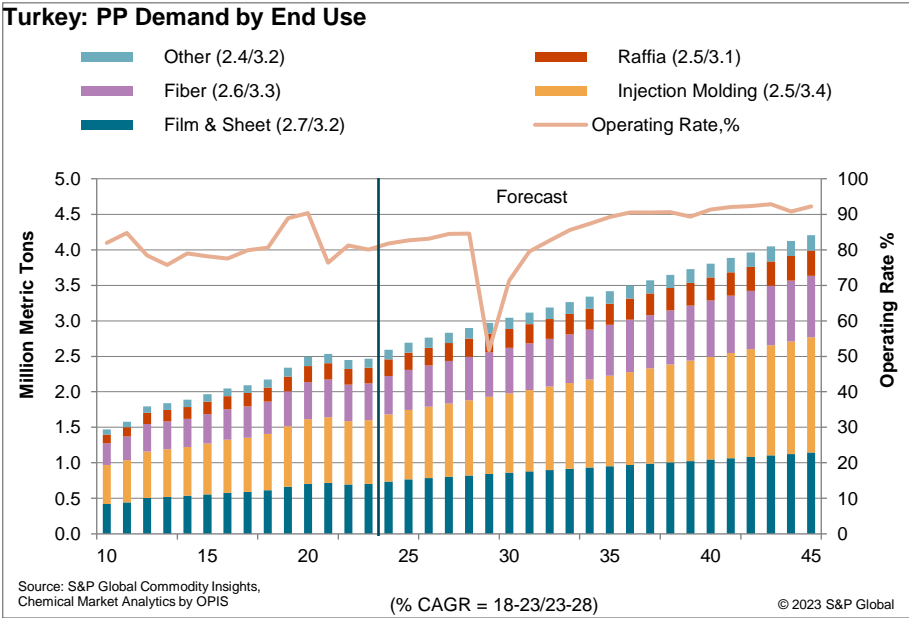
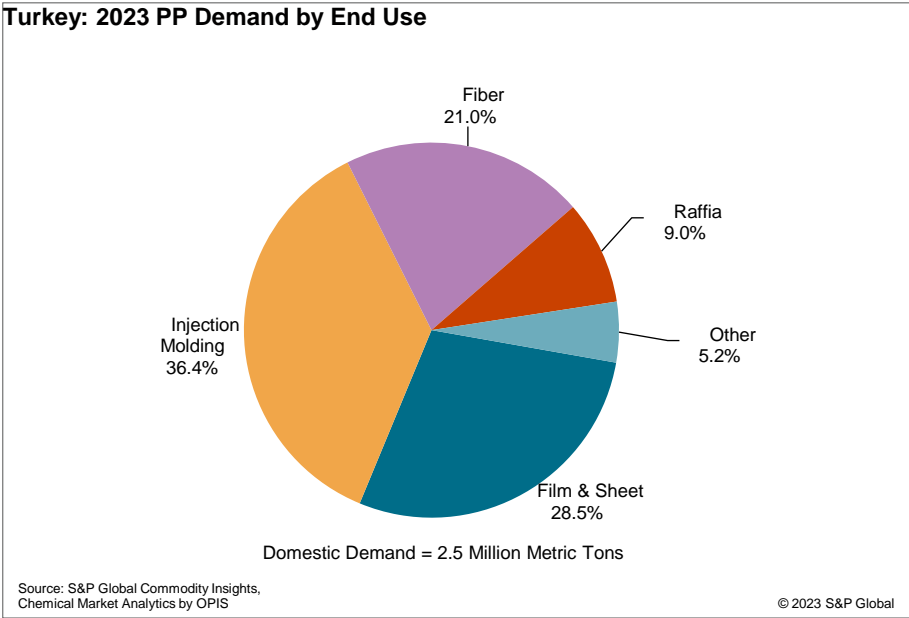
Around 115 thousand metric tons of polypropylene is produced in Turkey as of 2023. The production is expected to grow at CAGR of 1.1% between 2023-28. During the long-term forecast period, it is expected to grow by 13.0% between 2023-45.

Demand

In 2023, the Turkey consumes 2.5 million metric tons of PP, about 50.5% of total Middle East consumption. Domestic consumption is projected to grow at an average annual rate of 3.3% between 2023-28, and all the application segments are anticipated to follow the same growth trend during 2023-28. In long term, the demand is expected to grow at CAGR of 2.5% between 2023-45. Turkey will be the key demand driver for Middle East region.

In 2023, the largest segment estimated is injection molding, representing 36.4% of demand. Consumption of polypropylene in raffia applications is expected to grow at an CAGR of 3.4% in the near term (2023-28) and at an CAGR of 2.7% in the long term (2023-45).

Film & sheet is the second leading segment accounting for a share of 28.5% of demand, followed by fiber with a share of 21.0% of the overall demand in the country. Consumption of polypropylene in film & sheet applications is expected to grow at an CAGR of 3.2% in the near term (2023-28) and at an CAGR of 2.2% in the long term (2023-45). Consumption of polypropylene in fiber applications is expected to grow at an CAGR of 3.3% in the near term (2023-28) and at an CAGR of 2.4% in the long term (2023-45).



In 2023, homopolymer holds a predominant position, representing 72.2% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 18.9% of the market share. Random copolymer, on the other hand, constitutes only 8.8% of the total demand.

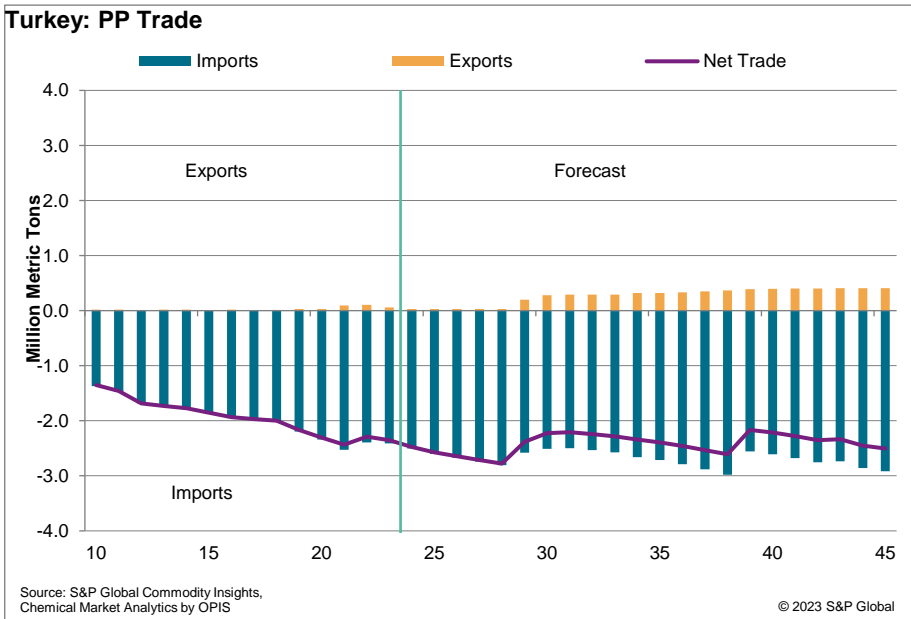
Trade

As of 2023, Turkey holds the distinction of being the largest net importer of polypropylene in the Middle East region, commanding a significant 78.1% share in regional imports and contributing 9.2% to the global polypropylene trade. In 2023, Turkey meets a substantial 97.8% of its domestic polypropylene demand through imports, totaling 2.4 million metric tons.

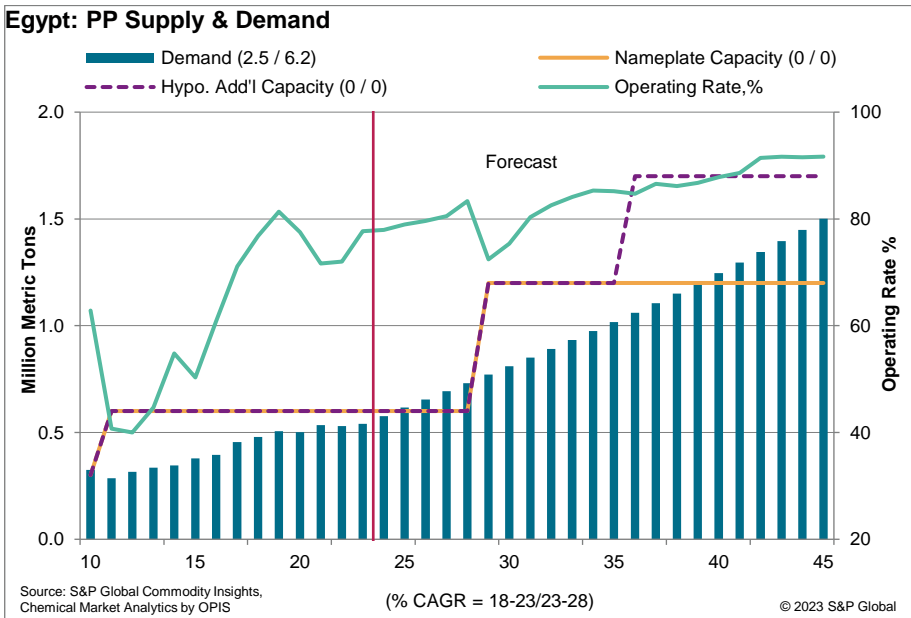
Projections for the future indicate a noteworthy expansion in Turkey's overall capacity, with approximately 1.7 million metric tons of new capacity expected to be added by 2045. Despite this increase, it is anticipated that Turkey's import volume will persist at around 2.7 million metric tons per year in the long term.

In 2023, key export regions for polypropylene to Turkey include West Europe, Saudi Arabia, Russia, Egypt, and South Korea.

In the upcoming five-year period (2023-2028), it is anticipated that Turkey's polypropylene imports will experience an annual growth rate of 3.1%. This growth is driven by the domestic demand growth and lack of new additional capacity.



4.2.10 Egypt
Supply



In 2023, Egypt has a total polypropylene capacity of 600 thousand metric tons. The most recent capacity increase occurred in 2010 when the Egyptian Propylene & Polypropylene Company initiated a 400 thousand metric tons expansion. Oriental Petrochemicals Corporation is another PP producer in the country, boasting a capacity of 200 thousand metric tons. The Red Sea National Refining and Petrochemicals Company has planned to introduce a 600 thousand metric tons PP capacity plant, scheduled for completion by 2029. A hypothetical capacity addition of approximately 5500 thousand metric tons is anticipated by 2045, leading to a total PP capacity of 1.7 million metric tons.

The operational rate in Egypt has remained relatively stable, hovering around 80%. Looking forward to the projected years, there is an expectation that the average operational rate will increase to around 84%.

Around 466 thousand metric tons of polypropylene is produced in Egypt as of 2023. The production is expected to grow at CAGR of 11.4% between 2023-28. During the long-term forecast period, it is expected to grow by 5.6% between 2023-45.

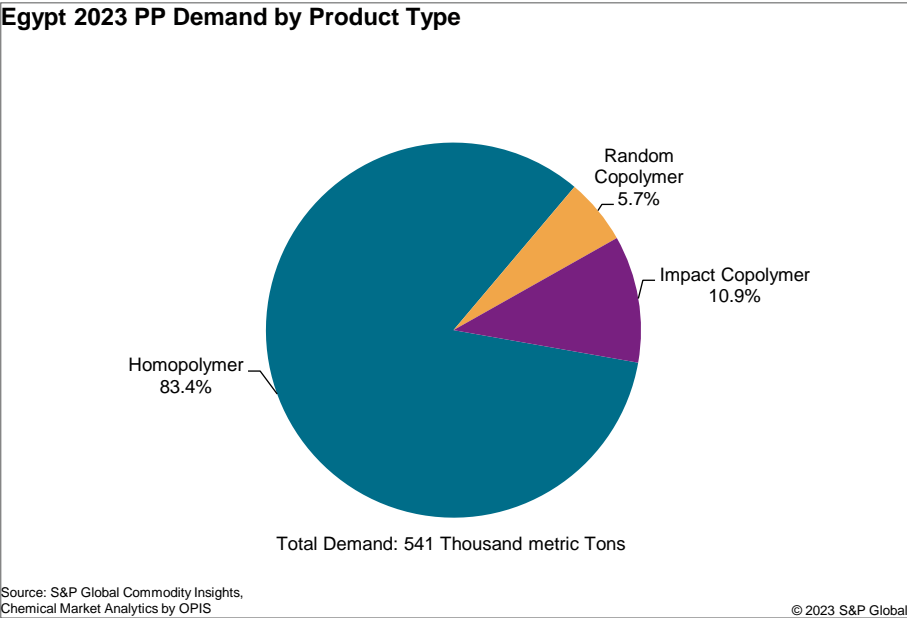
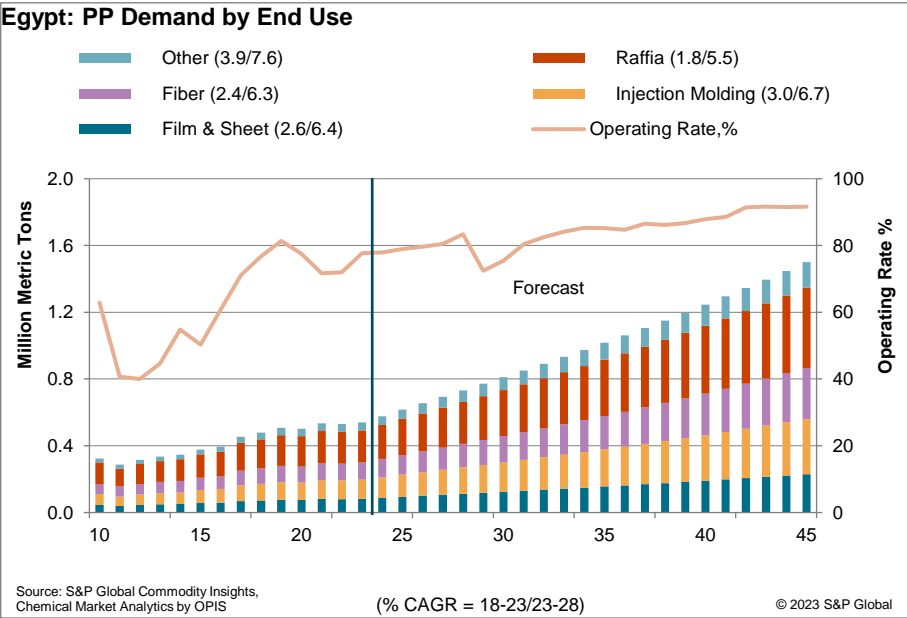
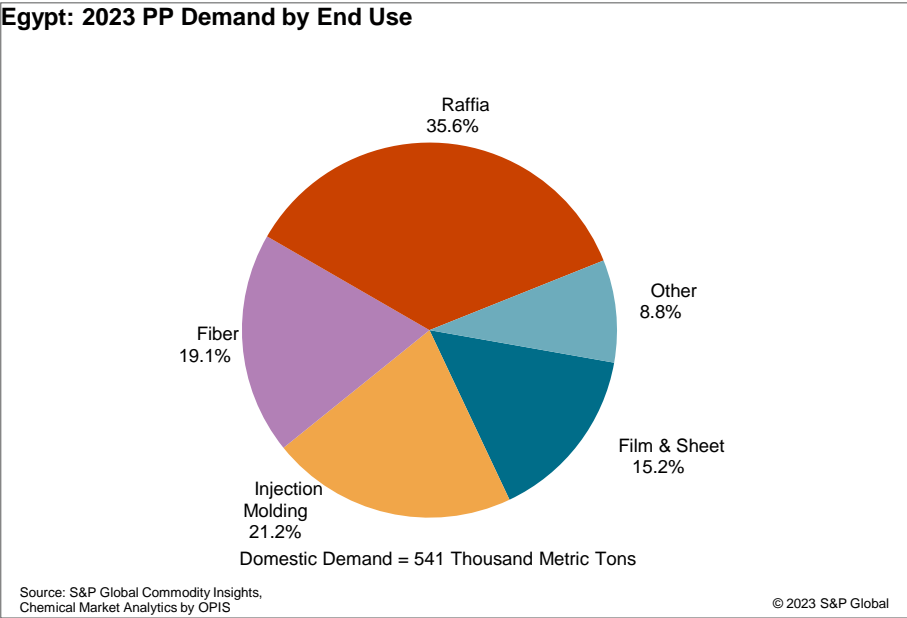
Demand

In 2023, the Egypt consumes 541 thousand metric tons of PP. Domestic consumption is projected to grow at an average annual rate of 6.2% between 2023-28. In long term, the demand is expected to grow at CAGR of 4.8% between 2023-45.

In 2023, the largest segment estimated is raffia, representing 35.6% of demand. Consumption of polypropylene in raffia applications is expected to grow at an CAGR of 5.5% in the near term (2023-28) and at an CAGR of 4.3% in the long term (2023-45).

Injection molding is the second leading segment accounting for a share of 21.2% of demand. Consumption of polypropylene in injection molding applications is expected to grow fastest, at an CAGR of 6.7% in the near term (2023-28) and at an CAGR of 4.9% in the long term (2023-45).

Fiber with a share of 19.1% of the overall demand in the country is the third largest segment. Consumption of polypropylene in fiber applications is expected to grow at an CAGR of 6.3% in the near term (2023-28) and at an CAGR of 5.0% in the long term (2023-45).



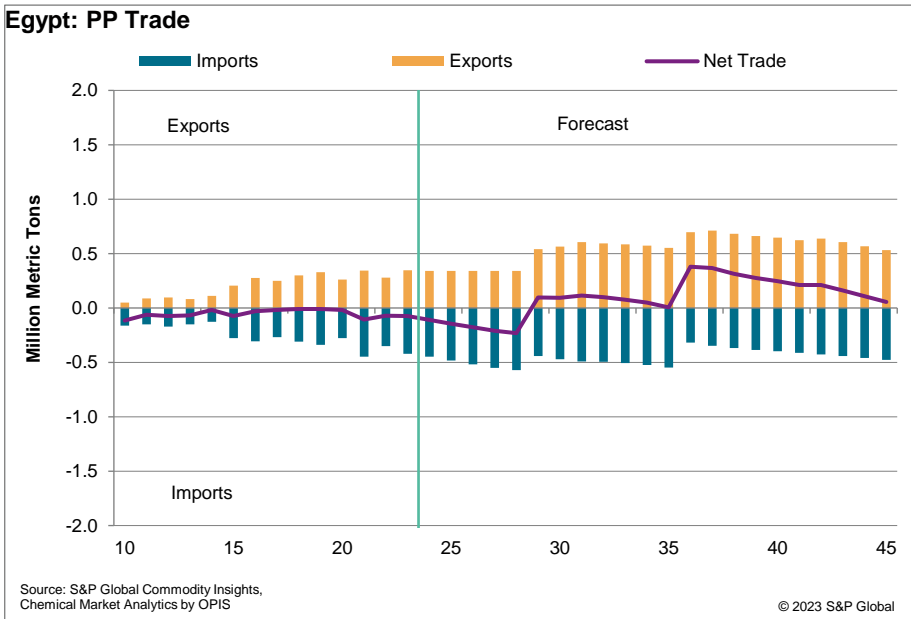
In 2023, homopolymer holds a predominant position, representing 83.4% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 10.9% of the market share. Random copolymer, on the other hand, constitutes only 5.7% of the total demand.

Trade

As of 2023, Egypt's polypropylene imports stand at 420 thousand metric tons. Over the upcoming five-year period (2023-2028), it is expected that Egypt's polypropylene imports will see an annual growth rate of 6.4%. In the long term, a projected average annual growth rate of 0.6% is anticipated between 2023 and 2045. The primary contributors to Egypt's polypropylene imports are Saudi Arabia and the UAE.

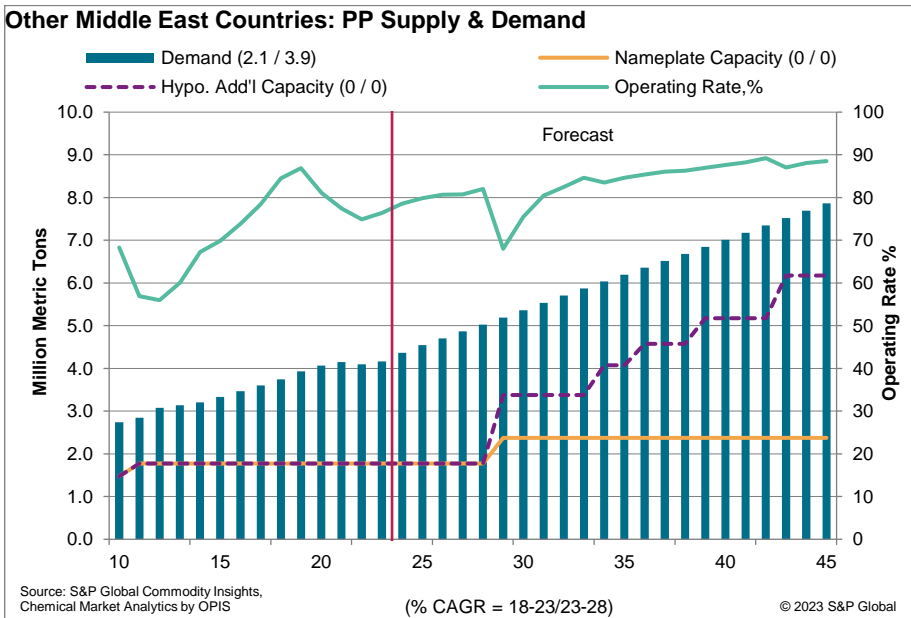
In contrast, Egypt exports 346 thousand metric tons of polypropylene in 2023. Over the next five years (2023-2028), a forecasted annual growth rate of -0.3% is expected for Egypt's polypropylene exports. Looking at the long term, a projected average annual growth rate of 2.0% is anticipated between 2023 and 2045. Key importers of Egyptian polypropylene include Turkey and various African countries.

Over the next five years, Egypt is poised to maintain its status as a net importer of polypropylene. However, as new polypropylene capacity is added, Egypt is projected to transition into a net exporter in the future.



4.2.11 Other Middle East Countries

Supply



In the polypropylene market analysis section, the classification of "Other Middle East countries" encompasses Turkey, Egypt, Iran, Syria, Iraq, Jordan, Tunisia, Morocco, Sudan, and Yemen. These countries collectively contribute to the broader understanding of the polypropylene market dynamics in the Middle East region.

With the nameplate capacity of around 1.7 million metric tons, other middle east countries are representing 17.6% of regional capacity. In 2023, Egypt has 600 thousand metric tons PP capacity, Iran has 1.0 million metric tons of PP capacity, Turkey has 144 thousand metric tons PP capacity. The rest of the countries has no PP capacity.

With a combined nameplate capacity of approximately 1.7 million metric tons, the "Other Middle East countries" represent 17.6% of the regional polypropylene capacity. In 2023, the individual polypropylene capacities of specific countries within this group are as follows: Egypt: 600 thousand metric tons of polypropylene capacity. Iran: 1.0 million metric tons of polypropylene capacity. Turkey: 144 thousand metric tons of polypropylene capacity. The remaining countries in the "Other Middle East countries" category have no polypropylene capacity as of 2023.

Hypothetical capacity addition of around 3.8 million metric tons is expected by 2045. Egypt will have 500 thousand metric tons hypothetical capacity, Turkey will have 1.7 million metric tons hypothetical capacity, Iran will have 1.6 million metric tons hypothetical capacity, no hypothetical capacity for other countries. Within the region, Iran will remain as the largest producer in forecast time.

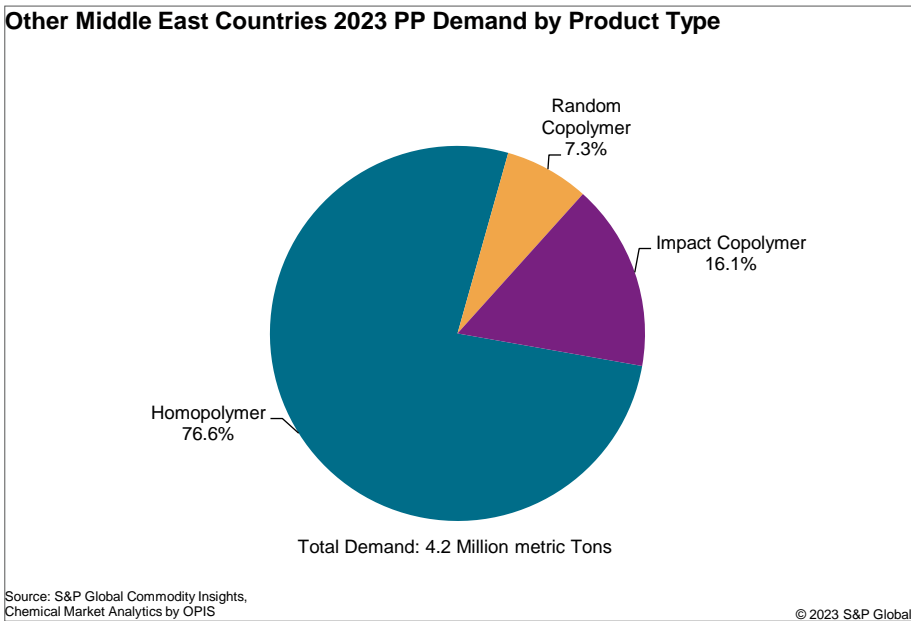
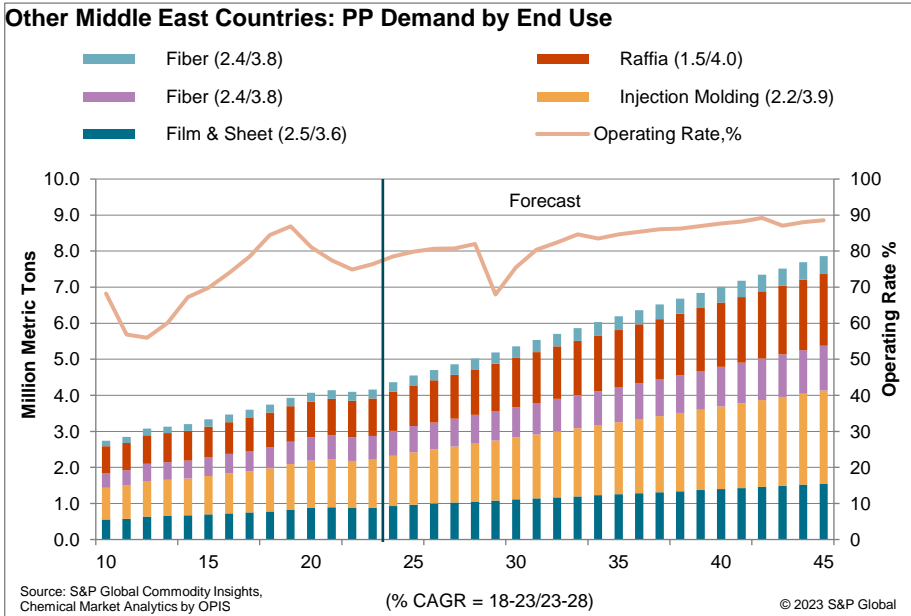
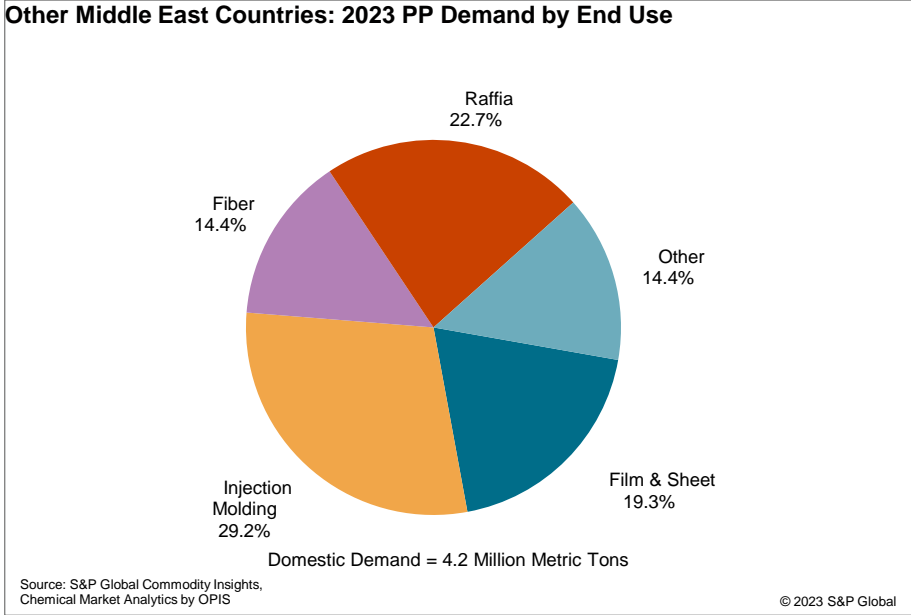
Around 1.4 million metric tons of polypropylene is produced in this region as of 2023. The production is expected to grow at CAGR of 1.4% between 2023-28. During the long-term forecast period, it is expected to grow by 66.5% between 2023-45, and will reach 5.5 million metric tons.

Demand

In 2023, the other middle east countries only consume 4.2 million thousand metric tons of PP. Regional consumption is projected to grow at an average annual rate of 3.9% between 2023-28, and all the application segments are anticipated to follow the same growth trend during 2023-28. In long term, the demand is expected to grow at CAGR of 2.9% between 2023-45.

In 2023, the largest segment estimated is injection molding, representing 29.2% of demand. Consumption of polypropylene in injection molding applications is expected to grow at an CAGR of 3.9% in the near term (2023-28) and at an CAGR of 3.1% in the long term (2023-45).

Riffa is the second leading segment accounting for a share of 22.7% of demand, followed by film & sheet with a share of 19.3% of the overall demand in the country. Consumption of polypropylene in raffia applications is expected to grow fast, at an CAGR of 4.0% in the near term (2023-28) and at an CAGR of 3.0% in the long term (2023-45). Consumption of polypropylene in film & sheet applications is expected to grow at an CAGR of 3.6% in the near term (2023-28) and at an CAGR of 2.6% in the long term (2023-45).



In 2023, homopolymer holds a predominant position, representing 76.6% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 16.1% of the market share. Random copolymer, on the other hand, constitutes only 7.3% of the total demand.

Trade

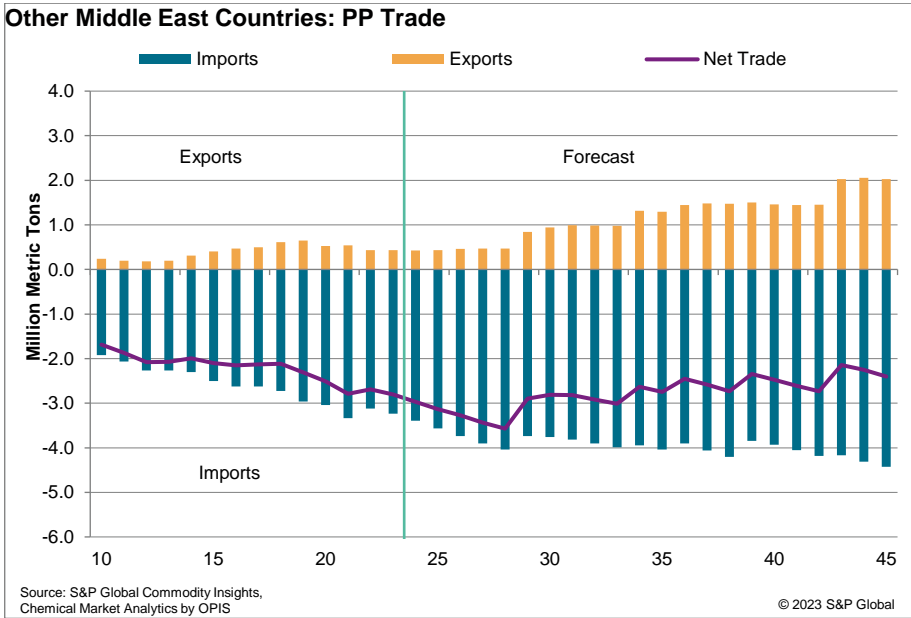
As of 2023, the "Other Middle East countries" continue to function as significant importers, holding a notable 12.4% share in the global polypropylene trade. In 2023, this region imports a substantial 77.7% of its domestic polypropylene demand, totaling 3.2 million metric tons.

In the long term, the annual import volume for polypropylene in these countries will persist at around 4.0 million metric tons. This highlights the ongoing reliance on imports to meet domestic polypropylene demand in the "Other Middle East countries" region.

In the upcoming five-year period (2023-2028), it is anticipated that regional polypropylene imports will experience an annual growth rate of 4.6%. This growth is driven by the region's growing domestic demand.

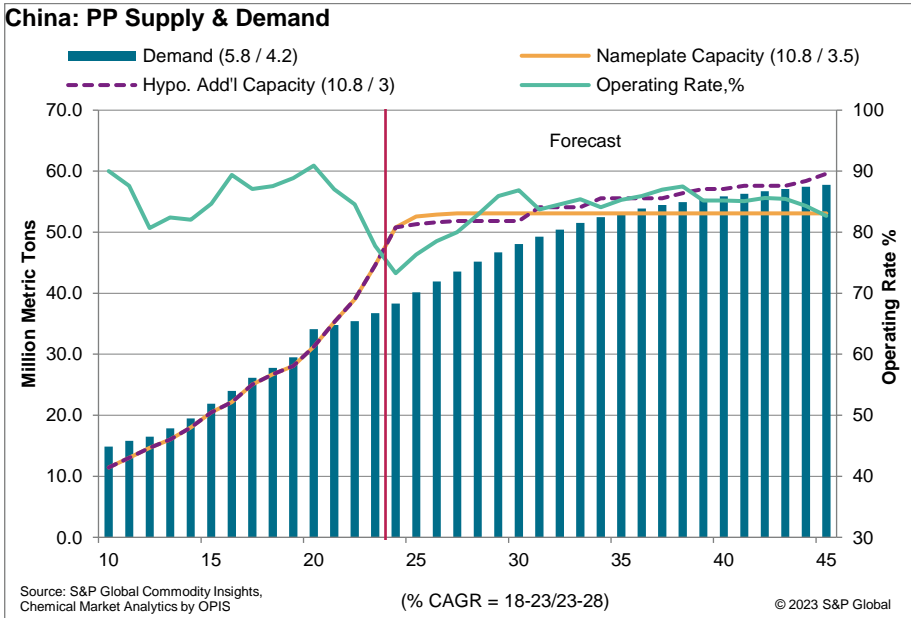
As of 2023, Turkey holds the position of the largest importer among the "Other Middle East countries," importing a substantial 2.4 million metric tons of polypropylene. On the other hand, Egypt stands out as the leading exporter in this group.

Looking ahead to the upcoming five-year period (2023-2028), there is an anticipated annual growth rate of 4.6% in regional polypropylene imports within the "Other Middle East countries." This growth is primarily fueled by the increasing domestic demand within the region.



4.2.12 China

Supply



With the nameplate capacity of 44.6 million metric tons, China is the largest player in the global polypropylene (PP) market and will remain that way through the forecast period. The nameplate capacity is expected to increase to around 53.1 million metric tons by 2028. Hypothetical capacity rationalization (smaller, less efficient plants) of 1.3 million metric tons is expected by 2028 and in long term, by 2045, hypothetical capacity addition of 6.5 million metric tons is expected. As of 2023, China contributes 40.8% of global PP capacity worldwide.

Top five capacity shareholders in the region as of 2023 are China Petrochemical Corporation (18.783%), China National Petroleum Corporation (11.03%), China Energy Ningxia Coal Industry Co., Ltd. (3.68%), China Soft Packaging Group Holdings Limited (3.11%), and Saudi Arabian Oil Company (3.02%). Together, they accounted for around 39.62% of country production capacity of polypropylene.

In next five years, China would account for all the polypropylene capacity additions in Northeast Asia. Major capacity additions are being done by players like Shandong Yulong Petrochemical Co Ltd of 1.9 million metric tons by 2024 in Yantai, Oriental Energy (Maoming) Co., Ltd. of 1.2 million metric tons by 2024 in Maoming, ExxonMobil (Huizhou) Chemical

Co., Ltd. of 900 thousand metric tons by 2024 in Huizhou, Jinneng Science and Technology Co Ltd of 450 thousand metric tons in Quingdao, Shandong by 2024, Ningbo Kingfa Advanced Materials Co Ltd of 800 thousand metric tons by 2024 in Ningbo, Ningxia Baofeng Energy Group Co Ltd of 300 thousand metric tons by 2024 in Yinchuan.

Around 34.7 million metric tons of polypropylene is produced in China as of 2023. The production is expected to grow at CAGR of 4.4% between 2023-28. During the long-term forecast period, it is expected to grow by 1.6% between 2023-45.

Most of the new PP capacity additions will likely be based on propylene from the traditional processes of using crude oil-based feedstocks in steam crackers or refineries. However, there will still be additional capacities that use unconventional processes such as coal-to-olefins (CTO), propane dehydrogenation (PDH), and methanol-to-olefins (MTO). Of all these unconventional processes, PDH–PP capacity should expand very quickly during the coming five years as nonintegrated PP producers and some big converters build their own upstream supply owing to small-scale investment.

China had commercialized its own CTO technology, which had run successfully since the first CTO-based PP plant started by Shenhua Baotou in 2010. The shift to use these alternative unconventional feedstock routes is changing the capacity and price competitiveness landscape in this region. However, overall, there is potential for a decline in production that may affect new capacity startups and the approval of new projects, given the government policy to control the energy consumption and intensity of the industrial sector, as well as the government’s stated goals to reach peak carbon emissions before 2030 and carbon neutrality by 2060.

Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)														
Company.Name	Country/Territo	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
Anhui Tianda Environmental Protection New Materials Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	0	0	226	300	300	300	300	300	
Anhui Tianda Environmental Protection New Materials Co., Ltd.	China	Bulk Slurry	100	100	100	100	100	100	100	100	100	100	100	
Baota Petrochemical Group Co Ltd	China	Bulk Slurry	80	80	80	80	80	80	80	80	80	80	80	
Bluestar Petrochemical Co., Ltd., Tianjin Branch	China	Bulk Slurry	60	60	60	60	60	60	60	60	60	60	60	
Bora LyondellBasell Petrochemical Co Ltd	China	Gas Phase	0	0	135	400	400	400	400	400	400	400	400	
Bora LyondellBasell Petrochemical Co Ltd	China	Gas Phase	0	0	68	200	200	200	200	200	200	200	200	
China Coal Shaanxi Yulin Energy & Chemical Co., Ltd.	China	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
China Energy Baotou Coal Chemical Co., Ltd.	China	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
China Energy Baotou Coal Chemical Co., Ltd.	China	Multiple Gas Phase	0	0	0	0	0	0	0	309	410	410	410	
China Energy Ningxia Coal Industry Co., Ltd.	China	Multiple Gas Phase	200	200	200	200	200	200	200	200	200	200	200	
China Energy Ningxia Coal Industry Co., Ltd.	China	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
China Energy Ningxia Coal Industry Co., Ltd.	China	Multiple Gas Phase	250	250	250	250	250	250	250	250	250	250	250	
China Energy Ningxia Coal Industry Co., Ltd.	China	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
China Energy Ningxia Coal Industry Co., Ltd.	China	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
China Energy Ningxia Coal Industry Co., Ltd.	China	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
China Energy Ningxia Coal Industry Co., Ltd.	China	Multiple Gas Phase	250	250	250	250	250	250	250	250	250	250	250	
China Energy Xinjiang Chemical Co., Ltd.	China	Gas Phase	450	450	450	450	450	450	450	450	450	450	450	
China Sanjiang Fine Chemicals Company Limited	China	Bulk Slurry	225	300	300	300	300	300	300	300	300	300	300	
CNOOC and Shell Petrochemicals Co Ltd (CSPC)	China	Multiple Gas Phase	290	290	290	290	290	290	290	290	290	290	290	
CNOOC and Shell Petrochemicals Co Ltd (CSPC)	China	Multiple Gas Phase	268	400	400	400	400	400	400	400	400	400	400	
Cnooc Ningbo Daxie Petrochemical Co Ltd	China	Gas Phase	0	0	0	0	100	300	300	300	300	300	300	
CNOOC Zhongjie Petrochemical Co., Ltd.	China	Other	60	60	60	60	60	60	60	60	60	60	60	
CNPC/PDVSA Guangdong Petrochemical Co. Ltd.	China	Gas Phase	0	0	0	0	0	117	200	200	200	200	200	
CNPC/PDVSA Guangdong Petrochemical Co. Ltd.	China	Gas Phase	0	0	0	0	0	458	500	500	500	500	500	
Dalian West Pacific Petrochemical Co Ltd (WEPEC)	China	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100	
Daqing Petrochemical Company	China	Bulk Slurry	20	20	20	20	20	20	20	20	20	20	20	
Daqing Petrochemical Company	China	Gas Phase	40	40	40	40	40	40	40	40	40	40	40	
Daqing Petrochemical Company	China	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100	
Datang Inner Mongolia Duolun Coal Chemical Co Ltd	China	Multiple Gas Phase	250	250	250	250	250	250	250	250	250	250	250	
Datang Inner Mongolia Duolun Coal Chemical Co Ltd	China	Multiple Gas Phase	250	250	250	250	250	250	250	250	250	250	250	
Dongguan Grand Resource Science & Technology Co., Ltd.	China	Gas Phase	0	100	300	300	300	300	300	300	300	300	300	
Dongguan Grand Resource Science & Technology Co., Ltd.	China	Gas Phase	0	100	300	300	300	300	300	300	300	300	300	
Dongguan Grand Resource Science & Technology Co., Ltd.	China	Gas Phase	0	0	0	0	0	252	300	300	300	300	300	
Dongguan Grand Resource Science & Technology Co., Ltd.	China	Gas Phase	0	0	0	0	0	252	300	300	300	300	300	
ExxonMobil (Huizhou) Chemical Co., Ltd.	China	Gas Phase	0	0	0	0	0	0	450	450	450	450	450	
ExxonMobil (Huizhou) Chemical Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	0	0	0	450	450	450	450	450	
Formosa Industries (Ningbo) Co., Ltd.	China	Multiple Gas Phase	170	170	170	170	170	170	170	170	170	170	170	
Formosa Industries (Ningbo) Co., Ltd.	China	Multiple Gas Phase	280	280	280	280	280	280	280	280	280	280	280	
Fujian Gulei Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	147	350	350	350	350	350	350	350	
Fujian Petrochemical Co Ltd	China	Other	0	0	0	0	0	0	0	0	0	0	0	
Fujian Refining & Petrochemical Co Ltd	China	Multiple Gas Phase	330	330	330	330	330	330	330	330	330	330	330	
Fujian Refining & Petrochemical Co Ltd	China	Multiple Gas Phase	220	220	220	220	220	220	220	220	220	220	220	
Fujian Refining & Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	120	120	120	120	120	120	120	120	120	120	120	
Fujian Zhongjiang Petrochemical Port Co Ltd	China	Liquid/Gas Phase Comb.	350	350	350	350	350	350	350	350	350	350	350	
Fujian Zhongjing Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	350	350	350	350	350	350	350	350	350	350	350	
Fujian Zhongjing Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	0	201	600	600	600	600	600	600	
Fujian Zhongjing Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	0	0	352	600	600	600	600	600	
Full Tech (Changzhou) Energy Chemical Development Co., Ltd.	China	Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
Guangqing Group Co., Ltd.	China	Other	100	100	100	100	100	100	100	100	100	100	100	
Guangxi Dongyou Asphalt Co., Ltd.	China	Other	30	30	30	30	30	30	30	30	30	30	30	
Guangxi Hongyi New Material Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	0	0	300	300	300	300	300	300	
Guoneng Yulin Chemical Co Ltd	China	Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
Hami Hengyou Energy Chemical Technology Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	0	168	200	200	200	200	200	200	
Hebei Haiwei Petrochemical Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	0	25	300	300	300	300	300	300	
Hebei Haiwei Petrochemical Co., Ltd.	China	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300	
Heilongjiang Province Haiguo Longyou Petrochemical Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	200	200	200	200	200	200	200	200	
Heilongjiang Province Haiguo Longyou Petrochemical Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	264	350	350	350	350	350	350	350	
Hengli Petrochemical (Dalian) Co., Ltd.	China	Gas Phase	0	0	183	200	200	200	200	200	200	200	200	
Hengli Petrochemical (Dalian) Co., Ltd.	China	Gas Phase	0	302	450	450	450	450	450	450	450	450	450	
Hengli Petrochemical (Dalian) Co., Ltd.	China	Gas Phase	0	0	151	200	200	200	200	200	200	200	200	
Huating Coal Industrial Group Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	1	200	200	200	200	200	200	200	
Hubei Biocause Pharmaceutical Co Ltd	China	Other	20	20	20	20	20	20	20	20	20	20	20	
Inner Mong. China Coal Mengda New En. Chem. Co Ltd	China	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
Jiangsu Pengcheng Chemical	China	Bulk Slurry	160	160	160	160	160	160	160	160	160	160	160	
Jiangsu Xusheng Petrochemical Co., Ltd.	China	Other	200	200	200	200	200	200	200	200	200	200	200	
Jinao (Hubei) Sci&Tech Chemical Industry Co Ltd	China	Other	20	20	20	75	80	80	80	80	80	80	80	
Jinneng Science and Technology Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	227	450	450	450	450	450	450	450	
Jinneng Science and Technology Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	0	0	0	227	450	450	450	450	
Jiutai Energy Inner Mongolia Co Ltd	China	Gas Phase	0	216	320	320	320	320	320	320	320	320	320	

Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)													
Company.Name	Country/Territory	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Levima Advanced Materials Corp	China	Gas Phase	200	200	200	200	200	200	200	200	200	200	200
Lihe Zhixin New Material Technology Co., Ltd.	China	Gas Phase	0	0	252	300	300	300	300	300	300	300	300
Linyi Yishun Chemical Co., Ltd.	China	Other	22	22	22	22	22	22	22	22	22	22	22
Luoyang Refinery Hongli Grace Chemical Co., Ltd.	China	Other	24	24	24	24	24	24	24	24	24	24	24
Maoming Petro-Chemical Shihua Co., Ltd.	China	Bulk Slurry	140	140	140	140	140	140	140	140	140	140	140
Nanchong Shida Chemical Co., Ltd.	China	Bulk Slurry	30	30	30	30	30	30	30	30	30	30	30
Nanjing Hongye Chemical Co., Ltd.	China	Other	60	60	60	60	60	60	60	60	60	60	60
Nanjing Jinling Plastic & Petrochemical Co., Ltd.	China	Other	23	30	30	30	30	30	30	30	30	30	30
Nanjing Jinling Plastic & Petrochemical Co., Ltd.	China	Other	120	120	120	120	120	120	120	120	120	120	120
Ningbo Funde Energy Co Ltd	China	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300
Ningbo Kingfa Advanced Materials Co Ltd	China	To Be Announced	0	0	0	0	0	235	400	400	400	400	400
Ningbo Kingfa Advanced Materials Co Ltd	China	To Be Announced	0	0	0	0	0	0	235	400	400	400	400
Ningbo Yongxing Chemical Co., Ltd.	China	Bulk Slurry	25	25	25	25	25	25	25	25	25	25	25
Ningxia Baofeng Energy Group Co Ltd	China	Gas Phase	0	100	300	300	300	300	300	300	300	300	300
Ningxia Baofeng Energy Group Co Ltd	China	Gas Phase	300	300	300	300	300	300	300	300	300	300	300
Ningxia Baofeng Energy Group Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	0	0	0	300	300	300	300	300
Ningxia Runfeng New Material Technology Co., Ltd.	China	Gas Phase	0	0	0	0	100	100	100	100	100	100	100
Ningxia Runfeng New Material Technology Co., Ltd.	China	Gas Phase	0	0	0	0	200	200	200	200	200	200	200
Ningxia Yongda Petrochemical Co., Ltd.	China	Other	0	60	60	60	60	60	60	60	60	60	60
Ordos Kaikai Chemical	China	Bulk Slurry	40	40	40	40	40	40	40	40	40	40	40
Oriental Energy (Maoming) Co., Ltd.	China	Gas Phase	0	0	0	0	0	0	400	400	400	400	400
Oriental Energy (Maoming) Co., Ltd.	China	Gas Phase	0	0	0	0	0	301	400	400	400	400	400
Oriental Energy (Maoming) Co., Ltd.	China	Gas Phase	0	0	0	0	0	0	400	400	400	400	400
Oriental Energy (Ningbo) New Materials Co Ltd	China	Gas Phase	400	400	400	400	400	400	400	400	400	400	400
Oriental Energy (Ningbo) New Materials Co Ltd	China	Gas Phase	0	0	0	268	400	400	400	400	400	400	400
Oriental Energy (Ningbo) New Materials Co Ltd	China	Gas Phase	0	0	0	301	400	400	400	400	400	400	400
Oriental Energy (Zhangjiagang) New Material Co., Ltd.	China	Gas Phase	400	400	400	400	400	400	400	400	400	400	400
Panjin Ethylene Co., Ltd.	China	Liquid/Gas Phase Comb.	250	250	250	250	250	250	250	250	250	250	250
PetroChina Dalian Petrochemical Co	China	Liquid/Gas Phase Comb.	70	70	70	70	70	70	70	70	70	70	70
PetroChina Dalian Petrochemical Co	China	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200
PetroChina Daqing Refining & Chemical Company	China	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300
PetroChina Daqing Refining & Chemical Company	China	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300
PetroChina Dushanzi Petrochemical Co	China	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300
PetroChina Dushanzi Petrochemical Co	China	Liquid/Gas Phase Comb.	140	140	140	140	140	140	140	140	140	140	140
PetroChina Dushanzi Petrochemical Co	China	Gas Phase	250	250	250	250	250	250	250	250	250	250	250
PetroChina Fushun Petrochemical Co	China	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300
PetroChina Fushun Petrochemical Co	China	Liquid/Gas Phase Comb.	90	90	90	90	90	90	90	90	90	90	90
PetroChina Guangxi Petrochemical Co Ltd	China	Gas Phase	200	200	200	200	200	200	200	200	200	200	200
PetroChina Harbin Petrochemical Co	China	Other	80	80	80	80	80	80	80	80	80	80	80
PetroChina Hohhot Petrochemical Co	China	Other	85	85	85	85	85	85	85	85	85	85	85
PetroChina Hohhot Petrochemical Co	China	Other	150	150	150	150	150	150	150	150	150	150	150
PetroChina Huabei Petrochemical Co	China	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100
PetroChina Jilin Petrochemical Co	China	Hydrocarbon Slurry	20	20	20	20	20	20	20	20	20	20	20
PetroChina Jinxi Petrochemical Co	China	Other	0	0	0	0	0	0	0	0	0	0	0
PetroChina Jinxi Petrochemical Co	China	Gas Phase	150	150	150	150	150	150	150	150	150	150	150
PetroChina Jinzhou Petrochemical Co	China	Bulk Slurry	28	28	28	28	28	28	28	28	28	28	28
PetroChina Lanzhou Petrochemical Co	China	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300
PetroChina Lanzhou Petrochemical Co	China	Hydrocarbon Slurry	0	0	0	0	0	0	0	0	0	0	0
PetroChina Lanzhou Petrochemical Co	China	Bulk Slurry	110	110	110	110	110	110	110	110	110	110	110
PetroChina Liaohe Oil Field Company	China	Liquid/Gas Phase Comb.	40	40	40	40	40	40	40	40	40	40	40
PetroChina Liaoyang Petrochemical Co	China	Liquid/Gas Phase Comb.	0	0	0	112	300	300	300	300	300	300	300
PetroChina Liaoyang Petrochemical Co	China	Hydrocarbon Slurry	70	70	70	0	0	0	0	0	0	0	0
PetroChina Ningxia Petrochemical Co	China	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100
PetroChina Ningxia Petrochemical Co	China	Bulk Slurry	20	20	20	20	20	20	20	20	20	20	20
PetroChina Qianguo Petrochemical Company	China	Bulk Slurry	0	0	0	0	0	0	0	0	0	0	0
PetroChina Qinghai Oilfield Co	China	Bulk Slurry	20	20	20	20	20	20	20	20	20	20	20
PetroChina Qingyang Petrochemical Co	China	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100
PetroChina Sichuan Petrochemical Co Ltd	China	Multiple Gas Phase	450	450	450	450	450	450	450	450	450	450	450
Pucheng Clean Energy Chemical Co., Ltd.	China	Liquid/Gas Phase Comb.	380	380	380	380	380	380	380	380	380	380	380
Qinghai Mining Co Ltd	China	Gas Phase	0	0	0	0	0	0	0	0	201	400	400
Qinghai Salt Lake Industry Co Ltd	China	Bulk Slurry	160	160	160	160	160	160	160	160	160	160	160
Quanzhou Grand Pacific Chemical Co., Ltd.	China	Gas Phase	0	0	0	0	0	227	450	450	450	450	450
Rizhao Guangxin Chemical	China	Bulk Slurry	100	100	100	100	100	100	100	100	100	100	100
Rizhao Guangxin Chemical	China	Bulk Slurry	100	100	100	100	100	100	100	100	100	100	100
Satellite Chemical Co., Ltd.	China	Bulk Slurry	300	300	300	300	300	300	300	300	300	300	300
Satellite Chemical Co., Ltd.	China	Bulk Slurry	0	132	150	150	150	150	150	150	150	150	150
Shaanxi Yanchang ChinaCoal Yulin Energy & Chemical Co Ltd	China	Liquid/Gas Phase Comb.	0	0	102	400	400	400	400	400	400	400	400
Shaanxi Yanchang ChinaCoal Yulin Energy & Chemical Co Ltd	China	Gas Phase	300	300	300	300	300	300	300	300	300	300	300
Shaanxi Yanchang ChinaCoal Yulin Energy & Chemical Co Ltd	China	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300
Shaanxi Yanchang Petroleum (Group) Co., Ltd., Refinery & Chem	China	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200

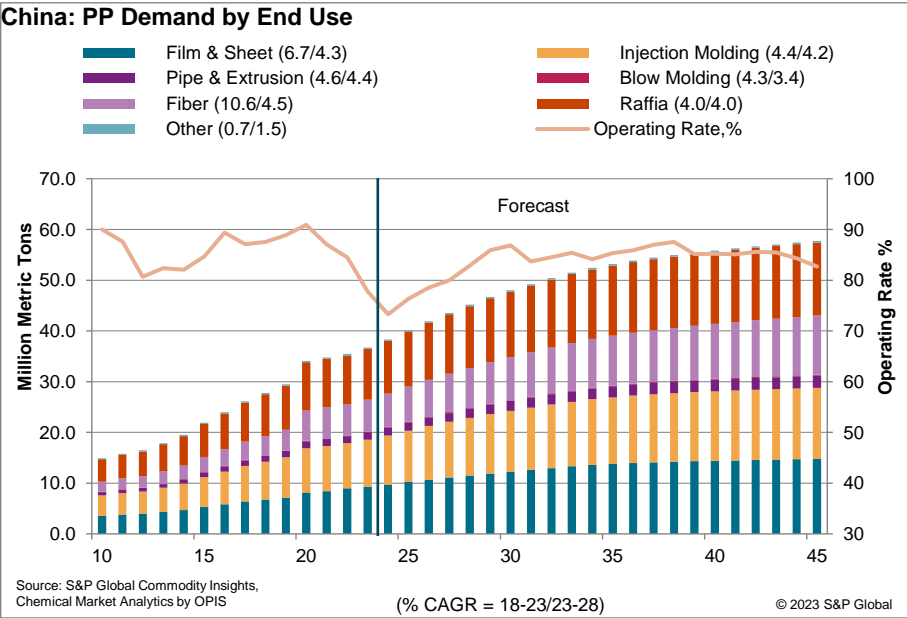
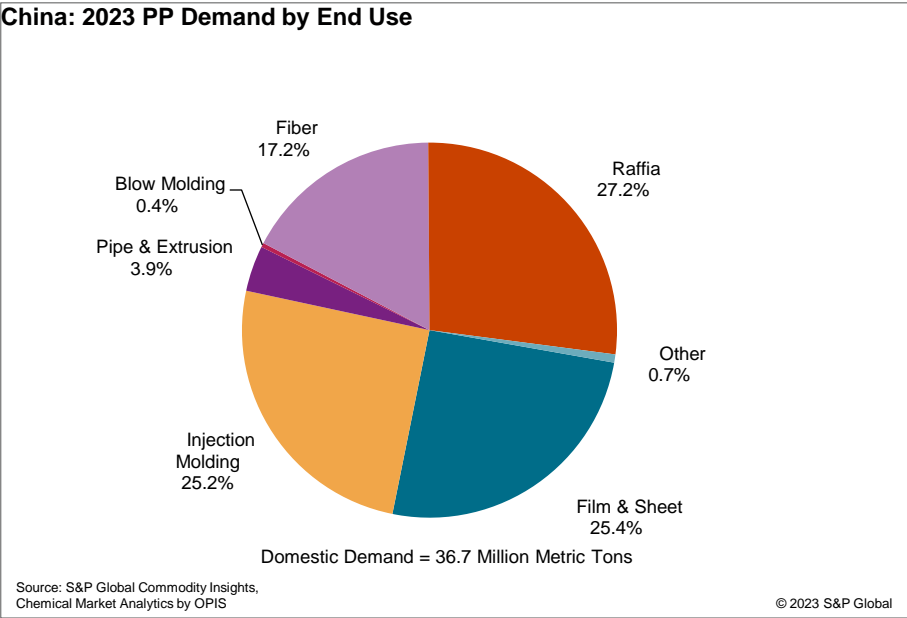
Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)													
Company.Name	Country/Territoi	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Shaanxi Yanchang Petroleum (Group) Co., Ltd., Refinery & Chem	China	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100
Shaanxi Yanchang Petroleum Yanan Energy & Chemical Industry	China	Gas Phase	84	250	250	250	250	250	250	250	250	250	250
Shandong Chambroad Sinopoly New Materials Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	0	0	168	200	200	200	200	200
Shandong Chambroad Sinopoly New Materials Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	0	0	335	400	400	400	400	400
Shandong Changyi Petrochemical Co Ltd	China	Other	10	10	10	10	10	10	10	10	10	10	10
Shandong Dongming Petrochemical Group Co Ltd	China	Other	50	50	50	50	50	50	50	50	50	50	50
Shandong Dongming Petrochemical Group Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	183	200	200	200	200	200	200	200
Shandong Hengfa	China	Bulk Slurry	40	40	40	40	40	40	40	40	40	40	40
Shandong Hengyuan Petrochemical Company Limited	China	Bulk Slurry	10	10	10	10	10	10	10	10	10	10	10
Shandong Heze Hengda Chemical Co., Ltd.	China	Other	50	50	50	50	50	50	50	50	50	50	50
Shandong Huaxing Petrochemical Group Co Ltd	China	Other	50	50	50	50	50	50	50	50	50	50	50
Shandong Kairi Chemical Co., Ltd.	China	Other	70	70	70	70	70	70	70	70	70	70	70
Shandong Qilu Petrochemical Qitai Petrochemical Co., Ltd.	China	Other	20	20	20	20	20	20	20	20	20	20	20
Shandong Runyin Biochemical Co Ltd	China	Bulk Slurry	40	40	40	40	40	40	40	40	40	40	40
Shandong Sea Right Petrochemical Co., Ltd.	China	Other	80	0	0	0	0	0	0	0	0	0	0
Shandong Sea Right Petrochemical Co., Ltd.	China	Other	150	0	0	0	0	0	0	0	0	0	0
Shandong Shouguang Jianyuanchun Co., Ltd.	China	Bulk Slurry	100	100	100	100	100	100	100	100	100	100	100
Shandong Shouguang LuQing Petrochemical Co Ltd	China	Other	100	100	100	100	100	100	100	100	100	100	100
Shandong Shouguang LuQing Petrochemical Co Ltd	China	Other	300	300	300	300	300	300	300	300	300	300	300
Shandong Shouguang LuQing Petrochemical Co Ltd	China	Gas Phase	0	0	0	0	175	300	300	300	300	300	300
Shandong Shouguang LuQing Petrochemical Co Ltd	China	Other	100	100	100	100	100	100	100	100	100	100	100
Shandong Yuhuang Chemical Co., Ltd.	China	Other	200	200	200	200	200	200	200	200	200	200	200
Shandong Yulong Petrochemical Co Ltd	China	Gas Phase	0	0	0	0	0	0	301	400	400	400	400
Shandong Yulong Petrochemical Co Ltd	China	Bulk Slurry	0	0	0	0	0	0	201	400	400	400	400
Shandong Yulong Petrochemical Co Ltd	China	Multiple Gas Phase	0	0	0	0	0	0	202	400	400	400	400
Shandong Yulong Petrochemical Co Ltd	China	Gas Phase	0	0	0	0	0	0	301	400	400	400	400
Shandong Yulong Petrochemical Co Ltd	China	Gas Phase	0	0	0	0	0	0	226	300	300	300	300
Shanghai SECCO Petrochemical Co Ltd	China	Multiple Gas Phase	280	280	280	280	280	280	280	280	280	280	280
Shouguang Fenghui New Materials Co., Ltd.	China	Bulk Slurry	100	100	100	100	100	100	100	100	100	100	100
Sichuan Shengma Chemical Co., Ltd.	China	Bulk Slurry	80	80	80	80	80	80	80	80	80	80	80
Sinochem Hongrun Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	0	0	189	450	450	450	450	450
Sinochem Quanzhou Petrochemical Co Ltd	China	Multiple Gas Phase	200	200	200	200	200	200	200	200	200	200	200
Sinochem Quanzhou Petrochemical Co Ltd	China	Multiple Gas Phase	0	0	88	350	350	350	350	350	350	350	350
Sinopec Anqing Company	China		35	35	35	35	35	35	35	35	35	35	35
Sinopec Anqing Company	China	Hydrocarbon Slurry	0	0	0	0	0	126	300	300	300	300	300
Sinopec Beihai Refining & Chemical Co., Ltd.	China	To Be Announced	200	200	200	200	200	200	200	200	200	200	200
Sinopec Beijing Yanshan Petrochemical Co Ltd	China	Bulk Slurry	40	40	40	40	40	40	40	40	40	40	40
Sinopec Beijing Yanshan Petrochemical Co Ltd	China	Gas Phase	150	150	150	150	150	150	150	150	150	150	150
Sinopec Beijing Yanshan Petrochemical Co Ltd	China	Multiple Gas Phase	250	250	250	250	250	250	250	250	250	250	250
Sinopec Cangzhou Co	China	Other	33	33	33	33	33	33	33	33	33	33	33
Sinopec Changling Co	China	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100
SINOPEC Dalu	China	To Be Announced	0	0	0	0	0	0	267	530	530	530	530
Sinopec Group Assets Management Corporation Baling Petroche	China	Bulk Slurry	65	65	65	65	65	65	65	65	65	65	65
Sinopec Guangzhou Co	China	Liquid/Gas Phase Comb.	150	150	150	150	150	150	150	150	150	150	150
Sinopec Guangzhou Co	China	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200
Sinopec Hainan Refining and Chemical Co Ltd	China	Gas Phase	0	0	0	0	0	175	200	200	200	200	200
Sinopec Hainan Refining and Chemical Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	0	0	263	300	300	300	300	300
Sinopec Hainan Refining and Chemical Co Ltd	China	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200
Sinopec Jinan Co	China	Liquid/Gas Phase Comb.	120	120	120	120	120	120	120	120	120	120	120
Sinopec Jingmen Co	China	Liquid/Gas Phase Comb.	130	130	130	130	130	130	130	130	130	130	130
Sinopec Jiujiang Co	China	Liquid/Gas Phase Comb.	110	110	110	110	110	110	110	110	110	110	110
Sinopec Luoyang Co	China	Bulk Slurry	0	0	0	0	0	0	0	0	0	0	0
Sinopec Luoyang Co	China	Liquid/Gas Phase Comb.	140	140	140	140	140	140	140	140	140	140	140
Sinopec Maoming Co	China	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300
Sinopec Maoming Co	China	Gas Phase	200	200	200	200	200	200	200	200	200	200	200
Sinopec Maoming Co	China	Liquid/Gas Phase Comb.	170	170	170	170	170	170	170	170	170	170	170
Sinopec Qilu Petrochemical Corp	China	Liquid/Gas Phase Comb.	110	110	110	110	110	110	110	110	110	110	110
Sinopec Qingdao Petrochemical Co Ltd	China	Other	70	70	70	70	70	70	70	70	70	70	70
Sinopec Qingdao Refining and Chemical Co Ltd	China	Liquid/Gas Phase Comb.	220	220	220	220	220	220	220	220	220	220	220
Sinopec SABIC Tianjin Petrochemical Co Ltd	China	Multiple Gas Phase	450	450	450	450	450	450	450	450	450	450	450

Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)													
Company.Name	Country/Territoi	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Sinopec Shanghai Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100
Sinopec Shanghai Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200
Sinopec Shanghai Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100
Sinopec Shijiazhuang Refining & Chemical Co	China	Liquid/Gas Phase Comb.	0	0	0	0	0	0	0	0	0	0	0
Sinopec Shijiazhuang Refining & Chemical Co	China	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200
Sinopec Shijiazhuang Refining & Chemical Co	China	Other	0	0	0	0	0	0	0	0	0	0	0
Sinopec Tianjin Co	China	Liquid/Gas Phase Comb.	0	0	0	150	200	200	200	200	200	200	200
Sinopec Tianjin Co	China	Liquid/Gas Phase Comb.	0	0	0	0	0	0	176	350	350	350	350
Sinopec Tianjin Co	China	Liquid/Gas Phase Comb.	60	60	60	60	60	60	60	60	60	60	60
Sinopec Yangzi Petrochemical Co Ltd	China	Multiple Gas Phase	200	200	200	200	200	200	200	200	200	200	200
Sinopec Yangzi Petrochemical Co Ltd	China	Gas Phase	100	100	100	100	100	100	100	100	100	100	100
Sinopec Yangzi Petrochemical Co Ltd	China	Gas Phase	100	100	100	100	100	100	100	100	100	100	100
Sinopec Zhanjiang Dongxing Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	140	140	140	140	140	140	140	140	140	140	140
Sinopec Zhenhai Refining & Chemical Co (ZRCC)	China	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300
Sinopec Zhenhai Refining & Chemical Co (ZRCC)	China	Bulk Slurry	32	32	32	32	32	32	32	32	32	32	32
Sinopec Zhenhai Refining & Chemical Co (ZRCC)	China	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200
Sinopec Zhenhai Refining & Chemical Co (ZRCC)	China	Gas Phase	0	0	0	0	275	300	300	300	300	300	300
Sinopec Zhongyuan Oilfield Company	China	Other	60	60	60	60	60	60	60	60	60	60	60
Sinopec Zhongyuan Petrochemical Corp Lrd	China	Liquid/Gas Phase Comb.	60	60	60	60	60	60	60	60	60	60	60
Sinopec Zhongyuan Petrochemical Corp Lrd	China	Liquid/Gas Phase Comb.	100	100	100	100	100	100	100	100	100	100	100
Sinopec-Sk(Wuhan) Petrochemical Co Ltd	China	Gas Phase	200	200	200	200	200	200	200	200	200	200	200
Sinopec-Sk(Wuhan) Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	105	105	105	105	105	105	105	105	105	105	105
Sinopec-Sk(Wuhan) Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	0	0	0	251	300	300	300	300	300	300	300
Sinopec-Sk(Wuhan) Petrochemical Co Ltd	China	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200
Tianjin Bohua Chemical Development Co Ltd	China	Gas Phase	0	0	0	0	175	300	300	300	300	300	300
Wanhua Chemical Group Co.,Ltd	China	To Be Announced	0	0	0	0	0	0	0	0	0	0	0
Wanhua Chemical Group Co.,Ltd	China	Liquid/Gas Phase Comb.	0	0	76	300	300	300	300	300	300	300	300
Xinjiang Dushanzi TianLi High & New Tech Co. Ltd	China	Other	40	40	40	40	40	40	40	40	40	40	40
Xinjiang Xinfeng Co. Ltd.	China	Other	30	30	30	30	30	30	30	30	30	30	30
Xuzhou Haitian Petrochemical (Group) Co., Ltd.	China	Gas Phase	0	0	0	17	100	100	100	100	100	100	100
Xuzhou Haitian Petrochemical (Group) Co., Ltd.	China	Bulk Slurry	100	100	100	100	100	100	100	100	100	100	100
Xuzhou Haitian Petrochemical (Group) Co., Ltd.	China	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200
Yangzhou Petrochemical Co., Ltd.	China	Other	30	30	30	30	30	30	30	30	30	30	30
Yangzijiang Petchem.Co., Ltd	China	Gas Phase	0	0	0	0	0	0	0	0	0	0	0
Yueyang Xingchang Petrochemical Co Ltd	China	Bulk Slurry	30	30	30	30	30	30	30	30	30	30	30
Yunnan Shuifu Yuntianhua Co., Ltd.	China	Gas Phase	150	150	150	150	150	150	150	150	150	150	150
Zhejiang Hongji Petrochemical Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	161	240	240	240	240	240	240	240
Zhejiang Hongji Petrochemical Co., Ltd.	China	Liquid/Gas Phase Comb.	240	240	240	240	240	240	240	240	240	240	240
Zhejiang Petroleum and Chemical Co Ltd	China	Gas Phase	0	0	0	0	377	450	450	450	450	450	450
Zhejiang Petroleum and Chemical Co Ltd	China	Gas Phase	0	0	412	450	450	450	450	450	450	450	450
Zhejiang Petroleum and Chemical Co Ltd	China	Gas Phase	0	0	0	0	450	450	450	450	450	450	450
Zhejiang Petroleum and Chemical Co Ltd	China	Gas Phase	0	0	450	450	450	450	450	450	450	450	450
Zhejiang Sanjiang New Material Co., Ltd.	China	Bulk Slurry	300	300	300	300	300	300	300	300	300	300	300
Zhejiang Shaoxing Sanyuan Petrochemical Co., Ltd.	China	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200
Zhejiang Shaoxing Sanyuan Petrochemical Co., Ltd.	China	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300
Zhejiang Yuanjin New Materials Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	0	0	202	400	400	400	400	400
Zhejiang Yuanjin New Materials Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	0	0	0	202	400	400	400	400	400
Zhenghe Group Co Ltd	China	Other	60	60	60	60	60	60	60	60	60	60	60
Zhong An United Coal Chemical Co Ltd	China	Liquid/Gas Phase Comb.	0	176	350	350	350	350	350	350	350	350	350
ZhongKe (Guangdong) Refinery & Petrochemical Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	124	350	350	350	350	350	350	350	350
ZhongKe (Guangdong) Refinery & Petrochemical Co., Ltd.	China	Liquid/Gas Phase Comb.	0	0	60	200	200	200	200	200	200	200	200
Zhongtian Synergetic (Hechuang) Energy Co Ltd	China	Liquid/Gas Phase Comb.	350	350	350	350	350	350	350	350	350	350	350
Zhongtian Synergetic (Hechuang) Energy Co Ltd	China	Gas Phase	350	350	350	350	350	350	350	350	350	350	350
Zibo Fufeng Chemical Co.Ltd.	China	Other	30	30	30	30	30	30	30	30	30	30	30
Zibo Haiyi Fine Chemical Co., Ltd.	China	Gas Phase	0	0	0	101	150	150	150	150	150	150	150
Zibo Yuanshun Chemical Co., Ltd.	China	Other	20	20	20	20	20	20	20	20	20	20	20
Total - China (mainland)			26,734	28,071	31,214	35,281	38,991	44,621	50,781	52,583	52,885	53,084	53,084

Demand

China captures 42.7% of the global PP consumption in 2023 and remains the top demand country in the world. Despite the negative effects of the COVID-19 outbreak in 2020, the pandemic has led to a huge increase in demand for polypropylene in nonwoven fabrics, e-commerce packaging, and takeout food boxes. In 2023, the country consumption is around 36.7 million metric tons. Demand is forecast to grow at CAGR of 4.2% between 2023-28. In the long term, it is expected to grow at CAGR of 2.1% between 2023-45 to reach around 57.7 million metric tons by 2045.

Currently, the per capita consumption of PP in China reads at 25 kg per person, the highest of all regions. However, note that a considerable share of the goods manufactured with PP in the region are exported to other regions. The growing middle-class population, with its increased spending power, is contributing to the healthy rate of demand growth. Rapid migration to China’s cities and changes in consumption patterns such as online shopping and take-out food have also spurred demand. Thus, with its large population, China is forecast to remain the region with the largest domestic demand, even as exports of finished goods that contain PP decrease over time.



In 2023, the largest segment estimated is raffia, representing 27.2% of demand. Film & sheet is the second leading segment accounting for a share of 25.4% of demand, followed by injection molding with a share of 25.2% of the overall demand in the region.

Film and Sheet

In 2023, the China market consumes 9.3 million metric tons of polypropylene as film & sheet.

BOPP is by far the largest application in film and sheet category. Since the early 1980s, biaxially oriented polypropylene (BOPP) has been produced in NEA. Typically, only commodity-type BOPP film is produced in NEA mainly China; however, more specialized films, such as capacitor films and packaging films are also produced.

However, BOPP is also an industry that has been characterized by investment cycles which has created periods of oversupply and margin pressure, and driving a trend for applications, particularly in the packaging sector, to commoditize. It has thus become an industry of highly competitive intensity, which has been further exacerbated by the volatility of raw material resin pricing and supply in recent years.

Much of this investment has been in China which is by far the largest market both in terms of production and demand. Traditionally production was geared to the local market, with producers managing the supply/demand balance by operating at low rates or not all. However, more recently investments in high-speed high output lines are driving Chinese producers to increasingly export and even invest abroad, with the power to disrupt markets. This imperative is likely to grow given the level of overcapacity and a slowdown in the growth rate for the Chinese economy. It will also drive significant restructuring and corporate realignments as those with old assets mothball or shutdown production and the less successful new investors look to get out of the industry.

Polypropylene applications in film & sheet have experienced strong demand growth in recent years. This has been driven by the additions of large capacity high speed production lines and the increase in the supply of high-speed process resin (such resins tend to have narrow molecular weight distribution and melt flow rate between 2 - 10). This factor allows for rapid growth of BOPP film in China. BOPP film is mostly consumed by the packaging market destined for domestic consumption and exports.

The largest volume category, food packaging, is expected generate moderate but slow growth. Frozen foods will generate the strongest growth, followed by confectionery. Products such as ice cream treats, and a wide variety of confectionery will benefit from a growing middle class with increasing disposable income in China.

The non-packaging category will also generate moderate but slow growth. Like BOPP, the markets for cast polypropylene film (CPP film) continue to expand, albeit from a small base. The use of CPP is currently limited to food and dry goods packaging, but the rapid growth of the packaging industry should boost CPP consumption.

Consumption of polypropylene in film & sheet applications is expected to grow at an CAGR of 4.3% in the near term (2023-28) and at an AAGR of 2.1% in the long term (2023-45).

Injection Molding

In 2023, the China market consumes 9.2 million metric tons of polypropylene for injection molding applications.

Currently, injection molding is the third-largest application for polypropylene in China. This market is highly fragmented, and it includes packaging and shipment containers (pallets, crates, caps and closures, suitcase, cases), auto parts (bumper, other exterior parts, door liner, batteries, and other interior parts), parts of electrical appliances, housewares, toys, and other parts.

A key industry sector for injection molding is China's automotive industry and it is responsible for rapid demand growth for injection molding in recent years. China as the production center and main exporter of the world of many electrical appliances and products (such as TV set, washing machine, air conditioner, electrical fan, refrigerator, coffee maker, dish washer, vacuum cleaner etc.), housewares and consumables (such as bowl, cup, plate, chopstick, skep, basket, drum, hoop, shelf, clothes rack, and hangers etc.) consumes significant quantity of injection molded polypropylene.

There is a great potential for injection molded plastics in medical sectors for caps and closure application. The market is expected to witness growth in the production of medical devices. Optical clarity, cost-effective solutions, and biocompatibility are expected to drive the demand.

Consumption of polypropylene in injection molding applications is expected to grow at an CAGR of 4.2% in the near term (2023-28) and at an CAGR of 1.9% in the long term (2023-45).

Pipe and Extrusion

In 2023, the China market consumes 1.4 million metric tons of polypropylene for pipe & extrusion application.

PPR pipes are widely used in China for fully enclosed high-standard sanitary pipes; pipes for building tap water and hot water supply; pipes for floor heating; pipes for strong corrosive fluids in industry; pipes for agriculture, landscaping and farms; Hot springs, heat exchangers, tubes for solar water heaters; tubes for air conditioning; sanitary tubes for food, beverages, pharmaceuticals; piping for shipbuilding; piping for machinery and equipment; tubes for ventilation and gas transmission; special tubes for seabed and strong corrosive environments.

The widespread promotion of PPR pipes in China began in 2000, when traditional galvanized pipes were used as water supply pipes by the state and were prohibited from being used in new homes. At the same time, to promote the application of new plastic building materials in construction. At that time, the Ministry of Construction and the State Petrochemical Bureau jointly issued the "Several Opinions on Strengthening Technological Innovation to Promote the Industrialization of Chemical Building Materials", which kicked off the development of PPR pipes.

Other PP pipes include PP-B (block copolymer) pipes and PP-H pipes (homo polymer). PP-B pipes are typically used for non-pressure applications such as sewage, profiles, and cable conduits, where the long-term pressure resistance is not critical and cold temperature impact strength and suitability for compounding with fillers are more important. PP-H shows superior resistance to certain chemicals and is therefore preferred for pipes and fittings in industry application. It also has the greatest stiffness and short-term mechanical strength but a lower impact strength at cold temperatures.

Building and construction and industries are major consumers of pipe and extrusion polypropylene.

The construction industry will continue to be very price conscious in its sourcing patterns. However, given polypropylene's superior performance, polypropylene pipe use for hot water distribution in major cities has broadened in recent years.

Consumption of polypropylene in pipe & extrusion applications is expected to grow at an CAGR of 4.4% in the near term (2023-28) and at an CAGR of 2.2% in the long term (2023-45).

Blow Molding

In 2023, the China market consumes 136 thousand metric tons of polypropylene for blow molded application.

Blow molding is a relatively new application for polypropylene in China, and it has grown rapidly with the introduction of stretch blow molding process in recent years. Blow molded articles are widely used in medical (infusion bottle), packaging and nonpackaging applications. The growth is mainly driven by strong demand from end-user segments such as food, pharmaceuticals, and personal care industry. Beverages is the major end-use segment for plastic bottles, majorly driven by soft drinks that constitute majority of the market share. Growth of liquid detergents by replacing powder detergents in China is a significant driver in household plastic bottles/ containers segment.

Others section includes blow molded containers, straws, stationary items, bottles and containers for detergents, beverages and toiletries and PP box strapping rolls etc. which primarily go for packaging and consumer and institutional products applications.

Consumption of polypropylene in blow molding applications is expected to grow at an CAGR of 3.4% in the near term (2023-28) and at an CAGR of 1.6% in the long term (2023-45).

Fibers

In 2023, the China market consumes 6.3 million metric tons of polypropylene for fiber application.

Polyolefin fibers are synthetic fibers made from the polymers polypropylene (PP) or polyethylene, with an ethylene or propylene content of at least 85% by weight. Polypropylene is the predominant polyolefin fiber used in textile applications; polyethylene fibers are also used, though generally in small volumes and for specific applications. The physical properties of polypropylene and polyethylene, especially tensile strength, abrasion resistance, and inertness to most chemicals—including water—make them well-suited for functional applications. On the other hand, poor dyeability and the inability to maintain a crease or pleat have generally limited their growth potential in the apparel and home fabrics markets.

Polyolefin fibers are available as continuous filament yarn, monofilament, slit, or fibrillated film and staple. The different types of fibers usually serve different end-use markets. Staple fibers are used to manufacture nonwoven fabrics, which, depending on their manufacture and characteristics, are used in many different applications, including medical, sanitary, construction, filtration, wipes, and automotive. This represents the largest market for polyolefin fibers, as well as its fastest-growing sector.

Yarns are used primarily in the manufacture of tufted and woven carpets. This has historically been the major end-use market for polyolefin fibers, but the market has gradually lost importance because of changing consumer preferences for floor covering. Slit films and monofilament are used in industrial applications to manufacture ropes and agricultural nets, for concrete reinforcement, and for artificial grass. Filament yarn is widely used in apparel, agricultural, carpet, furniture and home furnishings, medical/hygienic products, packaging, and other industrials. Filament faces strong competition coming from other fibers such as PET fiber, resulting in the negative growth of polypropylene filament.

Nonwoven is widely used in medical/hygienic products, furniture and furnishings, carpet, packaging, transportation, and industrials. This application is the largest subcategory under polypropylene fiber. The demand for non-woven polypropylene fiber in China is growing rapidly especially in the export market of non-woven products.

The main markets of nonwoven include sanitary covers for disposable baby diapers and feminine hygiene and adult incontinence products. Nonwovens are also consumed in medical/surgical products, geosynthetic fabrics, construction sheeting (i.e., fabrics used as dust covers and cushion wraps in home furniture and in automotive seats and chair backs), industrial garments, agricultural fabrics, and filtration. Polypropylene fiber gained entrance into the nonwoven market in the early 1990s as a diaper cover. Because of its lower cost and competitive product performance, it has displaced polyester and rayon fibers in many nonwoven applications. Consequently, nonwovens experienced double-digit growth rates in the 1990s. Now that it has gained a high level of penetration in many nonwovens uses, future growth will follow the rate of product growth.

More recently in China, the focus of future market growth of PP fibre seems to remain in the 'Apparel sector' because of its unique fibre properties and due to the present global demand of PP fibre in the apparel segment. Future market prospects of PP fibres, in terms of innovative differentiated products which can add value substantially are a must and their application in mainstream garment sectors through primary, functional, comfort and aesthetic variants of fibre properties for the development of newer products with desired fabric attributes and composite properties have been emphasized.

Consumption of polypropylene in fiber applications is expected to grow at an CAGR of 4.5% in the near term (2023-28) and at an CAGR of 2.8% in the long term (2023-45).

Raffia

In 2023, the China market consumes 10.0 million metric tons of polypropylene for raffia application.

Raffia is the largest application for polypropylene demand in China, of which woven sacks (25kg and 50kg) are the main end products. These sacks are widely used in packaging of construction materials (cement, grit), chemicals soda ash, fertilizer, resins, and others, animal feedstuff and materials, cereal and other agricultural materials and products, etc. The health of the construction industry determines demand for bulk cement which in turn impacts demand growth of woven sacks.

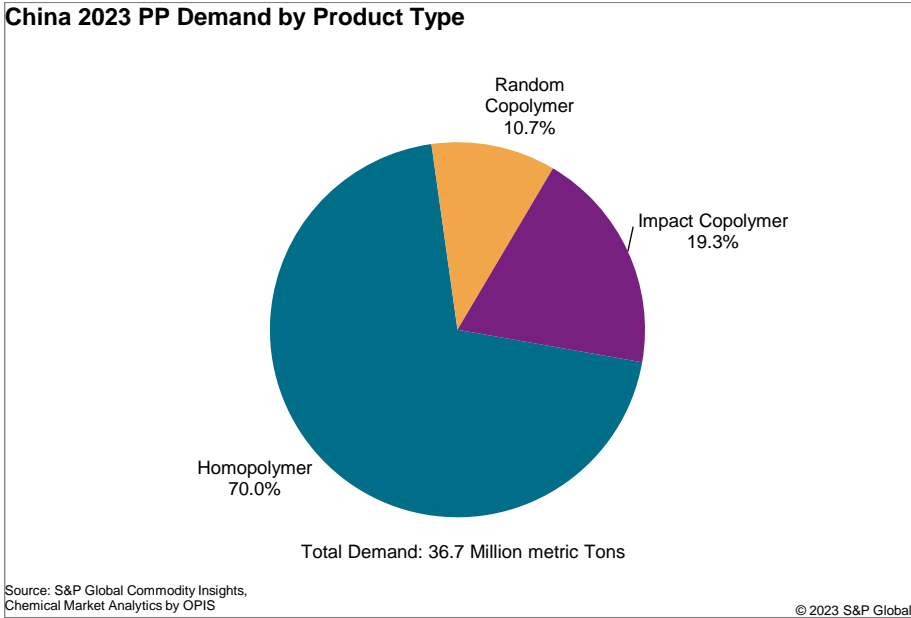
Jumbo bags are a relatively new application compared to woven sacks. Jumbo bags have gained great prominence when it comes to the transportation of bulk food and pharmaceutical items. These bags are durable and lasting, even in the toughest of weather and environmental conditions and are also economical to use. These bags are suitable for bulk handling of commodities and are strong and sturdy.

Other raffia application is mainly in the construction, gardening (for protection of trees and grasses in the winter) and agricultural (for example, farmers use woven cloth as ground cover for drying cereals and cotton) sectors.

Consumption of polypropylene in raffia applications is expected to grow at an CAGR of 4.0% in the near term (2023-28) and at an CAGR of 1.7% in the long term (2023-45).

Recycle demand for China peaked in 2012 at over 4.3 million metric tons and has since decreased. In 2020, recycle demand for PP dropped 20.5% due to COVID-19 as market preferences shifted to single-use packaging owing to hygiene concerns, but increased by 3.9% in 2021. In 2022, recycle demand increased by 9.9%, and in 2023, recycle demand increases by 9.7%, to over 2.2 million metric tons. The average annual growth rate of recycle demand through 2033 is 14.5%, significantly higher than that of virgin PP demand, although it is growing from a very small base that is only 6.2% the size of the virgin PP market in 2023. By 2033, recycle demand in China is expected to have increased by 384%, the largest percent increase of all the regions. By volume, China is expected to have an increase of 6 million metric tons, the largest of all regions. In China, PP recyclates (much like PE recyclates) are widely used in applications such as woven bags, polypropylene filament, garbage cans, pothooks, pallets, and battery boxes. However, in 2017 the Chinese government announced plans to ban the import of plastic waste and scrap, effective in January 2018. This greatly reduced the amount of PP recyclates available to produce products, as large volumes were previously imported, and virgin resin was used in its place. By the end of 2020,

a ban on the production and sale of disposable foamed plastic tableware, straws, and cotton buds was in effect. China itself has a Plastic Ban Schedule for 2021 (in large cities), 2022, 2023 (in prefectural level cities), 2024, 2025, and 2026 (countrywide) that includes PP plastic products.



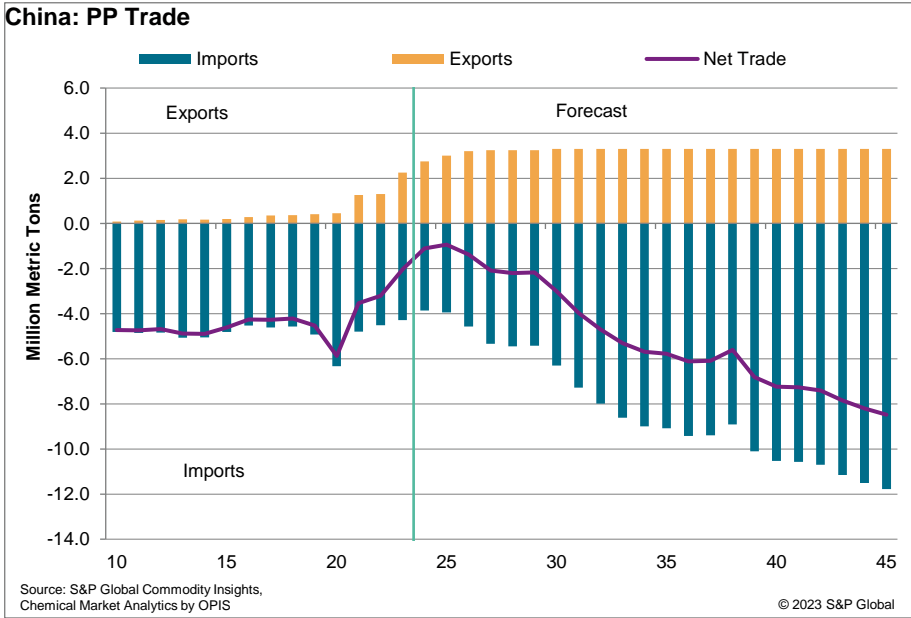
In 2023, homopolymer holds a predominant position, representing 70.0% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 19.3% of the market share. Random copolymer, on the other hand, constitutes only 10.7% of the total demand.

Trade

China has always been a net importer and projected to remain a net importer till 2045. Net imports as of 2023 are around 2.0 million metric tons. It is expected to increase to 2.2 million metric tons by 2028.

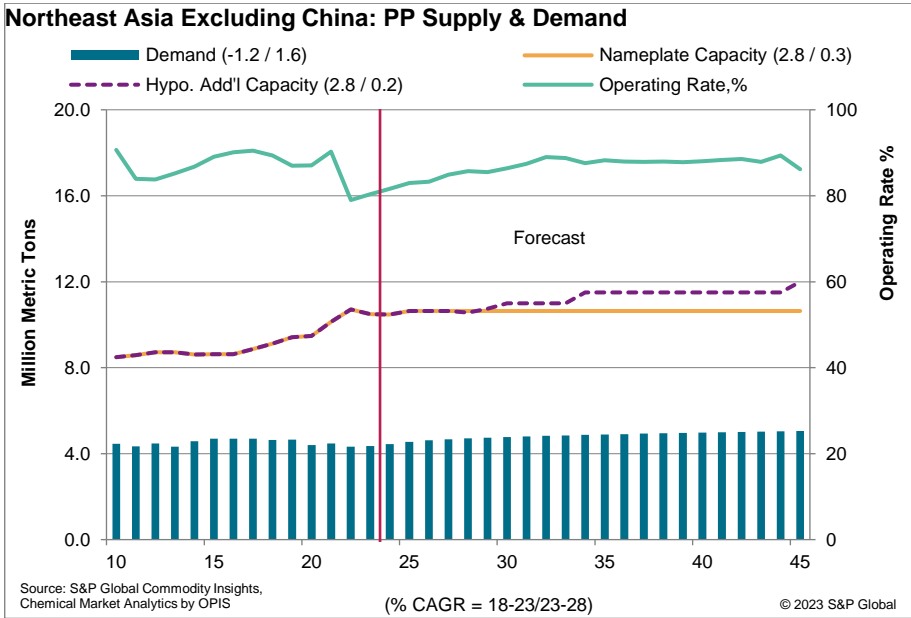
The imports are around 4.3 million metric tons as of 2023. Between 2023-28, it is expected to grow at CAGR of 4.9% and in long term, between 2023-45, it is expected to grow at CAGR of 4.7% to reach around 11.8 million metric tons by 2045. Other than intra-regional trade, Middle East and Southeast are the major sources of imports as of 2023.

The exports are around 2.2 million metric tons as of 2023. Between 2023-28, it is expected to grow at CAGR of 7.6% and in long term, between 2023-45, it is expected to grow at CAGR of 1.7% to reach around 3.3 million metric tons by 2045. Other than intra-regional trade, Southeast Asia and Indian Subcontinent are the important destinations of exports as of 2023.



4.2.13 Northeast Asia Excluding China

Supply



With the name plate capacity of 10.5 million metric tons, Northeast Asia Excluding China accounted 9.6% of global capacity. The regional nameplate capacity is expected to increase to around 10.6 million metric tons by 2025. In long term, by 2045, hypothetical capacity addition of 1.3 million metric tons is expected.

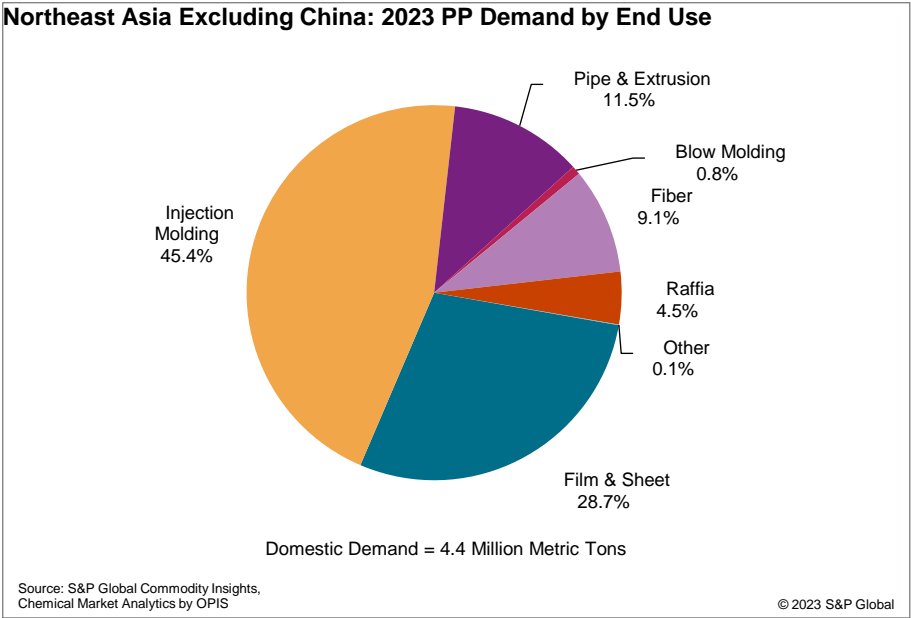
Recent capacity additions in the Other Northeast Asia region include Hanwha Total Petrochemical Co., Ltd. and Ulsan PP, both located in South Korea, each started its 400 thousand metric ton PP plants in 2021. Additionally, at the end of 2021 Hyundai Chemical Co., Ltd. started two 250 thousand metric ton PP plants in South Korea. Prime Polymer Co., Ltd. is planning to start a scrap and build 200 thousand metric ton PP plant in Japan in 2024. In addition, hypothetical capacity additions of 500 thousand metric tons in 2029 are expected in South Korea. In Japan, rationalization of plant capacity is in progress because of high labor costs, small plant sizes, and high logistics costs. South Korea has become the largest investor in PP construction in the Other Northeast Asia region, as it has a diversified marketing network and has signed free trade agreements (FTAs) with the EU, Turkey, and several South American countries. South Korean producers are investing not only in PP capacity in their own country, but also in Southeast Asian countries such as Indonesia and Vietnam.

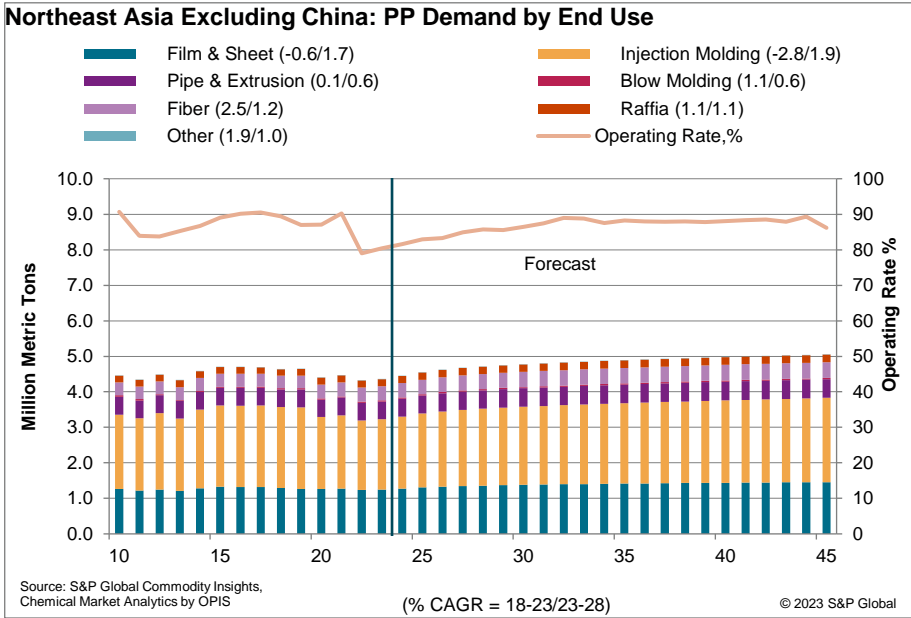
Operating rates held steady from 2019 to 2020 at around 87%, despite the pandemic. In 2021, operating rates increased to 90%, even with the aforementioned capacity additions coming online, but drop to 79% in 2022 reflecting the full capacity increases from 2021; this is somewhat offset by plant capacity rationalizations due to lower global and domestic demand growth. Hence, production is projected to remain almost the same in 2023 to a volume of around 8.4 million metric tons. Operating rates are predicted to average 84% through 2028. Production is expected to increase by 1.5% in next five years followed by an average annual growth rate of about 0.9% through 2045. By 2028, production in the Other Northeast Asia region is forecast to have increased by only 7.5%, to 9.1 million metric tons. This is due, in part, to the fact that Japan has already shifted most of its industrial manufacturing base out of the country because of high production costs, and Taiwanese producers will likely rationalize production in order to seek reasonable margins.

Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)														
Company.Name	Country/Territory.Name	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
Japan Polypropylene Corporation	Japan	Gas Phase		25	150	150	150	150	150	150	150	150	150	
Japan Polypropylene Corporation	Japan	Hydrocarbon Slurry	134	134	134	64	64	64	64	64	64	64	64	
Japan Polypropylene Corporation	Japan	Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
Japan Polypropylene Corporation	Japan	Hydrocarbon Slurry	256	256	176	150	150	150	150	150	150	150	150	
Japan Polypropylene Corporation	Japan	Gas Phase	100	100	100	100	100	100	100	100	100	100	100	
Japan Polypropylene Corporation	Japan	Multiple Gas Phase	80	80	80	80	80	80	80	80	80	80	80	
Prime Polymer Co., Ltd.	Japan	Gas Phase	126	126	126	126	126	21	0	0	0	0	0	
Prime Polymer Co., Ltd.	Japan	Hydrocarbon Slurry	250	250	250	250	250	250	250	250	250	250	250	
Prime Polymer Co., Ltd.	Japan	Gas Phase	0	0	0	0	0	0	33	200	200	200	200	
Prime Polymer Co., Ltd.	Japan	Multiple Gas Phase	140	140	140	140	140	23	0	0	0	0	0	
Prime Polymer Co., Ltd.	Japan	Bulk Slurry	48	48	48	48	48	48	48	48	48	48	48	
Prime Polymer Co., Ltd.	Japan	Bulk Slurry	300	300	300	300	300	300	300	300	300	300	300	
Prime Polymer Co., Ltd.	Japan	Bulk Slurry	100	100	100	100	100	100	100	100	100	100	100	
Sumitomo Chemical Co., Ltd	Japan	Multiple Gas Phase	146	146	146	146	146	146	146	146	146	146	146	
Sumitomo Chemical Co., Ltd	Japan	Multiple Gas Phase	170	170	170	170	170	170	170	170	170	170	170	
Sumitomo Chemical Co., Ltd	Japan	Multiple Gas Phase	150	150	150	150	150	150	150	150	150	150	150	
SunAllomer Ltd.	Japan	Gas Phase	127	127	127	127	127	127	127	127	127	127	127	
SunAllomer Ltd.	Japan	Liquid/Gas Phase Comb.	143	143	143	143	143	143	143	143	143	143	143	
SunAllomer Ltd.	Japan	Solution	138	138	138	138	138	138	138	138	138	138	138	
Tokuyama Polypropylene Co., Ltd.	Japan	Gas Phase	200	200	200	200	200	200	200	200	200	200	200	
Gs Caltex Corp	South Korea	Multiple Gas Phase	60	60	60	60	60	60	60	60	60	60	60	
Gs Caltex Corp	South Korea	Multiple Gas Phase	120	120	120	120	120	120	120	120	120	120	120	
Hanwha Total Petrochemicals Co Ltd	South Korea	Multiple Gas Phase	0	0	0	335	400	400	400	400	400	400	400	
Hanwha Total Petrochemicals Co Ltd	South Korea	Multiple Gas Phase	350	350	350	350	350	350	350	350	350	350	350	
Hanwha Total Petrochemicals Co Ltd	South Korea	Gas Phase	350	350	350	350	350	350	350	350	350	350	350	
Hyosung Corporation	South Korea	Multiple Gas Phase	200	200	200	200	200	200	200	200	200	200	200	
Hyosung Corporation	South Korea	Multiple Gas Phase	240	290	290	290	290	290	290	290	290	290	290	
Hyosung Corporation	South Korea	Bulk Slurry	160	160	160	160	160	160	160	160	160	160	160	
Hyundai Chemical Co Ltd	South Korea	Liquid/Gas Phase Comb.	0	0	0	42	250	250	250	250	250	250	250	
Hyundai Chemical Co Ltd	South Korea	Multiple Gas Phase	0	0	0	42	250	250	250	250	250	250	250	
Korea Petrochemical Industries Co Ltd	South Korea	Hydrocarbon Slurry	170	230	230	230	230	230	230	230	230	230	230	
Korea Petrochemical Industries Co Ltd	South Korea	Hydrocarbon Slurry	120	0	0	0	0	0	0	0	0	0	0	
Korea Petrochemical Industries Co Ltd	South Korea	Hydrocarbon Slurry	180	240	240	240	240	240	240	240	240	240	240	
LG Chemical Ltd	South Korea	Liquid/Gas Phase Comb.	180	180	180	180	180	180	180	180	180	180	180	
LG Chemical Ltd	South Korea	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200	
Lotte Chemical Corporation	South Korea	Multiple Gas Phase	250	250	250	250	250	250	250	250	250	250	250	
Lotte Chemical Corporation	South Korea	Liquid/Gas Phase Comb.	250	250	250	250	250	250	250	250	250	250	250	
Lotte Chemical Corporation	South Korea	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200	
Lotte Chemical Corporation	South Korea	Liquid/Gas Phase Comb.	250	250	250	250	250	250	250	250	250	250	250	
Lotte Chemical Corporation	South Korea	Liquid/Gas Phase Comb.	150	150	150	150	150	150	150	150	150	150	150	
PolyMirae Co., Ltd.	South Korea	Liquid/Gas Phase Comb.	168	177	177	177	177	177	177	177	177	177	177	
PolyMirae Co., Ltd.	South Korea	Liquid/Gas Phase Comb.	164	159	159	159	159	159	159	159	159	159	159	
PolyMirae Co., Ltd.	South Korea	Liquid/Gas Phase Comb.	194	207	207	207	207	207	207	207	207	207	207	
PolyMirae Co., Ltd.	South Korea	Liquid/Gas Phase Comb.	174	187	187	187	187	187	187	187	187	187	187	
S-Oil Corporation	South Korea	Multiple Gas Phase	203	405	405	405	405	405	405	405	405	405	405	
SK Corp./Himont jv	South Korea	Liquid/Gas Phase Comb.	10	10	10	10	10	10	10	10	10	10	10	
SK Geo Centric Co., Ltd.	South Korea	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200	
SK Geo Centric Co., Ltd.	South Korea	Bulk Slurry	190	190	190	190	190	190	190	190	190	190	190	
Ulsan PP Co Ltd	South Korea	Liquid/Gas Phase Comb.	0	0	0	301	400	400	400	400	400	400	400	
Formosa Chemical & Fiber Corp	Taiwan	Gas Phase	240	240	240	240	240	240	240	240	240	240	240	
Formosa Chemical & Fiber Corp	Taiwan	Gas Phase	200	200	200	200	200	200	200	200	200	200	200	
Formosa Chemical & Fiber Corp	Taiwan	Gas Phase	200	200	200	200	200	200	200	200	200	200	200	
Formosa Plastics Corp	Taiwan	Multiple Gas Phase	266	266	268	294	294	294	294	294	294	294	294	
Formosa Plastics Corp	Taiwan	Bulk Slurry	168	168	169	180	180	180	180	180	180	180	180	
LCY Chemical Corp	Taiwan	Bulk Slurry	225	225	225	225	225	225	225	225	225	225	225	
LCY Chemical Corp	Taiwan	Liquid/Gas Phase Comb.	175	175	175	175	175	175	175	175	175	175	175	
Total - Northeast Asia Excluding China			9,115	9,422	9,470	10,131	10,711	10,488	10,478	10,645	10,645	10,645	10,645	

Demand

Domestic demand in the Other Northeast Asia region declined 5.3% in 2020 because of the economic recession caused by COVID-19. However, domestic demand increased by 1.5% in 2021, but decreased 3.3% in 2022, and increases by another 0.9% in 2023 to a volume of 4.4 million metric tons. The average annual growth rate of domestic demand in this region from 2023 to 2028 is below 1.6%, as Japan, South Korea, and Taiwan—which have matured economies—are expected to experience moderated demand growth. Japan, specifically, with its mature economy and declining population, is expected to have the weakest growth in the region. Markets that are key to demand include the automotive, industrial appliances, and packaging applications. By 2028, domestic demand is forecast to have increased by only about 7.5% compared to 2023.

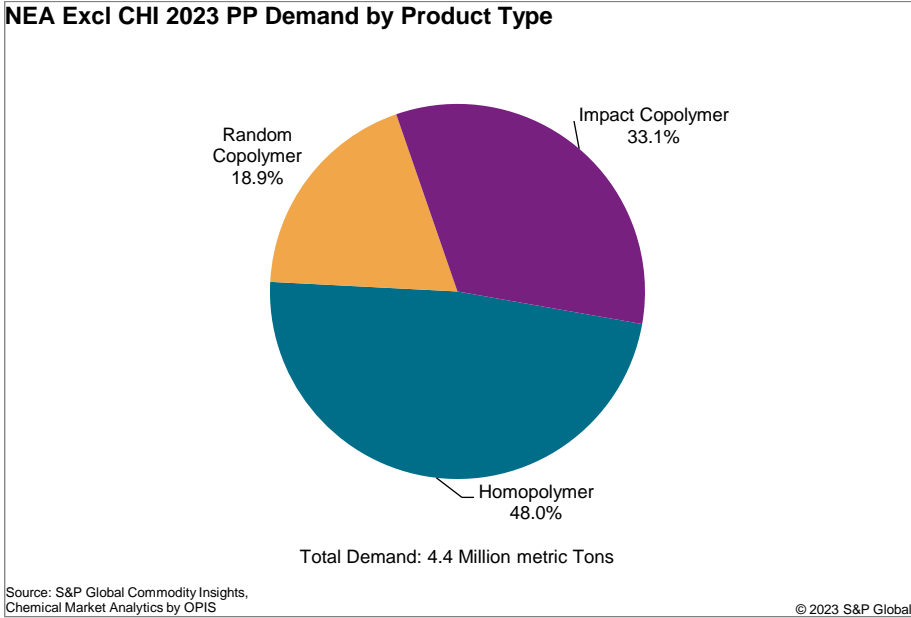




In 2023, the largest segment estimated is injection molding, representing 45.4% of demand. Film & sheet is the second leading segment accounting for a share of 28.7% of demand, followed by fiber with a share of 9.1% of the overall demand in the region.

In 2023, the Other Northeast Asia region market consumes 2.0 million metric tons of polypropylene as film & sheet. Consumption of polypropylene in film & sheet applications is expected to grow fastest, at an CAGR of 1.9% in the near term (2023-28) and at an CAGR of 0.8% in the long term (2023-45). Film & sheet demand growth is the key driver of PP demand in Other Northeast Asia region market.

Recycle demand for the Other Northeast Asia region peaked in 2015 at 553 thousand metric tons. In 2020, recycle demand for PP dropped 26.5% after COVID-19 caused market preferences to shift to single-use packaging because of hygiene concerns, but it increased in 2021 by 12%. Recycle demand increases by about 7.3% in 2023 to a volume of 358 thousand metric tons. The average annual growth rate of recycle demand through 2033 is about 10.2%, significantly higher than that of virgin PP demand, although it is growing from a very small base that is about 8.3% the size of the virgin PP market in 2023. South Korea, the largest PP producer in the region, currently has a Resource Recycling Act in place, an Extended Producer Responsibility (EPR) system for packaging, and near the end of 2022 the South Korean government expanded its ban on single use products by adding plastic bags, straws, stir sticks, and more with a year-long grace period to implement at retail stores. They are also the highest recyclers of municipal solid waste among the OECD countries. In Japan, beginning April 2022, the Plastic Resource Circulation Act was put into effect to address and encourage resource circulation of plastics in each stage of its lifecycle as a plastic product, in collaboration with all stakeholders including municipalities, businesses and consumers. Japan also has an EPR system in place for designated businesses. Taiwan began banning plastic straws, typically made from PP, in July 2019, and in 2020 the ban extended to single-use utensils by restaurants for on-premises customers. Taiwan has a goal of banning all single use plastic bags, containers, cups, utensils, and straws by 2030.



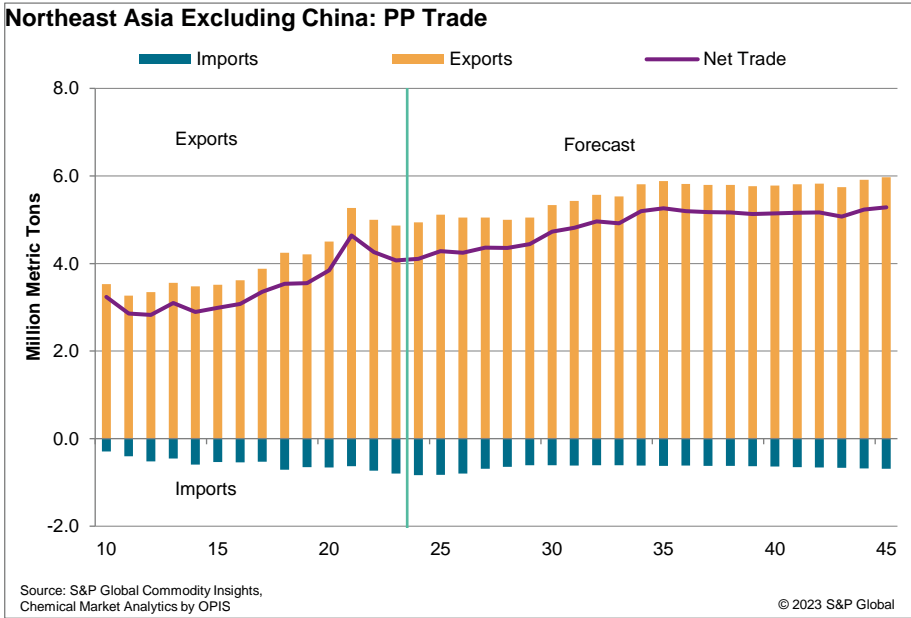
In 2023, homopolymer holds a predominant position, representing 48.0% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 33.1% of the market share. Random copolymer, on the other hand, constitutes only 18.9% of the total demand.

Trade

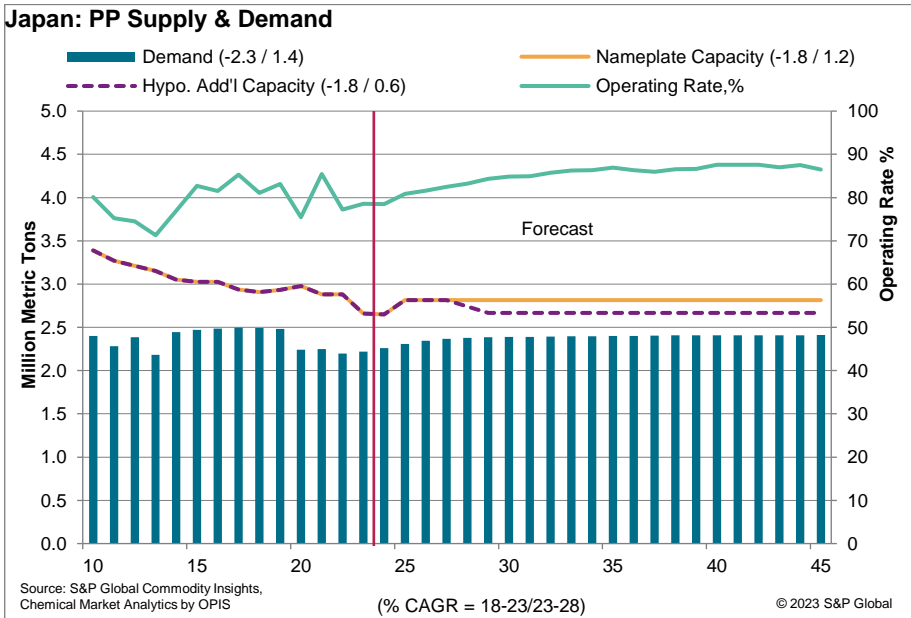
Historically, the Other Northeast Asia region has been a net exporter due to the lower domestic demand and is expected to remain one through the forecast period; the region currently exports about 57.8% of their domestic production. Within the region, South Korea is the largest exporter, exporting about 3.7 million metric tons, while Taiwan, the next-largest exporter, exports about 750 thousand metric tons. South Korean producers are exporting more volume to the European Union and Latin American countries because of the FTAs with these regions. South Korea will likely continue to increase their export volumes, while producers in Japan and Taiwan are implementing actions to counter more competitive exports

from the Middle East and are projected to rationalize capacity, resulting in an expected decrease in exports through the forecast period. The Other Northeast Asia region exports mostly to mainland China, intra-regionally, and to Southeast Asia.

Imports are anticipated to a volume of 799 thousand metric tons, the largest volume to date. Imports are projected to increase by an additional 4.4% in 2024 before starting to decline at an average annual growth rate of around 4.2% through 2028. Currently, the Other Northeast Asia region imports only about 9.5% of their domestic demand—the second smallest percent of all the regions—and that rate is expected to decline to around 7.1% by 2028. Japan is the largest importer in the region, which should not change during the forecast period. Japan’s net import position temporarily changed to a net export position in 2020, 2021, and in 2022, when severe supply disruptions in other regions offered greater export opportunities even for higher-cost producers. However, in 2023 they switch back to a net importer position, where it is expected they will remain through the forecast period. The Other Northeast Asia region imports mainly from other countries within the region, Southeast Asia, Mainland China, and the Middle East.



4.2.14 Japan
Supply



The Japanese PP industry has undergone massive restructuring that has reduced the number of companies from 14 in late 1994 to the current five producers. The PP producers and their capacity shares in 2023 are Prime Polymer (27.88%), Japan Polypropylene (31.74%), Sumitomo Chemical (17.52%), SunAllomer (15.34%) and Tokuyama Polypropylene (7.52%). Ukishima Polypro is now part of the SunAllomer Group. The average plant size in Japan is quite small, which prevents them from bearing the fruits of economy of scale.

Since the mid-2000s, Japan has been rationalizing PP capacity by closing some of the older, uncompetitive units and shifting its investment focus overseas to Southeast Asia and the Middle East. Over the last decade, Japan reduced PP capacity by 494 thousand metric tons in order to improve competitiveness. Among the primary reasons for downgrading PP capacity in Japan are low domestic demand and availability of cheap PP product from the Middle East and Asia. However, consolidation in the country has begun to slow because of lower supply pressures and better margins.

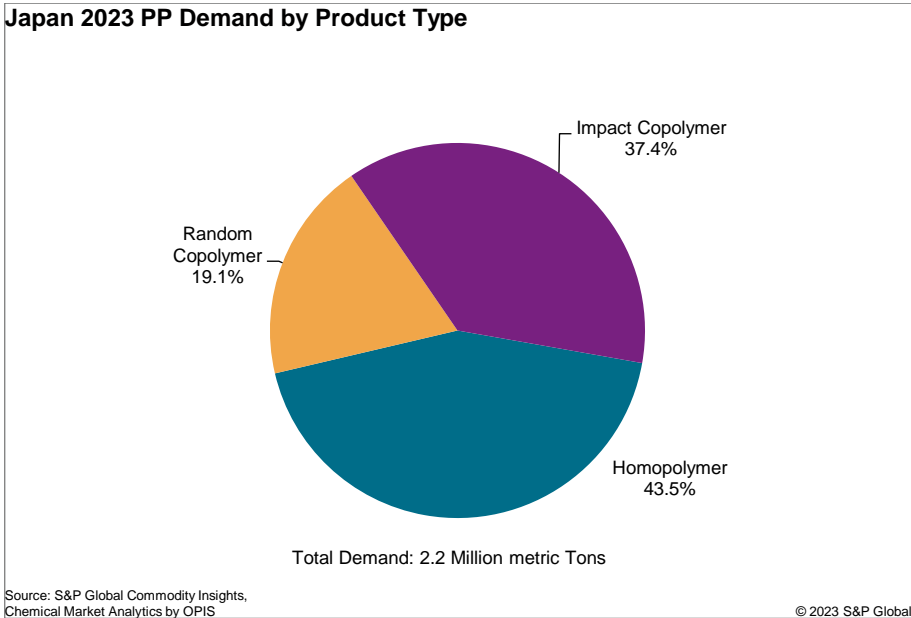
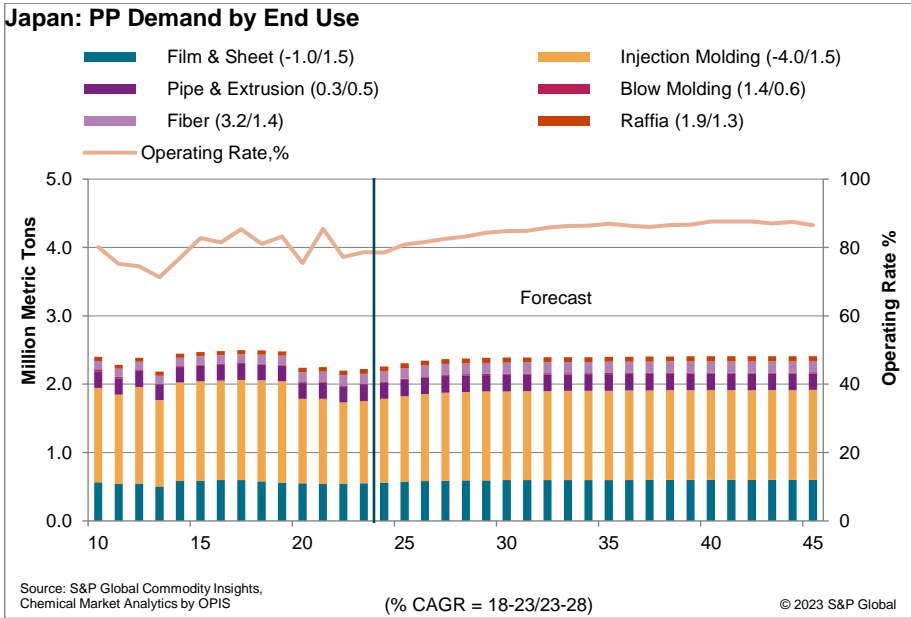
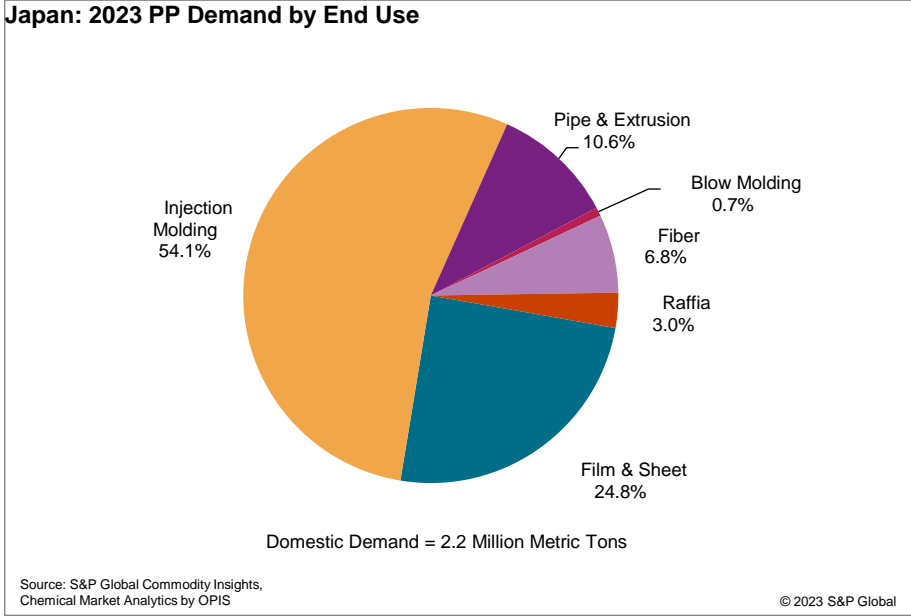
Japanese PP capacity in 2023 is nearly 2.6 million metric tons. Prime Polymer with a combined capacity of 741 thousand metric tons in 2023, Prime Polymer is the second largest PP producer in Japan. The company is owned by Mitsui Chemical (65%) and Idemitsu Kosan (35%). The company is planning to construct a 200 thousand metric ton PP plant. The new manufacturing facility will be designed to produce high-performance PP, something that has been unattainable with currently operating facilities. The factory is expected to be completed by the end of 2024, at which time Japan's production capacity will reach 2.8 million metric tons. There will be no additional capacity in the future, but there will still be rationalization of existing capacity. By the end of forecast time, we estimate the PP capacity will remain at 2.7 million metric tons.

Demand

In 2023, PP production in Japan is an estimated 2.1 million metric tons, for an operating rate of 79%. Over the past decade, Japan has faced major challenges in keeping its PP units afloat. Bearish domestic demand and aging plants have forced domestic manufacturers in Japan to close multiple units in the country. Further, availability of cheap PP product from the Middle East and Asian countries has put pressure on the domestic players to match the competitive price.

In the next five years, both production and demand growth in the country is expected to be flat with no major capacity enhancements.

Japan is a fairly mature economy. With very lean GDP growth a nearly decreasing population, its PP demand is not expected to change much. In 2023, Japan consumed about 2.2 million metric tons of polypropylene; consumption is expected to grow at an average of 1.4% per year over the next five years and close to 2.4 million metric tons in 2028, and an CAGR of 0.4% in the long term (2023-45) and remain at 2.4 million metric tons in 2045.

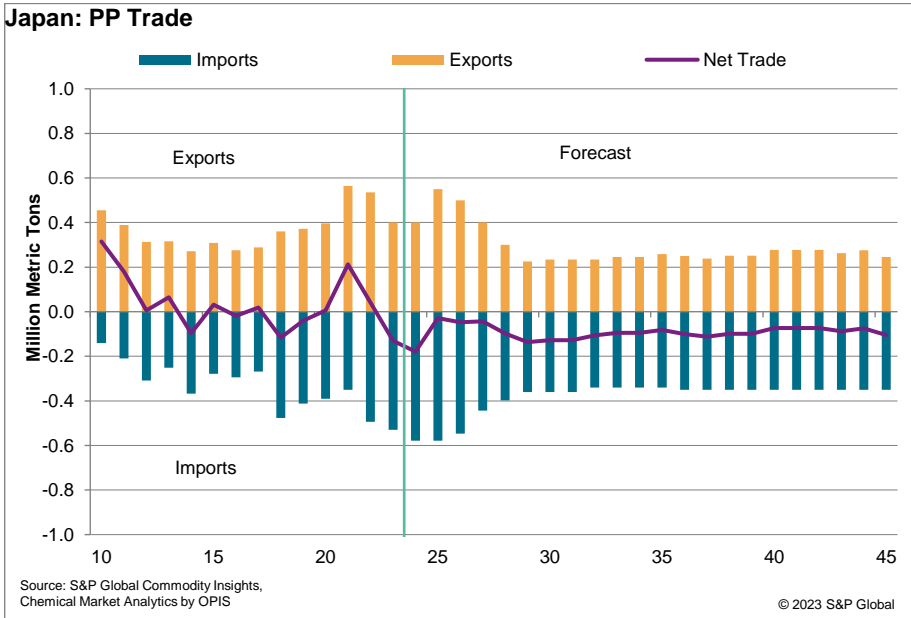


In 2023, homopolymer holds a predominant position, representing 43.5% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 37.4% of the market share. Random copolymer, on the other hand, constitutes only 19.1% of the total demand.

Trade

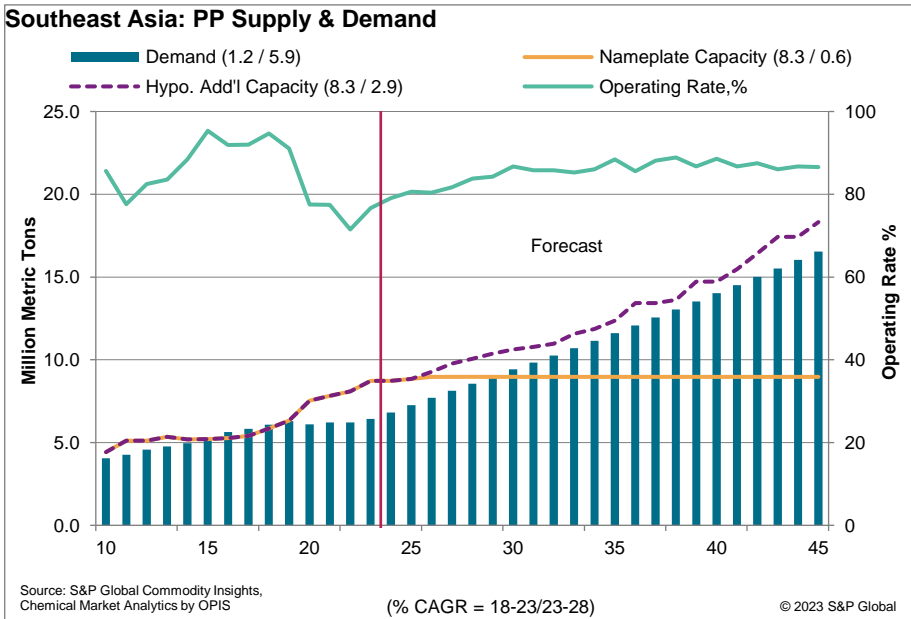
Due to decreasing cost competitiveness of domestically produced PP, end users in Japan have turned to other geographies to source PP, making Japan a net importer. In 2017, while PP producers in the country were taking prominent steps to reduce their capacity, Japan almost doubled its imports to fulfil domestic demand. In 2023, Japanese PP imports are an estimated 530 thousand metric tons, accounting for about 23.9% of domestic consumption. The largest exporters of PP to Japan are Northeast Asia and Southeast. Further, in 2023, Japanese exports of PP is at 400 thousand metric tons, which is equal to nearly 19.1% of domestic production.

Over the extended period, Japan is poised to persist as a net importer, with the import volume maintaining a level of approximately 350 thousand metric tons.



4.2.15 Southeast Asia

Supply



The regional nameplate capacity stands at around 8.7 million metric tons as of 2023. It is expected to increase to around 9.0 million metric tons as of 2028. Hypothetical capacity addition of 1.1 million metric tons is expected by 2028 and of around 9.4 million metric tons is expected by 2045.

Thailand, Singapore, Thailand, and Malaysia are the main producing countries in the region, accounting for a cumulative capacity of approximately 7.1 million metric tons, and equivalent to 81.8% of total regional capacity in 2023.

Top five capacity polypropylene capacity shareholders in the region as of 2023 are PTT Public Company Limited (16.01%), Exxon Mobil Corporation (9.86%), The Siam Cement Group (8.26%), Siam Cement Public (7.76%), and Lotte Corporation (7.34%). Together, they accounted for 49.23% of regional production capacity of polypropylene.

The most recent PP capacity additions in Southeast Asia were in 2021 by Hyosung Vietnam Co., Ltd. with a 300 thousand metric ton PP plant and by Pengerang Petrochemical Company Sdn. Bhd. with a 450 thousand metric ton PP plant in 2020. PT Lotte Chemical Indonesia is coming up with capacity addition of 250 thousand metric tons by 2025 in Merak, Banten, Indonesia. HMC Polymers Co Ltd in Map Ta Phut, Thailand has started a plant of 250 thousand metric tons in 2022, which ramps up to its full capacity by 2023. Long Son Petrochemicals Co Ltd in Ba Ria-Vung Tau, Vietnam started up with a polypropylene plant of 400 thousand metric tons in early 2023.

Rising demand from the increasing population and growing income levels, coupled with an ease of doing business and developing infrastructure, are making Southeast Asia a key investment location for PP producers and converters to explore. Around 6.7 million metric tons of polypropylene is produced in the region as of 2023. The production is expected to grow by 4.8% between 2023-28. In the long-term, it is expected to grow by 4.0% between 2023-45.

Total PP capacity is around 8.7 million metric tons in 2023. In anticipation of the capacity increase in the region, Southeast Asian producers are expected to put more effort into defending and expanding their own domestic markets and push for trade among the 10 ASEAN economies in pursuit of higher netbacks. Southeast Asian producers also are raising their efforts in the research and development of advanced PP grades with applications in automotive parts, medical appliances, hygiene products, and special packaging.

In the last five years, Malaysia expanded its PP capacity by four times by commissioning a 900 thousand metric ton unit at Pengerang. After Malaysia, Vietnam, which is a major plastic processing market, has made a large investment in PP projects and expanded its total capacity from 284 thousand metric tons to 1.55 million metric tons in the last five years, and surpass Singapore to become the second-largest PP producer in the region. While Singapore and Australia will remain complacent to the growing PP market and will not have any additions in PP capacity in the next five years.

Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)														
Company.Name	Country/Territory.Name	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
Viva Energy Polymers Pty Ltd	Australia	Bulk Slurry	130	130	130	130	130	130	130	130	130	130	130	130
PT Chandra Asri Petrochemical Tbk	Indonesia	Gas Phase	160	170	196	196	196	196	196	196	196	196	196	196
PT Chandra Asri Petrochemical Tbk	Indonesia	Multiple Gas Phase	160	170	197	197	197	197	197	197	197	197	197	197
PT Chandra Asri Petrochemical Tbk	Indonesia	Gas Phase	160	170	197	197	197	197	197	197	197	197	197	197
PT Lotte Chemical Indonesia	Indonesia	Liquid/Gas Phase Comb.	0	0	0	0	0	0	0	126	250	250	250	
PT Pertamina	Indonesia	Bulk Slurry	45	45	45	45	45	45	45	45	45	45	45	45
PT Polytama Propindo	Indonesia	Liquid/Gas Phase Comb.	240	240	300	300	300	300	300	300	300	300	300	300
Lotte Chemical Titan (M) Sdn Bhd	Malaysia	Liquid/Gas Phase Comb.	280	280	280	280	280	280	280	280	280	280	280	280
Lotte Chemical Titan (M) Sdn Bhd	Malaysia	Liquid/Gas Phase Comb.	101	200	200	200	200	200	200	200	200	200	200	200
Lotte Chemical Titan (M) Sdn Bhd	Malaysia	Liquid/Gas Phase Comb.	160	160	160	160	160	160	160	160	160	160	160	160
Pengerang Petrochemical Company Sdn Bhd	Malaysia	Liquid/Gas Phase Comb.	0	0	377	450	450	450	450	450	450	450	450	450
Pengerang Petrochemical Company Sdn Bhd	Malaysia	Liquid/Gas Phase Comb.	0	75	450	450	450	450	450	450	450	450	450	450
PP Malaysia	Malaysia	Gas Phase	0	0	0	0	0	0	0	0	0	0	0	0
JG Summit Olefins Corporation	Philippines	Gas Phase	185	185	185	243	300	300	300	300	300	300	300	300
Petrochemical Corp. of Asia Pacific	Philippines	Multiple Gas Phase	0	0	0	0	0	0	0	0	0	0	0	0
Philippine Polypropylene Inc.	Philippines	Multiple Gas Phase	160	176	225	225	225	225	225	225	225	225	225	225
Exxonmobil Asia Pacific Pte Ltd	Singapore	Liquid/Gas Phase Comb.	410	410	410	410	410	410	410	410	410	410	410	410
Exxonmobil Asia Pacific Pte Ltd	Singapore	Liquid/Gas Phase Comb.	450	450	450	450	450	450	450	450	450	450	450	450
The Polyolefin Company (Singapore) Pte. Ltd.	Singapore	Gas Phase	190	190	190	190	190	190	190	190	190	190	190	190
The Polyolefin Company (Singapore) Pte. Ltd.	Singapore	Gas Phase	200	200	200	200	200	200	200	200	200	200	200	200
The Polyolefin Company (Singapore) Pte. Ltd.	Singapore	Gas Phase	65	65	65	65	65	65	65	65	65	65	65	65
The Polyolefin Company (Singapore) Pte. Ltd.	Singapore	Bulk Slurry	170	170	170	170	170	170	170	170	170	170	170	170
HMC Polymers Co Ltd	Thailand	Multiple Gas Phase	0	0	0	0	21	250	250	250	250	250	250	250
HMC Polymers Co Ltd	Thailand	Liquid/Gas Phase Comb.	200	200	200	200	200	200	200	200	200	200	200	200
HMC Polymers Co Ltd	Thailand	Liquid/Gas Phase Comb.	250	250	250	250	250	250	250	250	250	250	250	250
HMC Polymers Co Ltd	Thailand	Multiple Gas Phase	360	360	360	360	360	360	360	360	360	360	360	360
IRPC Public Company Limited	Thailand	Gas Phase	140	140	140	140	140	140	140	140	140	140	140	140
IRPC Public Company Limited	Thailand	Multiple Gas Phase	160	160	160	160	160	160	160	160	160	160	160	160
IRPC Public Company Limited	Thailand	Gas Phase	175	175	175	175	175	175	175	175	175	175	175	175
IRPC Public Company Limited	Thailand	Multiple Gas Phase	150	150	150	150	150	150	150	150	150	150	150	150
IRPC Public Company Limited	Thailand	Multiple Gas Phase	150	150	150	150	150	150	150	150	150	150	150	150
Thai Polypropylene Co., Ltd.	Thailand	Liquid/Gas Phase Comb.	160	160	160	160	160	160	160	160	160	160	160	160
Thai Polypropylene Co., Ltd.	Thailand	Liquid/Gas Phase Comb.	400	400	400	400	400	400	400	400	400	400	400	400
Thai Polypropylene Co., Ltd.	Thailand	Liquid/Gas Phase Comb.	160	160	160	160	160	160	160	160	160	160	160	160
Hyosung Vietnam Co., Ltd.	Vietnam	Liquid/Gas Phase Comb.	0	0	252	300	300	300	300	300	300	300	300	300
Hyosung Vietnam Co., Ltd.	Vietnam	Liquid/Gas Phase Comb.	0	0	0	100	300	300	300	300	300	300	300	300
Long Son Petrochemicals Co Ltd	Vietnam	To Be Announced	0	0	0	0	0	400	400	400	400	400	400	400
Nghi Son Refinery and Petrochemical LLC	Vietnam	Gas Phase	134	400	400	400	400	400	400	400	400	400	400	400
Vietnam Oil and Gas Group	Vietnam	Gas Phase	150	150	150	150	150	150	150	150	150	150	150	150
Total - Southeast Asia			5,855	6,341	7,534	7,813	8,091	8,720	8,720	8,846	8,970	8,970	8,970	

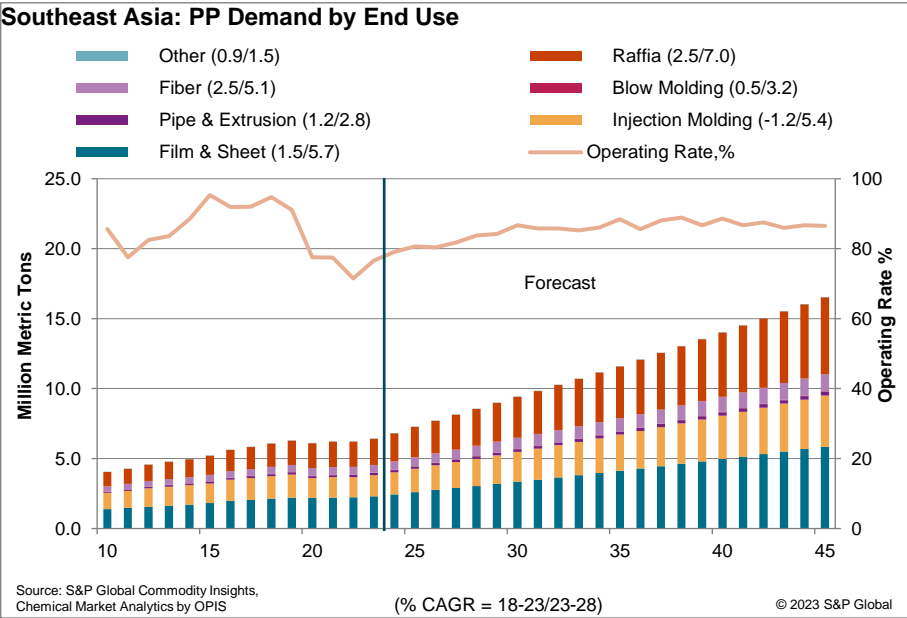
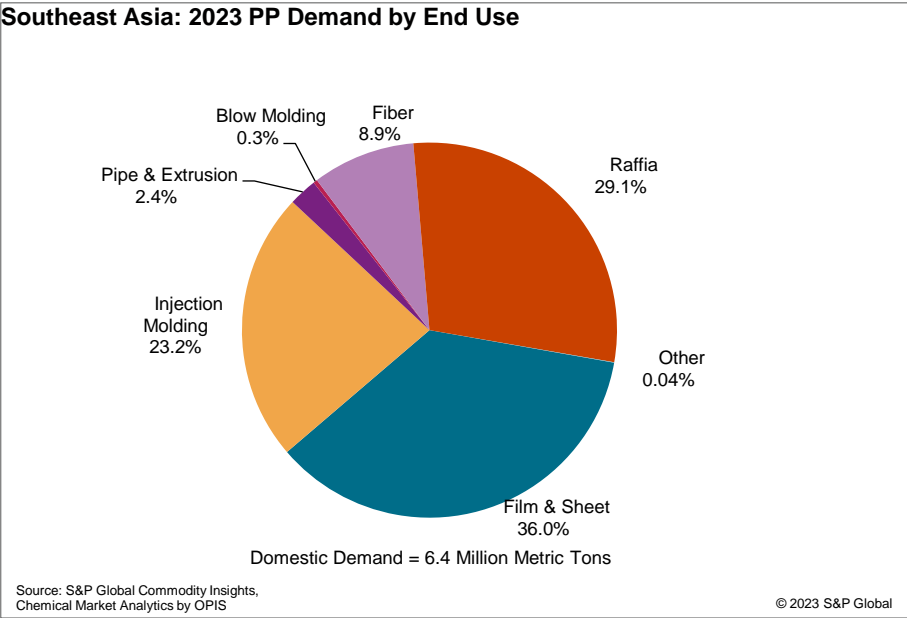
Demand

The regional consumption of polypropylene stands at around 6.4 million metric tons in 2023. It is expected to grow at CAGR of 5.9% to reach around 8.6 million metric tons by 2028 and in long term, 2023-45, it is expected to grow at CAGR of 4.4% to reach around 16.5 million metric tons by 2045.

In 2020, Southeast Asia PP demand suffered and fell to a negative growth owing to the impact of the COVID-19 pandemic. The rapid recovery in 2021 and supply constrains that were exacerbated by the Russia-Ukraine conflict caused worldwide inflation and diminished overall global demand. Hence, in the Southeast Asia region, producers faced weak finished-goods demand, increasing interest rates, weak consumer purchasing sentiment, tight bank credit, and worsening production margins that could derail the expected demand growth in the region. However, over a longer term, demand in this region is expected to continue to grow at a healthy rate. PP demand in Southeast Asia accounts for 7.5% of global consumption in 2023.The demand growth in this region is supported by a rapidly growing middle class with increasing spending power and growing economies. The robust pace of urbanization will continue to support demand for household products, automotive components, and construction parts and require higher standards of packaging.

In 2023, the three largest PP-consuming countries in Southeast Asia are Indonesia, Vietnam, and Thailand. Indonesia is the largest PP consumer at around 2.0 million metric tons, or around 31.1% of the total regional consumption, followed by Vietnam at approximately 26.6% and Thailand at 19.4%. The region's three biggest consumers of PP are expected to remain unchanged. With these three countries accounting for about 77.1% of total PP consumption in the Southeast Asian market, the region might still see out-of-the-region imports despite the increasing supply within the region.

Malaysia and the Philippines are the other two countries with a high potential for demand growth. Although there was a change of the Malaysian government in 2020, the investment and growth in the manufacturing sector in the country remained healthy and that helped to propel PP demand. In addition, the newly started up PP plants in the country from 2019 to 2021 are expected to encourage higher consumption through competitive pricing within the country. Mature economies, such as Singapore and Australia, will grow at a slower pace because of the high labor costs, which are not sustainable to support manufacturing industries.



PP has versatile and unique performance properties with a broad range of applications. In Southeast Asia, a major outlet for PP is in film and sheet applications, accounting for 36.0% of the region’s PP consumption in 2023. Both the film and sheet markets will see a good growth over the next five years, with film grades being used in industrial and food packaging, while sheets are used for thermoforming applications in food containers. Between 2023-28, this market segment is expected to grow at CAGR of 5.7%.

Injection molding applications are gaining importance and they are increasingly used for household goods, automotive parts, and electrical and electronics appliances. The injection molding sector make up 23.2% of total PP demand in 2023, with a forecast annual growth rate of 5.4% between 2023–28. Raffia and fiber grades combined accounts for 38.0% of PP end uses in 2023. The raffia and fiber markets include heavy-duty packaging and textile industries. These three main outlets for PP will continue to show strong growth in this region where several emerging economies are located.

Film and Sheet

In 2023, the SEA market consumes 2.3 million metric tons of polypropylene for film & sheet application.

Film and sheet made from polypropylene is used in a wide range of applications including industrial and food packaging, such as thermoforming sheets for tubs and trays for the food industry. Growth of film & sheet would be driven by increasing demand from the packaging industry in Indonesia and Thailand.

BOPP film is the major driver for film and sheet application in the region. BOPP film is primarily used for food (frozen food, confectionary etc.) and non-food packaging (garments). BOPP holds approximately 50% share of the total film and sheet market in the region. The non-packaging category which consists of capacitor film and other application such as battery separator film is also expected to grow well in the region driven by the expanding electronics industry.

Consumption of polypropylene in film & sheet applications is expected to grow at an AAGR of 5.7% in the near term (2023-28) and at an AAGR of 4.3% in the long term (2023-45).

Injection Molding

In 2023, the SEA market consumes 1.5 million metric tons of injection molded polypropylene.

Injection molding is primarily used in consumer plastic products, rigid packaging, automotive parts, home appliances, and medical products. Polypropylene is increasingly used in automotive applications, owing to its durability, heat resistance, and low weight polypropylene. It is used as a base material for producing compounds for automotive structural applications.

Polypropylene is also used in caps and closure application in Southeast Asia. Crown seal in Thailand and Bericap in Malaysia are some leading players of caps and closures in the region. Caps and closures are used across multiple applications such as consumer and institutional products, pharma, and medical applications.

Polypropylene is also widely used in appliances in the region. Thailand is ASEAN's largest production base in the electrical appliances sector, the world's second largest producer of air-conditioning units, and is the fourth largest for refrigerators. Top manufacturers in Thailand include European companies such as Philips, Electrolux, Schneider, and American companies like Western Digital, Seagate, Honeywell, and Carrier. Meanwhile, Malaysia has grown to become a major global manufacturing hub with several electronic manufacturing services (EMS) companies. From a mere four companies in 1970, Malaysia's electronic and electric industry today has expanded to more than 1,695 companies with total investment of around US\$ 35.5 billion. Therefore, continued expansion in electrical/ electronic appliances industry is expected to drive the demand for injection molded PP products in the region.

Consumption of polypropylene in injection molding applications is expected to grow at an AAGR of 5.4% in the near term (2023-28) and at an AAGR of 4.1% in the long term (2023-45).

Pipe and Extrusion

In 2023, the SEA market consumes 157 thousand metric tons of polypropylene for pipe & extrusion application.

PPR pipes, which is the most recent development, has been further improved to obtain the best long-term heat stability, slow crack growth resistance performance and welding performance. This material is used for hot and cold-water sanitary systems and heating pipes.

Other PP pipes include PP-B (block copolymer) pipes and PP-H pipes (homo polymer). PP-B pipes are typically used for non-pressure applications such as sewage, profiles, and cable conduits, where the long-term pressure resistance is not critical and cold temperature impact strength and suitability for compounding with fillers are more important. PP-H shows superior resistance to certain chemicals and is therefore preferred for pipes and fittings in industry application. It also has the greatest stiffness and short-term mechanical strength but a lower impact strength at cold temperatures.

Demand is driven by the industrial and building and construction sectors, particularly in Philippines and Vietnam.

Much of the construction industry growth is being driven by investment in new infrastructure, while increasing domestic demand is driving the expansion in construction of buildings across the residential and non-residential sectors.

Blow Molding

In 2023, the SEA market consumes 22 thousand metric tons of polypropylene for blow molding application.

Blow molded articles are widely used in medical (infusion bottle), packaging and nonpackaging applications. Demand is driven by the packaging sector, particularly in Indonesia and Thailand with blow molded bottles and containers going into packaging for consumer goods. Both Thailand and Indonesia packaging industries are expected to grow well in the coming years which will drive the demand for blow molded products.

Others section includes blow molded containers, straws, stationary items, bottles and containers for detergents, beverages and toiletries and PP box strapping rolls etc. which primarily go for packaging and consumer and institutional products applications.

Consumption of polypropylene in blow molding applications is expected to grow at an AAGR of 3.2% in the near term (2023-28) and at an AAGR of 2.0% in the long term (2023-45).

Fibers

In 2023, the SEA market consumes 571 thousand metric tons of polypropylene for fiber application.

Polypropylene is the predominant polyolefin fiber used in textile applications; polyethylene fibers are also used, though generally in small volumes and for specific applications. The physical properties of polypropylene and polyethylene, especially tensile strength, abrasion resistance, and inertness to most chemicals—including water—make them well-suited for functional applications.

Consumer and Institutional products are the biggest market (hygiene segment including diapers and adult contingency products and furnishings) of polypropylene non-woven. Other applications include automotive, geotextiles, medical, filtration, and apparel.

Nonwoven capacity and production demand in Southeast Asia is expected to continue to grow spurred on by favorable economic conditions, local and export market demand and increasing market penetration. Increasing market penetration for disposable and durable nonwovens in Southeast Asia and China, where market penetration is still low, is a positive predictive factor for good nonwoven demand growth in both Southeast Asian markets and in their export markets as well. Nonwoven producers in the ASEAN five countries are expected to benefit from good export demand from China, Japan, and other countries in and outside the Asia Pacific region.

Consumption of polypropylene in fiber applications is expected to grow at an AAGR of 5.1% in the near term (2023-28) and at an AAGR of 3.6% in the long term (2023-45).

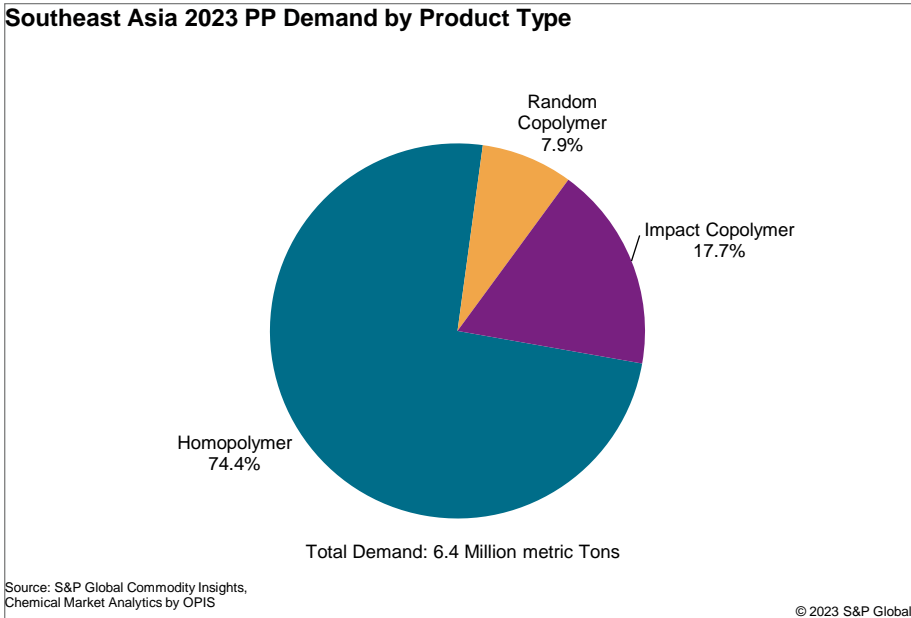
Raffia

In 2023, the SEA market consumes 1.9 million metric tons of polypropylene for raffia application. Raffia is used in heavy-duty packaging bags. Woven sacks, jumbo bags and rapping fabrics are the three common components of raffia. Woven sacks hold majority share in market since they show inertness towards moisture, chemical & exceptional resistance towards

rotting & fungus attack as they are nontoxic which is also lighter in weight and is more advantages than conventional bags. Also, increasing disposable incomes and rapid urbanization in the region will further drive the market of raffia bags in the region.

Consumption of polypropylene in raffia applications is expected to grow at an CAGR of 7.0% in the near term (2023-28) and at an AAGR of 5.0% in the long term (2023-45).

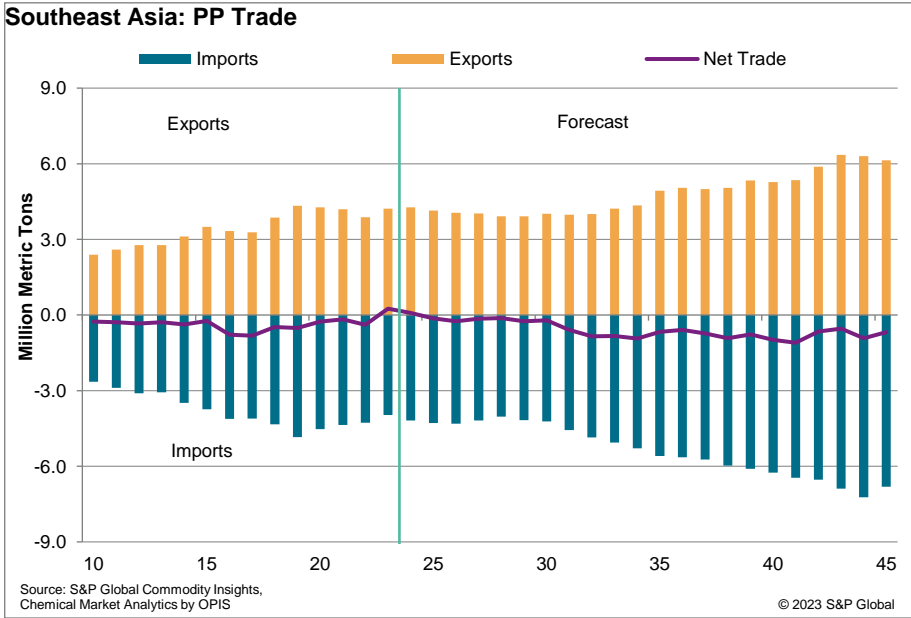
Recycle demand for Southeast Asia peaked in 2015, at 730,000 metric tons, and has not yet returned to levels that high. In 2020, recycle demand for PP dropped 28% due to COVID-19 as market preferences shifted to single-use packaging due to hygiene concerns, but it increased in 2021 by 11%. Recycle demand increased by 13% in 2022 to a volume of 501,000 metric tons, and increases by 13% in 2023 to a volume of 567,000 metric tons. The average annual growth rate of recycle demand in next ten years is close to 14%, significantly higher than that of virgin PP demand, although it is growing from a very small base that is about 8.1% the size of the virgin PP market in 2023. Thailand, the biggest PP producing country in the region, has a 20-year plan for plastic waste management, including bans on plastic items such as straws and cutlery, but it has been criticized for lack of potential and detailed long-term strategy. In April 2022, Thailand banned single use plastics (plastic bags of certain size, plastic food containers, cups, straws, and cutlery) from national parks and implemented a fine if caught travelling into national parks with them. In addition, they implemented a plastic scrap import ban with the goal of no plastic scrap imports by 2025. Many of the other countries in Southeast Asia have bag bans, recycling goals, a plastic tax, a plan in place to reduce plastic waste, or are working on creating EPRs.



In 2023, homopolymer holds a predominant position, representing 74.4% of the market share. The homopolymer market share in the Southeast Asia region is one of the highest globally. Following closely, impact copolymer secures the second-largest position, accounting for 17.7% of the market share. Random copolymer, on the other hand, constitutes only 7.9% of the total demand.

Trade

Southeast Asia is the world's second-largest PP import market after mainland China, accounting for about 4.0 million metric tons in 2023; this is equivalent to nearly 15.2% of global PP trade. The major share of around 40% of total imports is within the region, with the Northeast Asia the main supplier from outside the region, followed by Middle East. In 2023, Southeast Asian imports meets about 61.7% of total consumption. The main importers are Indonesia and Vietnam, together accounting for around 59.5% of total imports in the region. Currently, Vietnam is importing 61.5% of its total consumption.

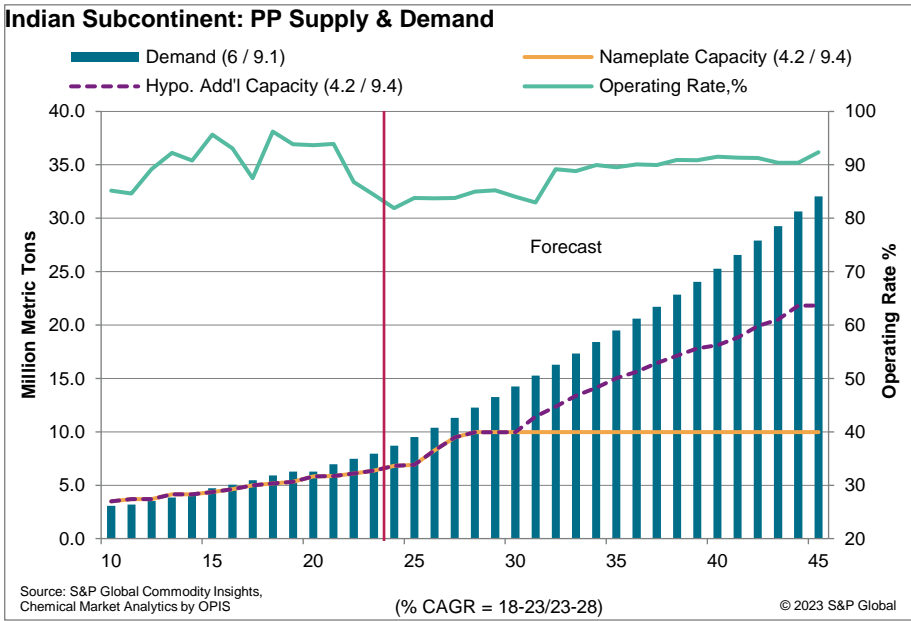


Southeast Asia is also a major exporter of PP. Exports reaches 4.2 million metric tons in 2023, or about 16.1% of world trade. Singapore and Thailand are the region's largest exporters of PP, with a combined total of more than 2.7 million metric tons in 2023. Mainland China is a significant destination for PP from Southeast Asia.

Currently, Southeast Asia mainly exports to other countries within the region and to Northeast Asia. The other export destinations are India and Europe. There is a Singapore-India FTA in place, which will facilitate trade between the two countries. Singapore and Vietnam also have FTAs with the European Union under the EU-Singapore Free Trade Agreement (EUSFTA) and EU-Vietnam free trade agreement (EVFTA), respectively.

4.2.16 India Subcontinent

Supply



The regional nameplate capacity stands at around 6.4 million metric tons as of 2023. It is expected to increase to around 10.0 million metric tons by 2028. Hypothetical capacity addition of around 11.8 million metric tons by 2045.

In 2020, India surpassed Saudi Arabia to have the third-largest PP capacity. There are currently seven producers of PP in the Indian Subcontinent with a total capacity of about 6.4 million metric tons, all the capacity is in India. Except for Reliance Industries, the other six producers are directly or indirectly owned by the government of India. Therefore, more than 50% of PP capacity in India is owned by the government of India. These companies are also referred to as public sector undertakings (PSU). Although they are competitors, they are also involved in frequent sharing of feedstock, finished products, and marketing channels to optimize geographic coverage and profits.

The shareholders in India as of 2023 are Reliance Industries Limited (45.40%), Oil & Natural Gas Corp Ltd (26.17%), Hindustan Petroleum Corporation Limited (17.06%), Oil India Limited (5.74%), The Chatterjee Group (4.91%), and GAIL (India) Limited (0.73%).

HPCL-Mittal Energy Ltd. started its second 500 thousand metric ton PP plant in 2022 in Bhatinda and ramps up to is full capacity by 2023. Nayara Energy Limited plans to start a 450 thousand metric ton PP plant in 2024 in Vadinar, followed by Indian Oil Corporation Limited in 2026 starting up a 500 thousand metric ton PP plant in Vadodara, which would ramp up to its full capacity by 2027. In 2026, HPCL Rajasthan Refinery Ltd. plans to start two 490 thousand metric ton PP plants and Indian Oil Corporation Limited plans to start a 450 thousand metric ton PP plant in Panipat by 2027. Additionally, Indian Oil Corporation Limited is planning to come up with a 200 thousand metric ton PP plant in Begusarai by 2025.

Overall, 63% of the PP production in India is based on the propylene produced via refinery fluidized catalytic cracking (RFCC). This is the highest percentage of dependence on RFCC propylene by a major region in the world. Such a high proportion of PP production based on competitive feedstock cost has ensured high operating rates, averaging above 90% during the 2015–20 period. However, despite plant operating rates of around 90%, domestic supply growth continuously falls behind demand growth. Operating rates remained about the same in 2020 as they were in 2019, at almost 94%, and decreased to over 87% in 2022, and further decreases to 84% in 2023. Around 5.4 million metric tons of polypropylene is produced in the country as of 2023. Production is forecast to grow by 9.6% between 2023-28 and in long term (2023-45), it is expected to grow at CAGR 6.2% to reach around 20.2 million metric tons by 2045.

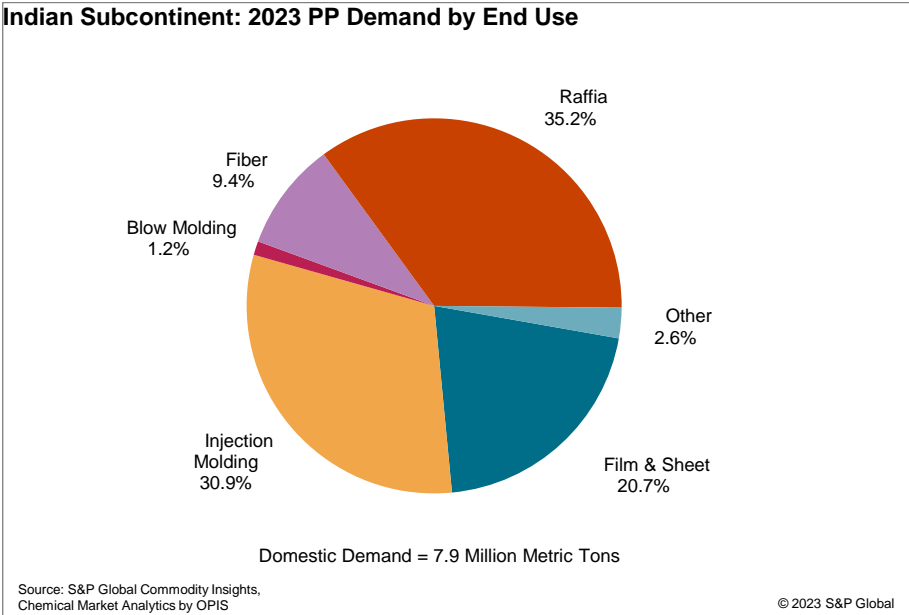
Polypropylene (PP) Capacity split by geography, company, and process - (-000- Metric Tons)														
Company.Name	Country/Territory.Name	Process.Name	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	
Brahmaputra Cracker and Polymer Ltd	India	Gas Phase	60	60	60	60	60	60	60	60	60	60	60	
Chennai Petroleum Corp Ltd (CPCL)	India	Gas Phase	0	0	0	0	0	0	0	0	0	238	475	
GAIL (India) Limited	India	Gas Phase	0	0	0	0	0	0	0	0	0	30	60	
GAIL (India) Limited	India	Gas Phase	0	0	0	0	0	0	0	0	0	251	500	
Haldia Petrochemicals Ltd	India	Liquid/Gas Phase Comb.	350	350	350	350	350	350	350	350	350	350	350	
HPCL Rajasthan Refinery Ltd	India	Gas Phase	0	0	0	0	0	0	0	0	0	490	490	
HPCL Rajasthan Refinery Ltd	India	Gas Phase	0	0	0	0	0	0	0	0	0	490	490	
HPCL-Mittal Energy Limited	India	Gas Phase	500	500	500	500	500	500	500	500	500	500	500	
HPCL-Mittal Energy Limited	India	Bulk Slurry	0	0	0	0	251	500	500	500	500	500	500	
Indian Oil Corporation Limited	India	Gas Phase	0	0	0	0	0	0	0	100	200	200	200	
Indian Oil Corporation Limited	India	Bulk Slurry	300	300	300	300	300	300	300	300	300	300	300	
Indian Oil Corporation Limited	India	Liquid/Gas Phase Comb.	300	300	300	300	300	300	300	300	300	300	300	
Indian Oil Corporation Limited	India	Liquid/Gas Phase Comb.	0	0	0	0	0	0	0	0	0	450	450	
Indian Oil Corporation Limited	India	Liquid/Gas Phase Comb.	0	0	301	340	340	340	340	340	340	340	340	
Indian Oil Corporation Limited	India	Liquid/Gas Phase Comb.	0	141	340	340	340	340	340	340	340	340	340	
Indian Oil Corporation Limited	India	Gas Phase	0	0	0	0	0	0	0	0	251	500	500	
Mangalore Refinery and Petrochemicals Ltd	India	Gas Phase	440	440	440	440	440	440	440	440	440	440	440	
Nayara Energy Limited	India	Gas Phase	0	0	0	0	0	0	450	450	450	450	450	
ONGC Petro Additions Limited	India	Multiple Gas Phase	340	340	340	340	340	340	340	340	340	340	340	
Reliance Industries Limited	India	Gas Phase	450	450	450	450	450	450	450	450	450	450	450	
Reliance Industries Limited	India	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
Reliance Industries Limited	India	Multiple Gas Phase	135	135	135	135	135	135	135	135	135	135	135	
Reliance Industries Limited	India	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
Reliance Industries Limited	India	Gas Phase	450	450	450	450	450	450	450	450	450	450	450	
Reliance Industries Limited	India	Multiple Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
Reliance Industries Limited	India	Gas Phase	300	300	300	300	300	300	300	300	300	300	300	
Reliance Industries Limited	India	Bulk Slurry	140	140	140	140	140	140	140	140	140	140	140	
Reliance Industries Limited	India	Multiple Gas Phase	200	200	200	200	200	200	200	200	200	200	200	
Reliance Industries Limited	India	Multiple Gas Phase	200	200	200	200	200	200	200	200	200	200	200	
Reliance Industries Limited	India	Bulk Slurry	25	25	25	25	25	25	25	25	25	25	25	
Reliance Industries Limited	India	Liquid/Gas Phase Comb.	85	85	85	85	85	85	85	85	85	85	85	
Total - Indian Subcontinent			5,175	5,316	5,816	5,855	6,106	6,355	6,805	6,905	8,266	9,484	9,970	

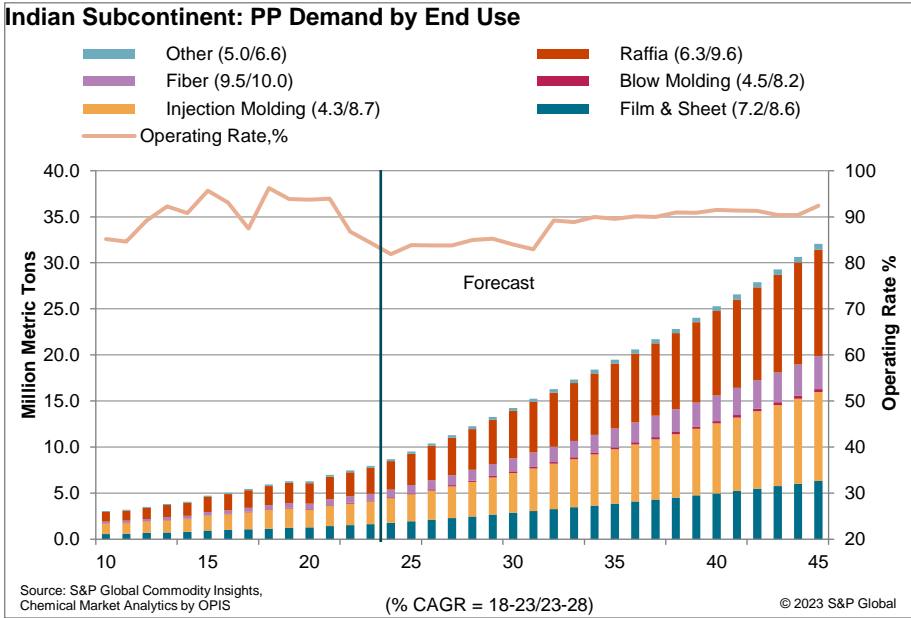
Demand

The regional consumption stands at around 7.9 million metric tons as of 2023. Between 2023-28, total consumption of PP resin in India Subcontinent is expected to grow at about 9.1% per year to reach over 12.2 million metric tons by 2028. Fiber will be the fastest-growing application, with projected annual growth of 10.0% per year during this timeframe. All end uses are projected to keep similar market shares during the forecast period. With the prominent demand growth, India Subcontinent will still be the fast-growing region for PP consumption worldwide. In long term, the demand is expected to grow by 6.5% between 2023-45.

India Subcontinent is the third-largest PP resin consumer in the world, following mainland China and the United States. India Subcontinent currently accounts for almost 20% of world population, but the PP consumption share is less than half of its population share. There is huge potential in India to increase its per capita consumption, which is around 4 kilograms (25–30 kilograms for developed nations such as the United States and Europe). With the economy of India projected to grow at a steady rate, as well as a growing middle-class population, per capita consumption is expected to double in the next decade.

In terms of the split of PP consumption among various applications, raffia with 35.2% is the highest consumed grade in India Subcontinent in 2023. India Subcontinent is the second-largest raffia-grade consumer after mainland China, consuming 15.6% of the total raffia-grade produced globally. India Subcontinent is a manufacturing hub for handlooms, power looms, and the textile industry. Raffia, which is a low-margin commodity product, is typically used in woven bags and FIBC bags (fabricated intermediate bulk container) for industrial packaging needs such as food grains, chemicals, cement, and construction. India not only has a strong domestic market but is also one of the most prominent raffia finished product exporters. Further, raffia is growing rapidly as PP woven sacks are replacing traditional packaging material for industrial and consumer packs.





Film and Sheets

In 2023, India Subcontinent consumes 1.6 million metric tons of polypropylene as film & sheet.

BOPP film is the largest market for film and sheet application in India Subcontinent. It holds roughly two-third share of the total film and sheet market in India. Film and Sheet is mainly dominated by BOPP films. Cosmo films, Jindal poly films, Max Specialty, Uflex, SRF, Vacmet, Chiripal Polyfilms, and Garware are the major BOPP film manufacturers in India. BOPP heat sealable grades are used for better seal strength and reduce the seal initiation temperature of the film. It is widely used in packaging, printing and laminating for food and non-food applications. It has both side heat sealable properties and specially developed to suit high speed packaging machine.

Though Indian Subcontinent BOPP Industry is expected to grow at a very healthy rate (10-12%) in the coming years due to boom in FMCG sector, last few years were not very good for the leading producers in the region. Demonetization and GST further exacerbated the pain as volumes took a hit, and coupled with a transport strike last year, which crimped FMCG sales, business took a hit, and costs mounted. Also, the Maharashtra government banned plastics and BoPP and CoPP too reeled under the plastic ban impacting sales, which hit demand. However, the producers are expecting a speedy recovery. The demand-supply scenario in the flexible packaging industry is stabilizing as no more new product capacities have been announced by the leading producers.

The key drivers in the Indian Subcontinent for the film and sheet market are growing penetration of packaged food driven by new applications in food retailing, higher disposable incomes, new converting, and packaging equipment, which have increased applications of poly films, growing importance of smaller pack sizes, shift from rigid material, aluminum foils, towards flexible packaging driven by lower cost, product quality and increasing prominence of organized and online retailing.

Jindal polym films, Sampark Industries Limited, xpro CPP films, Vista and Jhaveri are the major CPP film producers in India Subcontinent. CPP film properties offer exceptional performance are in hot-fill packaging for roofing materials, automotive interior components, tire processing, coated release films etc.

Tubular Quench PP (TQPP) film has played a very significant role in India Subcontinent from the beginning of 70s when PP was introduced in India Subcontinent. The low capital investment required for TQPP film suited the Indian plastic converting industry that was predominantly at a small scale. Additionally, the large textile industry that used the transparent film by manual packaging helped the TQPP sector. TQPP film market so far is mainly concentrated in those areas where manual packaging is required. In fact, the major usage was mainly focused where bags of several sizes were required. Lower rigidity and wider thickness distribution compared to BOPP/Cast PP film restricted TQPP film to have any significant share in the polypropylene film and sheet segment.

Consumption of polypropylene in film & sheet applications is expected to grow at a CAGR of 8.6% in the near term (2023-28) and at a growth rate of 6.3% in the long term (2023-45).

Injection Molding

In 2023, the India Subcontinent market consumes 2.4 million metric tons of polypropylene for injection molding.

The major end-user drivers for injection molding are auto parts and small major appliances sectors.

Auto parts take a major share of injection molding application of about 29.7% in the injection molding segment. The major parts are both for interior and exterior. Pillar trims, roof consoles, grab handles, centre and floor consoles, seating systems, door modules etc.,

Over the past decade, consumption of TPEs, TPOs & PP compounds in an Indian automobile has substantially increased from an average of 25 kg per vehicle to 40 kg per vehicle today. Indian cars, regardless of the size / price segment, is increasingly seeing new levels of luxury inside cabin / cockpit. This is provided by higher consumption of plastics, providing better aesthetics, soft feel with use of textile / leather inserts, metallic / wood grain finishes, two tone interiors.

Blue Star, Godrej, Hitachi, LG, Onida, Philips, Samsung, Sony, Videocon, Whirlpool are present in the major appliance sector which is driven by policies supporting investments.

Supreme, Nilkamal, Wimplast and Prima plastic are the major plastic converters which manufacture chairs and other household products which are considered in the small appliance market.

High flow high stiffness grades which can be easily compounded (such as with elastomers) in order to enhance the other properties like impact strength are increasing required. They are majorly used to automotive applications in order to make vehicles, which are lighter in weight. This helps in reducing the carbon footprint, which is a major concern as on date.

No break grade is also a niche grade which is used in applications where high impact strength is required such as luggage shells, automotive components etc.

Blow Molding

Consumption of polypropylene fibers in 2023 is about 95 thousand metric tons. There is promising demand growth opportunity in India Subcontinent. Consumer and institutional products lead to greater consumption of blow molded products.

Blow molded articles are widely used in medical (infusion bottle), packaging and nonpackaging applications. The growth is mainly driven by strong demand from end-user segments such as food, consumer and institutional products, pharmaceuticals, and personal care industry. Beverages is the major end-use segment for plastic bottles, majorly driven by soft drinks that constitute majority of the market share.

Consumption of polypropylene in blow molding applications is expected to grow at a CAGR of 8.2% in the near term (2023-28) and at 5.6% in the long term (2023-45).

Fibers

In 2023, the India Subcontinent market consumes 746 thousand metric tons of polypropylene as fibers.

Polypropylene is the predominant polyolefin fiber used in textile applications; polyethylene fibers are also used, though generally in small volumes and for specific applications.

PP Nonwovens is the largest application under fibre segment for India Subcontinent. Indian consumption of nonwoven fabric is around 438 thousand metric tons. Consumer and institutional products are the largest application, followed by home packaging. Other applications include automotive, geotextiles, medical, filtration, and apparel. Consumption of nonwoven fabric in India is still low in terms of kilograms per capita. There is more room for consumption to grow.

The growing middle-class population and rise in income levels of half of India's population are the major drivers for the growth of nonwovens and technical textiles in India. In addition, there is much interest in both the public (government) and private sectors to look into opportunities beyond the conventional textile chain (i.e., fiber to fashion)

Personal care, sanitary and medical products lead to greater consumption of nonwovens. The government is also focusing on technical textiles in various segments, including agricultural fabrics, geotextiles, industrial textiles, and medical textiles.

Raffia

In 2023, the India market consumes 2.8 million metric tons of polypropylene as raffia.

Polypropylene woven sacks have increasingly replaced jute bags and paper bags for packing cement. They offer distinct advantages such as high strength, lower bag weight, low cost, fungus attack and low seepage of cement as compared to jute bags. In comparison to paper bags, polypropylene woven sacks offer advantages such as better bursting strength, low weight, and low cost, but paper bags exhibit better printability and lower seepage than PP bags. Previously, HDPE woven sacks were predominantly used for packing cement, but most of the end users have shifted to polypropylene due to Polypropylene's lower density (0.90 g/cc) than HDPE (0.952 g/cc) therefore giving higher yield per unit weight. Polypropylene exhibits higher service temperature than HDPE, hence when cement is filled at a temperature of 85°C-90°C and at a pressure of 6 kg/cm², the performance of PP woven sacks is better in terms of bursting strength. Polypropylene has higher tensile strength than HDPE. Easy availability and Unlaminated gusseted polypropylene bags with a valve for filling cement are normally used. Cement is usually packed in 50 kg bags. The fabric used has a mesh size of 10x10 and the bag weight is at 70 gms. The bags are not laminated to facilitate breathing of air during filling.

Polypropylene woven fabric is used to fabricate FIBC's or jumbo bags. These bags have carrying capacities of 500 kgs to 4000 kgs. The design and fabric of these bags varies depending upon the requisite container strength. These bags are used for packing agro products, chemicals, detergent, plastic raw materials, petrochemical products, and fertilizers. UV stabilized PP grades are used for this application. The tape denier ranges from 2100D to 2600D for Jumbo bags.

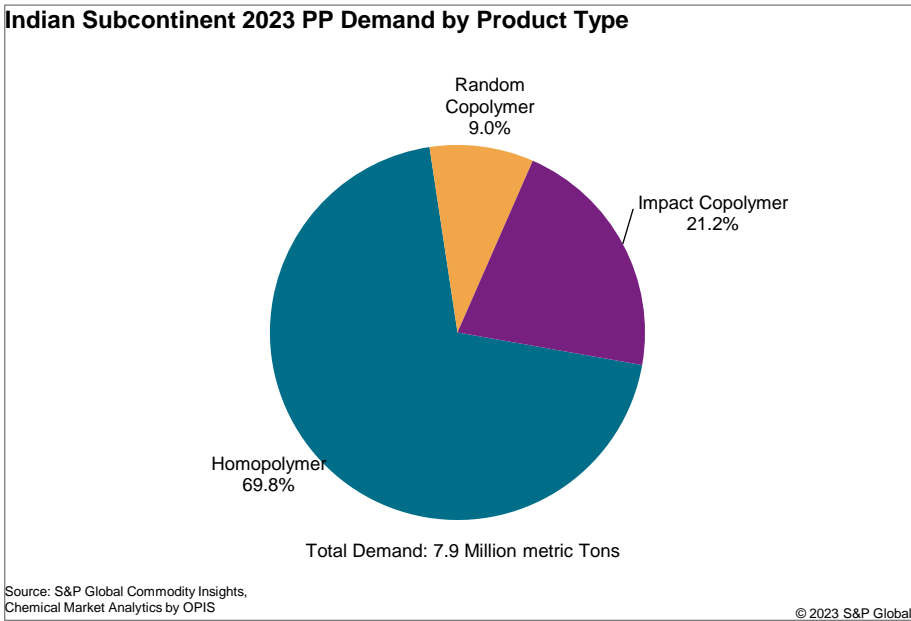
Increase in the disposable incomes of consumers and rapid pace of urbanization will lead to further growth in the consumption of polypropylene woven bags and sacks market in the country.

PPR pipe is also a niche grade which is used for making pipes for transportation of hot and cold water.

Consumption of polypropylene in raffia applications is expected to grow at a CAGR of 9.6% in the near term (2023-28) and at a growth rate of 6.7% in the long term (2023-45).

PP recycle demand increased by 4.6% in 2020 and increased by an additional 14.0% in 2021. The average annual growth rate of recycle demand through 2033 is about 11.9%, higher than that of virgin PP demand, although it is growing from a very small base that is about 9.3% the size of the virgin PP market in 2023. In India, the only PP producing market in the Indian Subcontinent region, the Union Ministry of Environment, Forests and Climate Change (MoEFCC) and India's federal government amended the Plastic Waste Management Rules by prohibiting certain single use plastic items in India Subcontinent, releasing guidelines on Extended Producer Responsibility (EPR) for plastic packaging, and prohibiting the manufacture, import, stocking, distribution, and sale of certain single-use plastics; all of these became effective in July

2022. Currently, this entire movement has many uncertainties as there are no alternatives to scale, recycling needs to increase, and the enforcement of Extended Producer Responsibility (EPR) is uneven.

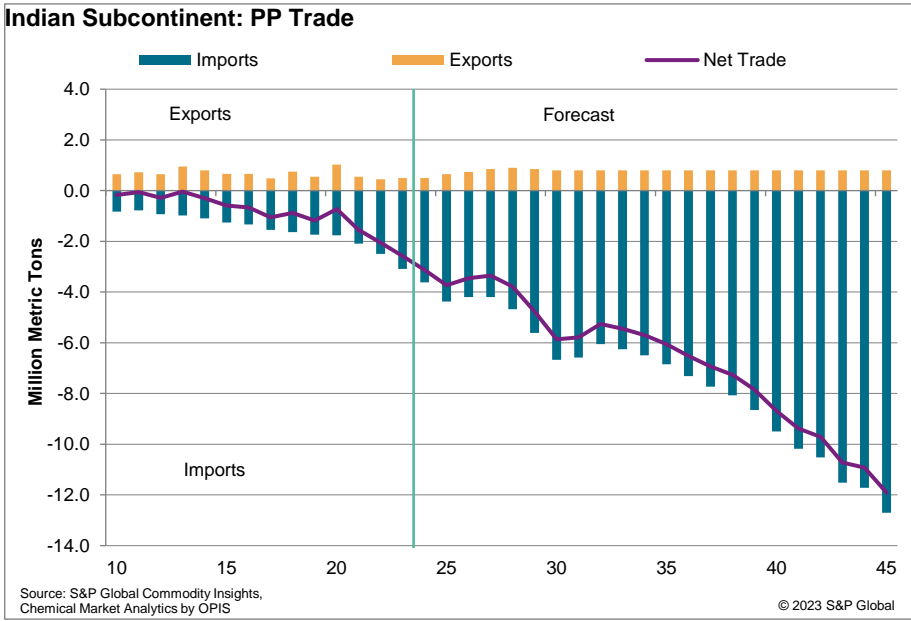


In 2023, homopolymer holds a predominant position, representing 69.8% of the market share. Following closely, impact copolymer secures the second-largest position, accounting for 21.2% of the market share. Random copolymer, on the other hand, constitutes only 9.0% of the total demand.

Trade

Due to its huge domestic market base, India Subcontinent continues to be dependent on imports and an attractive market for producers outside the region. The region was a net exporter of PP in the mid-2000s, but rapid consumption growth coupled with slower PP capacity growth has resulted in the region's shift to a net importer. Even new capacity being added will be insufficient to keep up with demand. In 2023, India Subcontinent imports nearly 3.1 million metric tons of PP, which is almost 38.8% of its total demand. In 2023, The Middle East and Southeast Asia are the two main exporting regions to the Indian Subcontinent.

Over the next five years, PP imports are expected to grow tremendously at a CAGR of 8.7% to match the pace of demand growth. This will increase the region's dependency on imports around 40% of total demand. At the same time, exports of PP will increase at a rate of 12.5% per year.



4.2.17 Target Markets

Target markets have been identified based on net imports, netback prices and market penetration levels. Indian Subcontinental, China, Other Middle East (including Turkey), Central& Eastern Europe and West Europe can be targeted by SIPCHEM for selling the volumes of PP they are planning to produce. The tables are attached below indicating the target markets and expected net imports for 2025, 2030 and 2035:

For 2025, by Indian Subcontinent Countries is the largest target market with the allocation of around 40% of total sales volume followed by Other Middle East Countries as the second largest target market with share of 28%, Central &Eastern Europe, China and West Europe with the shares of 13%, 10% and 9% respectively. The allocations have been given based on net import position, competitors in target market and netback opportunity.

Indian Subcontinent has been allocated 40% volume with a market penetration of 5% as the region is expected to meet more than 39% of its demand through imports, although it is one of the lowest netback regions together with China.

Other Middle East Countries is expected to import 3.6 million metric tons of PP in 2025, and net import volume is 3.1 million metric tons, meet around 69% of its local demand through imports in 2025. The regional imports are expected to increase by 2030 and 2035, but net imports are expected to decline in 2030 and 2035. It has moderate netback prices. Hence, it has been allocated the highest sales share of around 28%, which is around 169 thousand metric tons with market penetration of around 5%. With other major competitors in this region, 5% is a reasonable market share considering the SIPCHEM capacity share in this region.

Central & Eastern Europe is expected to import 2.3 million metric tons, and net import will be around 918 thousand metric tons. Central & Eastern Europe is the second highest netback region, it has been allocated 13% sales share, around 80 thousand metric tons.

In 2025, China is expected to import 3.9 million metric tons PP and net import is 942 thousand metric tons. Considering it is the lowest netback region, it has been allocated 10% sales share, around 61 thousand metric tons.

West Europe is expected to import 2.9 million metric tons, and net import will be around 593 thousand metric tons. West Europe is the highest netback region, there will fierce competitions from PP producers in West Europe, Other Middle East and North America. Considering it is the highest netback region and competitions in West Europe, it has been allocated 9% sales share, around 60 thousand metric tons, with market penetration of around 2%.

Total Polypropylene: 600 KTA								
Target Market	Regional Market (2025)			Product Placement		Market Penetration		
Region	Domestic Demand (KTPA)	Net Imports (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand (%)	Addressable Market (% of Net Trade)	Addressable Market (% of Imports)
Indian Subc.	9514	3726	4376	239	40%	3%	6%	5%
China	40136	942	3942	61	10%	0.2%	6%	2%
Other MDE (including Turkey)	4548	3132	3564	169	28%	4%	5%	5%
C. Europe	2536	918	2331	80	13%	3%	9%	3%
W. Europe	8545	596	2933	51	9%	1%	9%	2%

PP Impact Copolymer

The key target markets identified for PP impact copolymer is the same as PP total, however the impact copolymer percentage is higher in West Europe and Central & Eastern Europe, more than 11% of total PP demand. For Indian Subcontinent, China and Other Middle East Countries, the copolymer percentage is much lower, less than 9%. Thus, we suggest export more impact copolymer to West Europe and Central & Eastern Europe. **According to the impact copolymer demand in target markets, 70% of imported copolymer is impact copolymer, thus we allocate 336 KTA for impact copolymer.**

PP - Impact Copolymer: 336 KTA						
Target Market	Regional Market (2025)		Product Placement		Market Penetration	
Region	Domestic Demand (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Imports)
Indian Subc.	1998	919	134	40%	7%	15%
China	7786	765	31	9%	0.4%	4%
Other MDE (including Turkey)	732	574	86	26%	12%	15%
C. Europe	860	790	53	16%	6%	7%
W. Europe	2649	909	32	9%	1%	3%

PP Random Copolymer

The key target markets identified for PP random copolymer is the same as PP total, however the random copolymer percentage is higher in West Europe and Central & Eastern Europe, more than 30% of total PP demand. For Indian Subcontinent, China and Other Middle East Countries, the copolymer percentage is much lower, around 20%. Thus, we suggest export more random copolymer to West Europe and Central & Eastern Europe. According to the impact copolymer demand in target markets, 30% of imported copolymer is random copolymer, thus we allocate 144 KTA for random copolymer.

PP - Random Copolymer: 144 KTA						
Target Market	Regional Market (2025)		Product Placement		Market Penetration	
Region	Domestic Demand (KTrA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Imports)
Indian Subc.	847	389	57	39%	7%	15%
China	4295	422	17	12%	0.4%	4%
Other MDE (including Turkey)	332	260	39	27%	12%	15%
C. Europe	289	266	18	12%	6%	7%
W. Europe	1119	384	13	9%	1%	3%

PP Homopolymer

PP - Homopolymer: 120 KTA						
Target Market	Regional Market (2025)		Product Placement		Market Penetration	
Region	Domestic Demand (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Imports)
Indian Subc.	6669	3067	48	40%	1%	2%
China	28055	2756	12	10%	0.04%	0.4%
Other MDE (including Turkey)	3484	2730	44	37%	1%	2%
C. Europe	1387	1275	9	8%	1%	1%
W. Europe	4777	1640	6	5%	0.1%	0.4%

For 2030, India Subcontinent is expected to import 6.7 million metric tons PP and net import is 5.9 million metric tons. Indian Subcontinent is the largest target market with the allocation of around 43% of total sales volume, followed by China, with the share of 22%. Other Middle East Countries is the third largest target markets, with the shares of 18%. Central & Eastern Europe and West Europe is the smallest target markets, with the shares of 12% and 5% respectively. The allocations have been given based on net import position, netback opportunity as well as competition in target markets.

Indian Subcontinent is expected to meet around 41% of its local demand through imports in 2030. The regional imports are expected to increase to 5.9 million metric tons in 2030. But this region is one of lowest netback region. Hence, it still has been allocated the highest sales share of around 43%, which is around 261 thousand metric tons with the market penetration of around 4%.

In 2030, net import of China will increase to 3.0 million metric tons. China has been allocated remaining 22% of total sales volume with the market penetration of 2%.

Other Middle East countries is expected to meet around 52% of its local demand through imports in 2030. Considering the moderate netback prices, the region has been allocated around 18% of sales volume with market penetration of 3%.

Central & Eastern Europe has been allocated 12% of total sales volume with the market penetration of 3% as the region is to meet 39% of its demand through imports.

Further, West Europe is expected to meet only 5% of its demand through imports in 2030 and has been allocated 5% volume with a market penetration of 1%.

Total Polypropylene: 600 KTA								
Target Market	Regional Market (2030)			Product Placement		Market Penetration		
Region	Domestic Demand (KTPA)	Net Imports (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Net Trade)	Addressable Market (% of Imports)
Indian Subc.	14245	5869	6669	261	43%	2%	4%	4%
China	48036	3006	6306	135	22%	0.3%	4%	2%
Other MDE (including Turkey)	5362	2814	3759	106	18%	2%	4%	3%
C. Europe	2899	1119	2517	69	12%	2%	6%	3%
W. Europe	9070	473	2574	29	5%	0.3%	6%	1%

PP - Impact Copolymer: 336 KTA						
Target Market	Regional Market (2030)		Product Placement		Market Penetration	
Region	Domestic Demand (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Imports)
Indian Subc.	2949	1380	147	44%	5%	11%
China	9271	1217	70	21%	1%	6%
Other MDE (including Turkey)	863	605	55	16%	6%	9%
C. Europe	994	863	46	14%	5%	5%
W. Europe	2821	801	18	5%	1%	2%

PP - Random Copolymer: 144 KTA						
Target Market	Regional Market (2030)		Product Placement		Market Penetration	
Region	Domestic Demand (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Imports)
Indian Subc.	1254	587	60	42%	5%	10%
China	5140	675	38	26%	1%	6%
Other MDE (including Turkey)	386	271	24	16%	6%	9%
C. Europe	333	289	15	10%	5%	5%
W. Europe	1197	340	7	5%	1%	2%

PP - Homopolymer: 120 KTA						
Target Market	Regional Market (2030)		Product Placement		Market Penetration	
Region	Domestic Demand (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Imports)
Indian Subc.	10043	4702	54	45%	1%	1%
China	33625	4414	27	23%	0.1%	1%
Other MDE (including Turkey)	4113	2883	28	23%	1%	1%
C. Europe	1571	1364	8	7%	0.5%	1%
W. Europe	5052	1434	3	3%	0.1%	0.2%

For 2035, India Subcontinent is expected to import 6.8 million metric tons PP and net import is 6.0 million metric tons. Indian Subcontinent is the largest target market with the allocation of around 36% of total sales volume, followed by China with the share of 29%. Other Middle East Countries is the third largest market, with the share of 17%. Central & Eastern Europe and West Europe with the shares of 12% and 6% respectively. The allocations have been given based on net import position, netback opportunity as well as competition in target markets.

Indian Subcontinent is expected to meet around 31% of its local demand through imports in 2035. The regional imports are expected to increase about 185 thousand metric tons 2030 to 2035. But this region is also one of lowest netback regions. Hence, it has been allocated the highest sales share of around 36%, which is around 214 thousand metric tons with the market penetration remains around 3%.

From 2030 to 2035, net import of China will increase 2.8 million metric tons. China has been allocated remaining 29% of total sales volume with the market penetration of 2%.

Other Middle East countries is expected to meet around 44% of its local demand through imports in 2035. Considering the moderate netback prices, the region has been allocated around 17% of sales volume with market penetration of 3%.

Central & Eastern Europe has been allocated 12% of total sales volume with the market penetration of 3% as the region is to meet 44% of its demand through imports.

Further, West Europe is expected to meet only 8% of its demand through imports, but it is the highest netback region and has been allocated 6% volume with a market penetration of 1%.

Total Polypropylene: 600 KTA								
Target Market	Regional Market (2035)			Product Placement		Market Penetration		
Region	Domestic Demand (KTPA)	Net Imports (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Net Trade)	Addressable Market (% of Imports)
Indian Subc.	19502	6054	6854	214	36%	1%	4%	3%
China	53207	5782	9082	173	29%	0.3%	3%	2%
Other MDE (including Turkey)	6195	2746	4039	104	17%	2%	4%	3%
C. Europe	3218	1426	2727	71	12%	2%	5%	3%
W. Europe	9505	723	2713	36	6%	0.4%	5%	1%

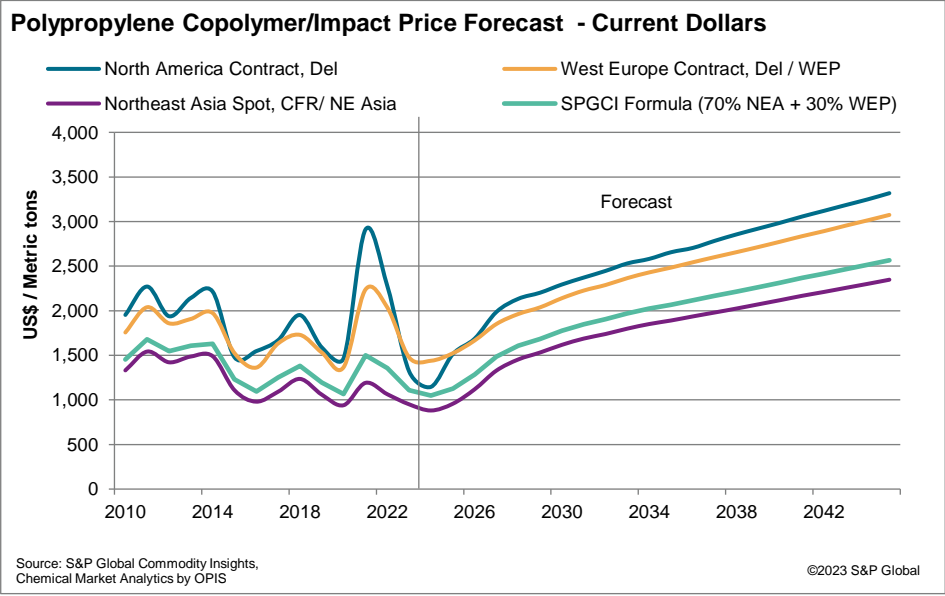
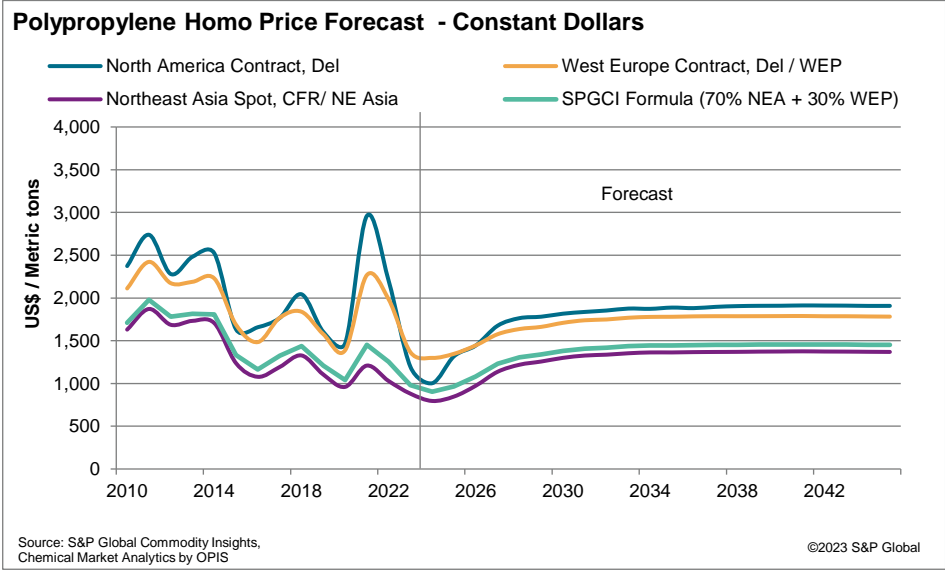
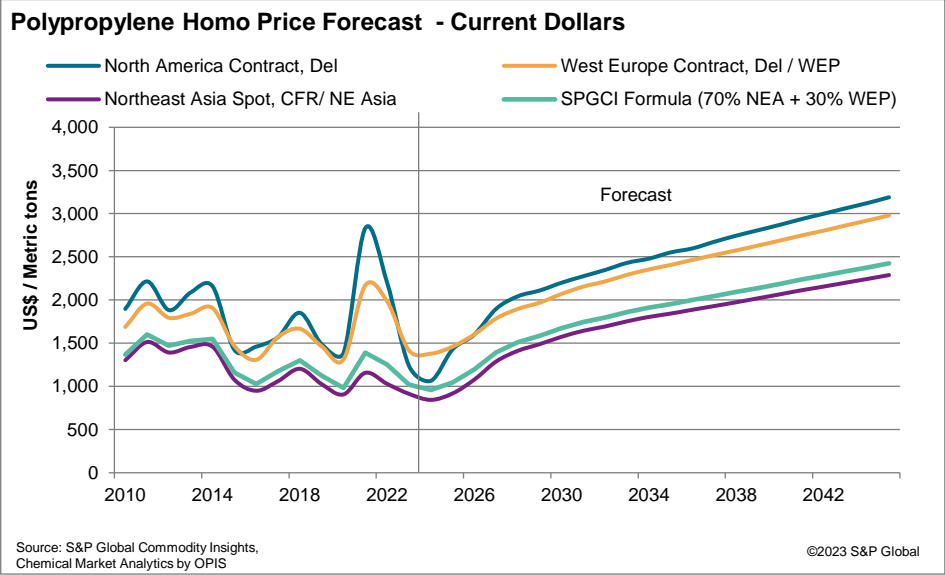
PP - Impact Copolymer: 336 KTA						
Target Market	Regional Market (2035)		Product Placement		Market Penetration	
Region	Domestic Demand (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Imports)
Indian Subc.	3998	1405	119	35%	3%	8%
China	10109	1726	105	31%	1%	6%
Other MDE (including Turkey)	997	650	42	13%	4%	7%
C. Europe	1114	944	47	14%	4%	5%
W. Europe	2975	849	22	6%	1%	3%

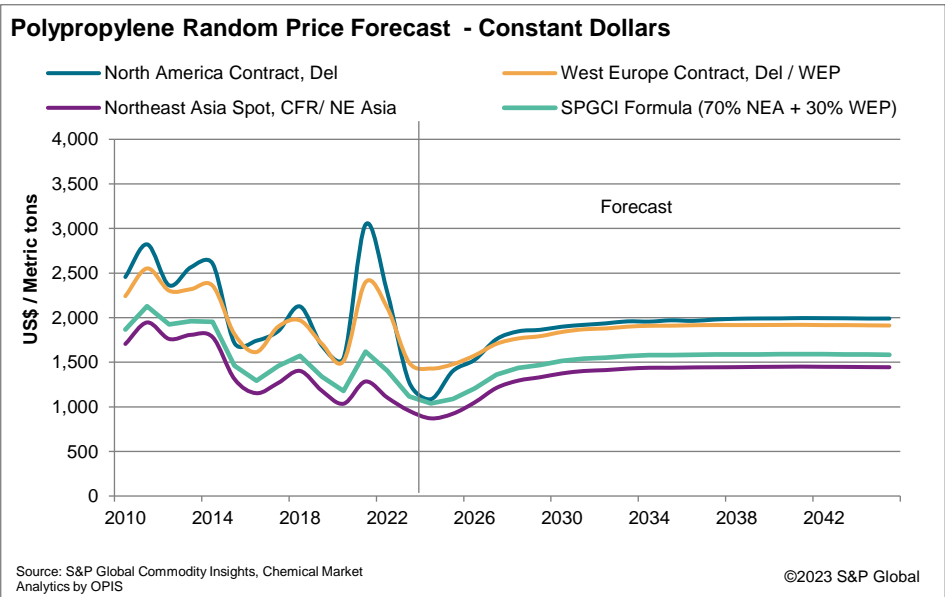
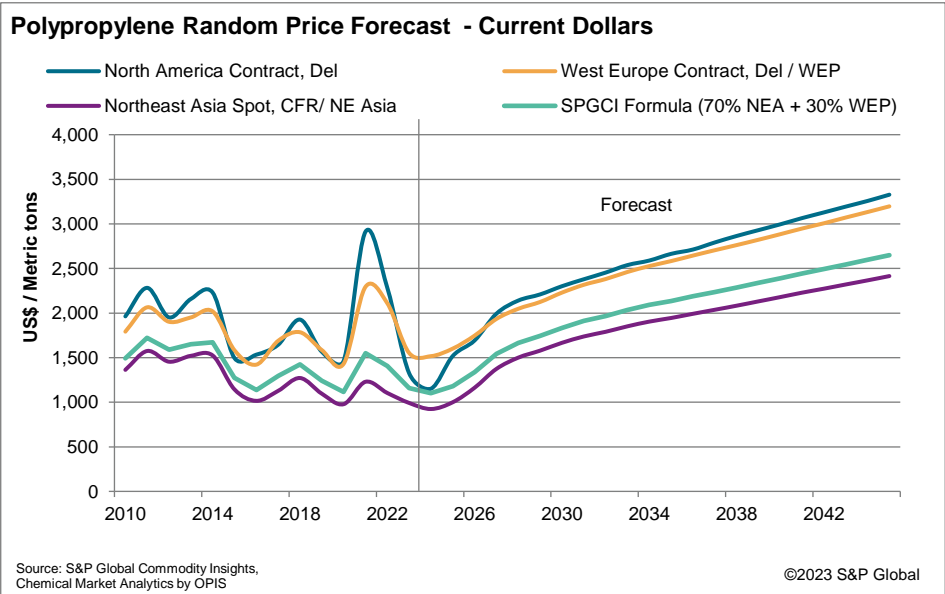
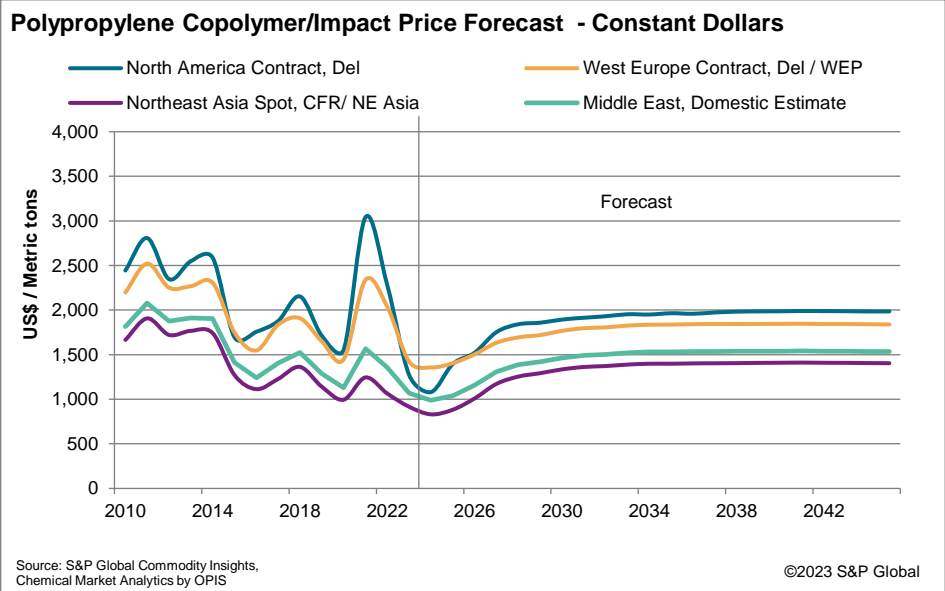
PP - Random Copolymer: 144 KTA						
Target Market	Regional Market (2035)		Product Placement		Market Penetration	
Region	Domestic Demand (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Imports)
Indian Subc.	1697	596	47	33%	3%	8%
China	5746	981	56	39%	1%	6%
Other MDE (including Turkey)	446	291	18	12%	4%	6%
C. Europe	370	314	15	10%	4%	5%
W. Europe	1255	358	9	6%	1%	2%

PP - Homopolymer: 120 KTA						
Target Market	Regional Market (2035)		Product Placement		Market Penetration	
Region	Domestic Demand (KTPA)	Imports (KTPA)	Sales (KTPA)	Sales(%)	Total Demand(%)	Addressable Market (% of Imports)
Indian Subc.	13807	4852	48	40%	0.3%	1%
China	37351	6376	12	10%	0.03%	0.2%
Other MDE (including Turkey)	4752	3098	44	37%	1%	1%
C. Europe	1735	1470	9	8%	1%	1%
W. Europe	5275	1506	6	5%	0.1%	0.4%

Note: Other Middle East countries includes Turkey, Egypt, Iran, Syria, Iraq, Jordan, Tunisia, Morocco, Sudan and Yemen.

4.2.18 Price Analysis





Supply and demand factors affect PP prices, but the propylene price is the major determinant of PP prices because it accounts for 90% of the variable production cost for the resin. Comonomer cost and operational cost are also a factor in distinguishing between polypropylene types, with homopolymer being the least expensive and random copolymers and impact copolymers being progressively more expensive as the ethylene copolymer content and complexity of the process also increases. Impact polymer generally enjoys a premium due to limited production capacity around the globe; further, its process needs an extra reactor, significantly increasing the operational cost.

North America

PP prices for the United States represent net transaction index prices for general-purpose homopolymer bulk shipments (railcar quantities) delivered to medium- to large-volume buyers. This net transaction number intends to approximate the realized domestic transaction price for a resin producer across various end-use markets for the referenced homopolymer resin category. Actual prices paid by any single buyer in North America may be lower, equal to, or higher than this index because of factors such as converter size, plant location, and financial terms, among others.

North American PP prices and margins over the last decade have been more volatile than those in other world regions. The greater fluctuations can be attributed mainly to the nature of the domestic propylene monomer market that caused PP margins to spike in 2018 and again in 2021. This volatility has changed the import dynamics as the market learned how to handle 25-kilogram bags and super sacks, which enabled interregional import volumes to rise to over 10% of regional

consumption in 2021. Domestic converters have made one-time investments for debagging equipment that gives them the ability to import resin for years to come, if necessary. Domestic buyers also use imports to effectively limit how high domestic prices can rise and as insurance against supply disruptions of both propylene and PP. However, imports have become less attractive as domestic supplies improved following the startup of new capacity and weaker demand growth.

Despite the COVID-19 pandemic, non-integrated margins held up much better, as the impact on supplies globally and regionally was greater than the impact on demand. A strong economic recovery in 2021, combined with even more severe supply constraints caused by major weather-related events and widespread global supply chain disruptions, led to record-high prices and margins. However, the strong economic recovery was cut short in 2022, when high energy and goods prices combined with rising wages fuelled inflationary pressures, prompting central banks to repeatedly raise interest rates. Household spending in the region has declined as a result, particularly on larger items and in interest rate-sensitive sectors, such as automotive and construction. Consumer consumption patterns also changed as consumers spent less on physical products and more on services like travel. Also, in many parts of the world COVID-19 induced behaviours like cleaning and wearing masks changed back towards pre-pandemic levels, resulting in less plastic consumption.

The startup of Inter Pipeline's (Canada) and ExxonMobil's (Baytown, Texas) new production facilities in the second half of 2022 further hastened the downward correction in regional prices and margins. Cash costs also have moved lower, with the downward continued in 2023, when Chevron Phillips and Enterprise started up new propylene production units.

In 2023, exports for North America are almost 2.1 million metric tons, while imports are around 1.9 million metric tons. There is a shift in trade flows turns North America into a small net exporter in 2023. Higher netbacks will direct most of the increased export volumes to destinations in the Americas and temporarily also West Europe, rather than Asia. As South America is expected to be the main target of new PP surplus production from North America, we do not believe that North American domestic pricing will be under tremendous pressure to compete with mainland Chinese prices. However, North American PP prices and margins reaches a trough in 2023 because of the global capacity overhang. Segments that are expected to be most impacted are in fiber and film, where buyers have the ability to import both resins and finished goods.

Beyond the cycle trough in 2023 and 2024, gradually tighter market conditions will support moderate increases in margins as PP prices are projected to rise slightly faster than cash cost starting in 2025. However, rising cash cost will keep margins below the levels of previous cyclical peaks. Operating rates should remain in the low to mid 80% range before 2030. The anticipated hypothetical PP capacity additions in the later years of the decade are not assumed to have large influence on operating rates and margins, since the projected increase in North American exports will lessen the adverse impact.

West Europe

The PP prices shown here for West Europe are based on similar criteria used for the US net transaction prices: they represent discounted index prices for bulk delivery to medium- to large-capacity converters by truck.

Prices and cash margins in Europe tend to be influenced by import pressures as well as the ability of European PP producers to export. With the deterioration of the regional net trade position since 2018, margins had again moved to lower levels. Higher propylene prices in response to tighter supplies and higher affordability levels of other propylene derivatives also contributed to lower PP margins. In 2020, exports from West Europe increased considerably as outages and supply disruptions in other regions created a greater need for imports globally. The higher export volumes more than offset a moderate decline in regional domestic demand, which allowed West European PP margins to move up slightly despite a sharp drop in prices.

As supply disruptions worldwide severely restricted PP production while demand rebounded in 2021, West European prices and margins climbed to peak levels. Although remaining below the comparable North American values, West European margins far exceeded the previous cyclical margin peak of 2016–17. The anticipated lengthening of the market in 2022 happened much quicker and was much more pronounced, as initially steep increases in energy prices pushed feedstock cost significantly higher. The Russian – Ukraine conflict and impact of international sanctions further exacerbated the run-up of regional energy and feedstock cost. On an average annual basis, PP cash cost pushed past prices, resulting in negative non-integrated margins in 2022 and 2023.

Regional PP demand in 2022 and 2023 weakened considerably, with West European inflation rising to over 8% in 2022, which is the highest level since the 1980s, and inflation remain at 5.6% in 2023. The reaction of European central banks has mirrored the US Federal Reserve, although regional interest rates have been rising more gradually with the exception of the UK. The resulting slowdown in consumer expenditures has affected the PP market via weaker demand for end uses such as small appliances, furniture, and piping, among others. The combination of weak demand and record high operating cost prompted manufacturers to reduce production along value chains, with many sectors also struggling with high inventories.

Import volumes from outside West Europe declined in 2022 as a weaker currency and less attractive PP price levels somewhat shielded the West European market. Russia was a major exporter to West Europe prior to the Ukraine conflict, so the removal of those pounds did provide some support to domestic sellers. In 2023, due to the high productions costs in West European countries and massive new added capacity in other regions, the regional operating rate further declined to 81%, leading to increased imports and shift from net exporter to net importer.

While a much more competitive international market will reduce exports from West Europe, import volumes will grow over the next several years as low-cost producers in the Middle East, Asia, and possibly North America target the West European market. By the end of the decade, imports nonetheless are expected to exceed exports by an estimated 400 to 500 thousand metric tons. Therefore, margins are forecast to remain at comparatively low levels for the remainder of the decade, although will be trending gradually higher.

Apart from lower margins, European companies will also have to contend with lower demand in the automotive and durables markets, traditionally an outlet for value-added and differentiated grades and compounds. We have already seen that the premium of impact copolymer grades has shrunk significantly over the past few years, and despite a temporary rebound in 2021 due to tighter supply conditions compared with homopolymer grades, this trend is expected to continue in the future. Another factor that will influence PP prices is the propylene/ethylene ratio, which will likely inch higher in the near term.

Owing to the intermaterial competition between polyethylene (PE) and PP, this relative difference will be a constraining factor for PP in terms of commanding a price premium over PE, which is further exacerbated by the global PE oversupply conditions and resulting lower PE prices in the short term.

On the cost side, European crackers are gradually shifting toward lighter feedstock, which has negative implications for propylene availability. At the same time, propylene supply from refineries is expected to decrease as weak fuel demand, a weak automotive sector, and the expansion of the electric vehicles sector will likely prompt lower refinery utilization and rationalizations. The resulting propylene tightness will require continued imports of propylene. A tight propylene market and robust demand from other non-PP derivatives of propylene will keep affordability and cost thresholds high for PP. The situation will ease over the next several years when new PDH capacity will come onstream in Europe.

Northeast Asia

PP prices quoted for Northeast Asia reflect the CFR China port price (spot price), which are more transparent than other prices in the region. Therefore, Asian prices are not calculated on the same basis as those indicated for the United States and West Europe. Overall, while positive forces including a lasting shift in consumers preferences to online shopping and the launch of large government infrastructure projects are still supporting global PP demand growth, market conditions have softened, and the near-term outlook has deteriorated. Asian prices during forecast time will likely continue to be the lowest on a global basis, primarily because of Mainland China’s influence as the world’s largest net importer, but also because of the impact of lower-cost resins moving from the Middle East into the region.

Mainland China’s continued efforts to become more self-sufficient by building more PP plants will put pricing pressure on other Northeast Asian PP producers that currently depend on mainland China as a destination for their exports. As China increases its competitiveness, export-oriented Asian countries will be forced to find new homes for their resin or develop higher-valued grades to maintain operating rates. The new capacity additions also will force older, high-cost mainland Chinese PP assets to reduce operating rates or halt production, especially if the government continues to be more active in enforcing the dual control energy policy that requires local industry to reduce energy consumption and intensity.

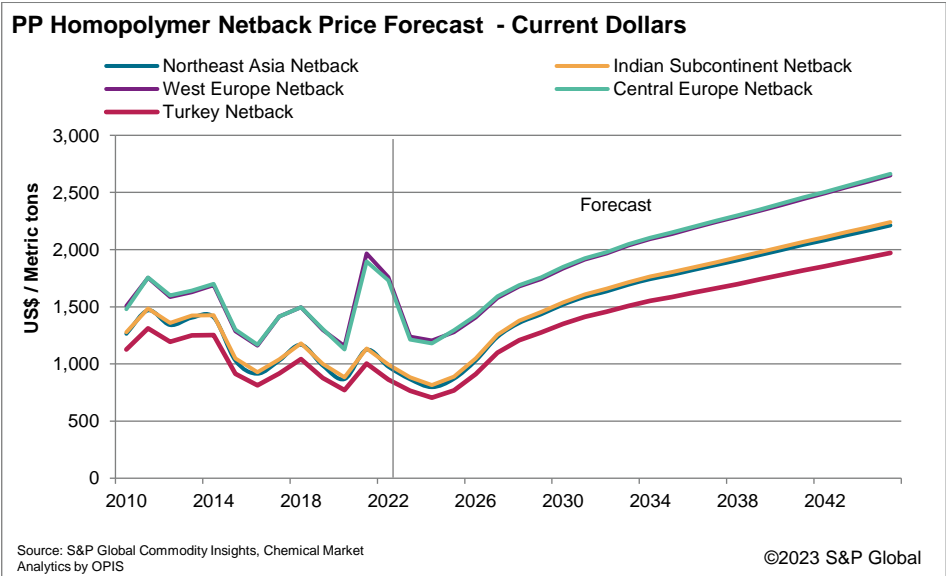
Historically, the ability of mainland Chinese buyers to abruptly start and stop resin procurement has had a significant influence on PP prices. However, the increasing size of the mainland Chinese market should have a moderating effect on the behaviour of market participants over time, which should reduce price volatility with the exception of periods when major shocks, such as the impact of COVID-19, cause severe market distortions. Based on the growth in regional production, local market conditions, rather than imports, are expected to establish price levels.

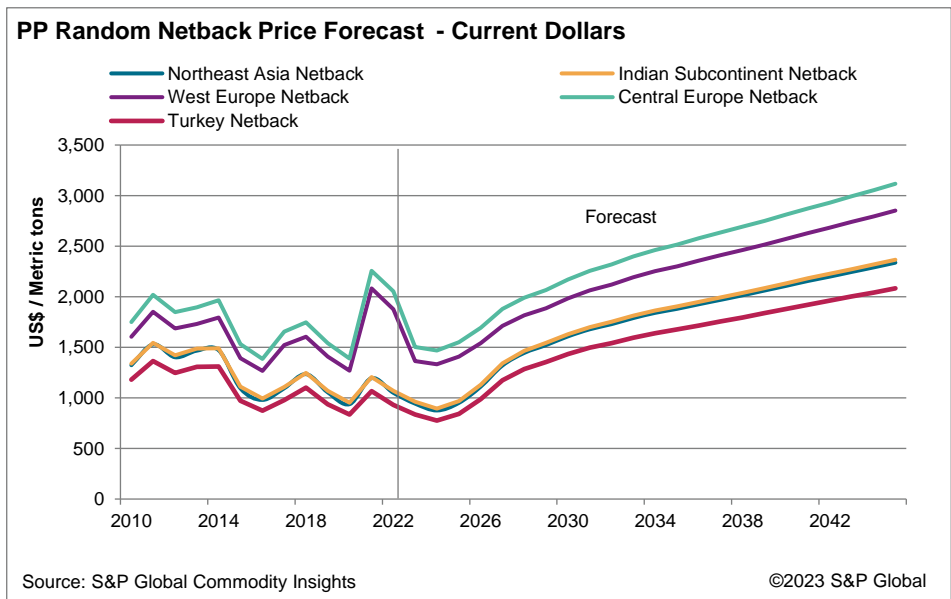
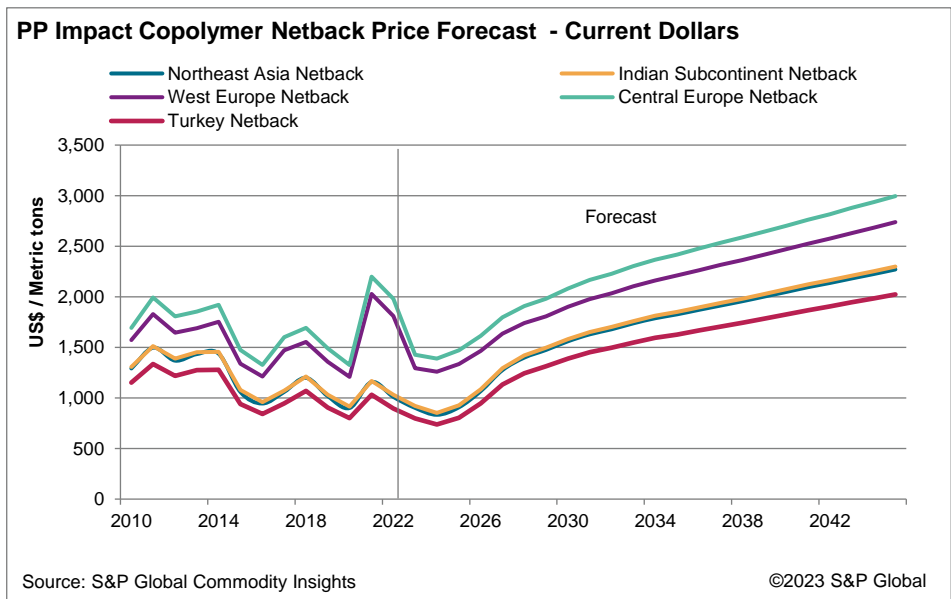
PP margins moved into negative territory since 2022 as prices declined while cash costs continued to increase. The situation is worsened in 2023—that is, prices is lower and cash costs higher—and the impact of the current massive capacity wave in mainland China pulls local operating rates lower. External demand will be weak, reflecting considerably higher interest rates in major trading partners and the lingering impact of inflationary pressures on household spending. Overall, the near-term view appears challenging for producers given the forecast of global and regional oversupply. However, healthy PP demand growth in the region and rising energy costs are expected to push prices upward during the latter years of the forecast period.

Middle East

In 2023, exports for Middle East are almost 6.0 million metric tons, while imports are around 3.1 million metric tons. Based on their competitive cost positions, Middle Eastern producers are expected to increase export volumes and run at some of the highest operating rates in the world. Based on the larger capacity additions planned in the Middle East, as the region strategically diversifies away from fuel to chemicals as part of energy transition plans, and a smaller domestic market, export flows from the Middle East will grow comparatively faster. As a major PP exporter, Middle East is a price taker in the PP market, prices are mainly based on the Europe and Asia prices.

4.2.19 Netback Analysis





A “netback price” is the delivered price per ton minus expenses incurred in the process of delivering the product from Saudi Arabia. S&P Global netback calculations take into account the following logistics cost elements:

- Ocean Freight: Based on discussions with buyers, sellers, brokers and traders and incorporating a long-term view on energy price changes. Back haul discounts are also taken into account.
- Inland Freight: Based upon movement to a typical consumer.
- Import Duty: Based upon reported data.
- Insurance: Insurance fees, as per product freight category
- Handling/Terminal charges: A charge of handling and terminal charge in physically moving product through ports and between transport modes.

Each netback analysis begins with forming a delivered price for each target region. A netback price forecast from target markets takes into consideration all costs related to freight (ocean freight/delivery charges, inland/port charges), insurance and marketing fee, if applicable. S&P has researched all above-mentioned elements of logistics costs for the year 2023 and these have been inflated over time to account for inflation and crude price increases.

Freight costs are difficult to forecast as they clearly depend on oil/fuel price, labour costs and inflation. The size of shipment will also dictate costs as larger shipments will tend to have a lower cost per ton. Costs also are dependent on the position in the petrochemical cycle as in periods of high demand; costs tend to increase as ship owners take advantage of a tight market. Also a particular route may be a back-load for a particular ship owner so he can provide a more competitive price. In addition, some shipments (e.g. to North America) usually consist of trans-shipments with subsequent additional costs.

Hence there are many variables and S&P Global looks at the trend expectation based on the main factors of fuel (hence oil related) and labour costs. Further, our forecast assumes that two other things will happen in the future. Firstly, there will be adequate transportation vessels built and second, the infrastructure necessary to receive more imports in China and around Asia will be built.

As of 2023, netback is highest in West Europe and Central & Eastern Europe, followed by Turkey. Indian Subcontinent and China has the lowest netback prices. The trend will not be changed during forecast time period.

4.2.20 SWOT Analysis

Strength	Weakness
<ul style="list-style-type: none">• Availability of cost advantaged feedstock gives SIPCHEM a competitive advantage over other regions in terms of lower cost of production.• SIPCHEM has past-experience of manufacturing polypropylene.• “Other Middle East countries” is a major net importing region and will remain as a big net importer during the forecast time frame.	<ul style="list-style-type: none">• There is a heavy reliance on PP exports as domestic demand for PP in the Middle East remains low.• The Middle East has a relatively higher capital cost index compared to other regions. A PP plant in the Middle East would therefore be more expensive to construct when compared to regions such as North America, Northeast Asia, Southeast Asia, and Indian Subcontinent.
Opportunities	Threats
<ul style="list-style-type: none">• PP demand growth will continue to be driven by post-pandemic government spending on infrastructure and pandemic-induced changes in consumer behavior, such as a preference for online ordering versus in-store shopping.• Despite growing environmental pressures in single-use applications, usage of PP in multi-use applications in automotive, durables, industrial and building segments is expected to grow as there are no visible or economical alternatives.• From 2033, Mainland China’s self-sufficiency in PP is expected to remain around 85% to 90%. Low-cost producers in Middle East are well positioned to retain their export volumes to China while the exports from high-cost producers in Southeast Asian countries are expected to decline over the long term.• The Indian subcontinent is a net importer of PP. As capacity additions are expected to lag demand growth, Indian subcontinent is likely to become an increasingly larger net importer of PP.• Since West Europe has a disadvantage in terms of feedstock competitiveness, it could be a potential target market for PP exports. PP impact and random co-polymers are majorly consumed in the developed markets such as West Europe. The demand growth potential for these grades is very high in such regions.	<ul style="list-style-type: none">• Recycling mandates across different countries and sustainability policies such as the ‘Plastic Tax’ in Europe exerts pressure on PP consumption in single use applications which include straws, cutlery, and bags for commodity packaging.• Due to the capacity additions seen in the last decade, the PP net import volume for China will be declined by 2025, and China’s self-sufficiency in PP is expected to remain below 20% before 2033.

4.2.21 Logistics- Shipping, Distribution

PP is a colorless, odorless, and non-toxic plastic material known for its excellent heat resistance, chemical corrosion resistance, and electrical insulation properties. PP is often shipped in bulk quantities rather than parcels. The size of shipments can vary significantly based on the needs of the buyer and seller. PP may be packed in bags, supersacks, or other packaging materials.

Specialized trucks or containers should be used for the transportation of PP, and these vehicles should have features such as moisture resistance, shock absorption, and friction prevention to ensure the safety of the product during transit.

4.2.22 Tariff Issues

Currently, the tariff rate for Saudi Arabia exporting Polypropylene to European countries is 6.5%, while the tariff rate for exports to other Middle Eastern countries, China, and India is 0%.

5 Appendix

5.1 Regional Coverage

Regional Coverage	
Region	Countries
North America	Canada, Mexico and United States.
South America	Argentina, Bolvia, Brazil, Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Guatemala, Guyana, Honduras, Jamaica, Netherlands Antilles, Nicargua, Panama, Paraguay, Peru, Suriname, Trinidad, Uruguay, Venezuela and other South America
West Europe	Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom
Middle East	Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Oman, Qatar, Saudi Arabia, Syria, Turkey, United Arab Emirates and other Middle East.
Northeast Asia	China, Hongkong, Japan, North Korea, South Korea and Taiwan
Southeast Asia	Australia, Brunei, Indonesia, Malaysia, Myanmar, New Zealand, Philippines, Singapore, Thailand, Vietnam and other Southeast Asia.
Indian Subcontinent	India, Srilanka, Pakistan and Bangladesh.

5.2 Top End Users

Major PP End Users in Saudi Arabia			
Company	Application segment	Geographic reach	Potential Volume (KTA)
Al Othman Group	Electronic and other accessories, food packaging, household goods among others, rigid packaging	Global	20-30
Arabian Plastic Industrial Company Limited	Film, blow molding, injection molding	Global	20-50
Al-Sharq Plastics Industries	Injection molding, blow molding, film blowing to manufacture plastic pallets, crates, cutleries	Global	20-50
Zamil Plastics	Food packaging, automotive, construction and engineering	Regional	30 - 50
Saudi German Co.	Nonwovens for the Hygiene, Medical, Agriculture and Industrial sectors	Global	30-50
Gulf Packaging Industries Gulf Pack	Films and BOPP film for food packaging, tapes	Global	20 - 40

Major PP End Users in GCC			
Company	Application segment	Geographic reach	Potential Volume (KTA)
Taghleef Industries	Packing films, labeling, automotive, electronics and other accessories	Global	180-200
Aalmir Plastic Industries (API)	Injection molding, blown film, thermoforming and extrusion applications	Global	50 - 100
Firstpress Plastic Moulders	Injection molding	Global	20 - 40
Al Barsha Plastic Product Co. LLC (UAE)	Injection molding and blow molding for caps, cosmetics container, and food container, etc	Global	20 - 40
Al Barsha Precision Moulding Dies. Ind. L.L.C	Injection molds, blow molds, extrusion dies, thermo forming dies, vacuum forming and molding engineering component products with high precision tooling	Regional	20 -50

5.3 Top Distributors

Distributors of PP in UAE		
Company	Geographic reach	Remarks
Rai International	Global	<ul style="list-style-type: none"> The company became Borouge's distributor in its local market in 2019 Supply partners include Borouge, Lotte Chemical, TotalEnergies, DAELIM, Veolia, Sabic and others

Distributors of PP in Saudi Arabia		
Company	Geographic reach	Remarks
Gulf Polymers Distribution Company FZCO	Saudi Arabia	<ul style="list-style-type: none"> The company became Borouge's distributor in its local market in 2019 Supply partners include Borouge, Lotte Chemical, TotalEnergies, DAELIM, Veolia, Sabic and others
Safaasco Polymers	Global	<ul style="list-style-type: none"> Saudi Polymers, Lyondellbasell, Sabic, Borouge and others are the supply partners
Vinmar	Global	<ul style="list-style-type: none"> Supply partners include IDC (SIPCHEM), Advanced Petrochemical Co. and Riopol
Tricon Dry Chemicals	Global	<ul style="list-style-type: none"> Supply partner of Advanced Petrochemical Company

CONTACTS

The Americas

+1 877 863 1306

Europe, Middle East & Africa

+44 20 7176 1234

Asia-Pacific

+852 2533 3565

[email](#)

[/division](#)

Disclaimer

© 2023 by S&P Global Inc. All rights reserved.

S&P Global, the S&P Global logo, S&P Global Commodity Insights, and Platts are trademarks of S&P Global Inc. Permission for any commercial use of these trademarks must be obtained in writing from S&P Global Inc.

You may view or otherwise use the information, prices, indices, assessments and other related information, graphs, tables and images ("Data") in this publication only for your personal use or, if you or your company has a license for the Data from S&P Global Commodity Insights and you are an authorized user, for your company's internal business use only. You may not publish, reproduce, extract, distribute, retransmit, resell, create any derivative work from and/or otherwise provide access to the Data or any portion thereof to any person (either within or outside your company, including as part of or via any internal electronic system or intranet), firm or entity, including any subsidiary, parent, or other entity that is affiliated with your company, without S&P Global Commodity Insights' prior written consent or as otherwise authorized under license from S&P Global Commodity Insights. Any use or distribution of the Data beyond the express uses authorized in this paragraph above is subject to the payment of additional fees to S&P Global Commodity Insights.

S&P Global Commodity Insights, its affiliates and all of their third-party licensors disclaim any and all warranties, express or implied, including, but not limited to, any warranties of merchantability or fitness for a particular purpose or use as to the Data, or the results obtained by its use or as to the performance thereof. Data in this publication includes independent and verifiable data collected from actual market participants. Any user of the Data should not rely on any information and/or assessment contained therein in making any investment, trading, risk management or other decision. S&P Global Commodity Insights, its affiliates and their third-party licensors do not guarantee the adequacy, accuracy, timeliness and/or completeness of the Data or any component thereof or any communications (whether written, oral, electronic or in other format), and shall not be subject to any damages or liability, including but not limited to any indirect, special, incidental, punitive or consequential damages (including but not limited to, loss of profits, trading losses and loss of goodwill).

ICE index data and NYMEX futures data used herein are provided under S&P Global Commodity Insights' commercial licensing agreements with ICE and with NYMEX. You acknowledge that the ICE index data and NYMEX futures data herein are confidential and are proprietary trade secrets and data of ICE and NYMEX or its licensors/suppliers, and you shall use best efforts to prevent the unauthorized publication, disclosure or copying of the ICE index data and/or NYMEX futures data.

Permission is granted for those registered with the Copyright Clearance Center (CCC) to copy material herein for internal reference or personal use only, provided that appropriate payment is made to the CCC, 222 Rosewood Drive, Danvers, MA 01923, phone +1-978-750-8400. Reproduction in any other form, or for any other purpose, is forbidden without the express prior permission of S&P Global Inc. For article reprints contact: The YGS Group, phone +1-717-505-9701 x105 (800-501-9571 from the U.S.).

For all other queries or requests pursuant to this notice, please contact S&P Global Inc. via email at support@platts.com.