CPMA

Chemicals & Petrochemicals
Manufacturers' Association, India

AN OVERVIEW

INDIA PETROCHEMICAL INDUSTRY

2023

INDIA COUNTRY REPORT

INDIAN PETROCHEMICAL INDUSTRY

INDIA COUNTRY REPORT 2023

CPMA

Chemicals & Petrochemicals
Manufacturers' Association, India

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Message from Kamal P. Nanavaty, President, CPMA, India

It is indeed my privilege to present the India Petrochemical Report 2023, published every year by CPMA.

This report has become a Reference Book for Petrochemical Industry Professionals, representing all its segments, covering review and outlook, together with detailed statistics on capacity, demand, production, import and export of key products.

CPMA enjoys the status of being the VOICE of the Petrochemical Industry in the country, a credible contact point for the Government, on all matters relating to growth of our industry. In order to facilitate policy regime which ensures sustainable and responsible growth, CPMA has been striving to lead various advocacy initiatives. CPMA has now become the apex forum of the industry, at Government level as well as at National Trade level, by affiliation with trade bodies including FICCI, CII and other major Associations.

Indian Petrochemical industry has shown resilience in tough times and comes forward with good rate of growth in consumption even during the worst economic crises. We see a very bright future of consumption and growth of all major petrochemical products and march towards self-sufficiency.

India indeed offers a vast potential for petrochemical industry to grow. The Indian Government's guiding principle for most segments of the economy are to be "Self Reliant- Atmanirbhar". New investments of nearly US$ 123 Bn is lined up in new Petchem capacities which are at various stages of announcements, planning and execution.

Sustainability is an integral part of our industry's growth and this year theme for the Asia Petrochemical Industry Conference happening in India after 13 years on 18th-19th May 2023. Petchem industry is passing through a phase of energy transition, carbon neutrality and circularity. New investments are taking place in sustainability and renewable feedstock based downstream plants and carbon capture technologies. CPMA has included a special chapter in this report covering how the industry has been supporting the various initiatives led by the Government of India for Sustainability.

Thank you.

INDIAN PETROCHEMICAL INDUSTRY

INDIA COUNTRY REPORT 2023

SECTION 1

THE INDIAN ECONOMY

The Indian Economy: Review and Outlook

The Indian Economy Review of 2022-23

There was no dearth of headwinds throughout the year, which impacted India's path to economic recovery. The year began with the threat of the Omicron variant of the coronavirus. Fortunately, the threat subsided fairly quickly, without impacting the economy in any significant way. The only problem was that this headwind was replaced by Russia's invasion of Ukraine in mid-February, leading to further disruptions in the global supply chain.

Another development to affect the Indian economy was the decision of several major central banks, especially the US Federal Reserve, to reverse their loose monetary policy stance. The ripple effect of the policy-tightening measures was felt worldwide. The RBI wasn't too far behind in tightening its stance either, with the first interest rate hike being announced in May.

Overall, the year 2022 had been challenging for India from various economic perspectives. While, on one hand the soaring inflation in India posed severe challenges to the masses, on the other hand, the Reserve Bank of India (RBI) left no stone unturned to address issues like falling foreign exchange (forex) reserves of the country and depreciating value of Rupee against US dollar.

Even with these challenges with way India has sailed through made many economists, brokerage firms and agencies like the International Monetary Fund (IMF) and World Bank state in their latest reports that Indian economy will be fastest growing among major economies in financial year 2022-23. As per IMF India to contribute 15% of global growth in 2023.

A Brief Snapshot of The Economy

The Indian GDP

India's economy expanded 13.5% in the April-June period of the current financial year (2022-23), as against a 20.1% growth seen during the same period last year, data released by the National Statistical Office (NSO), helped by good growth in the contact-based services sector, robust domestic demand and capital expenditure by the government, the two main pillars of the economy. This is the fastest growth for the country's economy in the past year despite global recessionary threats looming large. In the previous three quarters since July 2021, the economy had grown 8.4%, 5.4% and 4.1% respectively. As per economists, going forward, the GDP is likely to face downside risk due to the tightening of monetary policy by the RBI and higher oil and commodity prices. The economy had contracted 23.9% in the April-June quarter of 2020 during the first wave of the Covid-19 pandemic but grew 20.1% in the same quarter one year after in 2021.

The RBI had, however, predicted the first quarter economic growth to be at 16.2%. Some normalization was seen in the September-end quarter, with GDP growth slowing to 6.3%, driven by the contraction in the mining and manufacturing sectors, along with high inflation, declining exports and rising input prices. In Q3 2022-23 GDP slowed down to 4.4%. However, it is expected that it may be on track to achieve 7% for the fiscal.

Index of Industrial Production

In the first 10 months of FY23 (Apr-Jan), IIP grew 5.4 per cent against 13.7 per cent during the year-ago period. Industrial production grew by 5.2% in January 2023. This was just 2% in Jan'22 and 4.7% in Dec'22. Data also show that while the manufacturing sector's output increased by 3.7% in Jan against 1.9% last January, mining output rose 8.8% and power generation surged 12.7% against 3% and 0.9%, respectively, during Jan 2023. The manufacturing sector's output increased by 3.7% in Jan against 1.9% last January, mining output rose 8.8% and power generation surged 12.7% against 3% and 0.9%, respectively, during Jan 2023.

Core Industries

Growth in eight core infrastructure industries registered a four-month high in January this year at 7.8% with seven of the eight sectors witnessing positive growth amidst the higher capex push by the government and aided by a favourable base effect.

Inflation

War in Ukraine caused major economic damage all across the globe and India was no different. Retail inflation, as reflected by the CPI, remained above the RBI's upper tolerability level of 6% for 10 consecutive months to November, when it eased slightly to 5.88%. Retail inflation recorded an eight-year high in June at 16.2%. While, WPI saw a high of 7.4% in Sep'22. Since then, WPI has seen a steady decline and in the month of February 2023 it registered a low of 3.85%, while retail inflation was 6.44% in the same month.

USD-INR exchange rate

The rupee declined over 11% in 2022 – one of the worst-performing currencies last year in Asia but has reversed fortunes come 2023 and is ranked the third-best currency so far behind the Indonesian rupiah and the Philippine peso. Rupee is closer to replacing dollar as 18 nations agree to trade in INR.

Import and export

During the period of April to January 2022-23, overall export grew 17.33 per cent to $641.24 billion as against $546.55 billion in the corresponding period of the last fiscal i.e. April to January 2021-22.

Sectors which recorded positive growth include petroleum products, electronic goods, rice, ready-made garments of textiles and chemicals.

GST

As per the latest trends, GST collections have now settled with robust collection, revenue leakages and tax evasion being plugged and procedural issues getting addressed. The gross goods and service tax (GST) revenue collection in the month of February 2023 stood at Rs 1,49,577 crore, up around 12% on an annual basis. With this, the monthly GST revenues remained over Rs 1.4 lakh crore for 12 straight months in a row

Forex reserves

India's foreign exchange reserves increased by $4.53 billion to $588.78 billion in the week ending April 28, 2023, as per the Reserve Bank of India.

Industrial Capex

Overall industrial capex is seen rising to nearly Rs 5.7 lakh crore on average between fiscals 2023 and 2027, compared with Rs 3.7 lakh crore in the past five fiscals. Nearly half of this incremental capex is being driven by the Production-Linked Incentive (PLI) scheme and new-age sectors

FDI

India had recorded highest ever annual FDI inflow of USD 83.57 billion in the Financial Year 2021-22. FDI equity inflows in manufacturing rose 76% in FY22.

Looking Ahead at 2023

With respect to investments, sectors that are projected to perform the best include financial services, banking, insurance, capital goods, housing, defense, infrastructure and the railways. However, the overall outlook remains clouded with uncertainties especially with escalating crude oil prices, rising input prices and weaker global demand remain a concern. A combination of monetary, fiscal and financial market measures is needed to help the businesses and people cope with the crisis.

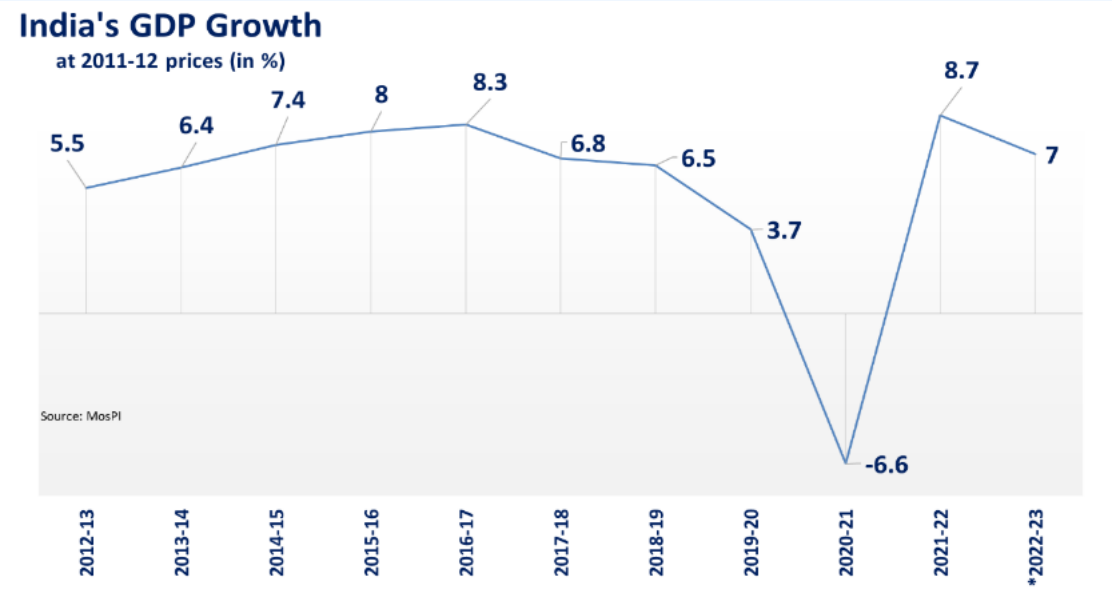
Snapshot of Key Indicators

I. GDP growth

The Indian economy is predicted to grow by 7 per cent in financial year 2022-23, according to the government’s second advance estimates of national income. The 7 per cent growth rate prediction matches the estimates made by Finance Minister Nirmala Sitharaman in 2023-24 Union Budget speech, and also the predictions made in the 2022-23 Economic Survey. Besides, government revised the GDP growth for 2021-22 to 9.1% against the earlier estimate of 8.7%.

In the previous quarter (July-September 2022), India's pace of GDP growth had slowed to 6.3% from 13.5% in Q1.

Figure 1: India's GDP Growth (Year-on-Year in Percent)



With a 7 per cent growth rate estimated for the full financial year, GDP is expected to grow at 5.1 per cent in the January-March quarter. With the revisions undertaken for the previous fiscal, the GDP components for FY23 also underwent revision: government final consumption expenditure has been revised down to 1.2 per cent from 3.1 per cent earlier; private final consumption expenditure is now estimated at 7.3 per cent down from 7.7 per cent earlier, while gross fixed capital formation - an indicator of investment - is seen growing 11.2 per cent as against earlier estimate of 11.5 per cent. India's nominal GDP, which factors in the inflation rate, is set to grow by 11.2 per cent in October-December as against 14.3 per cent in the year-ago period. Gross Value Added or GVA which is GDP minus net product taxes grew at 4.6 per cent in Q3.

Available data for Q3 and Q4:2022-23 indicates that economic activity in India remains resilient. Urban consumption demand has been firming up, driven by a sustained recovery in discretionary spending, especially on services, such as travel, tourism and hospitality. Rural demand continues to show signs of improvement as tractor sales and two-wheeler sales expanded in December.

Manufacturing continued to be in the negative territory for the second consecutive quarter at (-)1.1 per cent in October-December as against (-) 3.6 per cent in April-June and 1.3 per cent growth in the year-ago period, indicating impact of rising input costs.

Meanwhile, electricity, gas, water supply and other utility services expanded by 8.2% as against 6% last quarter. Similarly, construction also improved to 8.4% from 5.8% in Q2. Agriculture and mining & quarrying also expanded by 3.7% each, while trade, hotels and transport fell to 9.7%. Farm production is to grow by 3.7% which is on account of a good kharif crop. A revival in construction activity by 8.4% propped up low base was also supported by higher level of construction activity in both houses as well as roads. Service sector components continued to do well on the back of pent up demand especially in hospitality, travel, trade which led to growth of 9.7% over 9.2% last year.

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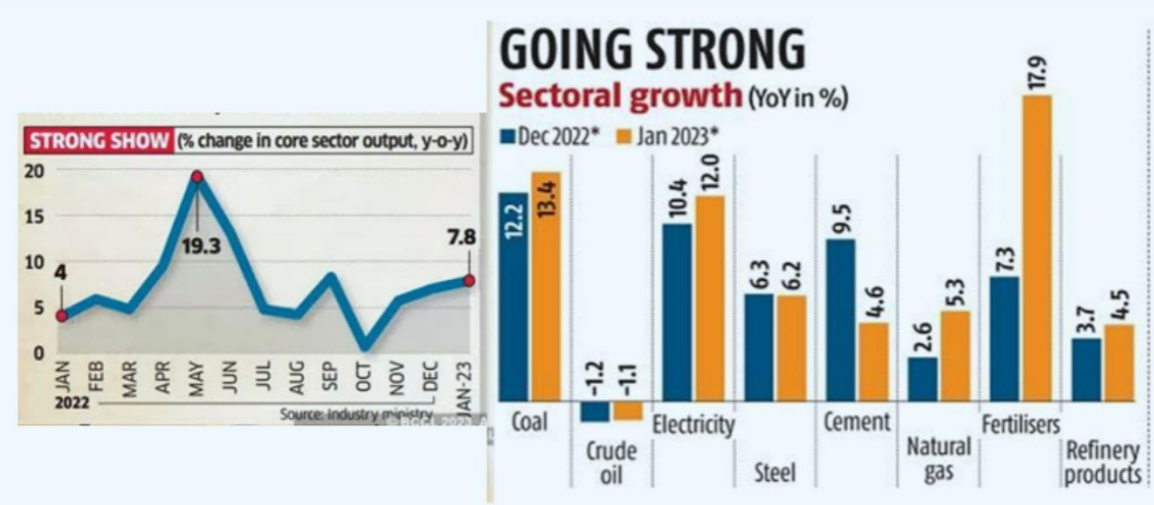
ii. Core Industries Performance

Growth in eight core infrastructure industries registered a four-month high in January this year at 7.8% with seven of the eight sectors witnessing positive growth amidst the higher capex push by the government and aided by a favourable base effect. It grew by 4% in January 2022 when the economy was still reeling from the pandemic and the third wave of infections was underway. Previously, the eight core industries posted a high growth of 8.3% in September 2022. Given that these core sectors have a combined weight of 40.3% in the index of industrial production (IIP), analysts expect IIP growth in the month to be at a robust 5% to 6% as against 4.3% growth in December. The core sector growth for December was revised downwards to 7% from 7.4% earlier.

The cumulative growth rate of the index of eight core industries during April-January 2022-23 was 7.9% as against 11.6% a year ago.

In January 2023, three of the industries including fertilisers, coal and electricity registered double digit growth. Coal production grew by 13.4% in January while electricity generation registered a 12% growth. This is indicative of steady industrial activity during the month. For the April to January 2022-23 period, its IIP grew by 16.1 percent. Crude oil production declined by 1.1 percent and its cumulative index declined by 1.3 percent during April to January, 2022-23 over the corresponding period of previous year.

Figure 2: Core Industries Growth Rate (in percent)



Similarly, natural gas production increased by 5.3 percent and its IIP grew by 1.4 percent. Petroleum refinery production increased by 4.5 percent and its cumulative index increased by 5.4 per cent during April to January, 2022-23 over the corresponding period of previous year, and analysts attributed this to both exports and domestic demand remaining high.

Fertilizer production saw an increase of 17.9 percent and its IIP grew by 10.5 percent during April to January, 2022-23 over the corresponding period of previous year. With the government focus on investments in infrastructure, steel and cement production grew by 6.2% and 4.2% respectively in January. Steel's cumulative index increased by 7.1 percent., while for cement increased by 10 percent. Electricity generation increased by 12 percent and its cumulative index increased by 10.1 percent in April-January, 2022-23 over the corresponding period of previous year.

iii. Forex reserves

India's foreign exchange reserves rose sharply by USD 12.798 billion to USD 572.801 billion in the week ending March 17, according to the Reserve Bank of India's latest data. During the prior week that ended on March 10, India's foreign exchange reserves declined by about USD 2.4 billion to USD 560.003 billion.

According to RBI's latest data, India's foreign currency assets, the biggest component of the forex reserves, rose by USD 10.485 billion to USD 505.348 billion. Gold reserves during the latest week rose by USD 2.187 billion to USD 44.109 billion.

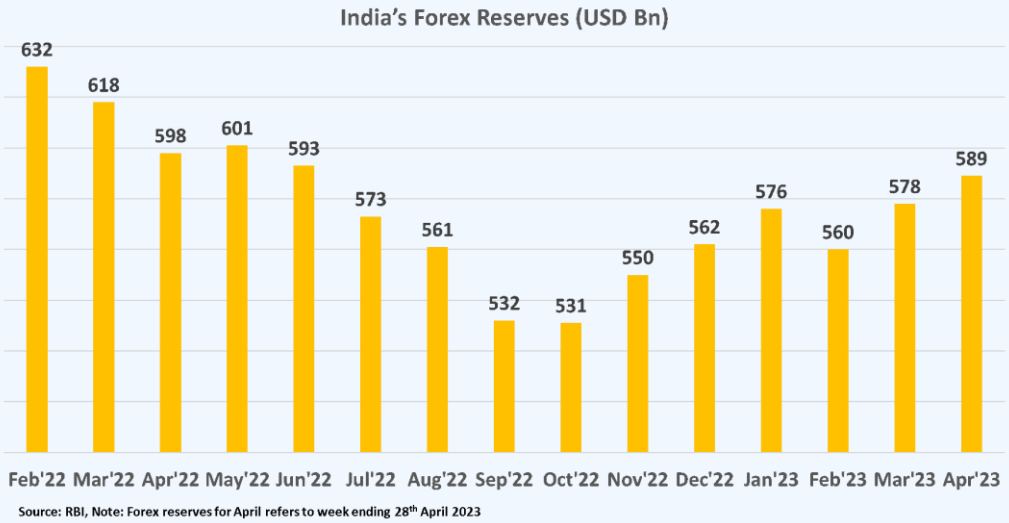
At the start of 2022, the overall forex reserves were at $633.61 billion and dropped to a two-year low in October. Much of the decline can be attributed to RBI's intervention and a rise in the cost of imported goods. It is still down sharply from a peak of over $642 billion touched in September last year.

The forex reserves had been intermittently falling for months now largely because of the RBI's intervention in the market to defend the depreciating rupee against a surging US dollar.

The worst drop was in the week to February 10 when the reserves plunged by a steep $8.32 billion to $566.95 billion.

The reserves have been falling as the rupee has been under pressure and the monetary authority has been taking measures to defend the currency from extreme volatility. In 2022, the cost of defending a falling rupee was over $115 billion of the reserves. In October 2021, the forex kitty had reached an all-time high of $645 billion.

Figure 3: Forex Reserves



Source: RBI, Note: Forex reserves for April refers to week ending 28th April 2023

iv. Inflation

At 3.85%, India's wholesale inflation fell to lowest since january 2021 in february 2023. Decline in the rate of inflation in february, 2023 is primarily contributed by fall in prices of crude petroleum and natural gas, non-food articles, food products, minerals, computer, electronic and optical products, chemicals and chemical products, electrical equipment and motor vehicles, trailers and semitrailers.

On month-on-month (MoM) basis, the WPI changed 0.20 per cent. The rate of inflation based on WPI Food Index decreased from 2.95 per cent in january 2023 to 2.76% february 2023. Retail inflation inched lower to 6.44 per cent in february from 6.52 per cent in january, even as it remained above the upper band of the 4+/-2 per cent medium-term target of the Reserve Bank of India (RBI) for the second consecutive month, data released by the National Statistical Office (NSO). While food inflation eased marginally to 5.95 per cent in february from the revised level of 6 per cent in january (earlier 5.94 per cent), inflation for cereals, milk and fruits picked up.

Core inflation — non-food, non-fuel component — continued to remain above 6 per cent mark for the fourth consecutive month, prompting expectations of another rate hike of 25 basis points by the RBI in its upcoming policy review in April. Also, even as rural inflation inched lower to 6.72 per cent in February from 6.85 per cent a month ago, it continued to remain above urban inflation, which rose to 6.10 per cent from 6 per cent.

Figure 4: CPI and WPI Inflation (in percent)

Experts said an inflation print above 6 per cent level for the second straight month indicates a lag in the impact of monetary policy, under which the RBI has increased the repo rate by a cumulative 250 basis points to 6.50 per cent since May last year. They, however, said the headline inflation print is expected to ease March onwards due to a significant base effect.

Retail inflation based on the Combined Price Index (Combined) had risen to a three-month high of 6.52 per cent in January this year. It stood at 6.07 per cent in February 2022, then rose to 6.95 per cent in March 2022 and further to 7.79 per cent in April 2022.

Among the sub-groups, while vegetables continued to remain in deflationary mode for the fourth consecutive month at (-)11.61 per cent in February, cereals inflation increased to 16.73 per cent in February, the sixth consecutive month of double-digit inflation. Inflation rate for milk and products increased to 9.65 per cent in February from 8.79 per cent a month ago, while that for fruits rose to 6.38 per cent from 2.93 per cent a month ago.

Though the government's measures to cool off wheat inflation through open market sales in February and reduction in reserve price is likely to show an impact on inflation with a lag, sticky core inflation and onset of summer may push up perishable products prices higher, as per experts.

In its latest monetary policy on February 8, the RBI had hiked the repo rate by 25 basis points. It had said that the outlook for inflation is mixed, projecting inflation at 6.5 per cent in 2022-23, with Q4 at 5.7 per cent.

vi. Rupee

2022 was a year of geopolitical tensions, soaring inflation and central banks worldwide hiking rates trying to catch up to surging inflation. Especially the US Fed, which caused the dollar to strengthen, affecting the rest of the world's currencies.

The rupee declined over 11 percent in 2022 – the worst-performing Asian currency – as it struggled against global developments. Most Asian countries, however, depreciated more due to dollar's inherent strength rather than their own weakness. US dollar, current account deficit in the country, forex reserves and domestic macro-economic developments will determine which way the rupee will move in 2023.

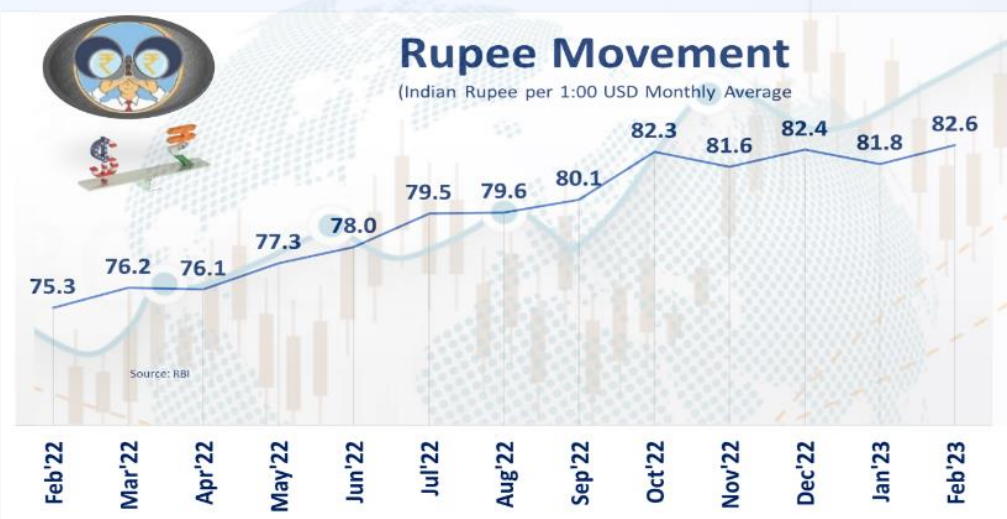
It is noteworthy here that the rupee was one of the worst-performing currencies last year in Asia but has reversed fortunes come 2023 and is ranked the third-best currency so far behind the Indonesian rupiah and the Philippine peso.

Last year, the rupee slid nearly 10 percent against the dollar and breached the 83 mark in October, a record low but since then it has strengthened despite a volatile macro environment, threats from the ongoing Russia-Ukraine war and global investors swaying towards the safe haven– US dollar.

Most emerging market currencies along with the rupee came under pressure after Fed Chair Jerome Powell reaffirmed that the Fed is determined to bring inflation down to its 2 percent target and an aggressive rate hike cycle will possibly continue to slow the stubbornly high inflation in the US.

Back home, the RBI will most probably follow the US central bank's footsteps and keep tightening in order to tame the red-hot inflation. That is despite economic data indicating growth to be below expectations in the last quarter as a gloomy global outlook and rising borrowing costs hurt manufacturing and consumption.

Figure 5: Rupee Movement in last one year



Meanwhile, the Reserve Bank of India has reportedly been selling dollars, both onshore and offshore, to prevent the rupee from weakening below the 83 against dollar, according to several market participants, and will continue its vigil. In January Indian currency strengthened to a one-month high against dollar, backed by dollar inflows.

xi. Outlook for 2023-24: India

The economy is projected to grow 7 per cent this fiscal, according to the official forecast, but many private forecasters have a lower outlook, ranging from 6.5 to 6.9 per cent. Many economists, brokerage firms and agencies like the IMF and World Bank have in their latest reports stated that Indian economy will be fastest growing among major economies in financial year 2022-23. As per IMF India to contribute 15% of global growth in 2023.

Even though existing global challenges like tightening monetary policy cycle, slowing growth and elevated commodity prices may lead to a lower growth than previous financial year, still India' growth will be robust due to strong domestic demand. At present, global economy is navigating through incredibly rough waters attributed mainly to global uncertainties, unfolding of conflict in Ukraine, the reaction of financial and commodity markets to the changing scenarios, tight monetary policy and more.

However, despite these hurdles, the World Bank in its latest India development update said that India showed higher resilience to global shocks and better than expected quarterly growth numbers. CRISIL agency has projected a growth of 6% in FY24 lower than RBI estimates of 6.8% and 4.4% for the third quarter. Moody's Investors Service recently in March 2023 raised India's economic growth estimate for 2023 to 5.5 per cent from 4.8 per cent pegged earlier, on the back of a sharp increase in capital expenditure in the Budget and a resilient economic momentum.

Table 1: India's GDP Growth Projection – 2022-23 and beyond

GDP Projections 2022-23 and beyond				
Sr. No.	Agencies	Earlier Estimates	Latest Estimates 2022	2023 Projections
1	Morgan Stanley	7.9%	7.0%	6.2%
2	Fitch Ratings	10.3%	7.0%	6.2%
3	Moodys Investor Service	9.5%	7.0%	5.5%
4	World Bank	8.7%	6.9%	6.6%
5	IMF	9.0%	6.8%	6.1%
6	UBS	7.7%	6.9%	5.5%
7	Asian Development Bank	7.0%	7.0%	7.2%
8	RBI	7.8%	6.8%	6.4%
9	Barclays	7.0%	7.0%	6.0%

Despite the fourth-quarter slowdown in consumer spending, analysts believe this component of national expenditure is likely to do much of the heavy lifting for growth in 2023 as inflation subsides and real spending power returns. Experts we also believe that private investment will remain a strong source of economic growth, helped along by the additional capital spending measures outlined in the latest Union budget.

As a proxy measure for consumer spending, personal loan growth has been firming in recent months, with the January 2023 growth rate edging up to 23.7% YoY.

Within this total, loans for big-ticket items such as vehicles and consumer durables are both growing strongly, signalling no shortage of consumer confidence, along with good growth in education loans. Credit card borrowing is also on the rise, though not much faster than overall personal loans. The outlook for private business investment also remains positive, and this is despite the increase in policy rates that the RBI has had to implement to tame inflation. In support of private investment, the banking sector is looking in decent shape despite the impact of the pandemic, with non-performing loan ratios declining across all main banking sub-groups. Scheduled commercial bank credit is growing strongly, and though the gross fixed capital formation series that feeds into GDP is more volatile, all indications are that it is growing robustly, and this should continue as rates peak out and the monetary environment becomes less restrictive.

The recently released Union budget for 2023/24 also shows that government support for the economy will continue to provide a solid backdrop for the business sector, with strong infrastructure investment likely to help “crowd in” additional business investment. Capital expenditure accounts for almost a quarter of the Indian government’s expenditure in the coming fiscal year, totaling INR 13,709 bn, an increase of 30% over the previous year. Infrastructure projects will be the main beneficiary of such spending.

On the domestic front, the peak impact of the rate hikes -- 250 basis points since May 2022, which has pushed interest rates above pre-Covid levels, will play out more in the next fiscal. Retail inflation is expected to average 5 per cent in FY24 from 6.8 per cent in FY23, owing to the high-base effect and some softening of crude and commodity prices. However, a good rabi harvest would help cool food inflation, provided the monsoons are normal while the slowing economy should moderate core inflation. However, risks to inflation are tilted upward, given the ongoing heat wave and the World Meteorological Organization's prediction that an El Nino warming is likely over the next couple of months.

On the external sector the country's external vulnerability is expected to decline with a narrower current account deficit (CAD) and modest short-term external debt. While CAD is expected to narrow to 2.4 per cent of GDP or USD 8 billion next fiscal from an estimated 3 per cent of USD 100 billion this fiscal, its financing may face challenges as foreign portfolio flows remain volatile and external commercial borrowings are less attractive.

Infrastructure spending will drive overall capex by 12-16 per cent next fiscal. Overall industrial capex is seen rising to nearly Rs 5.7 lakh crore on average between fiscals 2023 and 2027, compared to Rs 3.7 lakh crore in the past five fiscals. Nearly half of this incremental capex is being driven by the production-linked incentive scheme and new-age sectors.

Merchandise exports are expected to grow at a tepid 2-4 per cent next fiscal and 5-7 per cent growth this fiscal, with the PLI scheme supporting demand owing to global supply chain diversification and friend-shoring strategies.

Budget for FY24 announced one of the biggest-ever increases in capital spending to create jobs. The capital spending increase, which would amount to 3.3 cent of gross domestic product (GDP), will be the biggest such jump after an increase of more than 37 per cent between 2020-21 and 2022. India is paying on investing in the green economy, renewables with potential to shift the country towards clean energy and keep growth going. This can be seen as potential for the future is to translate this fiscal responsibility into a medium-term framework that gives even stronger anchor to India's public finances.

What is unique about India, is the fact that the public digital infrastructure is built in a very agile manner. So private initiatives can tap into this public infrastructure and benefit as well as support growth and employment in India. What is replicable is this concept open, holistic approach to digitization using key building blocks. India's G-20 presidency provides an opportunity for India to share this experience, more broadly, especially with the developing world, so other countries can leapfrog the way India, did it with its thoughtful approach to digitization. To achieve high growth in the coming decades, India will need to sustain strong investment. Capital in India has traditionally been mobilized by raising domestic savings and investing it in productive assets.

Investment into infrastructure that enables growth, particularly in transport, energy and communications, is critical to India's prospects. How well India can deliver on this will go a long way to determining its growth path. Improving India's business climate will also help increase investment.

Looking ahead, there are several factors that could impact the economy and businesses. While the normalization of contact-based services, increased private investment due to government initiatives (like PLI schemes & 'China plus 1' strategy), and improved rural consumption are positive developments, there are also potential headwinds such as a global economic slowdown, high energy prices, rising interest rates, and tighter financial conditions.

INDIAN PETROCHEMICAL INDUSTRY

INDIA COUNTRY REPORT 2023

SECTION 2

INDIAN PETROCHEMICAL INDUSTRY

xii. Petrochemical Industry in India

Petrochemicals are a vital cog in the global industrial arena and a major growth driver for economies. The petrochemical industry occupies a pivotal place in the country's economy, with increased domestic consumption and rising demand from various end use sectors such as medicines, construction, agriculture, textiles, automotive, etc.

It is one of the fastest growing sectors, with demand growing at a CAGR of 5%-plus over the last five years in 2022-23 (with a blip in 2020-21). The penetration level of petrochemicals in India is, however, far lower than the global average. India's per capita consumption stands at 12 kg compared to the global average of 35 kg, indicating significant headroom for growth.

The pandemic has brought about various changes in the India petrochemical market, including digitization, increased consolidation activities, and a focus on scenario-based planning. India is sitting in the cusp of per capita GDP as well as per capital purchasing power and history has shown that once past this inflexion point, the growth and demand for basic petrochemicals is insatiable. The direction in which Indian society is moving will imminently lead to requirement of new demand for basic petrochemicals as well as sow the foundation for speciality and functional chemicals.

The vision for the next 5 years is to have investment-led growth, to be driven by the private sector. To achieve this vision, the Government is working incessantly on policies to attract investment, both from domestic and foreign sources. The work-plan includes further liberalizing our FDI policy, simplification of labour laws, further enhancing ease of doing business, power sector reforms, and reforms in banking, insurance and pension sectors. The Government is reportedly targeting some $1.4 trillion of new infrastructure projects to be completed by 2025.

Apart from the above, government's ongoing efforts to promote economic development in India are the main factor influencing the expansion of the petrochemical industry. The Department of Chemicals and Petrochemicals (DCPC) of the Government of India (GoI) has implemented several initiatives to improve the industry's overall competitiveness, quality, and output. Initiatives such as Make in India, Aatmanirbhar Bharat Abhiyan, and the Production-Linked Incentive (PLI) Scheme are implemented to attract domestic manufacturing and facilitate exports.

Implementation of the above measures would go a long way in making India an attractive destination for investment and making it a global hub for manufacturing.

Some of the notable measures for promoting the growth of the petrochemical industry are the mandatory standards set by the Bureau of Indian Standards (BIS), public procurement policies for chemicals and petrochemicals, schemes for setting up plastic parks, and adequate support for research and innovation by setting up centers of excellence. All these policy incentives, low cost of manufacturing capital goods and manpower, and overall demand scenario are boosting business confidence to plan larger petrochemical complexes in India, which is evident from recent project announcements by major public sector units, private sector refiners, and niche specialty chemical players.

The Indian government has had announced many initiatives like Digital India, Swachh Bharat, Start-up India and Skill development program etc. which have started and will eventually expected to have a widespread multiplier effect.

Success of 'Make in India' programme will be a game changer and a big boost to manufacturing in the country. Increased focus on agriculture and irrigation will boost the demand for plastics along with GOI's thrust on infrastructure followed by a normal monsoon forecast in 2023 by IMD.

The continuing demand for housing, accounting for 60-65 per cent of cement demand, and aggressive government investments in infrastructure will drive demand, nudging cement-makers to add 145-155 MT in fresh capacity at an investment of Rs 1.2 lakh crore by FY27, according to a CRISIL report. With 570 mt of installed capacity, India is the world's second-largest cement producer after China. Between FY12 and FY23, the installed capacity grew by a whopping 61 per cent to 570 MT from 353 MT in FY12 -- a net addition of 217 MT from 2013 to 2022 -- and FY22 saw the highest capacity addition of 34 MT.

Cement makers have been adding substantial capacity in the past too. In the five fiscals through 2017, around 108 MT were added, while in the next five fiscals through 2022, 109 MT were added despite pandemic-induced disruptions.

Most of the new capacity will come up in the eastern and central regions, which add almost 57 per cent of the new capacity, due to the rural housing and infrastructure boom in the areas. South and the North are expected to add 19 per cent each, while the west will add only 5 per cent of incremental capacities over the period. The demand for housing and cement will indirectly boost the demand for petrochemicals in the country. Cement companies are expected to go on an expansion spree and add 145-155 MT capacity between FY 2023 and 2027. That translates to a 4-5 per cent compound annual growth rate on a high base. A robust 6-7 per cent CAGR expected in demand over these five fiscals will encourage the growth in supply, as per Crisil. Cement production is an indicator for good growth of raffia bags – positive for petrochemical sector.

The Union Budget 2023-24 presented was based on "seven priorities" - inclusive development, reaching the last mile, infrastructure and investment, unleashing the potential, green growth, youth power and financial sector.

If we consider the budgetary allocations of the ministries of civil aviation, communications, housing and urban affairs, new and renewable energy, power, ports, shipping and waterways, railways, and road transport and highways, which represent transport and communications, green and urban infrastructure, it turns out that 16.6 percent of the total expenditure and 2.5 percent of GDP in budget 2023 is dedicated to infrastructure. This represents an increase from the previous year's budget, which allocated 14.1 percent of total expenditure and 2.15 percent of GDP to infrastructure.

The government is promoting domestic manufacturing projects via policy initiatives such as the Production Linked Incentive Scheme aimed at boosting domestic manufacturing and exports by providing incentives on incremental sales from products made at domestic plants. The scheme has the potential of adding at least another $55bn of production over the next five years across all manufacturing sectors. This will lead to a quantum jump in the demand for petrochemicals such as polymers, resins, fibres, bulk chemicals, paints, pigments, food additives, etc.

The Union Budget 2023-24 focuses on green and infrastructure development which would be of great help to the Indian Chemical sector in FY 2023-24 and forward.

A few of the many such initiatives that are likely to result in new opportunity for industries and positively push the demand for petrochemicals are:

- Union Budget 2023-24 allocated a total of Rs 19,518 crore to all metro projects across India
- Around 810 km of metro lines are operational in 20 cities across the nation.
- More than 980 km of metro network currently under construction in 27 cities
- A budget arrangement of Rs 585 crore is proposed for the Kanpur Metro Rail Project in the financial year 2023-2024.
- In addition to the Gurugram Metro, three other metro links proposed in 2024.
- Delhi Metro's Phase 4 (Phase IV), has been planned to provide last-mile connectivity
- Budget, announced to further improve the coaches of trains like Rajdhani, Shatabdi, Duronto.
- Production of Vande Bharat Express will be revamped after 2.41 lakh crore was allocated in Budget 2023.
- Railways have been allocated Rs 2.41 lakh crore in the Union Budget 2023-24, the highest ever capital outlay for the sector.
- It is proposed to manufacture 4,500 newly designed automobile carrier coaches with side entry, 5,000 LHB coaches and 58,000 wagons.

- The Railways is also planning to refurbish more than 1,000 coaches of these premier trains. The interiors of these coaches will be modernized, and passenger comfort will be improved. The above on-going metro projects and refurnishing of coaches will boost the consumption of petrochemicals like composites, polymers like ABS and also polyesters.
- To promote green energy, Railways will now set up Ultra Mega Solar Plant. Moving towards zero carbon emission to reduce pollution, Railways is constantly emphasizing on rail electrification.
- The construction of the country's first hydrogen train, developed entirely in India, will be completed by December 2023. The hydrogen train will be operationalized in the first phase on heritage lines such as the Kalka-Shimla railway section.
- Road construction - The pace of construction of national highways in India has improved with 8,064 km finished in the current financial year as on February 28, 2023. This makes it 24.14 km per day on an average, with a marginal improvement from the numbers from 2021-22 for the same period.
- Construction and expansion, including strengthening, of national highways, touched 77,400km between April 2014 and October 2022
- Since inception till date (15.03.2023), a total of 8,06,681 km road length (1,85,667 roads & 10,549 bridges) has been sanctioned under various verticals of the Pradhan Mantri Gram Sadak Yojna (PMGSY), out of which 7,29,221 km road length has already been completed (1,74,423 roads & 7,912 bridges)
- 99,319 km of road length have been sanctioned so far under PMGSY –III, out of which 64,331 km of road length has been sanctioned using new/ green technology. Out of which 64,331 km road length, 18,983 km road length has been completed. New / Green technology economizes construction cost of road as well as facilitates effective disposal of different industrial and municipal waste along with conserving use of virgin mining materials.
- Govt to invest Rs 1.25 lakh crore to develop world-class infrastructure at ports
- Govt will iInvest Rs 1,00,000 to Rs 1,25,000 crore for capacity augmentation and development of world-class infrastructure at ports.
- India has plans to invest US$ 82 billion in port projects by 2035. Jawaharlal Nehru Port Trust (JNPT) Special Economic Zone (SEZ) became the first of its kind operational port-based multi-product SEZ in India.
- APSEZ (Adani Ports and Special Economic Zone) plans to become the world's largest private port company by 2030 and carbon neutral by 2025.
- With a projected budget of USD 130 billion, the Bharatmala Project proposes to build or upgrade nearly 34,800 kms of national highways and border roads to provide road connectivity throughout the nation.
- As part of the project, national highways, bridges, flyovers, bypasses, ring roads, elevated corridors, tunnels, and overpasses will be built to improve India's overall connectivity, particularly in the Northeastern regions.

- With an investment of USD 600 million and technical support from the World Bank, the development of inland waterways as a component of strategic infrastructure seeks to build 111 National Waterways in India. By March 2023, the project is anticipated to be finished.
- Few Other Infrastructure Projects by the Indian Government
    - Delhi- Mumbai Highway
    - Ganga Expressway
    - Bengaluru Metro
    - Gati Shakti, the National Single Window System, the National Monetization Plan, and the National Infrastructure Pipeline (NSWS).
    - Spending on water supply, transportation, and urban infrastructure is expected to drive the overall infrastructure investment to expand at a CAGR of 11.4% between FY21 and FY26.

Seven PM MITRA mega textile parks announced by government will boost the textiles sector in line with 5F (Farm to Fibre to Factory to Fashion to Foreign) vision. Each park will come up in at least 1,000-acre land with ready nearby availability of raw material, fully equipped infrastructure including port, road and rail connectivity, water and power availability etc. The mega textile parks are expected to emerge as manufacturing hubs, create employment, create global champions, and enable access to state of the art textile technology.

Measures taken in the Budget by the government to incentivize domestic value addition, promote Make in India and create a level-playing field for the domestic industry are very positive steps towards making India a global manufacturing hub.

Safe drinking water to all Indians, micro-irrigation techniques for efficient use of water in agriculture, road connectivity, rail network, electric vehicles, renewable energy, affordable housing etc. - most of the sectors found mention in the recent budget speech which augers well for the plastic sector and the demand for petrochemicals in India. The opportunities are huge, and the petrochemical industry stands to benefit in a big way. These proposals and the focus to support the start-ups will also go a long way in encouraging domestic manufacturing and demand.

Several Indian state-owned energy companies are making major investments to boost their petrochemical activities and are expected to become significant players in the sector. Despite the factor cost disadvantages, the domestic manufacturers have committed thousands of crores of rupees to create new capacities in petrochemical products. Some of these projects are at a preliminary stage; final decisions are yet to be taken.

The Indian petrochemical industry could see around $144 bn (more than~10 lakh crore) worth of new projects as the country moves to bridge the gap between the shortage of domestic supply and increasing consumer demand.

Going forward the planned investments on drawing board would need some government support and benefits so that they fructify and able to generate and create more job opportunities in the country.

The overall outlook for the petrochemical industry in India is more positive than it was in 2023 as several state-owned energy corporations have made investments to boost petrochemical feedstock availability and extend their presence in the downstream derivatives market.

The focus of the industry is to plan capacity addition and meet the domestic as well as export demand. The industry needs to be nurtured with the right policies and fiscal support from the government.

xiii. Petrochemical Industry Review of 2022-23 & Outlook for 2023-24

A. Global Petrochemical Industry Review

For the petrochemical industry, the past three years have been marked by disruption and volatility. In 2020, the outbreak of COVID-19 led to increased demand for household goods and consumer products, and petrochemicals proved remarkably resilient. In 2021, rising commodity prices and supply chain disruption resulted in record performance as well as a growing number of sustainability partnerships and commitments, particularly in recycling.

And in the 2022 year, petrochemicals value creation was affected by the war in Ukraine, global inflation, and the risk of recession—all while the world continued to recover from the worst of the pandemic.

In 2022, four themes rose to prominence: eased supply chain constraints, regional disparities, natural gas–linked chemicals volatility, and sustainability acceleration.

The global economy appears to be getting better because of signs that inflation may have peaked in the West as some of the supply-chain pressures caused by the pandemic continue to ease. Energy costs are also substantially down following their peak immediately after the Russian invasion of Ukraine.

Among petrochemicals, polymers and olefins continue their struggle with high supply and weak demand. These factors also adversely affect downstream aromatic industries like paraxylene and benzene. Hence, 2023 promises to be an eventful year for the petrochemical industry.

In the second half of 2022, however, profits began to return to pre-COVID-19 levels. A major reason for this return to “normal” is that supply chain constraints began easing at the beginning of the third quarter of 2022 as fleet capacity increased and global demand for consumer goods waned. As a result, congestion across the logistics value chain also began to ease, leading to price differentials for some petrochemicals, such as polyethylene (PE) and polypropylene (PP), returning to previously observed market behavior.

Slow economic growth in Asia continued to affect profitability. Zero-tolerance measures for COVID-19 in China were one factor, which contributed to the contraction of manufacturing activities in China and lower-than-expected petrochemical demand. And decreased demand growth put downward pressure on crucial petrochemical product prices. On the supply side, several large-scale chemical projects, generally integrated crackers and derivatives units—most years in the making—came online in 2022. As a result, some Asian players cut operating rates.

Several polyolefin players are investing in feedstock recycling, via pyrolysis, at increasing scale. In addition, the first announcements in advanced recycling on a global scale were made around polyethylene terephthalate (PET) monomer recycling, as well as growing investment in PET fiber (monomer) recycling.

The war, which began in February 2022, triggered new trade flows for some petrochemical products, notably polymers, as European buyers started rejecting Russian products, leading to increased supplies from Russia to China via land transport.

Asia’s polymer market came under pressure due to these additional supplies, triggering further cuts in steam cracker operating rates. In the first-half of 2022, naphtha-fed steam crackers in Asia slashed operating rates to as low as 70% of capacity as high feedstock naphtha costs had hit already-weak olefins margins. Some market sources said steam cracker operating rates would likely recover slightly in the second half of the year, as run rates were low in the first half and they don’t expect the rates to fall further.

Trade momentum softened in the Asian benzene complex in late 2021. Global benzene supplies hinged on downstream demand moving into the first half of 2022, with the importance of styrene monomer sharply in focus with new capacities coming online in Asia and following volatile disruption to production in both European and US markets during 2021. In Asia, the view on benzene prices in the second half of the year was mixed; following the unexpected toll on China's demand which was dampened by COVID-19 outbreaks and lockdowns in major cities. This trend of falling imports by China continued till end of 2022.

However, the steep reduction in run rates of around 20%-25% among Asian producers allowed producers to maintain profitability despite high oil prices. As for producers in Southeast Asian countries, flows continued to feed the Middle East and Europe, which were safe havens for a handful of producers in 2022. Benzene-based standalone plants faced negative margins for most of 2022, brought on by high benzene costs and weak SM import demand from key regions: China, the US, and Europe.

In 2022, on the demand side, the Asian polystyrene market faced the same outlook as feedstock styrene, with concerns over continuous COVID-19 lockdowns in China, affecting appetite for end products. This pushed consumer demand to Southeast Asia. The acrylonitrile-butadiene-styrene outlook for the second quarter remained mixed, with continuing consumer uncertainty due to COVID-19 lockdowns, and relatively cheaper domestic prices in China.

Asian toluene was expected to be rosier in the first half of 2022, when compared with 2021, as demand is set to pick up with more economies returning to business as usual and operations ramping up following the lifting of COVID-19 restrictions. Toluene, alongside benzene, was well supported in the second half of 2021 and producers looked to increase refinery production going into the new year. Asian toluene prices continued to be supported amid tight inventories across Northeast and Southeast Asia, as producers continue to run aromatics plants at lower rates. The PX-toluene spread averaged around $180-$185/mt in H1 2022, while the benzene-toluene spread averaged around $160-$170/mt, as per data by S&P Global showed. According to some producers, spreads above $100-$120/mt signal profitability.

The Asian purified terephthalic acid, or PTA, market faced an uncertain future, as capacity expansions in China, a gradual recovery of demand in Asia and volatile upstream prices in the wake of the ongoing war shroud the outlook for the second half of the year. The ongoing Russia-Ukraine conflict will keep upstream prices volatile, but trade participants hope that adjustments to run rates, coupled with easing pandemic-related lockdowns in China will help offset the volatility to some extent.

Asian paraxylene headed into 2022 under great pressure from increasing supply driven by China’s intensive PX capacity expansion. Like the rest of the globe, Asian PX was well supported in second quarter of 2022 by firm energy prices and short supply due to run cuts and planned maintenance, with the PX-naphtha spread widening to more than two-year highs. Despite improving margins in April-May, healthier reforming profits encouraged Asian producers to maintain low run rates for aromatics extraction units.

Global polyethylene market expectations were mixed for the second half of 2022 as new capacities ramp up, logistical issues continue to hamper trade and energy costs remain firm. A continued war in Europe has global implications as Asia and the Americas attempt to fill market share while Europe faces its own individual regional issues. In Asia, market expectations varied amid rising costs and oversupply due to expected supply coming online at the end of the year.

COVID-19 related shutdowns in Asia, the start of the hurricane season in the Americas and an ongoing war in Europe challenged traditional supply-demand market fundamentals for polypropylene in the second half of 2022.

Performance in the Asian styrene monomer (SM) market in 2022 had been lacklustre as tepid derivative demand, lengthening supply and weak global economics had pushed prices to below breakeven margins for producers.

For PVC, lingering COVID-19 shutdowns siphoned off Chinese demand, prompting aggressive exports that forced other Asian producers to slash pricing to remain competitive. Freight rates remained high, but further PVC price cuts restored Asian price influence on other regions as the year progressed.

Chinese Customs data showed China's PVC exports in Q1 2022 reached 474,464 mt, while imports were 70,718 mt. Soft demand because of lockdowns, including Shanghai, home to the world's largest container port, prompted robust outflows. About 20% of those outflows went to India, which lifted antidumping duties on Chinese- and US-origin PVC in February. Asian PVC prices dropped sharply through 2022, and December offers came at the lowest since June 2020. Market sources said those levels appeared to spur spot buying, raising expectations that the slide could have reached its bottom.

Ethylene markets globally treaded with caution in H2 2022, as fears of an uptick in inflation rates and economic slowdown could soften derivative demand. Market sources expected Asian demand for US ethylene to rise in the second half of the year, as regional producers also struggle with naphtha costs that rose alongside oil in the fallout of Russia’s invasion of Ukraine. In Asia, ethylene demand looked set to remain under pressure from weak derivative margins, with key downstream products such as polyethylene, styrene monomer, and ethylene glycol continuing to post losses. With upstream crude oil and naphtha prices volatile because of the Russia-Ukraine war, several naphtha-fed steam cracker operators in Asia are considered to run cuts from June, which tightened spot availability.

In Southeast Asia, increasing inflows of US-origin ethylene could hampered spot demand, but H2 2022 turnarounds kept supply in check.

Propylene market conditions in the second half of 2022 is set to be challenging in Asia amid weak downstream demand in the key market of China, while Europe continued to focus on contract volumes amid uncertainty fanned by the Russia-Ukraine War.

Asian propylene market expected to continue facing challenging conditions in H2, with demand hinging on the progress of China's COVID-19 restrictions. Price volatility in upstream markets amid the Russian-Ukraine conflict continued to weigh on margins. The sentiment on the demand side is seen to be bearish.

Global demand for polyethylene terephthalate was seen stable to strong in the second half of 2022, though economic concerns amid inflation, Russia's invasion of Ukraine and the specter of continued COVID-19 surges could temper optimism. In Asia, PET demand was seen stable through H2 amid consistent export inquiries from the US, Europe and Southeast Asia. PET producers are expected to maintain high operating rates amid strong demand as well as healthy margins despite volatile upstream paraxylene and purified terephthalic acid prices.

Overall, petrochemicals remained the fastest-growing segment in the hydrocarbon value chain and will continue to offer high growth and relatively high margins for integrated-energy companies

B. Outlook for 2023-24

The Petrochemicals market is expected to register fluctuating growth trends in the long term, while inflation and supply chain concerns are expected to continue in 2023. In 2023, petrochemical industry players might incur losses due to huge gap in currency translation followed by contracting revenues, shrinking profit margins & cost pressure on logistics and supply chain.

Controlling Inflation has become the first priority for global economies from last quarter of 2022 and to be followed in 2023. With skewed economic situations, rise in interest rate by governments to control spending and inflation, spiked oil and gas prices, high inflation, geo-political issues including U.S. & China trade war, Russia-Ukraine conflict to intensify the global economic issues.

Shifting consumer preferences in a projected economic downturn scenario, amendments to industrial policies to align with growing environmental concerns, huge fluctuations in raw material costs triggered by prevailing geo-political tensions, and expected economic turbulences are noted as key challenges to be addressed by the Petrochemicals industry players during the short and medium term forecast.

The Petrochemicals market is expected to register fluctuating growth trends in the long term, while inflation and supply chain concerns are expected to continue in 2023. As demand is slowing, especially in the US and Europe, the current global supply-demand balance is likely to remain unchanged for the most part. But, given likely higher demand from China (the country which has the strongest influence upon demand), it is forecasted that the supply-demand balance in Northeast Asia will come to show signs of a gradual recovery.

However, considering predictions that oil prices will stay high in 2023, demand is vulnerable to fluctuating according to Chinese policy changes, and supply issue burdens remain a factor. Given this backdrop, the extent of improvement in the industry will likely be limited next year.

Petrochemicals market players' investments will be oriented towards acquiring new technologies, securing raw materials, efficient procurement/inventory, strengthening product portfolios, and leveraging capabilities to maintain growth during challenging times. The economic and social challenges are noted to be highly varying between different countries/markets and Petrochemicals manufacturers and associated players are focused on country-specific strategies. Crude oil prices fluctuating to the tune of $76/barrel in one year are emerging to be a key concern for the Petrochemicals market, as fuel and chemical prices are impacting many other segments.

Several trends are expected to affect demand for petrochemicals. Continued growth of the critical end markets that consume petrochemicals—such as packaging and construction—and economic development in China, India, and Southeast Asia will have a positive effect on demand. Plastics recycling is also an important driver for the industry because the material flow from advanced recycling involves cracker and polymerization units.

China and Europe each account for around a quarter of the global capacity for naphtha-based, high-value chemicals, but they have only very small shares of capacity based on lighter feedstocks as a result of limited availability. China’s burgeoning coal-based chemical industry, once a speculative proposition, now embodies steady technological improvements. India is poised to grow strongly from its current level of only 4% of global capacity to satisfy increasing domestic demand.

About 42 MTA of ethylene capacity is expected to be added from 2022 to 2026 (including potential new projects), with China contributing about 19 MTA of confirmed capacity (or 58 percent of the global total), followed by North America at about five MTA (or 15 percent of the global total).

As per ICIS, PP projects will be delayed further to 2024, impacted by the pandemic and poor margins, there will be a strong rise in new capacity in Asia in 2023. A total of some 5.6m tonnes of effective new capacity are expected in China in 2023. Other new projects in Asia will come from India, Vietnam and Malaysia. With new paraxylene capacities in China in early 2023, Asian markets may face an oversupply and sluggish market in PX-PTA. With increase in domestic consumption and export, refinery margins in Asia are expected to be high.

Further, with supplies from China, the Asian toluene and mixed xylenes prices are likely to stay afloat in H1 2023. Asia's PVC market could rebound in early 2023, but as per analysts, a comeback would likely be limited without a full demand recovery in China. With market volatility remaining, there is no doubt about the urgency to balance short-term solutions with long-term strategy to build resilience and ensure future viability of business models. And while transformation is certainly not a new theme in the industry, emerging trends are forcing business leaders to create lasting change if the industry is to weather the storm in 2023 and beyond.

While the key themes of the transformation in the petrochemical industry remain, the developments of the past year have put additional emphasis on risk mitigation measures and significantly accelerated the need for action around new energy and feedstock supply efforts. To succeed in 2023 and beyond chemical companies must build resilience, accelerate investments in new and greener technologies, and develop M&A and margin management as core capabilities.

Petrochemical companies are likely to focus on repositioning their asset portfolios and balancing trade-offs between different strategic options with critical considerations such as scale, the scope of products, and growth opportunities. To deliver stronger growth and improve financial performance, firms should consider honing their product and services portfolios further, evaluating several areas:

xiv. Feedstock

A. Naphtha

Naphtha is a major raw material for production of Ethylene, Propylene and Aromatics. The current demand in country is lower than the production from refineries and as a result, India has been an exporter of nearly 6-8 MMTPA. However, In the year 2022-23, Naphtha exports were comparatively lower compared to last year around 5676 KT as well as production and imports.

Naphtha consumption witnessed a flat growth in 2021-22 and a negative growth in 2022-23. Next fiscal the demand is expected to see an improvement due to increase in demand from downstream products like Ethylene, Propylene demand.

Table 2: Naphtha Demand Supply

Naphtha (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Production	19381	19922	17016	--	--
Imports	1199	1246	893	--	--
Exports	6509	6861	5676	--	--
Apparent Demand	14100	14255	12047	--	--
Demand Growth%	**-1.2%**	**1.1%**	**-15.5%**	**--**	**--**

Following in the footsteps of Reliance Industries Ltd (RIL), GAIL India Ltd (GAIL), plans to import ethane from the United States to replace natural gas and naphtha as feedstock for its petrochemical facilities. Moving in this direction, GAIL and the Central Board of Direct Taxes (CBDT) entered into a landmark advance pricing agreement (ArA) for determining the transfer pricing margin payable on its long-term LNG sourcing contract from the USA for five years.

B. Natural Gas

Natural gas, 50-60% less polluting than coal, will work as the transition fuel that can get India to its ambitious goal of net-zero emissions by 2070, when the nation aspires to be fully powered by renewable energy. Natural gas consumption rose in January 2023 for the first time since May and liquefied natural gas (LNG) imports witnessed the first expansion in at least 15 months in early signs of domestic demand revival helped by a drop in international prices.

India consumed 5.18 billion cubic meters (BCM) of natural gas in January, up 6.4% from a year earlier, according to the oil ministry data. Imports of LNG rose 7.9% to 2.27 BCM. A 4% year-on-year rise in the local production of natural gas in January also helped boost consumption.

Most of the LNG India imports are under the long-term supply pact and linked to crude prices, which have fallen from the highs of $130 per barrel in March last year to around $81 now. Oil prices have remained below $90 per barrel for the past three months, keeping LNG imported under the long-term contract below $12-13 per mmbtu.

Even the Asian benchmark rates of LNG in the spot market, which has been extremely volatile for one-and-a-half years, have fallen to around $15 per mmbtu from $54 in August. India's LNG imports had dropped 19% year-on-year in August.

Prices of locally produced natural gas have, however, risen sharply in a year but have mostly remained lower than international rates.

As natural gas became expensive during the year, several commercial consumers switched to alternative fuels such as liquefied petroleum gas (LPG) and fuel oil, pushing up demand for both fuels.

The demand for natural gas is now beginning to return, an industry executive said, warning that prices must stay stable for the recovery to become durable.

LNG imports for the April-January period are 14% lower than a year earlier. Domestic natural gas consumption is 6.1% lower for the same period.

By February 2026, India will invest ₹3 lakh crore, or $40 billion, to expand gas infrastructure — pipelines, port-based LNG (liquefied natural gas) regasification terminals, city gas distribution (CGD) networks and gas exploration projects.

The investment will more than double the gas pipeline network from 16,000 km in FY19 to 34,600 km by 2024.

The number of LNG import terminals will increase from five in 2016 to 10 by 2024 with capacity expanding from 35 million tonnes per annum (mtpa) to 62 mtpa.

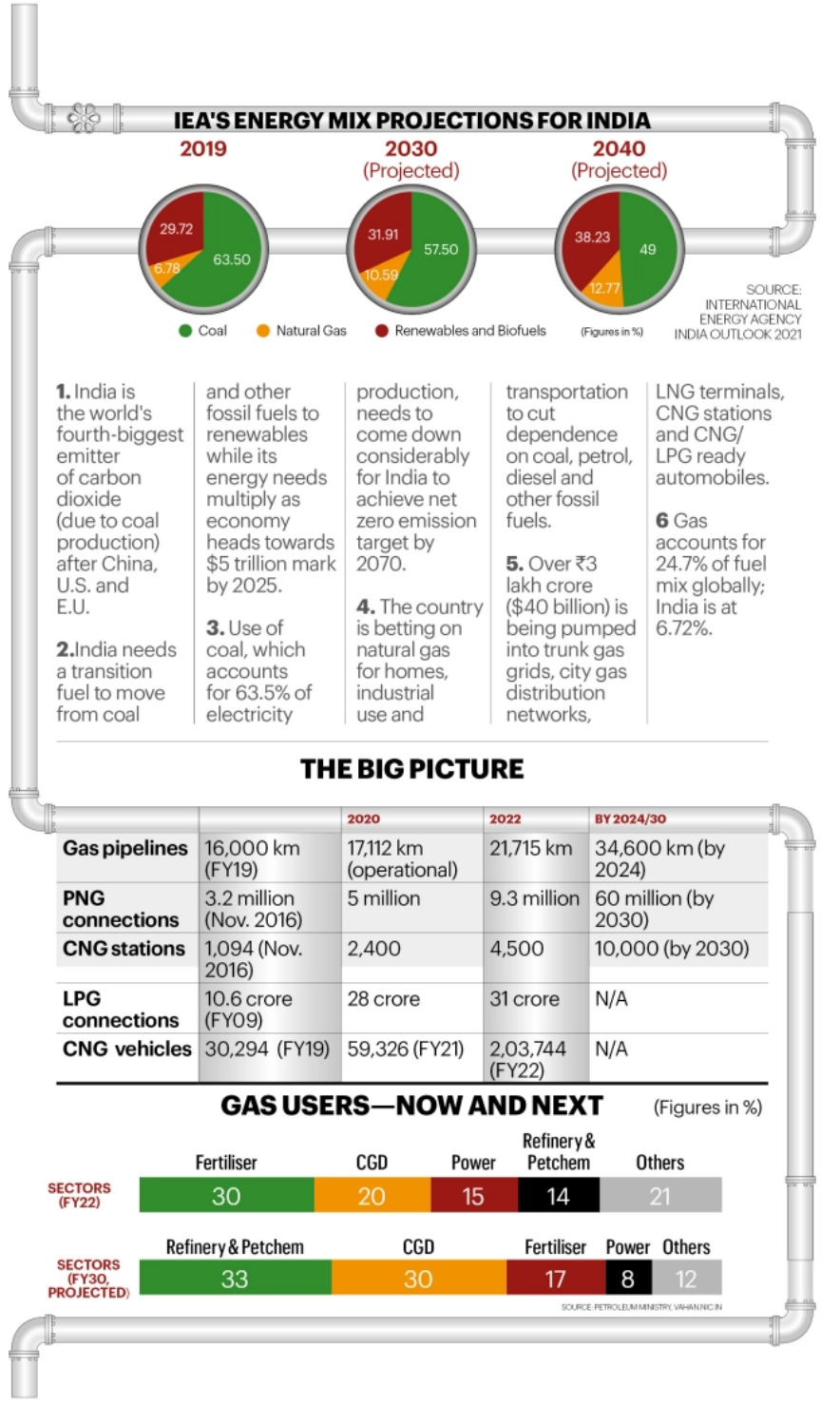
Piped natural gas (PNG) connections will increase from 3.2 million in November 2016 to 60 million in 2030 (as of March-end 2022, India had 9.3 million).

As gas grid widens, 297 geographical areas (GAs) covering 98% of the country's population and 88% area will get access to PNG.

The number of compressed natural gas (CNG) terminals will rise from 1,094 in November 2016 to 10,000 by 2030, the year when government expects natural gas to account for 15% of India's energy mix, up from 6% in FY15, when the foundation of this transition was laid. Yet, it's just the beginning. The global average is 24.7%.

As of FY22, fertiliser companies accounted for 30% of the 178 mmscmd gas consumption, followed by CGD (20%), power producers (15%), refinery and petrochemical companies (14%) and others (21%). By FY30, refinery and petrochemical units will account for 33%, followed by CGD (30%), fertiliser units (17%), power companies (8%) and others (12%).

Natural gas — and later blue and green hydrogen — will be a crucial source of near zero-carbon energy (green hydrogen is made from water electrolysis, while blue hydrogen is extracted from carbon captured during industrial processes). That calls for creation of infrastructure to meet this demand.



The expansion of gas network over last few years has been epic. Globally, around 20% trunk gas pipeline additions announced for completion up to 2026 are in India, according to GlobalData, a data and analytics company.

That is about 18,600 kms (16,000 kms in FY19 to 34,600 kms by 2024), more than the planned additions in China (17,810 km) and U.S. (12,305 km). GAIL India, which accounted for 14,385 km gas pipelines as of March 2022, is building another 5,000 kms. IHB's Kandla-Gorakhpur pipeline would be linked with 22 LPG bottling plants — Uttar Pradesh (13), Madhya Pradesh (six) and Gujarat (three). It will transport 8.25 million metric tonne per annum (mmtpa) LPG, 25% of India's total demand, to 34 crore users in these states. It will also supply LPG to 21 more bottling plants in Maharashtra, Gujarat, Madhya Pradesh, Rajasthan and Uttar Pradesh.

OMCs are not far behind. IOC is building the national gas pipeline grid. At present, 1,800 km standalone projects are under implementation, in addition to JV pipelines such as North-East Gas Grid and three other cross-country pipelines. Last year, BPCL commissioned the 355-km Bina-Kanpur multi-product pipeline. HPCL completed its cross-country pipeline projects like Vijayawada to Dharmapuri, which includes a new terminal at Dharmapuri, and Hassan-Cherlapally LPG pipeline and Barmer Palanpur Pipeline Project. Its ongoing projects include Bathinda Sangrur Pipeline (BSPL Project and Haldia Panagarh LPG Pipeline Project (HPPL).

Work is on to build regional pipelines, too. Those under construction include Kakinada-Vizag-Srikakulam, Ennore-Nellore, Kakinada-Vijayawada-Nellore and Srikakulam-Angul in Andhra Pradesh, North-East Natural Gas Pipeline Grid, Kanai Chhata-Shrirampur line in West Bengal, Mumbai-Nagpur-Jharsuguda line through Maharashtra, Madhya Pradesh, Chhattisgarh and Odisha, and a line from Jamnagar to Dwarka in Gujarat. The North-East Grid is being implemented by Indradhanush Gas Grid, a venture of IOC, ONGC, GAIL, OIL and Assam-based Numaligarh Refinery. It will be connected to Barauni-Guwahati natural gas trunk line as part of the Urja Ganga scheme.

ONGC U-field onshore facilities of KG-DWN-98/2 Deep Water Block, situated in Odalarevu of BR Ambedkar Konaseema district, dedicated to the nation by Prime Minister Narendra Modi in November 2022. The project was developed at a cost of INR 2,917 crore, and employment generation of ~3.4 million man-hours. It is part of ONGC’s flagship deep water KG-DWN-98/2 Cluster-II development project in the prolific Krishna Godavari Basin. The U-field is the deepest gas discovery of the project, with gas production potential of about 3 million standard cubic metres of gas per day.

Gas terminals are one of most important pieces of the puzzle as India meets over half its gas demand through imports. The six LNG regasification terminals — Kochi, Dabhol, Dahej, Hazira, Mundra and Ennore — have 40 mtpa capacity. These are being expanded to 62 mtpa by 2024 with four new terminals, at Dhamra in Odisha, Jaigarh in Maharashtra and Chhara and Jafrabad in Gujarat. Existing terminals are also being expanded.

Petronet, for example, has two terminals, at Dahej (17.5 mmtpa) and Kochi (5 mmtpa). It is adding 5 mmtpa capacity at Dahej. It will be completed by the beginning of 2025.
The company is also likely to build a floating terminal at Gopalpur in Odisha. IndianOil LNG has developed a 5 mmtpa terminal at Kamarajar port in Ennore.

IOC has also entered into offtake agreements with developers of upcoming terminals at Dhamra (3 mmtpa) and Jafrabad (1 mmtpa). It may also double Ennore's capacity to 10 mmtpa when demand grows. The other big piece of the coming gas infrastructure is piped gas to homes to reduce dependence on costlier LPG bottling/distribution and lower use of more polluting ways of cooking food.

In end-March 2022, India had 93.02 lakh PNG connections and 4,433 CNG stations. There were 297 GAs authorised by PNGRB in 27 states and UTs. Two dozen companies have won bids for CGD infrastructure, including Gujarat Gas, Indraprastha Gas, Mahanagar Gas, Adani Total Gas, Torrent, besides OMCs and GAIL Gas that are focussed on specific regions.

India's projected demand of about 551 mmscmd natural gas (equivalent to 550.74 mmscmd) by 2040 is not a big ask in a world where already over 380 million tonnes (equal to nearly 7,000 mmscmd natural gas) is traded every year. After the Ukraine-Russia war, prices are widely expected to stabilize as Europe is set to import additional 137 mmscmd LNG in 2022. IEA's world energy outlook 2022 says U.S. gas demand will fall by 110 mmscmd by 2030.

Stronger climate policies will accelerate Europe's shift from gas. Due to current high prices, India's gas demand for residential PNG may grow a modest 2-5% in the shorter term, while CNG demand is expected to rise 25-30% on the back of expanding network of CNG stations and number of vehicles as per CRISIL.

India's gas consumption was low for last 10 years. Reliance Industries discovery at KG D-6 contributes 20% of domestic production (91 mmscmd) by supplying 19 mmscmd. Out of total natural gas produced in India, 67.3% is extracted offshore in West and East, and the rest in Assam (10%), Rajasthan (5%), Tripura (5%), Gujarat (4%), Tamil Nadu (4%), Andhra Pradesh (3%), Jharkhand, Madhya Pradesh, and West Bengal (2%) and Arunachal Pradesh (0.1%).

Net domestic production, 127 mmscmd in FY12, fell to 76 mmscmd in FY20, but rose to 91 mmscmd in FY22. As far as consumption goes, it went from 176 mmscmd in FY12 to 141 mmscmd by FY15. It rose slightly to 175 mmscmd by FY20 before Covid-19 reduced demand to 166 mmscmd in FY21. In FY22, it rose 6.9% to 178 mmscmd, the highest in the last decade.

Government, too, is focusing on finding new reserves and tapping existing fields. India is estimated to have natural gas reserves of 1.37 trillion cubic metres (TCM) but has been unable to tap much of this potential. ONGC plans to increase gas production from 57.3 mmscmd in FY22 to 57.5 mmscmd in FY23 and 66.6 mmscmd next year.

ONGC is going to develop the Daman Upside gas field project by investing ₹4,144 crore. ONGC is planning to invest ₹31,000 crore in exploration over the next three years and has roped in ExxonMobil as E&P partner. The company has cumulatively invested ₹1.5 lakh crore in E&P over past five years.

To date, 20 major projects with cost of ₹59,000 crore are under implementation. Reliance Industries is also increasing gas production. With commissioning of MJ Field by end-2022, KG-D6 will increase its contribution to India's gas production to nearly 30%.

RIL and BP are developing three deep-water gas developments in KG D6 — R Cluster, Satellite Cluster and MJ — expected to produce 30 mmscmd gas by 2023. Vedanta's Cairn Oil & Gas is aiming to expand gas production from 1,700 mmscmd to 4,700 mmscmd by 2026.

Oil India Ltd (OIL), which produced 8.2 mmscmd of natural gas in FY22, the highest since its inception 63 years ago, is pursuing E&P. It drilled seven exploratory and 31 development wells last year alone and is planning oil and gas exploration in Assam and other areas — Assam Shelf & Assam Arakan Fold belt, Rajasthan basin, Mahanadi onshore, Andaman onshore and Kerala-Konkan onshore.

Assets Abroad - India has 54 overseas oil and gas exploratory assets in 24 countries. ONGC Videsh has stake in 33 oil and gas projects in 15 countries and gets oil and gas from 14 assets — production was about 12.330 million tonnes oil equivalent (MTOE) in FY22, 1.4% of the projected Indian energy demand of 853 MTOE by 2030.

G2G Import Agreements - expected to account for 40-45% of India's gas imports by 2030. India's gas imports have risen from 49 mmscmd of LNG in FY12 to 88 mmscmd in FY22. Qatar accounts for 40% with the rest coming from the U.A.E., Oman, U.S., Russia, Nigeria, Angola, Nigeria and Australia. Iran has also expressed willingness to sell more oil and gas. GAIL has 14 mmtpa of LNG contracts — almost 4.8 mmtpa from Qatar, 5.8 mmtpa from U.S. and 2.5 mmtpa from Gazprom (Russia). GAIL is raising ₹25,000 crore for expansion over the next two-three years. In 2021, 372.29 mmtpa LNG was traded globally. India's share was 24.02 mmtpa (6.5%). The biggest importers were China (21.3%), Japan (20%) and South Korea (12.6%).

Petronet LNG Ltd is heading forward in establishing its presence on the east coast of India by signing a term sheet with Gopalpur Ports Limited on December 14, 2022 for establishing and operating LNG terminal at Gopalpur port in Odisha.

The company's board had accorded investment approval for setting up the floating storage and regasification unit (FSRU) based LNG terminal at Gopalpur. Petronet's project in the Ganjam district in Odisha, which is expected to be operational before the end of 2025, will be financed by a combination of debt and equity.

The next big hope is the India-Oman natural gas pipeline. South Asia Gas Enterprise, promoted by New Delhi-based Siddho Mal Group, and UK-based Deepwater Technology Company, plan to set up a Middle East to India Deepwater Pipeline from Oman-U.A.E. coast to Gujarat.

The pipeline can lead to savings of $1 billion a year according to current LNG prices So far, talks at G2G level have not progressed much, say industry sources. Other than natural gas, efforts are also on to meet demand via other forms of gas such as biomass.

Government aims to produce 15 MMT compressed biogas (CBG) from 5,000 plants by FY24 under Sustainable Alternative Towards Affordable Transportation scheme launched in 2018.

As the gas network comes into its own, India's dreams of transitioning to a gas-based economy will gradually become a reality.

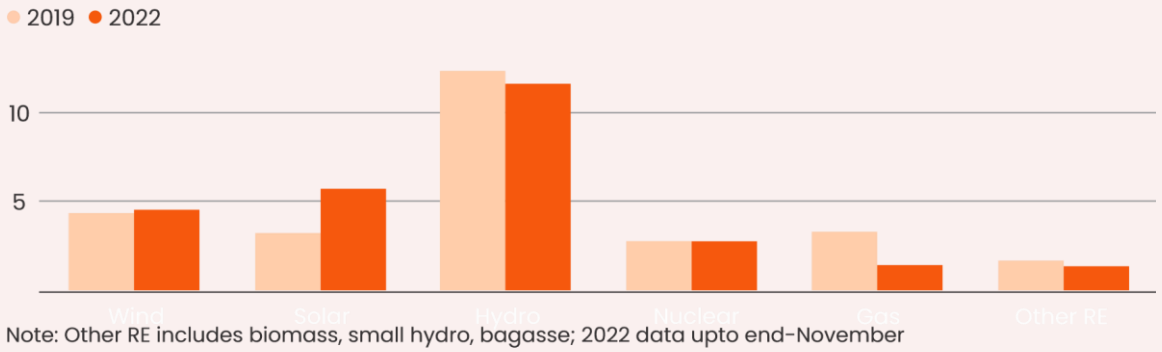
Northeast Gas Grid (NEGG) project of Rs. 9,265 crores are underway and will improve economy in NER.

Recently, India has asked state-run firms to increase imports of natural gas in anticipation of higher power demand next summer, three government sources said, aiming to avoid repeating a power crisis in April that was its worst in more than six years.

While the share of natural gas in India's power generation was just 1.5% this year, down from 3.3% in 2019 due to limited local availability and high global prices, the authorities see it as a crucial stop-gap power source for crunch times, especially when intense summer heat drives up air conditioning use.

Share of Fuels other than coal in India's power output

The share of natural gas in India's power generation has fallen to 1.5% this year, down from 3.3% in 2019, as the country has turned away from the fuel amid limited local availability and higher global liquified natural gas (LNG) prices. Coal accounts for nearly three quarters of output.



Note: Other RE includes biomass, small hydro, bagasse; 2022 data upto end-November
Source: Grid-India

In December 2022, The Petroleum and Natural Gas Regulatory Board (PNGRB) authorised a total of 33,603 km of natural gas pipelines in the country under the National Gas Grid. Kakinada - Vijayawada - Nellore natural gas pipeline forms part of the National Gas Grid.

IOCL is planning for Infrastructure development for utilization of Natural gas at Paradip Refinery. It is a strategic initiative for use of NG as an alternate fuel/Feed in HGU, TPS and Process unit Heaters. It is cost effective and better to control the emissions. The project envisaged for development of infrastructure for utilizing Natural gas as a fuel in GT, HRSG, Existing HGU (Under BOO) and new HGU coming up in Fuel quality upgradation project, utility Boilers and as make-up fuel in Process unit Heaters at Paradip Refinery.

IOCL is also planning for Development of Infrastructure facility for Utilizing Natural Gas at Haldia Refinery. It is a Strategic initiative for use of Natural Gas as an alternate fuel/ Feed for GT (Present fuel is Naphtha) and Process Heaters and Burners (present fuel is FO). It is very cost effective, environmentally friendly fuel and helps in better emissions control. Haldia Refinery currently utilizes Naphtha as feed and fuel for Hydrogen generation in HGU and as fuel in Gas Turbines for power generation. Internal Fuel Oil is consumed as fuel in Boilers and process unit furnaces. Refinery Fuel gas is consumed in process unit heaters.

The estimated Natural Gas consumption is 1.25 MMSCMD for process unit heaters, boiler-4 and Gas Turbines which is estimated to go up to 2.57 MMSCMD in the future considering HGU1 and HGU2.

Bharat Petroleum Corporation Ltd (BPCL) will invest Rs 1.4 lakh crore in petrochemicals, city gas and clean energy in the next five years as it looks to non-fuel businesses for growth. To expand natural gas footprints, BPCL is aggressively bidding and securing city gas retailing licenses. It, along with its joint ventures, now has licenses to retail CNG to automobiles and piped natural gas to households and industries in 50 geographical areas (GAs) covering 105 districts.

GAIL's total Capex for FY22 is Rs. 7,700 crores, mainly on pipelines, petrochemical, CGD projects, operational CapEx, equity contribution, and E&P. The different major projects that GAIL have in hand this financial year were Dhamra-Angu, Dhobi- Durgapur, Bokaro-Angul, Durgapur-Haldia, Barauni-Guwahati, Dhamra-Haldia, KKBMPL, Srikakulam-Angul, Mumbai-Nagpur-Jharsuguda; and major PC, a Petrochemical project, that is PDH PP that is coming near year in Usar.

The first compressed natural gas (CNG) Terminal in the world will be built near Gujarat's Bhavnagar port for an estimated cost of Rs 4,000 crore by a consortium of the Mumbai-based Padmanabhan Mafatlal Group and the UK's Foresight Group. The massive CNG Terminal project has a cargo handling capacity of 1.5 million metric tonnes per annum (MMTPA). India’s import dependency based on consumption for natural gas has decreased from 48.2% in Financial Year 2021-22 to 46.3% in Financial Year 2022-23 (April to October).

Table 3: Natural Gas Demand Supply

Natural Gas (MMSCM)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Production	28672	34024	33573	--	--
Imports	33031	31906	27021	--	--
Exports	0	0	0	--	--
Apparent Demand	60815	65037	60594	--	--
Demand Growth%	**-5.2%**	**6.9%**	**-6.8%**	**--**	--

As India is planning a massive expansion of LNG import infrastructure to spur gas demand, LNG prices have skyrocketed and increased attention on the global warming potential of methane (the major component of ‘natural’ gas) which is likely lead to a major risk of underutilization of this infrastructure with billions of dollars’ worth of investment. In a nutshell, to strengthen energy security, there is an urgency for investment in alternatives to gas to insulate India from balance of payments risks and from the fuel’s inflationary pressure — and, most importantly, to meet low-carbon goals.

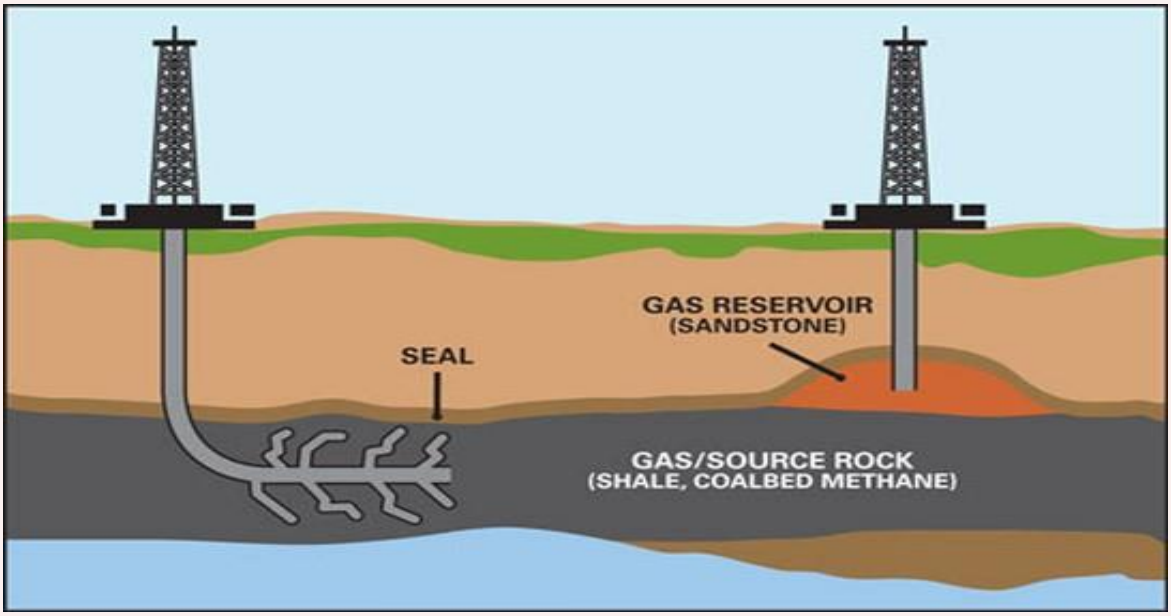
C. Coal Bed Methane

CBM, a natural gas which contains 90-95% methane, gets absorbed and stored in coal seams. India has a coal reserve of 285 billion tonnes, the world's fourth-largest coal reserves. and thus, holds significant prospects for exploration and exploitation of CBM.

The Government has set a vision to make India a gas-based economy, by increasing the share of gas in the energy mix. The Government is making all-out efforts to reduce gas import dependence and has set the gas production target of 50 BCM by 2023-24. In this context, to augment domestic gas production, MoPNG recently launched the Special Coal Bed Methane Bid Round-2021 (SCBM-21) with 15 CBM block are in 6 states and have prognosticated resource of 700 BCM.

In Oct 2022, India offered 26 oil and gas blocks and 16 coal bed methane blocks in its latest exploration licensing round, according to the country's upstream regulator, as the world's third largest oil consumer seeks to boost local output. India, also the world's third-biggest oil importer, ships in about 84% of its oil needs from overseas and wants to quickly monetize its oil and gas reserves to cut its import bill.

India's production of coal bed methane (CBM) for the 12 operational blocks at present is expected at 759 million Standard Cubic Meters (MMSCM) in FY23 and will further inch up to 1,072 MSCM in FY24. at present, 12 CBM blocks are active, 5 of which are in the production phase, 3 in the development phase, and 4 blocks (awarded during SCBM-21) are under the exploration phase.



The total prognosticated CBM resource of the active CBM blocks (12) is about 480 billion cubic meters (BCM) of which 5.4 BCM CBM has been produced up to October 2022. Government of India has now launched Special CBM Bid Round-2022 (SCBM-22) with the offering of 16 CBM blocks covering an area of around 5800 sq km across 7 States.

RIL is currently producing Coal Bed Methane (CBM) from Block SP (West)– CBM–2001/1. More than 300 wells are in production, with an average output of 0.73 MMSCMD gas during the year. To sustain plateau production, CBM development is being undertaken in Blocks SP (West)–CBM–2001/1 and SP (East)–CBM–2001/1.

In 2021, Reliance had sold three-fourths of the gas from the same CBM block to an affiliate of the company. India Gas Solutions Private Limited, a 50: 50 joint ventures of Reliance and UK's BP, bought 0.62 mmscmd out of 0.82 mmscmd gas bid out in that auction. State-owned gas utility GAIL India Ltd cornered 0.17 mmscmd while 0.03 mmscmd was picked by Reliance Gas Pipeline - the entity that transports gas from the CBM blocks in Madhya Pradesh to consumers. In March 2022, Reliance sold 0.65 million standard cubic metres per day (mmscmd) of gas from its coal-bed methane (CBM) block SP-(West)-CBM-2001/1 at a USD 8.28 per million British thermal unit. Reliance gets USD 6.13 for gas from its KG basin fields. In 2021-22 RIL production of CBM was 10.2 BCF.

Reliance Industries is confident of commissioning new gas condensate field by end of year. As per RIL, bringing on stream MJ development will boost Block KG D6's gas output to 30% of India's total. In the second quarter of its 2023 financial year, the operator realised an average $9.86 per million British thermal units for gas produced at Block KG D6 versus $3.62 per million Btu in the same period last year after the India government increased the gas price ceiling.

Reliance also benefited from a significantly higher price for the 2.43 billion cubic feet of coalbed methane it produced in the second quarter of its 2023 financial year, achieving $23.34 per million Btu – almost three and a half times higher than it had realised in same period for its 2022 financial year. Looking ahead, the ceiling gas price applicable for the R-Series and satellite fields on Block KG D6 will increase to around $12.46 per million Btu for the second half of this financial year. Reliance Gas Pipeline Limited, a subsidiary of RIL, operates the 302 km Shahdol-Phulpur Pipeline from Shahdol (MP) to Phulpur (UP), connecting the CBM gas fields with the Indian gas grid, thus providing access to consumers across the country. Reliance is seeking a minimum USD 12.75 per million British thermal unit for coal bed methane (CBM) from a block in Shahdol district of Madhya Pradesh, while ONGC wants USD 9.35 for the same kind of fuel from North Karanpura in Jharkhand, according to tender documents.

Reliance has sought bids for sale of 0.65 million standard cubic meters per day from CBM block SP(West)-CBM-2001/1 for one year beginning April 1, 2023. RIL is engaged in R&D efforts to increase recovery from CBM fields. The current focus of this research is Bio-CBM. In CBM, methane gas is produced that is adsorbed and trapped naturally in coal seams. The Bio-CBM technology uses microbe injection to produce in-situ methane in places where either the coals are devoid of methane or conventional CBM extraction is uneconomical.

Lab tests have shown encouraging results on the potential of methane production. Research is underway to verify if this technology can be scaled up to commercial level. RIL is leveraging its infrastructure (advance laboratories), diverse inter-disciplinary technical skills, CBM production expertise, CBM fields and knowledge of regulatory requirements to boost the Bio-CBM research.

Indian coalbed methane (CBM) producer Essar Oil and Gas Exploration and Production (EOGEPL) plans to drill 200 new wells at its Raniganj East field over the next two years with an investment of around 15bn ($190mn) to 20 bn INR.

Essar Oil and Gas Exploration and Production Ltd (EOGEPL) in June 2022 crossed the 0.8 million standard cubic meters per day (mmscmd) mark of coal bed methane production and is inching towards the benchmark of 1.0 mmscmd post commissioning of the Urja Ganga Pipeline. As per, EOGEPL said its next milestone remains 1.0 mmscmd of CBM production. EOGEPL is engaged in Raniganj East CBM Block in West Bengal. As of now, EOGEPL operates around 350 wells in the block and since May 2021.

In FY 2021-22, a 5 TPD (tonne per day) pilot plant was successfully commissioned by TATA at Jamshedpur to capture CO2 from blast furnace gas. They have also successfully tried continuous injection of Coal Bed Methane (CBM) gas in one of our blast furnaces. Great Eastern Energy Corporation Ltd, a pioneer in the field of coal bed methane in India, plans to invest about USD 2 billion (Rs 15,000 crore) in shale gas exploration at its Raniganj South block in West Bengal. GEECL signed the first CBM contract in India for the Raniganj South block on May 31, 2001. They were the first to commercialize CBM in July 2007.

Prior to this, the firm’s Coal bed methane block was under an agreement with Coal India Ltd since 1993. At that time, CBM was practically not present in Asia and was still at a nascent stage worldwide.

The Coal Ministry has released policy guidelines for utilization of more than 7,900 acres of mined out or de-coaled land for setting up thermal and renewable energy (RE) power plants, coal bed methane (CBM) extraction units, washeries, and coal to chemical plants, among other uses.

These holdings are mined out or practically unsuitable for mining and are prone to unauthorized encroachment which leads to government spending on security and maintenance, an avoidable expense.

On April 22, the Coal Ministry came out with policy guidelines for granting lease by land owning PSUs and coal PSUs to government and private sector entities. The Union Cabinet had already approved the proposal on April 13, 2022.

Coal Ministry has decided that the maximum lease period for coal-bed methane (CBM) extraction will be 30 years.

In September 2022, the government has signed contracts for 31 discovered small fields (DSF) under the third round of bidding as well as for four coal bed methane (CBM) blocks under the fifth round of bidding with 14 domestic companies, which have been awarded these blocks.

Among these blocks, the Oil and Natural Gas Corporation (ONGC) has signed six contracts for DSF, with 3 each for fields in the Arabian Sea and Bay of Bengal. These include four contract areas as sole bidder and two contract areas in partnership with Indian Oil Corporation Ltd. The ONGC has also signed two contracts for CBM fields situated in Jharkhand and Madhya Pradesh. Cairn Oil & Gas has also signed pacts for eight fields. The third round for DSF was launched by the government on June 10, 2021, where 75 fields were clubbed under 31 contract areas. The CBM bidding round was launched on September 22, 2021, which concluded on May 31 with 15 blocks under offer.

Table 4: Coal Bed Methane Demand Supply

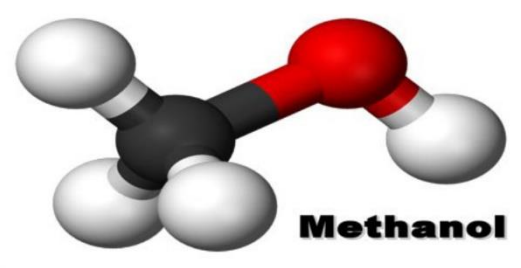
Coal Bed Methane (MMSCM)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Production	642	683	674	--	--
Imports	--	--	--	--	--
Exports	--	--	--	--	--
Apparent Demand	--	--	--	--	--
Demand Growth%	--	--	--	**--**	**--**

In yet another development, Oil and gas explorer Invenire Energy announce in December 2022 that it will invest USD 500 million (about Rs 4,137 crore) over the next 10 years to produce gas from coal seams (CBM) in a block in Madhya Pradesh. Invenire Petrodyne Ltd (IPL), a subsidiary of the company, won a Coal Bed Methane (CBM) block SP-ONHP(CBM)-2021/1 in Madhya Pradesh.

The revenue-sharing contract for the block, which is estimated to hold 2 trillion cubic feet of in-place resources, was signed in September.

Invenire received a production license in December 2022. The block is estimated to have a plateau of 3 million standard cubic metres per day of gas, which can be used to fire power plants, manufacture fertilizer or turned into CNG to run automobiles. The government is focused on raising domestic natural gas production to help increase the share of the environment-friendly fuel in India's primary energy basket to 15 per cent by 2030 from current 6.7 per cent.

D. Methanol



NITI Aayog's 'Methanol Economy' programme is aimed at reducing India's oil import bill, greenhouse gas (GHG) emissions, converting coal reserves and municipal solid waste into methanol. It is estimated that the methanol economy will create close to 5 million jobs through methanol production, application and distribution services. Additionally, Rs 6,000 crore should be saved annually by blending 20% DME (Di-methyl Ether, a derivative of methanol) in LPG.

Under the programme, five methanol plants based on high ash coal, five DME plants, and one natural gas-based methanol production plant with a total production of 20 MMT/annum in a joint venture with Israel are planned to be set up. In fact, Thermax Ltd., a private enterprise, has successfully developed a 5 KW methanol-based reformer on a Direct Methanol Fuel Cell (DMFC) with an aim of replacing DG sets in mobile towers.

India's major power producer NTPC Ltd has signed a non-binding Memorandum of Understanding (MoU) with Italy-based Maire Tecnimont Group's Indian arm Tecnimont Pvt Ltd. Through this move, the two organizations aimed to jointly evaluate and explore the possibility of developing a commercial-scale Green Methanol Production facility at the NTPC project in India.

Further, the scope of this Green Methanol project includes capturing carbon from NTPC power plants and converting it into green fuel. NTPC Renewable Energy Ltd's is in the process of setting up a pilot project at its Vindhyachal power plant in Madhya Pradesh, which will feature India's first carbon capture plant. As a pilot project, the facility will be set up in Vindhyachal, wherein carbon dioxide emitted from the plant will be mixed with hydrogen to form methanol.

India's GACL, NTPC REL to produce green methanol
India's Gujarat Alkalies & Chemicals Ltd (GACL) has entered into an agreement with NTPC Renewable Energy (NTPC REL) to produce 75 tonnes/day of green methanol and 35 tonnes/day of green ammonia.

The two plants, which will use renewable energy produced by NTPC REL, will be India's first commercial-scale green ammonia and green methanol projects. NTPC REL signed a memorandum of understanding (MoU) with GACL to realize green energy and green hydrogen objectives and the government's efforts towards a carbon-neutral environment.

NTPC will ensure a constant supply of 100MG (megawatts) of renewable energy to the plants. The methanol and ammonia output will be used by GACL at its Vadodara and Dahej complexes in western Gujarat state to produce various downstream chemicals.

India's first Coal to Methanol Plant starts commercial production
In Jan 2022, India's first indigenously developed Coal to Methanol (CTM) Plant started functioning with more than 99 % of purity opening a new avenue to convert high ash coals to methanol. The 0.25 TPD (Tons per Day) capacity CTM pilot plant was designed, developed, and installed by the BHEL, and has been producing methanol with 99 % accuracy. Significantly, this conversion of high ash Indian coals to methanol through the gasification route is the first of its kind technology demonstration in India. After this project, the government is going to set up more such plants to make the best use of high ash coal by converting it into methanol fuel.

SFC Energy, FC TecNrgy to manufacture hydrogen and methanol fuel cells in India
In April 2022, a German firm SFC Energy and FC TecNrgy have inked a pact to enter into manufacturing of hydrogen and methanol fuel cells in India. The venture plans to set up a manufacturing unit, Research & Development and a repair centre in Gurugram, Haryana. Further, they have also announced the launch of EFOY Hydrogen Fuel Cell in India which is expected to play a significant role in meeting the country's National Hydrogen targets which include plans to produce up to 5 million tonne of green hydrogen by 2030.

NTPC Floats Tender for a Methanol Synthesis Plant at its Facility in Uttar Pradesh
In October 2022, NTPC has invited bids to set up a 10-temperature programmed desorption (TPD) methanol synthesis plant at its Vindhyachal facility in Uttar Pradesh based on the design provided by TOYO, a Japanese hydrocarbon, and petrochemical engineering company.

Faridabad to have first waste to methanol plant by December 2023
The Municipal Corporation of Gurugram (MCG) has identified 8 acres of land in Faridabad's Sihi to set up a ₹200 crore waste-to-methanol plant, where 500 tonnes of waste will be converted into 50 kilo litres of methanol daily. Adding that the corporation is likely to sign an agreement this week with their door-to-door waste collection concessionaire Ecogreen so that waste is not sent to landfill and will be directly sent to the plant instead.

This will also resolve issues at material recovery facilities (MRFs) where waste is brought in a segregated manner and is then further segregated into various categories according to their reusability and recyclability. The Haryana State Pollution Control Board announced on November 16 that no more waste would be dumped at the Bandhwari landfill in the Aravallis from February 1 next year.

Green Methanol has a wide range of applications, including serving as a base material for the chemical industry, storing renewable electricity, and even as a transportation fuel. It is also considered a substitute fuel for maritime fuel applications. Green methanol can help the thermal power sector in tackling one of its biggest challenges — reducing carbon emissions.

NITI Aayog has drawn out a road map to substitute 10% of Crude imports by 2030, by Methanol alone. This requires approximately 30 MT of Methanol. Methanol & DME are substantially cheaper than Petrol and Diesel and India can look to reduce its fuel bill 30% by 2030.

With very little modifications to existing engines (vehicles) and fuel distribution infrastructure, 15% of all vehicle fuels can be converted to Methanol & Di Methyl Ether (DME).

In Jan 2022, Indian Oil Corp (IOC) rolled out M15 petrol -- 15 per cent blend of methanol with petrol -- on a pilot basis in Assam's Tinsukia district.

Methanol can also be added to diesel, which trucks carrying goods and involved long-distance trips use. Currently, methanol production is highest in two Coal India plants in Dankuni (2000 tons per day) and Asansol (1800 tons per day), while the five plants that produce methanol using natural gas produce a combined total of 2,192 tones daily. Much more can be done in the long term.

India is shortly going to implement Methanol 15 % blending program with Petrol and cost of petrol is expected to come down immediately by 10% and M100 program for buses and trucks is also to be implemented shortly.

Global engine manufactures like Volvo, caterpillar, Mercedes and in collaboration with Indian players can manufacture these engines under the Make in India and will result in big FDI investments. The development of this sector will bring jobs in the engineering sector.

Ashok Leyland has successfully converted trucks that run on CNG to run on only methanol. In Kerala, the state road transport corporation is trying out buses that run on 15 per cent methanol. Kirloskar is developing gensets that run on methanol and Ashok Leyland, power generators.

Methanol can also be used for ships and barges; it will also be cheaper than using diesel and certainly more useful when it comes to global warming. The "carbon factor" or the amount of emissions of carbon dioxide is lower in methanol than diesel, LNG and even ethanol. The CF or carbon factor in diesel is 3.206, in LNG, it is 3.015, in ethanol, it is 1.913, while in methanol it is 1. 375. Emission levels in methanol are almost half when methanol, made from biomass, is used, compared with heavy fuel oil and fossil-based LNG.

Worldwide due to emission regulations being implemented stringently by IMO (International Maritime Organization), marine sector is shifting to Methanol as fuel of choice. Being a very efficient in liquid form and practically generating no SOx or NOx, Methanol is much cheaper than LNG and Bunker / Heavy Oil. Sweden has already about 17 boats, ferries, barges and a 1500 passengers cruise ship running on Methanol.

India will convert about 50 Nos of vessels in the Port sector and various vessels owned by government entities to operate on Methanol. This opportunity will also be used to standardize all the marine regulations both sea and inland in parity with International Maritime Organization rules and with global standards.

Indian Railways consumes about 3 billion litres a year and the annual diesel bill is in excess of Rs. 15000 Crores. A Methanol locomotive prototype is being implemented by Indian Railways under a grant by Department of Science & Technology and once all 6000 diesel engines are converted to methanol (at very minimal cost of less than 1 crore an engine), the annual diesel bill can be reduced by 50%. Methanol conversion program in railways is complimentary to the goals of electrification in Railways.

The cooking fuel program of Methanol liquid fuel and LPG-DME blending is a low hanging fruit for India. A 20% blending program with LPG, without any infrastructure modifications would result in a immediate savings of Rs.6000 Crores a year. Lakhs of rural women will cook healthy and Methanol supplied in canisters would ensure fuel supply in the remotest part of North East and Himalayas.

India’s first indigenously Designed High Ash Coal Gasification Based Methanol Production Plant at Bharat Heavy Electricals Limited (BHEL) Research and Development Centre, Hyderabad was inaugurated in January 2022. The project was funded by the Department of Science and Technology, which provided a Rs 10 crore grant, at the initiative of NITI Aayog, PMO-India and the Ministry of Coal.

The 0.25 TPD (tonnes per day) capacity CTM pilot plant that has been indigenously designed, developed and installed by BHEL is currently producing methanol with purity of more than 99 per cent from high-ash Indian coal.

Significantly, this conversion of high-ash Indian coal to methanol through the gasification route is the first-of-its-kind technology demonstration in India

Recently the Indian government approached Deccan Water Treatment Pvt. Ltd. and its joint partner ScandiNAOS to promote methanol marine engines for the defence and maritime industry as part of a strategy to bolster energy security and improve air quality. Methanol is a viable, affordable alternative transportation fuel due to its efficient combustion, ease of distribution, and wide availability around the globe. India has set standards for M15 (15% methanol with 85% gasoline) for gasoline engines. Last year, ARAI along with automobile companies like Hero MotoCorp Ltd, Bajaj Auto, TVS, Honda Motorcycle and Scooter launched trials of M15 two-wheelers under the Methanol Economy program spearheaded by NITI Aayog.

Methanol can be used for producing various chemicals like formaldehyde, acetic acid and olefins which can be exported and can be high foreign exchange earners. Apart from coal, biomass/Municipal Solid Waste (MSW) to methanol can also be a viable option for India which can be dovetailed with Swachh Bharat Mission. The current availability of biomass in India is estimated to be in the range of 500-650 MT, however, a proper supply chain mechanism has to be created for the same so that there is a continuous availability of biomass for methanol production. Moreover, it can be an opportunity for India to use its landfills to convert it into methanol and avoid problems such as toxins leaching into the soil and release of GHG emissions etc. It can create close 5 million jobs through methanol production/application or distribution services.

Methanol, can provide a cleaner alternative in rural areas for those families not covered under the Pradhan Mantri Ujjwala Yojna. The Bureau of Indian standards estimates that even partial use of methanol would reduce the country's cooking fuel import bill by $US 100 billion and reduce pollution levels considerably.

The impact of using petrol and diesel with 15 per cent methanol would be considerable. If by 2025, 10 percent of Indian vehicles used fuel with 15 per cent methanol, carbon emissions would come down by 38,600 tons every year and import costs of petroleum would come down by about US$ 450 million. If by 2030, 25 percent of vehicles in India used fuel with 15 percent methanol, it would reduce carbon emissions by 116,000 tons annually and reduce petroleum import costs by US$ 1,350 million.

Similar benefits can be obtained by blending methanol based Dimethyl ether or DME in cooking gas. Using 20 per cent DME by 2025 will lead to import reduction of 4.5 million tons of LPG, saving US$ 2,450 million and by 2030, a 20 per cent blend would mean importing 5.7 million tons less LPG, saving US$3,160 million. It would also reduce the PM Ujjwala subsidy considerably.

The government is planning to convert its inland waterways and army trucks into methanol engines with an aim to promote alternative fuel to reduce India's dependence on imported petrol and diesel.

Table 5: Methanol Demand Supply

Methanol (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	634	634	661	757	804
Production	205	204	172	235	293
Imports	2173	2470	2677	2643	2681
Exports	9	16	16	16	16
Apparent Demand	2368	2632	2833	2862	2958
Demand Growth%	**3.5%**	**11.2%**	**7.6%**	**1.0%**	**3.4%**

Conventionally, methanol is produced from coal and natural gas. India is rich in coal reserves that can support the production of methanol. The National Coal Gasification Mission aims for 100 MT of coal gasification by 2030 to produce utility chemicals including methanol.

India has diverse sustainable feedstocks– such as captured carbon dioxide, municipal solid waste (MSW), and agricultural residue for the production of renewable methanol which is a carbon-neutral hydrogen carrier that offers a pathway for the energy transition. Bio-methanol produced from biomass feedstocks holds great potential to meet the growing energy demand and support the rural economy of the country. Indore was adjudged the cleanest city for the fifth year in a row in the Union government’s annual survey.

The Indore Municipal Corporation earns INR 80 million annually from the plants which convert waste into useful biofuel products. This could be amplified and extended to pan-Indian cities where bio methanol could support efficient waste management systems, provide economic opportunities, and reduce carbon footprints.

With the highest hydrogen-to-carbon ratio of any liquid fuel, methanol is a superior hydrogen carrier that supports the faster development of hydrogen economies by enabling the adoption of hydrogen as a fuel today. Thus, any investments in India’s methanol economy would be an investment in the hydrogen economy of the future.

Policy interventions to encourage the role of low carbon and net carbon-neutral fuels like renewable methanol would strengthen the country’s energy security and offer India a viable and practical alternative fuel that can be produced with indigenous resources.

Investments in dedicated pilot and demonstration of renewable methanol technologies with the inclusion of the private sector could enhance the scale-up of the renewable methanol. Beyond policies to support production, there should also be a focus on demand creation for renewable methanol in the Indian market.

There is a need to develop a supportive policy landscape that creates commercial opportunities for the increased adoption of methanol for different applications such as mobility and power generation. Additionally, India could also look at the scope of expanding its markets internationally positioning itself as an international hub for renewable methanol production with the intention of exploring exporting opportunities.

xv. Building Blocks

A. Ethylene & Propylene

Ethylene Capacity touched 7853 KT in India in 2022-23 and is expected to increase to 8677 KT in next fiscal with capacity additions planned by HMEL. Ethylene consumption in the country rose from 7253 KT in 2021-22 to 7333 KT in 2022-23 and is forecasted to witness a further growth next fiscal to 7557 KT, before touching 7701 KT by 2024-25.

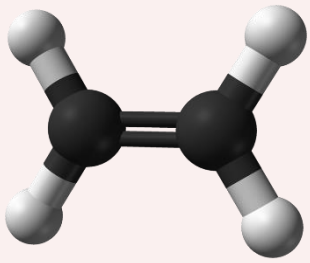
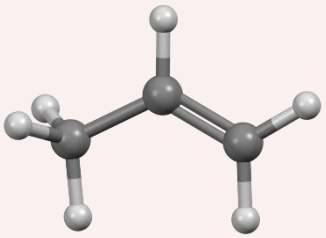


Table 6: Ethylene & Propylene net availability

Ethylene (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	7477	7477	7853	8677	8677
Production	7158	7311	7312	7595	7761
Imports	50	59	56	31	60
Exports	134	118	35	70	120
Net Availability	**7074**	**7253**	**7333**	**7557**	**7701**
Propylene (KT)	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	6614	6614	7071	7602	7602
Production	5621	5835	5908	5735	5923
Imports	10	27	15	0	0
Exports	15	0	0	0	0
Net Availability	**5615**	**5862**	**5923**	**5735**	**5923**

Exports of Ethylene witnessed a dip from 35 KT in 2022-23 and is projected to rise to 120 KT levels once again in 2024-25. While production rose from 7311 KT to 7312 KT in 2022-23. It is forecasted to increase further in next fiscal year i.e., 2023-24 to 7595 KT and then bounce back to 7761 by 2025.



Propylene demand rose from 5862 KT in 2021-22 to 5923 KT in 2022-23 and is expected to rise further to 5735 KT by 2023-24 and further to 5923 KT by 2023-24. Capacity is expected to witness an increase from 7071 KT presently to 7602 KT by 2023-24 with HMEL plant becoming fully operational. Production rose from 5835 KT in 2021-22 to 5908 KT in 2022-23. It is projected to witness a dip and touch 5735 KT in 2023-24 before rising and touching 5923 KT by 2024-25.

The Ratnagiri Refinery & Petrochemicals Ltd (RRPCL), has seen a cost increase by India by 36 per cent to $60bn. RRPCL has previously described this complex to be capable of 1.2 million barrels a day of processing capacity for Euro-VI fuels and aviation fuels with an eventual petrochemical component of over 50 units. The original location for the refinery was Nanar in Maharashtra's Ratnagiri district but this was scrapped in March in 2019 following protests by the locals. The Ministry of Environment, Forest and Climate Change had provided environmental clearance for the Ratnagiri oil refinery in March 2018. The project was earlier proposed at Nanar village in the Rajapur taluka in 2014. A survey was undertaken, along with soil testing and the submission of a feasibility report and environmental permissions. However, the project came to a standstill due to protests over land acquisition. It was later proposed at Barsu and Solgaon, the other side of Nanar near the Jaitapur Atomic project.

A total of 11 villages are set to be affected by the project. Among these are Barasu, Solgaon, Goval, Devache Gothane, Shivane Khurd, Sogamwadi, Rautwadi, and others that are located around the Arjuna river in the Rajarpur taluka. Delays in acquiring a 15,000-acre land parcel have almost stalled the project, initially planned for 2025, and boosted costs by 36% to $60 billion, as per estimates made in 2019.

In Feb 2022, Bharat Petroleum Corp Ltd (BPCL) decided to discontinue its planned specialty polyols petrochemicals project in Kochi due to cost overruns, and instead looking at building polypropylene (PP) plant at the site. The proposed polyols project was supposed to have a 250,000 tonnes/year polyols plant, a 100,000 tonnes/year propylene glycol (PG) unit, a 300,000 tonnes/year propylene oxide (PO) line and a 140,000 tonnes/year Monoethylene glycol (MEG) plant.

Feasibility studies and other pre-project activities are in progress to establish ethylene cracker project at Bina Refinery in Madhya Pradesh and a polypropylene project at Kochi Refinery in Kerala. Planned PP plant at the site would use up 250,000 tonnes/year of propylene, which were initially earmarked for the polyols project. The company produces 500,000 tonnes/year of propylene at its Kochi refinery, half of which goes into various downstream operations at the site.

The projects are likely to take around four years for completion once the environmental clearance is received and are expected to come on stream by 2026.

In January 2022, Bharat Petroleum Corporation Limited (BPCL) set up a superabsorbent polymer (SAP) technology demonstration plant of 200 tonne per annum at the Kochi Refinery. Using the in-house acrylic acid as feedstock, SAP technology is used in various hygiene products such as diapers and other incontinence products. Bharat Petroleum Corporation Limited's Kochi refinery dispatched the first indigenous superabsorbent polymer from its Propylene Derivatives Petrochemical Complex in July 2022.

Superabsorbent polymer (SAP), the key component of sanitary napkins, and other incontinence products is being produced for the first time in India. The technology for this niche petrochemical is not available for licensing, and the R&D centre of BPCL took this challenge to develop an end-to-end process for the production of hygienic SAP, and a demonstration plant of 200 tonne per annum have been set up at Kochi Refinery. SAP is made using the in-house acrylic acid produced at Kochi Refinery.

The demonstration project will be followed by setting up a commercial plant of 50,000 tonne per annum capacity, thereby saving foreign exchange worth ₹1,000 crore to make India Atmanirbhar in this niche, and fast-growing segment.

BPCL R&D team has developed the technology for production of hygiene grade SAP.SAP is produced using the acrylic acid which is manufactured at the new Propylene Derivatives Petrochemical Complex at Kochi Refinery. Presently, manufacturing units of these products in India are importing SAP. Large quantity of napkins, diapers and under-pads are also being imported.

Assam-based Numaligarh Refinery Limited (NRL)has achieved financial closure for its upcoming 6 MMTPA refinery expansion project. Numaligarh has finalized more details of the new diesel hydrotreating unit it will be installing as part of its multi-year expansion.

Toyo Engineering Corp. a subsidiary, Toyo Engineering India Pte Ltd, had been awarded a contract by NRL for the engineering, procurement, construction and commissioning of 3.55 million mt/year diesel hydrotreating unit. The finalization of the details came on the back of the refiner saying in May it will use Honeywell's UOP technology to produce clean-burning diesel fuel in compliance with India's Euro 6 emissions standards and increase crude oil conversion. NRL is undertaking a project to triple its capacity to 9 million mt/year. Numaligarh Refinery Ltd. has also Axens to provide technical support and licensed technology for its planned expansion.

Axens will provide technical support and license a naphtha hydrotreating unit, continuous catalytic reforming unit, isomerization, and fluid catalytic cracker. The company was aiming to complete the expansion project by 2025.

Indian Oil Corp. has received environmental clearance for a capacity upgrade project at its Mathura refinery. The capacity expansion project includes residue upgrade and distillate yield improvement programs. The upgraded crude processing capacity will be 11 million mt/year.

India's HPCL had postponed its target of raising its existing capacity of 8.3 million mt at its Vizag refinery to 15 million mt by December 2022. In 2020, the refiner had set the target for capacity upgrade by 2023-24 (April-March).

The latest revised completion deadline for the expansion project brought forward the target by two years. The initial deadline for the completion of the project along with a bottom-upgrade program was March 2020. The expansion project involves the installation of primary processing units such as a CDU -- replacing one of the three existing CDUs -- a hydrocracker, and a naphtha isomerization unit.

Indian Oil Corp. has awarded an engineering, procurement, construction, and commissioning (EPCC) contract to Paris-based Technip for its expansion project at the Barauni refinery in the eastern state of Bihar. The contract involves the installation of a 1 million mt/year "once-through" hydrocracker unit (OHCU), a fuel gas treatment unit (FGTU) and associated facilities.

The expansion project will increase its capacity by 50% to 180,000 b/d and add petrochemicals such as polypropylene to the product portfolio. The initial plan for the completion of the capacity project was scheduled for 2021. But the second wave of the coronavirus pandemic may result in this being rescheduled. The Project envisages capacity expansion of Barauni refinery capacity from current 6.0 MMTPA to 9.0 MMTPA. The expansion would enhance the flexibility in operations and would also improve the refining margin. It is also proposed to implement Polypropylene unit of 200 TMTPA capacity for processing propylene feed stock.

In March 2023, it was announced that the capacity of Bongaigaon Refinery and Petrochemicals Ltd, a part of Indian Oil in Assam's Chirang district will be expanded to five million metric tonne per annum from the existing 2.7 MMTPA

IOC has asked the Union ministry of chemicals and fertilisers to make available the adjacent 175 acres land of the defunct Hindustan Fertilizer Corporation for the project. The company plans to replicate the Paradip model at Haldia. At the Haldia refinery, IOC is currently setting up a second Catalytic Dewaxing Unit (CDW-II) at a cost of Rs 1,019 Crore. The CDW unit will help in augmenting API Group-II & Group-III Lube oil base stock (LOBS) production.

IOC-owned Gujarat refinery's capacity expansion project is set to be over by Sept. 30, 2024, a delay of one-and-a-half years from the previous deadline. The delay is primarily a result of the coronavirus pandemic. The initial deadline was contemplated for 2020. The existing smaller capacity atmospheric unit and vacuum units will be replaced by a large atmospheric vacuum unit (AVU). The project also involves a revamp of the existing hydrogen generation unit, a new n-butanol processing unit and a revamp of the linear alkylbenzenes (LAB) unit.

Nayara, which operates a 20 million tonne-a-year oil refinery at Vadinar in Gujarat, has adopted a phase-wise asset development strategy to enter into the petrochemicals sector. Under Phase-1 of the project, Nayara is setting up a 450-kilo tonne per annum polypropylene plant at its Vadinar refinery in Gujarat - a propylene recovery unit along with upgrades to the existing FCC Unit (Fluidized Catalytic Cracking Unit) and a polypropylene unit (PPU).

The company had laid the foundation stone for their petrochemical project for a 450 KTPA polypropylene plant in November 2021. As per company, the Phase-1 project development has achieved over 85 per cent progress and expects production of its first petrochemical product i.e., polypropylene by Q4 of 2023.

The refinery expansion project is part of the government of India’s initiative towards “Hydrocarbon Vision 2030” for the northeast region of India. The efforts are aimed at exploiting the region’s hydrocarbon sector to facilitate economic development, enhance the access to clean fuels, increase the availability of petroleum products and create employment opportunities. Numaligarh Refinery Ltd (NRL) will use Honeywell UOP technology to produce cleaner-burning diesel fuel in compliance with India’s BS-VI emission standards and increase crude oil conversion.

The LuPech project will produce import substitutes like Lube Oil Base Stock (LOBS) and Polypropylene. The Acrylics/Oxo Alcohol Project at Dumad and Gujarat Refinery will manufacture value-added Butyl Acrylate, a key ingredient for paints, coatings, adhesives, textile chemicals, plasticizer industry, and other similar products.

Indian Oil has let a contract to Chevron Lummus Global to license process technologies for units involved in the LuPech portion of its project to expand crude oil processing capacity of its Koyali refinery.

The inclusion of the petrochemical-lube integration component comes as part of IOC's strategy to create a building block for future production of niche chemicals with a potential to increase petrochemical and specialty products integration index on incremental crude throughput to improve margins.

These projects will strengthen the IOC's readiness for venturing into petrochemical projects like PVC, Styrene, Acrylonitrile, Poly-Methyl Methacrylate and Ethylene Oxide in future. The Petrochemicals & Specialty products (Gr-II/III LOBS) integration index based on additional crude oil added under this project is estimated to be 20.7%.

As per IOC, MoU was also signed for infrastructure facilities at Dumad for Koyali-Ahmednagar-Solapur Pipeline and tank truck loading facility for Linear Alkyl Benzene (LAB) - a feed-stock for detergent industries.

The other infrastructure projects envisaged are a new flare system at the Gujarat refinery and a hydrogen dispensing facility for Fuel Cell Electric Vehicles (FCEV).

The refinery will be implementing India's first hydrogen dispensing facility as a clean fuel initiative. This facility aims to fuel hydrogen buses plying between Vadodara and Kevadia /Sabarmati Ashram. Gujarat Refinery is now poised to grow to 18 MMTPA capacity. New units for the production of polypropylene, butyl acrylate and lube oil base stocks will also be added to the refinery's portfolio.

State-owned Indian Oil Corp (IOC) board in Sep 2020 approved an investment of Rs 1,268 crore for setting up a needle coker unit at the firm's Paradip refinery in Odisha.

At the 15 mtpa capacity Paradip refinery, IOC is setting up a Paraxylene & Purified Terephthalic Acid (PX-PTA) unit with capacity of 1.2 MMTPA at Paradip in Jagatsingpur district of Odisha. The Rs 13,805.00 Crore project is expected to be ready by January 2024. As of November 2022, around 54 per cent work on the project was completed and an amount of Rs. 2002.71 crore expenditure was incurred on the project.

Once complete the project is expected to generate employment of around 10,000 people. The hydrocarbon processing complex comprising a light crude oil refinery, aromatics complex and ethylene cracker units.

In addition to Haldia Petrochemicals, the HLCA also approved the proposal of state-run Indian Oil Corp to set up a polyester product manufacturing unit of 300 kilo tonnes per annum (KTPA) capacity at an investment of $ 280 million in the textiles park coming up at Bhadrak district. The proposed textile park of Indian Oil Corporation Limited (IOCL) in Bhadrak will be functional in 2023-24.

The project will create employment opportunities for many people and is expected to be implemented within four years of land allotment. Considering the large population base and high GDP growth rate of Odisha and the country overall, the demand for these products is likely to be huge.

It is worth considering that entire eastern India and nearby countries like Bangladesh are dependent on sourcing polyester fibres from the western part of India to meet the clothing demand of the region.

Therefore, it is envisaged that setting up PTA unit will trigger investment in these products and will catalyze the growth of further downstream processing units along the value chain, driving economic growth of the region. Since the total polyester chain starting from spinning to garments is a labor-intensive process, it is estimated that direct and indirect employment generation potential of the project is about one lakh people.

GAIL is diversifying its Petrochemical business by entering into Polypropylene business. GAIL is setting up a 500 KTA PP plant based on PDH technology at Usar, Maharashtra to be commissioned by 2025 and another 60 KTA PP plant is also being set up at PATA petrochemical complex to be commissioned by 2024.

M/s W R Grace is the technology Licensor for both the upcoming PP plants and will be utilizing Unipol PP process technology with latest generation catalyst to produce world class PP products. Homopolymer Polypropylene grades will be produced at Usar PP plant whereas both Homopolymer as well as Co-Polymer Polypropylene grades will be produced from Pata PP plant.

GAIL (India) Ltd has revised its petrochemical expansion plan of Pata petrochemical complex and has decided to add some offsite storage facilities to ensure efficient feedstock and product storage. As per the GAIL's initial strategy, the investment capital over the addition of 60KTPA Polypropylene unit at the gas-based Pata petrochemical complex in Uttar Pradesh was estimated around INR 7.50 billion.

However, the PSU came up with some changes after a detailed study of the project plan wherein it suggested some necessary additions, particularly with respect to the feedstock and product storage facilities. The company has henceforth escalated the project cost by over 20% to INR 9.10 billion. According to a company official, since the petrochemical site is landlocked, one of the important additions to the project plan will be an offsite warehouse capable of holding nearly two months of Polypropylene inventory.

As per the project proposal, GAIL plans to use around 50,000 tpy of polymer grade Propylene produced at the Pata plant as the key feedstock for the new PP unit. Currently, GAIL is selling the Propylene produced at its Pata complex to several clients.

In addition, the Pata complex has the capacity to produce 810 KTPA of Polyethylene (PE) and 20 KTPA of Butene-1.

Polypropylene, popularly known as PP, is a tough crystalline thermoplastic produced from Propylene serving versatile applications such as plastic, fibre in automobiles, consumer goods and furniture, apart from other industrial uses.

By stepping into Polypropylene production, GAIL is expanding its petrochemicals portfolio and entering the league of major manufacturers of the country when India is already following the footsteps of becoming a global manufacturing hub.

GAIL is planning to import ethane from the US to replace natural gas and naphtha as feedstock at petrochemical plants. GAIL has signed a memorandum of understanding with Shell Energy India to explore opportunities for infrastructure development for ethane sourcing. GAIL in Feb'23 floated a tender to hire a very large ethane carrier (VLEC) for 20 years starting mid-2026 for importing ethane from the US. The ship with capacity of 80,000 to 99,000 cubic metres is targeted to take deliveries from the US ports of Marcus Hook, Nederland, Morgan's Point or Beaumont and deliver ethane at Dahej or Hazira in Gujarat or Dabhol in Maharashtra.

GAIL has a petrochemical plant at Pata, near Kanpur in Uttar Pradesh, and is also looking to set up another unit at Usar in Maharashtra. The company had to cut down on run rate at Pata after the government diverted gas supplies from the plant to city gas suppliers. This led to its profitability being impacted and so now the company is looking to supplement the feedstock with ethane.

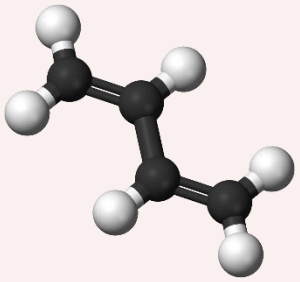
A consortium of Tecnimont SpA and Tecnimont Private Ltd., subsidiaries of Maire Tecnimont SpA, have received a contract from Indian Oil Corp. Ltd. (IOCL) to set up a new paraxylene unit and relevant offsite facilities in Paradip, Odisha, India. The project will involve construction of a new 800,000-t/y paraxylene plant, which will feed an adjacent 1.2- million-t/y purified terephthalic acid (PTA) unit. Both facilities are expected to be complete by early 2024.

Under the lump-sum contract, valued at around $450- million, the consortium will be responsible for the engineering, procurement, construction and commissioning activities of the paraxylene unit up to the performance guarantees test run. IOCL is currently building a 357,000-t/y ethylene glycol (EG) plant at Paradip, which is scheduled to begin operations towards the end of this year. PTA from the new complex will be used as feedstock in the EG plant.

Ethylene Glycol is extensively used in the manufacture of items like polyester fibre, bottle & film grade chips, solvents, coolant, textiles, packaging, PET film, sheet and molded containers for food packaging, which have a sustained industrial demand. The project is seen as a key driver for the growing textiles industry in the region and will cater to the rising demand for polyester fibre.

With a textiles park proposed at Bhadrak, there will be huge opportunity for supplying raw material to downstream textile units.

B. Butadiene



Butadiene market on application basis is segmented into plastic, chemical and rubber industry.

It is a raw material for PBR, SBR, NBR, ABS, Adiponitrile, Styrene Butadiene Latex, and other applications. The market was negatively impacted by COVID-19.

Prices of Butadiene had climbed up in the Asia-Pacific region during the first quarter of 2022, owing to increased demand for Butadiene in the manufacturing of synthetic rubbers. Butadiene costs had risen due to increased demand for elastomers in the region. High upstream crude oil prices then, as well as a scarcity of supply in the region as a result of Russia's invasion of Ukraine, had a substantial impact on production rates and operational costs. Because there was no competition, the rising value of upstream Crude oil put pressure on industries to meet downstream demand. As a result, the crisis in Ukraine severely hampered supply networks.

Butadiene prices surged in the Asia-Pacific region during the second quarter of 2022, owing to boosted demand for Butadiene manufacturing synthetic rubbers. Butadiene costs have risen due to the high demand for elastomers in the region. Prices in China appeared to be growing despite an increase in Covid cases and shutdown limitations. Furthermore, the high costs of Butadiene were attributed to the skyrocketing crude oil value amidst the Russia-Ukraine war.

During the third quarter of 2022, Butadiene prices showed mixed sentiments in the Asia- Pacific region. During July and August, prices plunged by 8.1% and 14.6%, respectively. The price decline was attributed to insufficient inventory and weak demand from the downstream synthetic rubber industries

Butadiene price has witnessed an upward trend in the Asia and European markets, backed by the improved buying sentiment in the region. In addition, volatile energy prices, the reopening of the Chinese market, high Asian import prices, and sanctions on Russian imports by the European Union further accelerated the prices of Butadiene in the respective regions.

In initial periods of FY 23 Butadiene prices surged owing to boosted demand for Butadiene and high crude oil prices. From Q2 prices plunged due to insufficient inventory and weak demand from the downstream industry and prices showed recovery by Q4.

Butadiene prices are anticipated to intensify across Asian and European markets in the coming quarters of 2023. Additionally, demand from downstream Synthetic Rubber, Polymer, and other industries is expected to increase in Q2 and Q3 of 2023 as it is the major demand season for the automotive and construction industries

While automotive and parts manufacture play by far the largest role, other industries producing electronics, plastic goods (e.g., gloves), and appliances are also influencing the global butadiene market.

Butadiene and butadiene derivative production in this region remain limited to India. This is not expected to change in the foreseeable future. Butadiene capacity additions in the last decade outpaced investments in derivatives, enabling India to become a significant exporter of refined butadiene. In contrast, India remains a net importer of butadiene derivatives, primarily SBR and PBR. SBR import volumes have declined with the start-up of new SBR plants by Reliance and IOC, but they will increase again as strong automotive production growth is expected throughout the forecast period.

Table 7: Butadiene Demand Supply

Butadiene (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	605	605	605	605	605
Production	461	505	462	505	505
Imports	0	0	0	0	0
Exports	134	163	150	159	155
Apparent Demand	327	342	312	346	350
Demand Growth%	**-0.6%**	**4.6%**	**-8.8%**	**10.9%**	**1.2%**

The region has historically been a net exporter of butadiene monomer as OPaL and Haldia Petrochemical do not have any downstream derivative units. This trend will increase the region's net import position in butadiene net equivalent trade to an estimated 300,000 metric tons by the end of the decade. Haldia exported 61 KT of Butadiene in CY22. It is vital to mention that Asia is and will remain a key region with respect to butadiene rubber consumption and production.

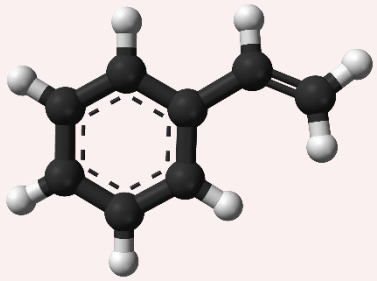
Lummus Technology in April 2022 announced that its Green Circle business and Synthos S.A. have reached a major milestone in the development of advanced bio-butadiene technology. After completing a successful feasibility study in 2021, Lummus and Synthos have concluded that the bio-butadiene technology is ready for implementation, and the companies have agreed to move into the engineering and design phase of the project.

Given the confidence in the technology and the strong market demand for renewable materials, Synthos has committed to building a plant with a capacity of 40,000 metric tons of bio-butadiene per year – twice as much as the companies had originally planned. In addition to the plant capacity expansion, Synthos has confirmed that it will license BASF's butadiene extraction technology from Lummus and leverage Lummus' digitalization capabilities for operational efficiency and reliability.

The commercialization with Synthos of this biotechnology for more sustainable rubber products is one of several sustainable process solutions that are making a positive impact. Lummus Technology (Houston) announced that Butadiene LLP has selected its iC4 CATOFIN, CATADIENE, CDMtbe technologies and BASF's butadiene extraction technology for units at Butadiene LLP's new petrochemical plant in Atyrau, Kazakhstan.

C. Styrene

The entire demand for styrene is met through imports due to lack of any production facilities within the country. This makes the demand susceptible to international fluctuations in prices as well in its availability. Benzene, the primary feedstock for styrene, has a direct influence on the supply of styrene to India since feedstock prices determine the prevalent market dynamics.



Due to lack of production facilities, India is entirely dependent on imports from other countries to meet its growing styrene demand. An abrupt change in international prices therefore, harshly affects domestic users in the country. Since there are no plans of any capacity initiations in the near future, international producers hold an extraordinary grip on the domestic market.

The prices of Styrene in the Asia-Pacific region followed the uptrend sentiments in Q1. Flourishing downstream industries, such as plastic rubber, disposable cups affected the market sentiments positively in the domestic market. The feed stock Benzene and Ethylene prices surged up accompanying crude oil prices. The outbreak of Omicron virus in China, forced the manufacturers to halt their production causing supply disruption in the Asia-Pacific market as major manufacturers have terminated their production temporarily. The prices of Styrene in January observed to be $1197/ton CFR Shanghai, China.

Asia-Pacific region observed a positive growth of Styrene towards the quarter-end. Monthly average styrene price – (SEA basis) gained around 11% since Feb to reach $1397/ton in March 2022.

As styrene surged to $1397/ton SEA within a month, it became a major concern for all ABS producers, as styrene monomer forms 55% of ABS production. As of the first two weeks of March, Styrene prices settled down USD at 1410/tonne. This was the highest since Feb 2020.

During the third Quarter of 2022, Styrene prices in the Asia-Pacific region fell. The drop in feedstock Benzene and Ethylene prices as a result of the slowing crude oil values was a crucial element influencing the market dynamics of Styrene. In China, production costs fell in tandem with feedstock prices. On the other hand, in the Indian market, Styrene prices were stable in terms of demand during Q3.

Steady demand, government levies, rupee-dollar depreciation, and refinery concept ratio have all impacted domestic petroleum prices, according to market participants. Furthermore, the availability of sufficient feedstock with Indian manufacturers and competitiveness in the Indian market have prompted manufacturers to lower Styrene pricing in the Asia Pacific region.

The Asia Pacific market witnessed a continuous decline in Styrene prices on the back of falling feedstock Benzene prices. The high production rates, coupled with muted demand from the downstream industries, kept the prices for the product very low throughout Q4.

The Chinese market remained quiet in Q4 due to the covid restrictions and muted demand in the Chinese domestic market. Similarly, the Korean market remained loaded with supplies, and thus India could import Styrene at a discounted rate.

Styrene is relatively inexpensive to move and hence, widely exchanged between different regions. Asia currently accounts for more than half of global styrene demand and is expected to remain the global styrene growth driver. Continued industrial development, population growth and rising income levels are key drivers, all of which are dominant in the upcoming Asian markets and in India.

The Indian Styrenics Market stood at 889 KT in 2021-22 while it is expected to touch 1173 KT in 2022-23 with imports touching 880 KT in April-Jan period. The demand of Styrene has been continuously increasing in Indian plastics market from past few years. The end segment with high styrene consumption has been automobiles, packaging, building and constructions, consumer products, medical devices and others. The favorable government policies & rapid expansion in projects such as Smart Cities has increased consumption of styrene used in the plastic products.

The major demand for styrene is from the automotive application in which it is used as an alternative material to metals and steel to reduce the weight of the vehicle which in turn increases the efficiency.

Indian Styrene Market was impacted by COVID-19 in 2021-22, however with a buoyant retail sale of vehicles in India a jump of 16% to around 1.8 million units in February, helped in part by strong demand during the wedding season, and ease of chip storages, automakers launching new models to tap into the rising demand has helped demand for Styrenics in India. The demand for products like nylon tires, foam seating, and paints, which are made from benzene-derived intermediates like nylon, styrene, and phenol resins, also witnessed a surge in market demand.

West India has been dominating the market accounted about 65% of the Styrene market in FY2022. Western states like Gujarat and Maharashtra have been the key consumer of styrene due to presence of leading industries of paints & coatings, packaging and automotives located in these regions. By FY2023, imports meet all of India's styrene requirement. Although India Oil Corporation Limited (IOCL), one of the biggest refineries for refining, transportation and marketing of petroleum products is aiming for a greenfield expansion at Panipat, Haryana, which is estimated to be operational by FY2026-27 with a capacity of 387 KT. This shall help the imports coming into India to reduce.

Table 8: Styrene Demand Supply

Styrene (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Imports	738	889	1173	1266	1368
Exports	0	0	0	0	0
Apparent Demand	738	889	1173	1266	1368
Demand Growth%	**-15.8%**	**20.5%**	**31.9%**	**7.9%**	**8.1%**

The downstream ABS and polystyrene (PS) markets witnessed good demand in 2022 with demand from end-users such as the home appliance and automotive industries. A lot ultimately depends on the global economic recovery. Imports are projected to increase ~8% in next two fiscals to reach 1368 KT by 2025.

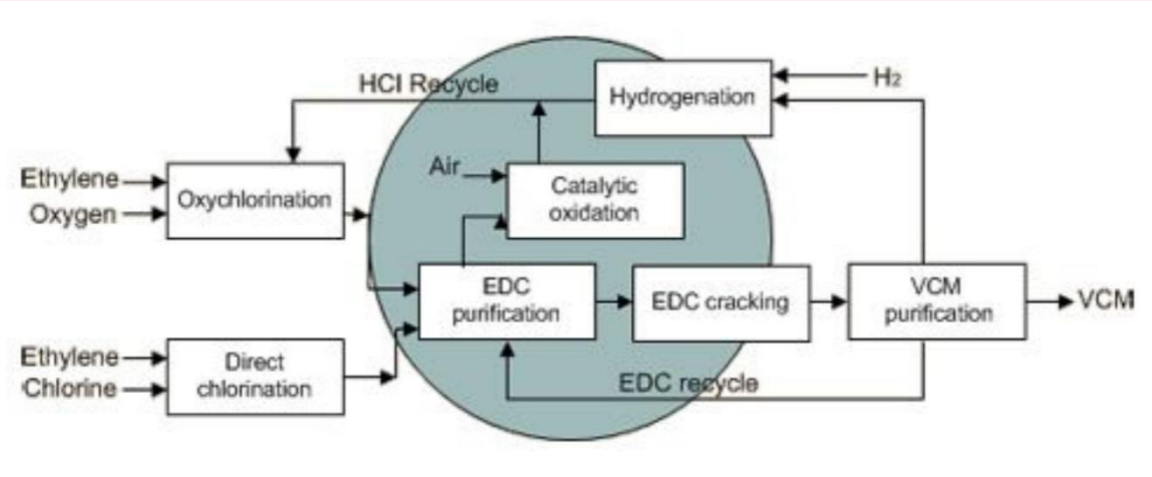
In September 2022, the Indian government once again extended the implementation of mandatory quality certification for styrene imports till 3rd April 2023. Some international suppliers are already registered with the Bureau of Indian Standards (BIS) for certification, but the completion process may take longer.

D. EDC and VCM

Almost the entire production of EDC and VCM in India are consumed captively by the polymer manufacturers for production of PVC and hence, PVC manufacturers who do not have facilities for captive production of EDC and VCM have to rely entirely on imports to meet their demand for PVC building blocks viz. EDC and VCM.

RIL has committed to establishing a chemical manufacturing unit in Abu Dhabi to generate 940,000 MTPA Chlor-Alkali, 1.1 MMTPA, Ethylene Dichloride (EDC) and 360,000 MTPA Polyvinyl Chloride (PVC) facility.

In India, the price of Ethylene Dichloride reduced in Q1 2022 when compared with previous quarter due to slipping feedstock Ethylene and Chlorine market. However, the market sentiments improved in the month of March and prices rose due to strong downstream market.



Feedstock Ethylene prices marched high with improved product demand on the back of constrained product availability in the region. On the top of that, the demand of Ethylene Dichloride in the region surged supported by price gain. Upstream crude oil prices also jumped in the Asian market due to accelerating tension between Ukraine and Russia. In India, the price of Ethylene Dichloride towards the quarter end were observed to be USD 788/ton CFR Mundra. Downstream PVC market remained on the lower end with deterred construction sector and high inventories among the enterprises.

Table 9: EDC & VCM Import into India

EDC (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	247	247	247	247	247
Production	244	244	245	245	245
Imports	471	490	510	510	510
Exports	0	0	0	0	0
Apparent Demand	715	734	755	755	755
Growth (%)	**-18.1%**	**2.7%**	**2.9%**	**0.0%**	**0.0%**
VCM (KT)	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	996	996	996	996	996
Production	974	1007	943	963	977
Imports	500	500	521	525	525
Exports	0	0	0	0	0
Apparent Demand	1474	1507	1464	1488	1502
Growth (%)	**-4.2%**	**2.2%**	**-2.9%**	**1.6%**	**0.9%**

In Q2 2022, the prices of Ethylene Dichloride in the Asian market reduced with succeeding months due to affected purchasing appetite and muted market fundamentals. With fluctuations in crude and Naphtha values, the price of Ethylene also declined in the region owing to weak demand and deterred market sentiments. Feedstock Ethylene offers in India have crashed, taking down the costs of downstream PVC due to rising supplies and low purchasing activities affecting the price trend. Narrowed supply and demand gap resulted in the stabilized price movement for Ethylene Dichloride as bearish buying sentiments were witnessed amongst the domestic buyers in India.

In Q4’23, Spot EDC availability seen tighter as integrated producers are allocating more volume for captive PVC. Caustic Soda overhang continues leading to lower caustic prices in global markets. US and Europe CA plants operating rates have increased, arbitrage opportunities for spot US to Europe and South America have shrunk- More caustic is likely to be available Ex USGC. This might put pressure on caustic prices. EDC prices are in increasing trend. Current spot EDC offers are in CFR WCI 380 – 395$/ton levels for April shipments. EDC outlook – Availability expected to remain tight in Q2 and related prices are expected to remain stable to slightly downward trend depending on PVC scenarios.

EDC demand witnessed a positive growth of 3% in 2022-23. While the next financial year demand is expected to see flat growth. While VCM witnessed a negative growth of 3% in 2022-23 and is expecting a marginal growth in next two fiscals. In case of EDC imports, there was an increase of 20 KT in 2022-23. Imports in case of VCM is expected to pick up marginally in next two years to around 525 KT.

Vinyl Chloride Monomer (VCM) prices surged in Q1-2022 due to high feedstock Ethylene costs. Insufficient supply of raw material resulted in increased production cost of Vinyl Chloride Monomer and created pressure on the downstream enterprises to fulfill the desired market requirement. Additionally, bullish energy costs influenced the prices of Vinyl Chloride in Asian region. Crude oil prices soared throughout the quarter, refineries using Naphtha as cracker feed remained under pressure from exorbitant feedstock prices of Ethylene. Moreover, several planned shutdowns in feedstock Ethylene chemical plants also consequently resulted in rise in prices of VCM in regional market of Asia.

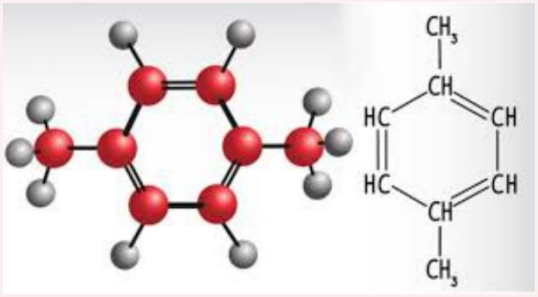
Due to high feedstock Ethylene costs, Vinyl Chloride Monomer (VCM) prices surged in Q2, 2022. Inadequate inventory availability and crippled overseas raw material supply resulted in escalated production cost of Vinyl Chloride Monomer in this Quarter. High inflation pressured the downstream enterprises to fulfill the desired market requirement by passing the cost burden to consumers. Additionally, bullish energy values due to ongoing heat waves in the region influenced the prices of Vinyl Chloride monomers. Moreover, several planned maintenance shutdowns in Gujarat chemical plants also caused a rise in the prices of VCM in Asia. Prices of VCM settled at an upward trajectory in the Second Quarter of 2022.

Due to lower downstream consumer confidence in the PVC manufacturing industry, Vinyl Chloride Monomer (VCM) prices dropped in Q3 2022. Adequate inventory availability and crippled overseas demand fundamentals have resulted in the cut in production of downstream PVC in this Quarter. High inflation pressured the downstream enterprises to make sales at lower margins in the local market. Additionally, the rise in market uncertainties and port congestion due to wages dispute has led to a dip in the buying sentiments in the region during the third Quarter. Prices of VCM settled at a downward trajectory in the third Quarter of 2022, with a commodity price ease of 11% in September in the Indian market.

The VCM (Vinyl Chloride Monomer) prices showed a plunging trend in the Q4 of 2022 in the APAC region due to ample inventories and muted consumer demand from the downstream PVC manufacturing segment.

The VCM price dropped in the Asian market amid bearish domestic downstream PVC offers and dampened export offers. Moreover, the cheaper imports in the region and ease in the feedstock Chlorine costs affected the price momentum of VCM.

E. Aromatics – Paraxylene



Asian paraxylene headed into 2022 under great pressure from increasing supply driven by China's intensive PX capacity expansion. Like the rest of the globe, Asian PX was well supported in second quarter of 2022 by firm energy prices and short supply due to run cuts and planned maintenance, with the PX-naphtha spread widening to more than two-year highs. Despite improving margins in April-May, healthier reforming profits encouraged Asian producers to maintain low run rates for aromatics extraction units.

In Asia, the paraxylene deficit is estimated to average 115,000 mt per month in Q2 2023. China's Shenghong Petrochemical will start its 2.2 million mt/year No. 2 purified terephthalic acid line at Lianyungang from around March 25-26 after turnaround. The company had shut its no. 2 PTA line earlier in March for maintenance. The company has another PTA line with a capacity of 1.5 million mt/year that has been shut for a year. There are no immediate plans to start operations at the idled line, as per the company source, citing weak PTA-paraxylene margins.

India exported 2.2 million metric tons of PX in 2021. Poor demand for imports from mainland China and healthy gasoline margins have resulted in a deep decline in PX exports, which are expected to be declining by almost 64% in 2022 to about 600 KT from previous year. On the other hand, Haldia company will continue to import for logistical and strategic reasons, so overall import volumes are expected to remain largely unchanged.

India takes up to about 5.2% of world's total PX capacity, as world's third largest PX producer following China and South Korea. India is one of the major suppliers of PX to China. PX imports in India were around 540 KT in 2022-23 and it is expected to rise to 671 KT next two years.

Table 10: Paraxylene Demand Supply

(KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	5860	5900	5900	6101	6760
Production	5109	4839	3756	3703	5256
Imports	615	557	540	671	671
Exports	2242	1670	600	390	1137
Apparent Demand	3297	3772	3696	3984	4789
Demand Growth%	**-15.6%**	**14.4%**	**-2.0%**	**7.8%**	**20.2%**

PX consumption touched 3696 KT in 2022-23 a dip of 2% from previous year. However, it is expected to touch 3984 KT by 2023-24, growing at ~8% and at a double digit in 2024-25 at 20% in India.

PX demand is expected to increase in coming years, mainly on account of a healthy growth in textile production, which will lead to a healthy growth in PTA.

Prices for Paraxylene in the Asia-Pacific region increased throughout the quarter in China and India, owing to the increasing price trend for its feedstock market. Crude oil prices increased after OPEC+, an alliance of the Organization of the Petroleum Exporting Countries and other producing nations, including Russia, whose output has fallen by about 1 million BPD following Western sanctions on Moscow over its invasion of Ukraine. Further, tight supply amid healthy demand from downstream Purified Terephthalic Acid (PTA) and Polyethylene Terephthalate (PET) Bottle contributed to the soaring pricing of Paraxylene.

Paraxylene feedstock such as Toluene, Ethylene, and mixed Xylene has been firm since the end of April, which continued its upward trend until June. Thus, the price of Paraxylene saw an upward rally in the Asia-Pacific region. The prices settled at USD 2097/MT Ex-Ahmedabad and USD 1307/MT FOB Shanghai, respectively, in June 2022.

Paraxylene Prices in the Asia-Pacific region declined throughout the Q3’23. China's Paraxylene end-use market frequently experienced difficult market conditions. Weakness continued to be heard in the paraxylene market since the start of this quarter, falling around USD -57/MT. Stable polyester demand and low PTA operating rates kept offers for Paraxylene lower as inventory remained high.

Paraxylene prices initially in the Asia-Pacific Region were held high with an improved demand outlook in the fourth quarter. The market situation was bullish as for PTA, polyester plant operation rates rose; thus, the demand in the domestic regions also rose. However, slow demand and healthy supply sent the price of Paraxylene the other way. The support from the global polyester market was affected because of weak global spending. Weak sales in the polyester market also had an impact on the price. In the month of November, the price stood at USD 1140/MT FOB Shanghai. The demand from downstream industries was bearish because the consumer’s confidence in the end-use polyester industries was not healthy to support the upward trend

PX prices dipped marginally amidst bearish upstream around 20th March 2023. However, steady demand recovery bolstered trade for April-May delivery. Over the week lesser loss in Aromatics over naphtha supported margins; PX-Nap delta rose $56/MT,BZ-Nap margin $40/MT and TL-Nap by $38/MT respectively.

IOC has given the EPCC contract for its new PX plant at Paradip to Tecnimont SPA and Tecnimont Private Ltd. which will deliver engineering, procurement, construction, and commissioning (EPCC) of the complex's new PX plant and related offsite installations. Once completed, the new plant will have a PX production capacity of 800,000 tpy, which will be used as feedstock for an adjacent 1.2-million tpy PTA plant to be built as part of complex.

The PX plant will receive its feedstock of reformate from the refinery's existing UOP LLC-licensed continuous catalyst regeneration (CCR) platforming unit, according to official project documents from IOC and the government of India. Maire Tecnimont—which valued the lump-sum EPCC contract at about $450 million—said mechanical completion of the PX plant is scheduled for 33 months from the award date, or sometime in early 2024. In official project documents filed by IOC with the government of India, the operator said the PX plant will consist of an integrated, UOP-licensed aromatics block that includes the following proprietary units and technologies: a xylene fractionation unit, a Sulfolane unit, a benzene-toluene fractionation unit, a Tatoray unit, a Parex unit, an Isomar unit. The complex's PTA will consist of two sections, the first of which will use a feedstock of PX to produce crude terephthalic acid (CTA). A second section of the plant will then use the CTA to produce high-purity PTA, according to IOC.

xvi. Intermediates

Fibre Intermediates

The textile industry contributes 5% to the GDP from domestic trade and 7% from foreign exports. However, these values are expected to increase this year, making this industry one of the leaders in the Indian economy

India synthetic fiber industry is the new addendum to the ever-growing Indian Textile Industry as it plays a vital role in the Indian Textile industry. The synthetic fiber industry of India has shown tremendous business potential and the industry has grown stupendously over the recent years.

The primary or key raw materials used to make polyester are Purified Terephthalic Acid (PTA) and Mono Ethylene Glycol (MEG). Both PTA & MEG are also used in large quantity in non-textiles segment applications. Textile applications accounts for only 60-65% of the total polyester production in India. PTA & MEG are a key raw material that also caters to packaging (bottle & film), automobiles and industrial applications.

India is net importer of PTA and MEG and thus the demand-supply situation in the international market has an influence on the domestic prices. The export scenario of the Indian textiles industry remains good.

PTA import volumes into India shot up in 2021-22 to 1297 KT from 590 KT in the previous year. Imports are expected to see a rise again in next fiscal to touch 2000 KT. In April 2022, while the prices of PTA increased by 26% from October 2021 to April 2022, the prices of MEG declined by 23% in same period.

PTA prices as per Platts, in 2021-22 over 2020-21 rose 51% and from Apr'22 to Feb'23 prices increased by 15%. However, from $914/ton in Apr'22, the prices had reduced to $775 in Feb'23.

While MEG as per Platts, in 2021-22 over 2020-21 rose 35% and from Apr'22 to Feb'23 prices crashed by 22%. India witnessed huge imports of MEG in 2022-23 almost 1600 KT, mainly from Kuwait, Saudi Arab, UAE and Singapore. While Middle east does have a feedstock advantage and location proximity to India.

In case of MEG, re-investment economics is unfavourable due to exportable surplus in Asia. Further there is expansion plan of around 25 million tons in China during 2023-2035 period. Volatility in Crude price, as well as that of Paraxylene, has caused considerable loss to the industry in terms of Inventory losses. While in recent times the prices of petrochemical feedstock has increased significantly, the import price of MEG has seen a decline.

This terrible situation is led to shutting down of the domestic MEG industry. Indian Glycols Limited (150 KTA, ~7% of Indian capacity had severely cut down MEG operations to merely 25% and Indian Oil Corporation (Capacity 325 KTA) had taken the plant under complete shutdown since Jul'22 till January 2023. Reliance Industries Limited (Capacity 1740 KTA) has also been reduced by 20% and is implementing quick plans to further reduce by another 10%.

Collectively domestic MEG producers were not running over ~85% average since last Financial Year and which has further dropped to 80% since this calendar year 2022 and further dropped to ~70-75%. The situation is becoming alarming for entire polyester value chain as MEG plants are shutting down in India will also impact polyester industry operations adversely. The shutdown of PTA plants also led to increase in imports.

The last PTA capacity addition commenced in the region was back in 2015, when Reliance Industries started two megaton plants within a few months of the start of the first plant. Since then, PTA capacity has remained mostly stable (barring some small debottlenecks) at 6.4 million metric tons per year. Production has almost always been at peak possible rates, with PTA availability determining polyester production. Several technical factors have limited PTA production to about 90% in the region over the past five years. In late 2020 and 2021, for the first time in several years, there was a broad-based shutdown of PTA plants in the country, primarily due to lower polyester operating rates during the pandemic, which was made up for by a large increase in imports in 2021-22.

Currently, India's PTA capacity is at ~ 6.4 MMTPA of which RIL commands a lion's share of ~78% (4.5 MMTPA).

Reliance will also expand its polyester chain capacity by adding 3 million mt/year of purified terephthalic acid capacity and 1 million mt/year of polyethylene terephthalate capacity at Dahej, Gujarat state, by 2026, as announced at the company's annual general meeting.

The new capacity at Dahej would boost its capacity by ~ 60% by FY26. More than 60% of the end usage application for PTA is in the textile space (polyester fibre and yarn). Considering the vast export potential, the Government of India has already announced incentives to promote the growth of manmade fibre industry through production linked incentive scheme (PLI). Material increase in capacity by the market leader signifies bright prospects for India’s man-made textile value chain.

JBF was in the process of building a PTA plant with an initial estimated start date of 2017. This project was co-located with the OMPL PX plant in Mangalore, India, and JBF was the first merchant licensor of BP’s new generation technology. However, that company ran into commercial difficulties in 2017 and the project had been stalled since then, despite being almost 90% complete. In October 2022, GAIL (India) won the financial bid to take over the debt-laden asset through an insolvency process. After duly securing ownership of the asset, the company plans to be able to start-up the plant in 2025, at the earliest.

In India, poor margins and limited PTA availability had discouraged polyester capacity additions over the past couple of years. However, additional polyester capacity has been starting up since 2022, which will increase PTA demand in the region, although growth rates will be constrained by the lack of additional local PTA supply, which is not expected to become available until 2025.

In India, PTA capacity available is enough to meet domestic demand (6.4 Mn Tons). However, capacity utilization was only 74% in 2021 and 80% in 2022. Domestic PTA Industry has planned for capacity addition to take care of future domestic demand. Expansion of 5.5 Mn Tons over existing 6.4 MMT is planned by domestic PTA players. There has been a huge overcapacity in Asia with total PTA exportable surplus of ~26 MMT collectively available with China, Korea, Thailand and Vietnam, and is likely go up to 33 MMT by 2025.

China alone is having over capacity of 18 Mn Tons in 2022 which is around three times of India’s domestic PTA consumption of India and is expected to go up to 27 Mn Tons in 2025 which will be four times the expected domestic PTA consumption of India. After the removal of ADD on PTA imports, there has been a sharp increase in PTA imports of around 130% in 2021 over 2018, mainly from China (increasing by more than 1500%).

Table 11: Fibre Intermediate Demand Supply

ACN	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	0	0	0	70	70
Production	0	0	0	35	65
Imports	135	176	222	215	205
Exports	0	0	0	0	0
Demand	135	176	222	250	270
Demand Growth (%)	**-23.3%**	**30.4%**	**26.1%**	**12.6%**	**8.0%**
Caprolactam	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	70	120	120	120	120
Production	72	86	90	94	100
Imports	68	74	74	74	74
Exports	6	0	0	0	0
Demand	134	160	164	168	174
Demand Growth (%)	**-11.3%**	**19.4%**	**2.5%**	**2.4%**	**3.6%**
PTA	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	6440	6440	6440	6440	6440
Production	5082	5616	5645	5796	5796
Imports	611	1350	1550	1800	2200
Exports	130	53	1.944	0	0
Demand	5563	6913	7193.056	7596	7996
Demand Growth (%)	**-14.6%**	**24.3%**	**4.1%**	**5.6%**	**5.3%**
MEG	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	2215	2215	2279	2705	2705
Production	2036	1969	1642	2225	2396
Imports	648	950	1400	1000	1000
Exports	284	27	20	30	30
Demand	2400	2892	3022	3195	3366
Demand Growth (%)	**-7.3%**	**20.5%**	**4.5%**	**5.7%**	**5.4%**

Indian PTA industry has enough capacity to meet domestic demand (6.4 Mn Tons). However, capacity utilization was only 74% in 2021 and 80% in 2022. Domestic PTA Industry has also planned to enhance capacity to take care of future domestic demand. Expansion of 5.5 Mn Tons over existing 6.4 MMT is planned. Total PTA exportable surplus of ~26 MMT collectively available with China, Korea, Thailand and Vietnam, likely go up to 33 MMT by 2025.

China alone is having over capacity of 18 Mn Tons in 2022 which is thrice the domestic PTA consumption of India, and it is expected to go up to 27 Mn Tons in 2025 which will be four times the expected domestic PTA consumption of India.

After the removal of ADD on PTA imports, there has been a sharp increase in PTA imports of around 130% in 2021 over 2018, mainly from China (increasing by more than 1500%). The demand for fiber intermediates is driven by its increasing use in the manufacturing of synthetic fiber such as polyester and others. The fiber intermediates market is likely to grow on account of the increasing demand for synthetic fibres in various applications such as clothing, furniture, and upholstery. The expanding textiles industry, as a result of increased spending on clothing coupled with changing fashion trends, is likely to propel the growth of the fiber intermediates market.

Recently, strategic partnerships have emerged as the key trend gaining popularity in the mono ethylene glycol market. Major companies operating in the mono ethylene glycol sector are looking for partnerships to reinforce their position in the market. For instance, in March 2022, Braskem, a Brazil-based petrochemical company, partnered with Sojitz Corporation, a Japan-based trading company. This partnership aims to increase the industrial production and sale of chemicals made from renewable sources.

Meanwhile, the EU imposed antidumping duties on MEG imports from the US and Saudi Arabia in late 2021, leading to more US and Saudi Arabian MEG supplies in Asia at times. Additionally, in late October 2022, India dropped its antidumping investigation on MEG imports from the US, Kuwait and Saudi Arabia, renewing attention for US export cargoes to the country. Asian MEG margins were uncompetitive, as per analysts. Asian price outlook remained mixed amid weak demand in the wake of an uncertain economic outlook and rising costs, as per analysts. With the bullish stance of suppliers, however, prices need to move up in line with rising oil costs, while production cuts would continue until the margins strengthen, analysts added. Upcoming MEG plants in 2023 will add to oversupply, but there may be delays to the new starts given a shaky macroeconomy and inflation, as per analysts. The companies that plan to open these coal-based plants at a lower rate than not start at all as the investment had been made. The MEG demand outlook is mixed, with polyester accounting for more than 60% of MEG demand and China continuing to dominate trade flows and futures as it accounted for 60% of global demand.

ACN production was stopped by RIL and demand is being met by imports on the back of pesticide industry doing well. However, RIL has plans to re-start the production by 2022-23 end by adding 70 KT. HPL, in the second phase of revamp of Nagarjuna Oil Corp Ltd (NOCL) refinery, the company plans to setup a 1.6m tonnes/year paraxylene (PX) line and a 1.25m tonnes/year purified terephthalic acid (PTA) plant.

India’s petrochemical giant, Indian Oil Corp. (IOCL) gave a nod for an investment of INR 13,805 crore towards setting up a plant in Odisha's seaport city of Paradip, solely dedicated towards manufacturing raw materials for the textile sector. The construction of this Paraxylene (PX) and Purified Terephthalic Acid (PTA) plant is slated to complete by 2024. As stated by a company official, the upcoming plant would be integrated with the Indian Oil's refinery located in the port town of Jagatsinghpur district.

The petrochemicals complex will have PX production capacity of 800 KTPA which would serve as the feedstock for manufacturing purified terephthalic acid which is a key raw material for the production of polyester yarns. The PTA plant capacity would stand nearly at 1200,000 tpy post the commissioning. Plant backed by IOCL’s upcoming MEG facility in Paradip would serve as a source of feedstock for the company’s upcoming 357 KT textile yarn manufacturing project located in the city of Bhadrak in Odisha.

MEG plant has been commissioned recently by IOC. The project will help in consolidating the Polyester business of the corporation by way of producing MEG which will be is used in manufacturing Polyester fibres, Bottle grade Chips & Polyester film grade chips. MEG is also used in non-Polyester applications, like to produce Antifreeze, Coolants, Paint formulations & Acrylic binders etc. This Project envisages recovery of ethylene present in FCC off-gases and then upgrading it to MEG, Di Ethylene Glycol (DEG) and Tri Ethylene Glycol (TEG) at Paradip Refinery.

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Demand for Caprolactam was subdued as compared to last year in India. Despite the pandemic-led adverse market scenario in which raw material prices sky-rocketed in the international markets. FACT produced 963,000 MT fertiliser during the year. Total fertilizer sales for the year crossed one million MT.

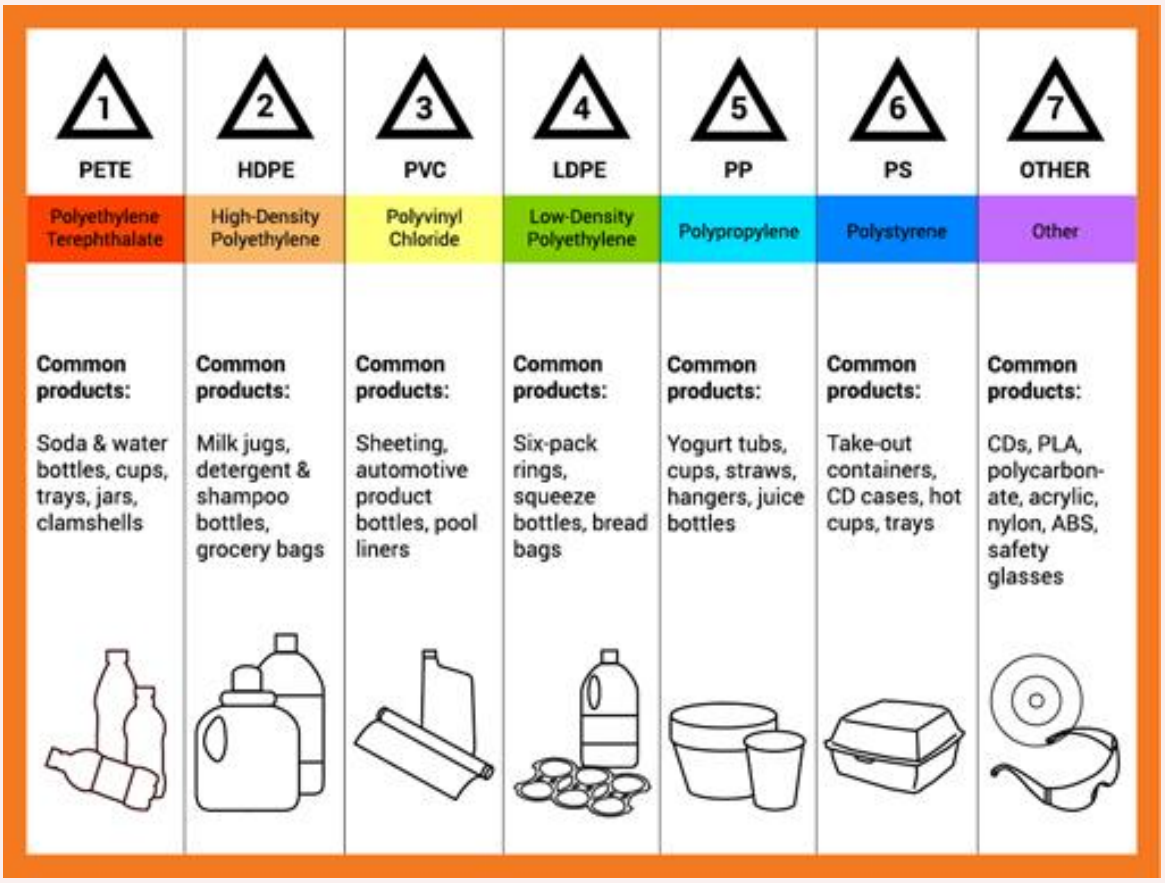
Another highlight for FACT during the year is the restart of Caprolactam production after about nine years. The company produced 20,835 MT of Caprolactam resulting in considerable reduction in import of Caprolactam to the country. FACT is also planning to increase its production capacity with an additional NP fertilizer plant at its Cochin Division located at Ambalamedu. The work for the new project has already started and is expected to be completed by 2024. This will add another 500,000 MT to the total production capacity of the company.

Majority of the Caprolactam produced in India is utilized during the production of nylon 6 fibres and nylon 6 resins, to cater textile and engineering plastic product manufacturers, respectively. In 2021-22 the demand rebounded to staggering 20% from negative a year back. It is expected to however see a tepid growth in coming two years. In another development outside India, in August 2022 San Diego-based biotechnology firm Genomatica (Geno) and its collaboration with Asahi Kasei to commercialize renewably sourced nylon 66. Nylon 6,6 is produced using approximately 50% HMDA along with ~50% adipic acid. ow, the company reports that it is one step closer to commercialization of renewable nylon 6 with its long-term partner Aquafil, Italy's nylon 6 fiber producer.

The partners produced the first several tons of plant-based nylon-6 building block caprolactam, have converted it to nylon 6 polymer and are now in the process of transforming it for evaluation in nylon applications, ranging from yarns for textile and carpet to engineering plastics for automotive as part of pre-commercial quantities from demonstration production taking place in Europe. Geno also confirmed that they also are currently exploring a range of opportunities in North America and internationally. Having successfully completed the pilot-scale production runs of 100% plant-based nylon 6, the partners have advanced to production of pre-commercial quantities which will help determine the final design of future commercial plants. The material will go to leading global brands and their value chain partners who are eager to explore and develop renewable products, create showcase goods and test feedback with customers. A significant collaboration is with Covestro, which this past January, announced that the partners had teamed up to be the first to successfully produce significant volumes of a plant-based version of HDMA. Asahi Kasei currently produces petro-based nylon 6,6 under the brand Leona™ an engineering plastic featuring outstanding heat resistance and rigidity for use in automotive and electronics applications as well as yarn for airbag fabric.

xvii. Polymers, Fibres and Elastomers

There was no dearth of headwinds throughout the year, which impacted India's path to economic recovery. The year began with the threat of the Omicron variant of the coronavirus. Fortunately, the threat subsided fairly quickly, without impacting the economy in any significant way. The only problem was that this headwind was replaced by Russia's invasion of Ukraine in mid-February, leading to further disruptions in the global supply chain.



The chemical industry in India experienced robust growth in 2022 and was one of the few industries that recovered well after the COVID-19 pandemic. It has the potential to keep growing in the upcoming years. Overall, business environment started improving in 2022. Economy started to come back to normalcy, the demand started to see a pickup from end use sectors as people once again began purchasing. Other events and conference and even the big public events, like the fabulous Indian Premier League, supported consumption. Packaging is a key downstream sector for PE. Food packaging supported the PE demand and pushed converters to include a wide range of packaging options. Essential goods manufacturers in India have also added smaller packaging sizes to their product lines to increase accessibility for low-income customers.

The rising consumption has helped balance demand with supply in India. With the increasing purchasing power, the demand for petrochemical is on the roll. The products cover all the essential daily use items ranging from housing, clothing, construction, automobiles, horticulture, furniture, household items, packaging, medical appliances and much more. This has given polymers the much-needed push in the country. The per capita consumption of polymer has reached the saturation level in US whereas India is expected to maintain a high economic growth propelling the country's polymer consumption. Polymers witnessed a robust growth of 10% in 2022-23, with rise in demand in PVC close to 30%, all PE (LD+LLD+HD) 9%, and polypropylene 5%.

LDPE witnessed highest share under general purpose, followed by EC, AL, MP and HD in 2022-23. In case of LLDPE, Butene 1 MI saw the maximum growth, followed by Metallocene and Butene 2 MI. In case of HDPE, maximum growth was seen in blow molding segment, followed HM pipe, injection molding and raffia.

HMEL was expected to begin its new PE plant soon with 450 KT HDPE capacity and 800 KT, LLD/HD swing plant. January witnessed OPAL operating at reduced rates because of tight gas availability, 340 KT HDPE, 720 KT LLD/HD. Whereas Haldia faced some technical issue at its naphtha-based cracker. It too was operating at reduced rates 330 KT LLD and 615 KT LLD/HD plant and 330 KT PP plant. PP demand remained firm in Q1'23 with demand for grain and fertilizer packaging with increased agricultural activity.

With HMEL capacity addition, the HDPE capacity in India is projected to touch 3515 KT by 2024-25 and demand 3730 KT. Similarly, in case of LLDPE, the capacity by 2024-25 is projected to touch 2945 KT and demand 3225 KT.

As per Nayara Energy, the Phase-1 project development has achieved over 85 per cent progress and expects production of its first petrochemical product i.e., polypropylene by Q4 of 2023. In case of PVC supply availability remained a concerned for Indian buyers in first half of 2023. With industrial activity, especially construction and agricultural acidity with rainy season on the anvil, demand for agricultural pipe used in irrigation is likely to boost PVC demand.

Important to highlight is that India is deficit in Polyethylene (PE), is dependent on imports for fulfilling demand. Presently on account of demand supply gap especially in LD/LLDPE, imports are arriving to cover up the shortfall. More investments in this segment needs to be encouraged to bridge the demand-supply gap going forward. In case of PE, HDPE imports registered ~1200 KT coming into India in April January period

In case of Polypropylene – India has large surplus capacity despite which significant imports take place (1100 KT in 2021-22), mainly from FTA countries – Singapore etc. PVC - India has a deficit of 2 MMT for a long time now, where industry needs government policy intervention. RIL plans to add 1.5 million tonnes a year of fresh capacity while Adani group which intended to build 2 million tonnes a year of the production facility has put this project on hold. If this project came along total planned combined capacity of 3.5 million tonnes will more than triple India's capacity in a few years. IOCL has recently announced an investment of Rs. 4000 crore for a PVC project of 200 KT to bridge the supply deficit expected increase further with growing demand in the country.

Table 12: Polymer Demand Supply

Polymers (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	14157	14190	14405	16162	16739
Production	12350	12857	11922	14995	15512
Op Rate (%)	**87%**	**91%**	**83%**	**93%**	**93%**
Import	3601	4089	6344	4601	5250
Exports	1799	1024	490	351	380
Net Trade	**-1802**	**-3065**	**-5854**	**-4250**	**-4870**
Demand	14696	15913	17523	18832	20132
Demand Growth %	**0.0%**	**8.3%**	**10.1%**	**7.5%**	**6.9%**

The Indian domestic polymer industry (like global industry) was dominated by Polyolefins (PE & PP). After clocking a flat growth in 2020-21 the polymer growth witnessed a rebound growing at 10%. The demand is expected to be around 7% in next two fiscals as well. Polymer import dependency witnessed an increase with PVC, PP, HDPE imports witnessing a rise in 2022-23.

In 2022-23 net trade deficit of total polymers stood at 5854 KT which was higher than previous year which stood at 3065 KT. India's petrochemical demand is likely to more than triple in the next two decades due to the evolution of new crude-to-chemicals technologies coupled with rapidly changing consumer lifestyles which calls for an increase in plastic consumption.

Overall, the polymer industry has seen strong growth in 2022 and is expected to continue growing in 2023, with the global demand for resins and polymers increasing. It is estimated that the focus on sustainability and green solutions in the industry will be increased. It is because companies are looking forward to more eco-friendly ways of producing and using polymers. Efforts would be made towards creating new and improved polymers that can meet the needs of a rapidly changing world.

xviii. Polyolefins

Table 13: Polyolefin Demand in India Actual & Projected

(KTA)	Actual			Projected		% change year on year			
	2020-21	2021-22	2022-23	2023-24	2024-25	2021-22	2022-23	2023-24	2024-25
LDPE+EVA	973	1047	1073	1153	1243	8%	2%	7%	8%
LLDPE	2518	2650	2781	2983	3225	5%	5%	7%	8%
HDPE	2775	2933	3200	3500	3730	6%	9%	9%	7%
PP	5358	6089	6370	6816	7293	14%	5%	7%	7%
Polyolefins	**11624**	**12719**	**13424**	**14452**	**15491**	**9%**	**6%**	**8%**	**7%**

Source: Industry Estimates

India's polyolefin demand witnessed a 6 percent growth in the current financial year ending March 2023 because of a revival in the domestic consumers' sentiment, especially in rural markets where the growing agriculture economy and demand from infra sectors encouraged buyers to take advantage of the current low price and fill the past two years Covid-related consumption gap.

As per estimates India's polyolefin demand was 13.4 million tonnes for the financial year 2022-23 compared to 12.72 million tonnes in the previous year. The source further estimates India's polyolefin demand would continue to rise to 15.4 million tonnes in the financial year 2024-25. All PE registered a modest demand growth of 6.2% in 2022-23 to touch 6846 KT. By 2025, demand is forecasted to touch 7965 KT with end use sector demand increasing.

xix. Vinyl's: PVC

India is the world's largest importer of PVC resin, followed by the US and China. The country imported more than 2 million. tonne, and half of the over 3.9 million tonne annual demand 2023-24. Most of the imports were made from Japan, Taiwan, China and South Korea in 2021-22 and current year 2022-23. The imports bridge the gap between demand & domestic supply in case of PVC resin. Despite rapid growth in demand expected in India linked with GDP, the wide gap in demand-supply is likely to persist.

Given the supply deficit in the country, the consumption growth is driven mainly by imports with domestic capacity having remained stagnant over last several years. As per industry estimates, total PVC imports of ~2.1 million MT are expected in India in FY23 taking share of imports to ~60% of total PVC consumption of ~3.7 million MT expected in India in FY23 after recovering the lost ground due to Covid.

The import offers to India have fallen by more than 46% from Mar 2022 to Mar 2023 under shadow of weak demand globally which has resulted in fierce competition amongst PVC exporters mainly Chinese & US amidst surplus supply and has forced them to continue to lower their price offers to international markets in fear of losing out their market share to competition.

US and Asian producers have looked at export markets in India and elsewhere which were better off in terms of demand for offloading their surplus inventory. Last year, the zero covid lockdowns in China amid poor construction demand hurt local demand for PVC there. This caused surplus inventory to build up and lifted their exports which led to bearish pricing sentiment globally. Rising interest rates and high inflation have siphoned off domestic housing demand in US and Europe which in turn has weakened the demand for PVC in these markets. Normalization of container freights has also influenced this decline besides poor demand & lower Asian offers.

Besides price competition from US PVC supplies last year amid falling PVC offers from China, the global caustic soda rally amid soaring utility costs ensured that PVC operating rates remained high globally, offsetting the losses from PVC operations and contributing further to PVC slump.

Asia especially China & the US, both are expected to be dependent on exports for now with domestic demand seen sluggish amid pressure to maintain reduced rates. While China has relaxed Covid-19 related restrictions/policies now, weakness in their housing and construction markets has continued to keep their domestic PVC demand muted as of now.

While uncertainty regarding US interest rate hikes & global inflation remain, a global demand recovery would likely be limited without a full demand recovery in China that will impact competitiveness of US PVC exports in global markets. The demand in China is definitely better than last year, but, it still remains below par. With some new capacities also expected there, it will remain a net exporter. Amid decline in energy costs from record highs, there is cautious optimism in US & Europe even as high inflation rates and continued geopolitical pressures weigh on consumer spending. Global markets could see a slow recovery in CY23, with prices largely seen to have bottomed out amid high feedstock costs.

Pipes & fittings used in Agriculture & Construction account for more than 70% of PVC resin consumption in India as against ~45% for the world. The other key drivers for PVC Resin is the growth coming from applications other than pipes such as packaging, profiles, pharmaceuticals segments, etc. which are expected to account for a higher share of the demand for PVC Resins in the years to come. India’s per capita PVC consumption is 2.4 kg which is low compared to 10.3 kg in China & 12.7 kg in US. With steady rise in demand and promising prospects in the downstream agriculture, building & construction and infrastructure segments amid high dependence on imports, India is likely to remain at the forefront of the global PVC market.

PVC market witnessed a staggering growth in 2022-23 growing at 30% and demand touching 3679 KT. Industry likely to grow at 7% to 3934 KTA in 2023-24, with imports of ~2416 KTA and further increasing to 2650 KT by 2024-25.

India has a deficit of 2 MMT for a long time now, where industry needs government policy intervention. With RIL plans to add 1.5 million tonnes a year of fresh capacity while Adani group which intended to build 2 million tonnes a year of the production facility has put this project on hold. If this project came along total planned combined capacity of 3.5 million tonnes will more than triple India's capacity in a few years. IOCL has recently announced an investment of Rs. 4000 crore for a PVC project of 200 KT to bridge the supply deficit expected increase further with growing demand in the country. In suspension PVC, Chemplast Sanmar has 331,000 tonnes/year of capacity in Cuddalore after completing a 31,000 tonne/year debottlenecking in May 2022. Its 41,000 tonne/year specialty PVC paste project in Cuddalore is on track to be commissioned in H2 of the company's fiscal year 2024 (October 2023-March 2024).

DCW Limited ("DCW"), a leading speciality chemical company in India, plans to double its CPVC capacity by adding another 10KT capacity. The Company also plan to augment the capacity utilization of its SIOP plant to 100% with some line balancing Capex to generate an additional 10KT of production per annum. As per Company estimates, the CPVC project is expected to be commissioned in 2nd half of FY24 & SIOP de-bottlenecking to be completed by Q1 of FY24.

Meghmani Finechem Limited (MFL), in January 2023 announced it has expanded its manufacturing capacity of CPVC, 1.5 folds to 75,000 tonne per annum (TPA). The company will be adding another 45,000 TPA by the fourth quarter of 2023-24. In India, inventory level was reported to be high after huge PVC imports in February, which slashed buying appetite for import materials. Industry sources estimated imports of PVC into India in February at around 325,000 mt, against 245,000 mt in January. An Indian producer said the import quantity in February is quiet high into India and traders have been reducing offers. Consumption is very strong, but the only thing is availability is very high.

On the other hand, PVC demand remained strong in India as March-May is the peak consumption period after slow season around the end of March. Meanwhile, the price spread between PVC and vinyl chloride monomer feedstock was calculated at $105/mt March 15, the lowest level since July 6, 2022, when the spread was calculated at $90/mt, according to the data. The spread is lower than the typical breakeven level of $150/mt, the data showed.

Table 14: PVC Demand Supply

PVC (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	1557	1557	1617	1672	1717
Production	1367	1414	1493	1508	1510
Imports	1394	1433	2186	2416	2650
Exports		19			
Apparent Demand	2745	2834	3679	3934	4170
Demand Growth%	**-15.8%**	**3.3%**	**29.8%**	**6.9%**	**6.0%**

While announcing the Budget for the financial year 2022-23, India's finance minister Nirmala Sitharaman laid special emphasis on the government's flagship – 'Har Ghar Nal se Jal' - scheme to provide tap water to the rural household by allocating a 20 percent increase in allocation under this scheme.

Current coverage of 'Har Ghar Nal se Jal' scheme is 87 million households. Of these, 55 million households were provided tap water in the last two years. The allocation of Rs 60,000 crore has been made to cover 38 million households in 2022-23. The 'Har Ghar Nal se Jal' scheme is likely to boost the demand for PVC pipes in India. As per the existing regulation, the government doesn't encourage the participation of non-ISI (Indian Standard Institute) marked pipes for application in any government-sponsored project. Hence, most players in the unorganized sector would not be availed of this benefit.

The implementation of drinking water supply works to ensure tap water supply in rural villages to raise demand for materials like cement, bricks, gravel, sand, steel, pipes, motors, faucets, etc. on one hand and engagement of unskilled, semi-skilled and skilled workers for creation as well as for operation and maintenance of water supply schemes on the other. This also boosts the rural economy and income generation to people in rural areas. Apart from India, new PVC capacity is coming up in Middle East. Qatar Vinyl Co's (QVC) new 350,000 tonne/year polyvinyl chloride (PVC) plant in Mesaieed is slated for completion in mid-2025, with Industries Qatar expected to have a direct 44.8% stake in the company in May 2026.

The PVC plant, which will be the first in Qatar, will be integrated with QVC's existing vinyl chloride monomer (VCM), ethylene dichloride (EDC) and caustic soda facilities in Mesaieed. Currently, QVC is a joint venture among three entities – MPHC, Qatar Petrochemical Company (QAPCO) – a subsidiary of Industries Qatar – with a 31.9% stake, and Qatar Energy with a 12.9% stake. This ownership structure will expire on 1 May 2026, MPHC and Industries Qatar. Being the first PVC plant in the State of Qatar, the project aims to position Qatar as a new regional player in PVC production, while reinforcing the downstream value chain.

xx. Styrenics

A. Polystyrene

In 2022, on the demand side, the Asian polystyrene market faced the same outlook as feedstock styrene, with concerns over continuous COVID-19 lockdowns in China, affecting appetite for end products. This pushed consumer demand to Southeast Asia. The acrylonitrile-butadiene-styrene outlook for the second quarter remained mixed, with continuing consumer uncertainty due to COVID-19 lockdowns, and relatively cheaper domestic prices in China. Around 3 7 Mt/year of new capacity will come on stream over 2022 2025 and most in Northeast Asia. All of the new capacity in Northeast Asia will occur in China. However, we do expect delay considering the overall supply and demand market conditions. Some elimination of old plants should also occur in the future considering the fierce competition among both PS producers and ABS producers.
One new PS plant expected to start production in India later in 2023.

Supreme Petrochem has announced that Consent to Operate (CTO) has been received by company from Maharashtra Pollution Control Board (MPCB) on 30th December 2022 for polystyrene (PS) and Expandable Polystyrene (EPS) capacity expansion projects at its plant situated at Village Amdoshi, Taluka- Roha, District-Raigad, Maharashtra. Consequently, the company's effective manufacturing capacity of Polystyrene (PS) will stand increased from the existing 2,20,000 MTA to 3,00,000 MTA and Expandable Polystyrene (EPS) will stand increased from the existing 50,000 MTA to 85,000 MTA. The company also completed EPS production facility revamp programme / commissioning trials at its plant situated at Manali New Town, Chennai, Tamil Nadu on 28/12/2022 and consequently the effective production capacity of EPS at Manali Plant has increased from the existing 24000 TPA to 33000 TPA. In 2022, Supreme Petrochem Board approved the Phase II expansion of its expandable polystyrene (EPS) plant at Nagothane, Maharashtra by 30,000 MTA. The board of the company also approved setting of second-line of Extruded Polystyrene Board (XPS) with the capacity of 1,00,000 M3 and increasing the Masterbatch and Compounds capacity by 50,000 MTA

General polystyrene is also used in disposable medical products such as test tubes, test kit shells, diagnostic products, culture plates and tissue trays.

Bathroom accessories and gardening equipment are also made from GPPS.
The range of applications for this type of polystyrene is very wide. GPPS is used for disposable cups, case for a box lunch and a household dishes, confectionary tray, package, CD cases, container for a seasoning, various films, etc. Packaging is the largest segment for HIPS. It is used for food packaging (of meat trays, egg cartons, fruit trays, dairy packaging, etc.), industrial packaging, and consumer packaging (of cassettes, CD covers, etc.). The food packaging sector has kept demand positive during the coronavirus pandemic that has destroyed styrene draw from other sectors. HIPS has seen a good demand from appliances like air conditioners specially for the body and indoor unit panel. It has recently seen a jump in demand in COVID testing kit, Malaria testing kit, pregnancy kit. Apart from these, there is good demand for HIPS for probiotic bottles and cups for ice-cream and curd by various manufacturers and food containers of various sizes.

On account of falling feedstock Styrene prices, the Asia Pacific market saw a steady reduction in Polystyrene prices. The fourth quarter saw relatively low prices for the commodity due to strong production rates and weak demand from the downstream industries. Due to COVID restrictions and weak demand in the domestic Chinese market, the Chinese market remained quiet in Q4.

The prices of Polystyrene remained diminishing throughout the third quarter of 2022 in the APAC region. The key factor governing the market sentiments of Polystyrene is the diminishing prices of crude oil in the international market. Feedstock Styrene prices kept declining in the Chinese market, proportionally impacting the market prices of Polystyrene.

Table 15: Polystyrene Demand Supply

Polystyrene (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	490	490	518	518	518
Production	212	240	260	315	330
Imports	42	34	65	60	60
Exports	27	30	25	60	60
Apparent Demand	227	240	300	315	330
Demand Growth%	**-9.9%**	**5.7%**	**25.0%**	**5.0%**	**4.8%**

In the second quarter, approximately a 3% price hike was witnessed in the prices of Polystyrene in the Asia-Pacific market. Asian countries suffered from restricted transportation elevating the market prices of Polystyrene. The demand from packaging and disposable cutlery industries in countries such as India and South Korea governed the elevated market prices of Polystyrene in the Asia-Pacific market. In Q1 of 2022, the Asia Pacific market witnessed growth of 9.1% as opposed to Q4 of 2021.

The surge in the prices occurred due to surging feedstock Styrene prices and high crude oil prices. Further demand growth will however rely on global economic recovery for both domestic and export markets, given great uncertainties. After witnessing a negative demand growth in 2020-21, demand for Polystyrene witnessed a modest growth in 2021-22 and in 2022-23 a robust growth of 25%. It is forecasted that next two fiscal years will see a lower growth of around 5% and demand will touch 330 KT. Imports witnessed an increase in 2022-23 and is expected to remain around 60 KT in next two years.

B. Acrylonitrile-Butadiene-Styrene (ABS)

In the first two months of the third Quarter of 2022, the Acrylonitrile Butadiene Styrene prices declined in the Asian market due to the feedstock's weak cost pressure. The quotations from feedstock Butadiene were lower in Asia, which affected the Indian market. In China, the decline of the domestic butadiene market slowed down in August. At the end of the month, the quotations of major manufacturers increased, and the market atmosphere warmed up. The main reason was the contradiction between supply and demand. The supply was on the high side, while the downstream demand was relatively low, and the external market was slightly boosted.

In September, the price of ABS saw a slightly upward trajectory due to high feedstock Styrene prices in the Asian market. The cost of Acrylonitrile Butadiene Styrene was recorded at USD 1582/MT on a CFR JNPT basis during the quarter ending.

Acrylonitrile Butadiene Styrene prices fell in the Asian market during the second quarter of 2022, with prices hovering at INR 188475/ton ABS Bulk High Flow Grade Ex-Pune during June with a quarterly decline of 0.3% in India. The support for the ABS cost side was diminished by the general decline in the market for the upstream three materials. Recent days have seen a rise in tension between Russia and Ukraine, leading to the closure of numerous oil fields and fluctuations in crude oil prices. However, the market diverged significantly due to price transmission to the ABS business chain.

The effects of the domestic plague on logistics are still being felt in East China, where businesses and merchants continue to oppose shipments, and downstream consumers frequently keep production on little needs.

The price of ABS saw declined trend during the final quarter of 2022 in the Asia Pacific region. The three feedstocks saw mixed price trends in the Chinese domestic market.

The demand from the downstream construction and automotive sectors was low due to the Zero COVID-19 restriction, and the orders from domestic buyers were reduced and inventories stockpiled in the market. At the same time, India also followed the same trend due to high inventory from the exporting nations, and the traders had significant availability of the product. Due to the year-end, some traders were selling the product at low prices in the domestic market.

Table 16: ABS Demand Supply

ABS (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	205	215	225	230	230
Production	122	123	180	195	200
Imports	88	100	60	60	60
Exports	0	0	0	0	0
Apparent Demand	210	223	240	255	260
Demand Growth%	**-16.0%**	**6.2%**	**7.6%**	**6.3%**	**2.0%**

Prices of ABS remained uncertain in the Asian region. In China, values decreased by 6% during Q1 of 2022 amid the low demand from downstream industries. ABS spot Shanghai prices settled at USD 2320 per tonne. However, in the Indian Market, prices turned firm in March because of disruption in the global supply chain amidst the Ukraine – Russia war scenario. However, raw material prices fluctuated in the stable to firm range throughout the quarter in India. ABS Bulk High flow grade prices showcased a decline of 15% in India from the last quarter of 2021. Demand for ABS is growing at 6-7% since last two years.

While capacity additions are happening in China for Styrene, ABS and Polystyrene, all these capacities are utilized.

India also is witnessing capacity expansions in ABS, as 10 KT was added by Bhansali Engineering in 2022-23 and Lotte (Only compounding) added 10 KT since year 2021-22, Supreme expanded Polystyrene capacity by 28 KT to reach 300 KT in 2022-23.

Supreme Petrochem has undertaken Project for manufacture of Mass Acrylonitrile Butadiene Styrene (mABS) at Village Amdoshi-Wangani, District-Raigad, Maharashtra (India), with two Lines of 70 KTA each aggregating 140 KTA. Line I is scheduled to go on stream by June 2024 and Line II is planned for completion by March 2025. The Company has already entered into an agreement for License and Basic Engineering Design for Line I of 70 KTA with M/s Vesralis-Eni Chemicals Group. The total project cost for both lines shall be funded from the Company's own funds. ABS has also seen a spurt in demand with the introduction of EVs (electric vehicles) and fast expanding two wheelers market in India.

Two wheelers and appliances infact provide a huge scope for ABS applications in India. And leading brands in India are expanding the use of ABS in the manufacturing of their products in India example for refrigerators etc. ABS is used as a raw material in various industries such as automotive, plastic, construction, and others and all these industries showed a good recovery this year. Another example is of Toys market in India. With toy imports from China reduced to BIS specifications India has got oxygen to work and grow in this space and use of ABS has gone up in this segment. Moulders have also invested heavily in India and setting up new plants signalling good demand for ABS.

Asian market witnessed an overall supply recovery for polymers including feedstock PC and ABS during the month of April and May, which ultimately led to an ease in the regional prices. Besides, feeble demand from downstream manufacturers played a significant role in pulling down the prices of feedstock ABS and PC and their other derivative products in the region.

Demand in India continued to be supported by schools and offices means that computers and the peripherals such as monitors, mouses, and keyboards are now essential products, and with spurt in house construction activity in India has led to rising demand for television sets and refrigerators. Increasing use of ABS in fabrication industry, 3D printing or injection molding process is also supplementing the growth of the market.

The rising demand for ABS from the automotive sector and the rise in demand for plastic pipes and sheets will further accelerate the growth of the market. ABS demand in India witnessed a growth of 7.6% in 2022-23 and is expected to grow around the same in the following year before witnessing a dip by 2025.

C. Styrene-Acrylonitrile (SAN)

Styrene Acrylonitrile prices plunged in the Asian market during the fourth quarter of 2022 on the back of falling feedstock Styrene prices. Demand in the domestic market remained subdued, and despite the festivities, the price of Styrene Acrylonitrile remained unchanged in India, as did offtakes. Similarly, in other Asian countries, supplies remained sufficient, and demand was unaltered. Hence the market activity remained gloomy.

Furthermore, the import availability of the material remained steady in Indian ports from Korea, China, and other exporting countries. Thus, inventory levels have been termed stable throughout the quarter. In Q3, the prices of Styrene Acrylonitrile continued to follow the retardation in China as the market remained quiet. Typhoon Chaba destroyed the country's commercial hubs, proportionally impacting the prices of Styrene Acrylonitrile. Major manufacturers had to shut down the plant on a temporary basis for maintenance.

The decline in productivity rate and slow demand from downstream household appliances such as refrigerators and electronic appliances became the key factor for the decline in prices in the domestic market. Stagnancy in the prices of Styrene Acrylonitrile in the Indian market was witnessed during the third week of July.

The demand for downstream medical devices, along with electronic appliances, remained stagnant in the Indian market. The feedstock, Styrene prices kept on declining in India, impacting the production cost of SAN in the domestic market. However, demand for downstream medical devices and electronic appliances in the Indian market remained flat. SAN prices for CFR Qingdao in the Chinese region settled at USD 1 700/MT as a ripple effect.

The overall market trend of Styrene Acrylonitrile dwindled in the second quarter in the Asia-Pacific market. Drastic fall was witnessed towards the quarter-end as the Asian market remained quiet on the back of the restricted movement. Chinese market remained muted as lockdown curbs were reimposed, halting the operational rate of Styrene Acrylonitrile.

Immobility in the market led to a decline in demand from downstream, automotive, and packaging sectors, consequently impacting the market dynamics of Styrene Acrylonitrile in Asia-Pacific. The movement of cargo was stagnant. This led to the availability of enough inventories to cater to the slow demand from the domestic market. As a ripple effect, the market dynamics were slow in the Asian market.

In the first quarter of 2022, the market sentiments of Styrene Acrylonitrile in Asia-Pacific region observed a growth of 16% as compared to Q4 of 2021. The prices ranged from USD1947/ton CFR Shanghai in January 2022 to USD2000/ton, CFR Shanghai China towards the end of the first quarter of 2022.

The prices of Styrene Acrylonitrile moved briskly due to the conflict between Russia and Ukraine which consequently increased the feed (styrene and acrylic acid) showing its proportional effects on the Asia-Pacific market.

Flourishing cosmetics and healthcare industries in the Asian market had boosted the prices of Styrene Acrylonitrile. Moreover, after the implementation of lockdown in China, the manufactures were forced to terminate the production of Styrene Acrylonitrile temporarily, consequently increasing the prices of Styrene Acrylonitrile in Asia-Pacific.

Table 17: SAN Demand Supply

SAN (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	170	170	170	175	175
Production	107	111	145	155	160
Imports	8	14	15	12	12
Exports	0	0	0	0	0
Apparent Demand	115	125	160	167	172
Demand Growth%	**-19.0%**	**8.7%**	**28.0%**	**4.4%**	**3.0%**

SAN had been witnessing healthy growth in last two years due to its wide-ranging usage in consumer electronics, appliances and automotive sector.

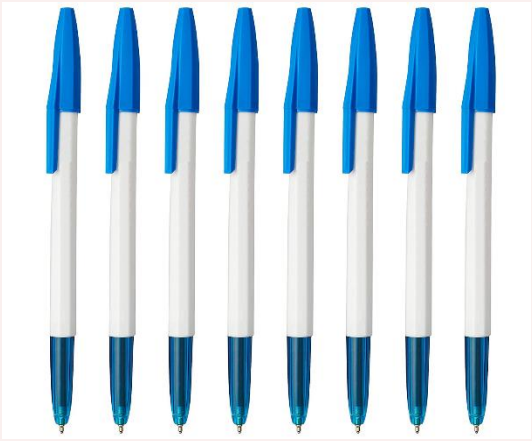
Significant demand for SAN is observed in various sectors owing to its impressive properties like high rigidity, high heat resistance, and chemical resistance.

Increasing demand for Styrene Acrylonitrile in the electronics sector for jacketing of air conditioner impellers, dial switches, and industrial battery switches on account of its thermal insulation properties is expected to escalate the demand for SAN in India.

Owing to the appreciable usage of SAN in autoclavable devices, medical light diffusers, and dental applications, the demand for SAN is anticipated to grow considerably on growth in the demand for medical devices due to potential advances in the healthcare sector after Coronavirus stress. In addition to this, demand for SAN in packaging applications in the cosmetic and food industry to further drive the growth of the Indian SAN market

Demand for SAN is dependent on the yearly production of derivative Acrylonitrile Butadiene Styrene (ABS). With capacity expansion of ABS in 2022-23, SAN demand also witnessed a staggering growth of 28%in the said year.

The Indian writing instruments industry, which has been growing at a CAGR of about 15% over the last decade, is already worth about Rs.2,500 crore and is marked by a fierce competition among brands like Add Gel, Cello, Flair, Luxor, Linc, Reynolds, Rotomac, Stic, Today's and hundreds of other small-scale and unorganised players. While the low-value segment (which includes ball point and gel pens) constitutes 80% of the Indian market, mid (pens priced in the range of Rs.20 to Rs.500) and high-end (the price tag goes as high as in lakhs) writing instruments make for the rest 20%. Pen industry is growing at a fast space in India now and SAN has seen a huge demand in the pen market as well.



Dependance on Swiss machines have now seen a decline owing to high waiting time to import. Secondly the manufacturing on pens in India has also seen a rise due to shift seen in manufacturing from China to India, as China has been moving and adopting to 3D printers and robotics for manufacturing pens. It is expected there will be an increase in demand of SAN grades, with a focus on consumer and industrial applications.

D. PET (Polyethylene Terephthalate)

In FY22-23, the estimated PET domestic demand was 1.5 MMT growing more than pre COVID level. It overcame the degrowth during last two years, supported by post COVID economic recovery. No significant capacity was added last year.

The demand drivers are primarily downstream consumption growth in different application segments, which is propelled by increased on the go consumption backed by strong summer seasonal demand last year, opening of educational institutions, Offices, strong tourism, major festivities & marriage season. Demand in country liquor segment of PET is 10% of the total PET demand.

Jars for household usage and edible oil consists of 15% of PET demand. Rest other sectors such as pharma, personal / home care etc., contribute to remaining 20% of the PET market.

PET market continuously rose in India in the Q1 2022 owing to the high demand from packaging and textile industries. The speculations around the global crude oil supply were unable to ease hence crude oil prices was trending upwards since the beginning of Ukraine-Russia conflict affected its derivatives paraxylene and PTA market. This had caused overall cost pressure on key value chains including PET. Thus, PET price rose significantly and were assessed at USD1972.28/MT.

The Indian market for PET was ruled by its feedstock, which remained high in Q2. In Q3, the Indian market witnessed a declining trend as a result of lower demand and weakened feedstock PTA prices. Due to uncertainties in international price, inflationary pressure cash flow remained a challenge for brand owners and small converters, need based buying maintained with average raw material inventory 4-5 days. The cash crunch eased out in third quarter of the year.

Table 18: PET Demand Supply

PET (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	2020	2055	2241	2574	2610
Production	1757	1788	2062	2394	2427
Imports	165	105.5	98	90	75
Exports	802	711	649	837	708
Apparent Demand	1120	1182	1510	1646	1794
Demand Growth%	**-0.4%**	**5.5%**	**27.7%**	**9.0%**	**9.0%**

PET Imports into India FY 23 were around 100 KT, reduction by 4% over last year. 85% share of imports from China, Vietnam and Taiwan. Bangladesh's new capacity addition Meghna Group took rest 14% share. Major customers in South & East like Sibi Polymers, Indopet, Varun Beverages and SNJ continued to import material.

Total Downstream investment estimated in FY22-23: 400 Cr; Capacity addition – 130 KT. Major Equipment suppliers are Husky/Krauss Maffei/SIPA/ASB and Ferromatik.

Brand owners stayed active in launching different variants with new PET applications.

- DAVAT launched drinks in different pack sizes (Limpoo, Love Apple, Malty);
- Storia Launched Nimbu Pani, Coconut water changing shape and size of the bottle.
- Asian Beverages launched different variant of the bottle
- Dabur is planning to enter Cola segment.
- Coke has launched Limca Sportz. No Fizz product.
- Parle launched Smoodh (flavoured milk) packed in PET (Aseptic line)

Main driver behind India's PET demand growth is more widespread use of PET packaging in the beverage sector in India.The outlook of domestic industry is very positive with estimated growth of 9% in next year. New capacities are lined up IVL-Nagpur (252 KT), Sumilon (144 KT), Jindal (90 KT) and Uflex (72 KT).

Braskem has been developing a chemo-catalytic production of MEG/MPG using sugar since 2017 in partnership with Haldor Topsoe. MEG is the raw material for the production of PET resin. Sojitz is also looking to produce biomass-derived paraxylene via the Isobutanol pathway in order to be able to manufacture 100% bio-based PET.

Sojitz have recently signed an agreement to form a JV focused on the production and commercialization of BioMEG and BioMPG (monopropylene glycol). With the completion of the technology development in 2022, the business plan foresees the implementation of three industrial plants, with the start of operation of the first unit in 2025.

xxi. Synthetic Fibres

Textiles is India's foremost manufacturing industry. It has a significant impact on the economy by contributing to industrial output, employment generation and the export earnings of the country. India synthetic fiber industry is the new addendum to the ever-growing Indian Textile Industry as it plays a vital role in the Indian Textile industry. The synthetic fiber industry of India has shown tremendous business potential and the industry has grown stupendously over the recent years.

Synthetic textile industry in India is self-reliant across the value chain right from raw materials to the garmenting.

Fabrics made from synthetic fibres are international standard and known for their excellent workmanship, colours, comforts, durability and other technical properties. Due to heavy investments in world-class manufacturing plants, continuous innovation, untiring entrepreneurship, new product mix and strategic market expansion, India is soon going to cloth the entire world and set to take centre stage in the global arena.

India is the second largest producer of synthetic fibres after China. The synthetic fibre value chain is vertically integrated with upstream and downstream linkages from raw materials to finished goods. Production of synthetic fibres in India increased from 7954 KT in 2001 – 2022 to 8553 KT in 2022 – 2023 it is expected to touch 10098 KT by 2024 – 2025

Government has recently announced to set up 7 Mega Integrated Textile Region and Apparel (PM MITRA) Parks with a total outlay of Rs. 4,445 crores. The Parks will come up in Tamil Nadu, Telangana, Gujarat, Karnataka, Madhya Pradesh, Uttar Pradesh and Maharashtra. This will provide a big boost to synthetic fibre industry in the country. The Indian textile sector is set to benefit from the government's priorities outlined in the budget 2023. The budget indicates the government's commitment to enhancing the textile sector's competitiveness, employment opportunities, and exports.

The government has set aside substantial funds for the textile industry, including Rs. 10,000 crore for the production-linked incentive (PLI) scheme for textiles, Rs. 500 crore for the Indian Technical Textiles Mission, and Rs. 1,000 crore for the National Technical Textiles Mission. These measures are expected to boost the sector's production and exports, as well as create more employment opportunities for people in the country. PM Gati Shakti presents significant opportunities for technical textiles to be used extensively. The Production Linked Incentive (PLI) Scheme for textiles for Man Made Fibre Fabrics & Apparel, and Technical Textiles is expected to attract investment of Rs. 19,798 crores for manufacturing. The response of the industry has been very encouraging.

In addition, the government has announced several other initiatives to support the textile sector, including establishing mega textile parks, providing infrastructure development support, increasing support for the Handloom sector, and supporting the growth of the jute sector. The textile sector is a significant contributor to India's economy, and the government's focus on it in the 2023-24 budget is expected to have a positive impact on the sector's growth and development. The government's commitment to the textile sector's development is also in line with its goal of making India a global manufacturing hub and boosting its exports.

Government support

- Rs 10,683 cr Production Linked Incentive scheme in place
- Man Made Fibre (MMF), garments, technical textiles focus areas
- 7 PM Mega Integrated Textile Region & Apparel Parks planned
- MITRA scheme providing complete value chain support for textile
- $100 billion export target by 2030
- Incentive scheme for textile value chain
- Cotton Price Stabilisation Fund Scheme to push exports
- Replace Technology Upgradation Fund Scheme with PLI type plan
- Issue claims for 40,000 pending cases in ATUFS

Presently, India's per capita fibre consumption is around 6.0 kg / per capita of which MMF consumption per capita is 3.7 kg / capita only which is among the lowest as compared to the world per capita MMF consumption which is around 10.1 kg / per capita.

Hence, there is ample scope for increasing MMF per capita fibre consumption in India and synthetic fibre will play the leading role in the growth story. There has been an increasing awareness of unsustainable practices in the textiles industry including carbon emissions, high energy and water input, usage of chemicals polluting water and impacting aquatic life and high level of pre- consumer and post-consumer wastes with tonnes ending up in landfills. The focus on green growth along with the G20 priority of Lifestyle for Environment - LiFE would help make textiles more sustainable and transition from linear to circular models. The recent EU Strategy for Sustainable Textiles is also set to impact the suppliers in India with greater compliances and quality adherence requirements including across recycled fibres, reduce and repair ecosystem and producer responsibility.

With the increased awareness and consumer consciousness, India should proactively gear up with focus on revamping:

- Processes including circular designs, use of blended fibres, natural source fibres, Zero Liquid Discharge (ZLD), Effluent treatment plants (ETP), chemicals management and use of eco-friendly dyes.
- Practices including reducing use of energy while increasing share of renewables in the energy mix, and conserving water.
- Policies including safety at workplace.

With an emphasis on more sustainable fashion and Indian industry geared up to compete in the new paradigm. To improve sustainability credential, India industry is promoting recycling of PET products to prepare polyester fibre. Besides the Government, the Industry is also gearing up with various initiatives promoting innovation, digitization, increasing competitiveness and lowering cost of doing business. Textiles 4.0 smart factories of the future are being conceptualized with focus on intelligent manufacturing, end to end digitization, use of IoT, big data and AI. With such pragmatic interventions, India is poised to attract substantial investments and unleash tremendous potential in, both as a manufacturing and a sourcing hub.

2023 has dawned with bright hopes for the Indian textile industry. The industry seems to be headed towards a positive steady growth phase, after a period of turbulence and uncertainty. With a world that is hopefully coming to the end of the pandemic, things are looking up for the textile industry. This buoyant mood stems from the series of measures taken by the Union Government to revive the fortunes of the textile industry.

The sector was in dire need of some positive policy measures in this Budget. As the second-largest source of employment in India after agriculture, the textile industry must be viewed as a strategic sector that could be used to resuscitate both consumption and employment thus creating a multiplier effect on the economy.

Demand momentum is expected to continue in FY23 in view of the reduction in impact of COVID-19 and re-opening of retail space malls offices and schools along with the reduction in logistics issues for export demand. Domestic demand for all the textile sub-sectors has continued to improve from 2QFY22, after a slight dip in 1QFY22.

The increased demand momentum along with the supply chain issues has increased the realizations. Demand for cotton remained all-time high in 2HFY21, leading to reduced opening stock for the new cotton season. The rise in prices of cotton has led spinners to accumulate the stock. The demand for MMF has also continued to increase, mainly due to the rise in cotton prices, leading to a shift of demand from cotton to MMF, to an extent.

From the highs of the pandemic, growth and demand for the textiles sector has moderated this financial year. The Russia-Ukraine war, high inflation and the threat of a looming recession in key markets like the US and Europe have led to a slowdown in exports. The silver lining for the sector has, however, been robust domestic demand and new pockets of growth.

The demand momentum sustained for home textiles in the domestic market because of improved consumer spending. About 100 smart cities that are being established have a huge opportunity for home textile as well because people are shifting to these places and getting established there. So, markets are no more restricted to metros. It is a good sign for manufacturers, retailers and for India as a country, as prosperity is spreading in the smaller pockets. It is becoming visible in retail sales in home categories as well. India’s annual textile and apparel exports stood at USD 44.4 billion in FY 2022 with an increase of 41 per cent compared to last year

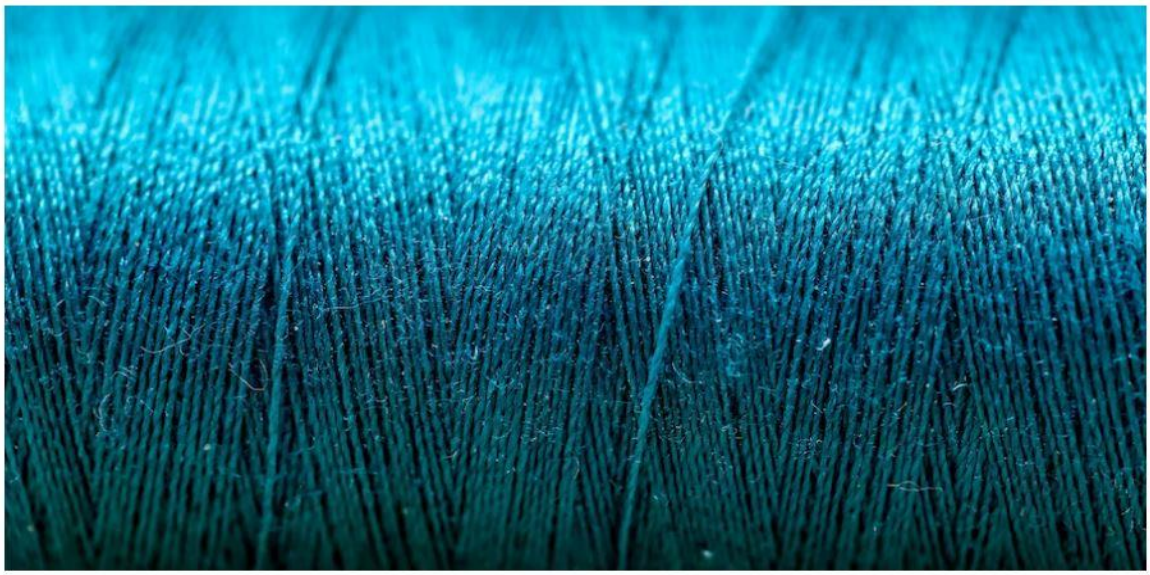


Table 19: Demand Supply Balance of Synthetic Fibre

PSF	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	2702	2762	2784	2919	2950
Production	1500	1650	1760	1813	1867
Imports	25	24	20	20	20
Exports	216	274	218	177	177
Demand	1290	1378	1530	1576	1622
Demand Growth (%)	**-11.3%**	**6.9%**	**11.1%**	**3.0%**	**2.9%**
POY	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	3480	3480	3480	3766	4088
Production	2190	2861	2931	3238	3529
Imports	144	75	162	70	50
Exports	106	179	86	108	120
Demand	2228	2757	3007	3200	3459
Demand Growth (%)	**-12.6%**	**23.7%**	**9.1%**	**6.4%**	**8.1%**
PTY	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	2640	2995	3115	3335	3645
Production	1911	2460	2817	3010	3269
Imports	13	13	17	14	14
Exports	360	503	338	420	540
Demand	1564	1970	2496	2604	2743
Demand Growth (%)	**-12.1%**	**25.9%**	**26.7%**	**4.3%**	**5.3%**
IDY	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	62	69	69	69	70
Production	41	54	56	62	67
Imports	36	51	50	55	63
Exports	9	10	8	9	9
Demand	71	92	98	113	130
Demand Growth (%)	**18.3%**	**30.0%**	**6.5%**	**15.3%**	**15.0%**
FDY	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	1254	1259	1313	1475	1493
Production	629	929	989	1163	1366
Imports	52	146	215	100	60
Exports	19	25	14	30	70
Demand	686	1033	1194	1333	1416
Demand Growth (%)	**-28.1%**	**50.7%**	**15.6%**	**11.6%**	**6.2%**

India had been somewhat slow to capitalize on the sourcing shift from China towards South-east Asia, an opportunity quickly seized by Vietnam and Bangladesh to grow alternative apparel markets.

Still, Indian ready-made garment (RMG) exports have seen respectable traction in recent months, as trade diversification within Asia gathered steam because of geopolitical reasons.

According to the latest industry data, the value of Indian RMG exports in the first 11 months of fiscal 2022-23 (April to February) grew 3.5% to some $15bn. With increased investment and policy reforms, India is looking to boost apparel exports to $100bn by 2030.

In 2022-23, the combined production of synthetic fibre (PSF, POY, PTY, IDY, FDY) increased to 7951 KT from 7374 KT in the previous year. The same is expected to touch 9381 KT by 2024-25.

The demand which had derailed to negative 16% in 2020-21 owing to the current pandemic situation grew at a robust rate of 28% in 2021-22. In 2022-23, demand grew at healthy growth of 16%. The same is expected to grow further to touch 8761 KT by 2024-25.

Demand across end-user industry rebounded along with the textile demand picking up however high costs issues are still prevailing and hurting the manufacturers. The overall synthetic fibre capacity is expected to touch 9244 KT by 2024-25.

xxii. Synthetic Rubber

Carrying on its post COVID-19 recovery, the Indian automobile industry saw the easing of the supply chain crisis that had caused serious disruptions in 2021. Sales were back and September 2022 saw wholesale numbers set a new monthly benchmark of 3,55,946 units. The recent spike in the costs of commodities and raw materials have put pressure on auto and auto components companies' bottom line during Q223. Companies tried to offset this cost by increasing the price of the end products. But market conditions and competition meant that they could not pass it on fully. The good news is that raw material and commodity prices have now started softening and market watchers say that the auto industry should start seeing the benefits from Q3 onwards.

The Indian automobile industry is setting out on a journey with hopes for a sustained growth momentum in 2023 and further embracing clean technology amid the lurking speed breakers of rising interest rates and cost increases due to new emission and safety norms, having witnessed a strong comeback from the COVID-led downturn this year.

While the passenger vehicles (PV) segment is set for record sales in 2022 despite the lingering effects of supply chain constraints and semiconductor shortages, the two-wheeler space is yet to see sustained sales buoyancy after having suffered for most of the year.

According to industry estimates, PV sales can reach around 38 lakh units this year. The three-wheelers and commercial vehicles segments have also witnessed good growth in 2022 compared to 2021, albeit on a low base of last year, which was affected by the second wave of COVID-19 and manufacturers will be keen to carry forward the momentum to the new year.

As per industry observers, 2023 will also see acceleration in adoption of electric vehicles, which has already started taking root in 2022, especially in the two-wheelers segment.

The Bureau of Energy Efficiency has launched a new Star Labelling programme for tyres, similar to the one seen on ACs and refrigerators. Here, this rating will indicate the rolling resistance and the tyre's fuel efficiency potential. A low rolling resistance will attract a higher star rating, thus potentially increasing one’s fuel savings and lowering emissions.

Michelin became the first tyre brand in India to gain a 5-star rating in the newly introduced star labelling programme. Its tyres for commercial vehicles were also the first to receive a 4-star rating. Michelin tested its Latitude Sport 3 and Pilot Sport 4 tyres for SUVs.

Calendar year 2022, which started on a high note with 252,466 units in January, is set to close by scaling a new peak, breaking many records along the way for car makers in the country. And this performance comes on the back of PV sales accelerating past the 300,000-unit sales mark for for five months this year (see retail sales data table below).

Passenger Vehicle Sales in India in 2022	
Month	**Units Sold**
January	2,52,466
February	2,77,405
March	3,36,000
April	2,76,326
May	2,85,000
June	3,03,250
July	2,92,414
August	3,19,500
September	3,36,638
October	3,64,671
November	2,87,929
December (Estimated)	4,05,000
Total Sales in CY2022	**37,36,599**
Data: Industry Sources	

With sales of an estimated 40,000-odd units in December, the auto retail industry would generate a turnover of over $5 billion or Rs 41,235 crore in a single month, facilitating a minimum of over Rs 10,000 crore to Rs 12,000 crore of GST collection for the government.

CY2022 to set a new benchmark for PV sales

Given the strong and sustained momentum, the Indian passenger vehicle market is set to close the calendar year with a record 3.7 million units in retail sales, which constitutes YoY growth of 19% (CY2021: over 3.1 million units).

India Becomes World's Third Largest Auto Maker			
Top 5	Country/Territory	CY2022	% Growth
1	Mainland China	24.8	3.60%
2	United States	13.8	-8.30%
3	India	4.4	23.40%
4	Japan	4.2	-4.40%
5	Germany	2.8	-2.90%

Above table is based on light vehicle sales (0-6 tons) in million units

Data Source: S&P Global Mobility

On an average, carmakers delivered over 300,000 cars in a month, which is approximately 40,000 units per month higher than in 2021.

India beats Japan in the global car race

A strong bounce back in the demand for personal mobility and last-mile deliveries after the pandemic have helped India overtake Japan in car sales for the first time ever. India is now the third largest auto market in the world in 2022.

According to global forecasting agency S&P Global Mobility, Indian light vehicle sales for 2022 are set to grow by over 22% to 4.4 million units, whereas Japanese market sales are expected to slip to 4.2 million units. Light vehicle sales include all passenger vehicles, small commercial vehicles and vans up to six tonnes.

Retains No. 4 position in light vehicle production

In terms of output, India has retained its position as the fourth largest light vehicle producer with an output crossing a milestone of over five million units for the first time ever — the actual numbers are likely to be officially published within a fortnight's time.

INDIA THE WORLD NO. 4 ON THE LIGHT VEHICLE PRODUCTION FRONT				
TOP 10	Country/Territory	CY2012	CY2022	CAGR Last 10 years
1	Mainland China	18.2	26.1	4%
2	United States	10.1	9.8	0%
3	Japan	9.4	7.4	-2%
4	India	3.8	5.1	3%
5	South Korea	4.5	3.7	-2%
6	Germany	5.5	3.6	-4%
7	Mexico	2.9	3.3	1%
8	Brazil	3.2	2.2	4%
9	Spain	1.9	2.1	1%
10	Thailand	2.4	1.8	3%

Above table is based on Light Vehicle Production (0-6 tons) in million units

Data Source: S&P Global Mobility

Strong double-digit growth for second straight year

Asia's third biggest economy was the fastest-growing market in 2022 and no other country posted consecutive strong double-digit (over 20%) growth in the world.

In spite of major disruptions, the Indian light vehicle market has swelled at a compounded annual growth rate of 3% in the last decade while most of the matured markets have registered flat growth or negative growth.

On a low base of FY22, domestic auto industry is expected to grow by 25% in FY23 While the shortage of chips and supplies from China did disrupt production and supplies in the first half of 2022, the way India managed the Russia-Ukraine crisis helped the country to manage inflationary challenges well.

India imports over 80% of its crude annually to meet its mobility needs. During CY2022, India started sourcing more crude from Russia than ever before. From importing about 1% of the total crude requirement, almost 25% of fuel was imported from Russia by September 22. This helped India to counter inflation and provided a stable economy compared to other major economies of the world.

While the move to source crude from Russia paid off in 2022, the decision to continue to buy despite the G7 price cap on the Russian Urals and its implications will decide the future stability of the economy, experts feel.

S&P Global Mobility forecasts the momentum to moderate and it expects India light vehicle production to grow by just 5 to 8% in 2023, with the pent-up demand getting saturated and inventory at the dealership returning to normalcy.

Apart from the economic headwinds of inflation, there are structural challenges the country continues to face. The rising congestion and increased pollution in Indian cities are one of the major challenges in front of the government and policymakers. Even as the penetration is low, the vehicle density in India is on the rise.
It has increased from 15 cars per thousand in 2010 to 36 cars per thousand in 2022, as per S&P's latest findings.

Riding high on fresh capacity addition and improving production the domestic tyre industry is hoping to generate an incremental turnover of $ 3 billion or Rs 25000 crore in the next three years and cross a turnover of Rs 1 lakh crore, as per a new report by Automotive Tyre Manufacturers Association (ATMA).

At present the overall turnover of the domestic tyre industry stands at Rs 75,000 crore.

As per ATMA report, the domestic tyre industry has already completed an investment of over Rs 35,000 crore in the last three years aided by improved efficiency via debottlenecking and fresh capacity creation. It also noted that the investments that have been undertaken in a challenging time period span across all the key tyre segments with major beneficiary being Truck & Bus Radials (TBR) and Passenger Car Radials (PCR) manufacturing.

In view of the normal monsoon, the rural economy is also picking up. Festive season has led to a new resurgence in Auto sales. Premiumization of the Passenger car market with clear preference for SUVs is creating an exponential rise in demand for higher profile tyres for 16 inch wheels and above. According to ATMA, the Indian tyre industry recorded a 50 percent jump in exports in FY 22. And despite recessionary trends in the key export markets, the exports have increased in double digits in the ongoing year too.

Four leading tyre makers will invest Rs 1,100 crore to increase rubber plantation in Northeast and West Bengal as part of a five-year project being implemented by the Automotive Tyre Manufacturers' Association (ATMA) in association with the Rubber Board. This is the first of its kind project in the world where the consuming industry is working in collaboration with government agencies to ramp up production of natural rubber to increase availability of this strategic raw material. As part of the project, ATMA plans to develop two lakh hectares of rubber plantation in Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and West Bengal.

CESL has floated second tender under the National Electric Bus Program, this time for 4,675 eBuses for Rs 5000 crore. This is the third tender for electric buses, following the Grand Challenge tender of 5,450 e-buses that catalyzed this business and a recently concluded tender for 6465 electric buses. The tender is based on a dry lease contract, allowing STUs to deploy their own bus drivers. Three states - Delhi, Kerala and Telangana are covered in this tender, deploying 2400, 775 and 1500 e-Buses respectively. This is the third tender for electric buses in less than 15 months, with a total cumulative volume of 16,590 e-Buses across the country, equivalent to 33% of the target given to CESL. Aiming to accelerate EV adoption and cut down fuel imports, carbon emissions and air pollution, STUs in Delhi, Kerala and Telangana will deploy 4675 electric buses on the basis of a “dry lease”

The Madras Rubber Factory (MRF) has decided to invest Rs 1,000 crore to not only expand its existing facility but also to create a new specialty assembly line at Sangareddy. Taiwan-based Continental Carbon has set up its first greenfield project in India at Gujarat’s Dahej for producing carbon black with an investment of around USD 200 million. The first unit was set up through acquisition routes in the National Capital Region (NCR) in 2000. The capacity of the NCR unit with two production lines is 85,000 tonnes carbon black per annum. While the new unit is the company’s first greenfield set up in India having an annual capacity of 1,50,000 tonnes with four production lines. The company’s total installed capacity in India to manufacture carbon black stands at 2,35,000 tonnes annually with six production lines. Since the demand for carbon black is rising especially from the automobile and tyre industry. The company will focus on research and development (R&D) activities in carbon black manufacturing and usage at the company’s NCR unit.

Yokohama Rubber Co. (YRC) has started production at its third Indian off-road off-road tyre manufacturing plant in Visakhapatnam, Andhra Pradesh. Commenced about four months ahead of schedule, the facility is aimed at Yokohama Off-Highway Tires (YOHT). This new plant, like the existing facilities in Dahej, Gujarat, and Tirunelveli, Tamil Nadu, will produce YOHT's core Alliance, Galaxy and Primex off-highway tyre brands – which are used on agricultural, construction, industrial and forestry machinery.

According to the tyremaker, the Visakhapatnam unit will have a daily manufacturing capacity of 69 tonnes in rubber weight in its initial production stage. The daily capacity will be increased to 132 tonnes in the second phase, which is scheduled to start in the first quarter of 2024. Further expansion of the plant capacity is under consideration. Once fully completed, the Visakhapatnam facility will raise Yokohama's overall production capacity for off-road tyres to 548 tonnes (rubber weight) per day. The new line is scheduled to start production in the fourth quarter of 2024 and will increase Yokohama Rubber Co. capacity to 4.5 million tyres.

Tyre manufacturer JK Tyre & Industries will be investing ₹1100 crore for expanding capacity over the next two years. The investment will result in increasing the capacity by 13 per cent in passenger vehicle tyres. Earlier, the company had planned an investment of ₹700 crore in 2018 but that was scrapped because of the coronavirus. The company is expecting to maintain its export level at ₹1,900 crore.

Tyre major CEAT plans to invest another Rs. 700-800 crore in the next 9-12 months as it nearly doubles capacity at its Chennai plant with an eye on global markets like Europe and the US. CEAT invested around Rs. 1,400-1,500 crore in the Chennai plant so far and the ramp up will mean another Rs. 700-800 crore investment. CEAT's new plant at Ambernath (Maharashtra) ramped up production from 50 MT to 80 MT per day.

TVS Srichakra is implementing a project pertaining to establishment of Off-highway tyres (OHT) plant in Madurai (Tamil Nadu) at a total cost of Rs 320 crore. Phase 1 of the capex will be completed by the first quarter of fiscal 2023. The OHT expansion project has an additional revenue potential of Rs 200-250 crore per annum, subsequent to ramp-up and stabilization of the plant in three years with 100% of output catering to the EU agriculture market.

Rajratan Global Wire, a manufacturer of tyre bead wire/reinforcement wire, is planning to invest INR 370 crore to increase its bead wire production capacity from 100,000 tonnes to 180,000 tonnes per annum. INR 70 crore is being invested in Rajratan's Thailand-located tyre bead wire manufacturing plant. This plant's capacity has risen from 40,000 tonnes to 60,000 tonnes per annum.

The company caters to the demand of Thailand-based, and international tyre makers from this sole international facility. Tyre makers including Apollo, Bridgestone, CEAT, Goodyear, JK Tyre, MRF, TVS Tyres, Yokohama, and more are included in the company's list of national and international clients. Notably, tyre bead wires constitute a 3-4% cost in the overall bill of materials (BoM) for raw materials used in manufacturing a tyre. The remaining INR 300 crore has been planned to be invested in Rajratan's upcoming Chennai facility which will begin part operations by March 2024. Rajratan, after the deployment of the Chennai facility, will have three tyre bead wire manufacturing locations located in Indore, Chennai, and Thailand.

Mitas's (Trelleborg Wheel Systems) newest two-wheeler tyre production facility in India has been formally inaugurated. The factory, which will serve global motorcycle tyre markets, is the result of a joint venture with the Mahansaria Group. Apollo Tyres inaugurated their Chennai tyre testing facility in December 2022.

Automobile companies have lined up their investment plans in India.
M&M to invest Rs 10,000 cr to set up plant in Pune for upcoming EV range
Auto major aims to have 30% of its sales to be from electric vehicles by 2027.
Automaker Kia India plans to invest Rs 2,000 crore over the next four years to scale up its presence in the electric vehicle segment.

Suzuki to invest Rs 30,000 cr on 2 new plants. The factory at Hansalpur in Gujarat will be completed by 2026 and make cells for electric vehicles (EV) that the company will make in India. The upcoming Maruti Suzuki plant at Kharkhoda in Haryana, meanwhile, will make EVs and petrol-driven cars and will have an annual capacity to make one million units.

Maruti Suzuki India (MSI) in May 2022 announced, its new manufacturing facility in Haryana, the company's third in the state, would reach peak production capacity of 10 lakh units per annum in the next eight years entailing a total investment of Rs 18,000 crore. The new facility, which would come at an 800-acre site at IMT Kharkhoda in Sonipat district, will entail total investment of Rs 11,000 crore in the first phase with a production capacity of 2.5 lakh units per annum. The first set of vehicles are expected to roll out from the facility in 2025.

MG Motor India plans to invest about ₹4,000 crore in a second manufacturing unit, for which it is in talks with several State governments, including Gujarat where its first facility is located, according to a top company official. Tata Motors Ltd signed an agreement in August 2022 to buy Ford Motor's manufacturing plant in the western state of Gujarat for 7.26 billion rupees ($91.5 million).

The company, which is expanding the annual production capacity of its current plant at Halol in Gujarat to 1.25 lakh units by 2023, is looking to add another 1.75 lakh units capacity from the second plant and take its overall capacity to 3 lakh units a year in the next two years.

Switch Mobility, the electric vehicle arm of Ashok Leyland, is all set to invest around Rs 1,000 crore for setting up a new manufacturing unit in South India. The company is also in talks with financial investors to raise over $200 million for its expansion. Switch in April 2022 lined up investments of about 300 million pound across the UK and India to develop its range of electric buses and light commercial vehicles

Ola Electrics is set to acquire around 1500 acres land in Tamil Nadu to set up a electric vehicle factory, Ola already has around 500 acres in the area and is now adding a much bigger land parcel. Ola is expected to invest around Rs. 1 lakh crore by the end of the decade in the ‘electric vehicles’ park that it is setting up at the Krishnagiri district in Tamil Nadu.

US-based Biliti Electric Inc in April 2022 said it is planning to invest USD 150 million (around Rs 1,144 crore) to set up an electric three-wheeler plant with a production capacity of 2.5 lakh units per year in Telangana. The new plant is estimated to drive private investment of USD 150 million and create over 3,000 jobs in the state, aligning with the state's policy to become a global hub for electric vehicle (EV) and energy storage manufacturing, the California-based company said in a statement. Biliti currently operates through an exclusive manufacturing partnership with Hyderabad-based Gayam Motor Works (GMW) for manufacturing its three-wheelers.

Electric vehicle (EV) startup Mecwin India has announced an investment of Rs 500 million to set up an EV manufacturing plant in Bengaluru, Karnataka. The manufacturing facility will focus on indigenous EV motors and controllers and is expected to be operational by the end of this year. The facility targets to have an initial manufacturing capacity of 2,000 units per day.

Recently, Mecwin also entered the EV retrofitting market following a Rs 15 billion deal with the Raipur-based Tatva Group. Under the partnership, Mecwin will manufacture and supply 500,000 retrofitting kits, including motor, controller, lithium-ion battery, and charger, for different vehicles over the next three years to Tatva Group.

As per ICRA, demand for tyres in India is likely to grow 6-8% in FY23, with tyre manufacturers witnessing margins expansion in second half of the fiscal. Demand will be driven by strong growth in OE (original equipment), and a slight increase growth in replacement volumes as well as softening prices of natural rubber and crude oil derivatives since July.

ICRA expects, OE demand to witness a low double-digit growth supported by factors like easing supply-related headwinds in the passenger vehicle (PV) segment, improving two-wheeler (2W) demand, and strong growth in commercial vehicle (CV) segment amid favourable macro-economic environment.

Replacement demand, which forms around two-third of tyre demand, is likely to witness mid-single digit growth in FY23 following a strong FY22.

The growth in tyre exports from India was robust in FY22, supported by healthy demand from key export destinations such as the US and European nations. However, the economic slowdown in the US and European nations is expected to impact export demand and growth is expected to be flat in FY23. Tyre industry revenues continue to breach record high levels as they recorded a strong YoY growth of 29% during H1 FY2023 driven by stable demand and favourable realizations.

After a mixed second quarter (Q2), there are multiple tailwinds for Indian tyre companies. Higher volumes from automotive makers (especially the original equipment manufacturer segment) and steady replacement demand are key drivers on the top-line front. The bigger trigger, however, is the easing of commodity prices on the back of falling crude oil-related inputs, as well as natural rubber prices. Together, the two account for over 60 per cent of the raw material cost as a percentage of sales.

As per experts, while this is the fourth straight quarter, when industry profit margins have remained affected by the effect of elevated input and freight costs. However, with the softening prices of natural rubber and crude oil derivatives since July 2022 and a stable pricing environment, the industry’s margins will witness expansion in H2 FY23.

The same might not be significant given the higher OE skew in the revenue mix. The margins shall remain exposed to vulnerability in movement in crude and rubber prices, going forward.Tyre industry has been investing around 10% of its revenues in capacity expansion over the past few years.

ICRA expects the industry to continue to invest 10-12% of the revenues in the medium term. While part of the capex will be debt-funded, the credit profiles of tyre manufacturers would be supported by healthy earnings and cash reserves.

Sales of commercial vehicles - a barometer of economic activity - are expected to come close to the pre-pandemic peak of over a million units in the ongoing financial year on the back of improved fleet utilizations, strong replacement demand and pick-up in road construction projects across the country.

Industry estimates around 1.02 million commercial vehicles will be sold in the local market by the close of the fiscal year, aided by robust recovery in demand for small commercial vehicles (less than 3.5 tonne) and light & medium duty (LMD) trucks that will breach previous peaks.

Total sales of commercial vehicles are expected to fall shy by merely 40,000-45,000 units compared to record sales of 1.06 million units registered in FY19. Increased government spends on infrastructure development, better availability of financing and replacement demand will support sales of commercial vehicles, especially of heavy-duty trucks, going forward.

Replacement sales of commercial vehicles have been muted the last few years with consumers deferring purchases amid economic uncertainties as well as the outbreak of Covid-19, which has been adversely impacting utilization rates and profitability. M&HCV trucks are expected to grow by 15-20% in FY2023 and 10-12% in FY2024, with growth continuing to be supported by traction in construction and mining activities, as well as pent-up replacement demand. The rubber products industry is looking for a demand boost as cheaper synthetic rubber and declining prices of natural rubber have helped to lower production cost.

While the tyre sector, the largest consumer of both forms of rubber, is facing subdued demand, the non-tyre segment is witnessing a buoyancy in activities. Synthetic rubber Synthetic Rubber prices, which surged with the intensification of COVID-19 and the outbreak of the Russia-Ukraine war, have now declined. SR has become cheaper because of weak demand the world over.

Synthetic Rubber prices went up as much as 80 percent after the war started. They had dropped by 30- 40 percent. Similar to FY22, PBR & SBR deltas were high at $1040 & $815 in FY23; (5-year average for PBR & SBR is $686 & $619 respectively). In India, the Styrene-Butadiene Rubber market was termed in early 2022 as stable to firm owing to high feedstock prices and robust demand fundamentals. India imports all its Styrene, and major exporters have been Far East Asian, Southeast Asian and Middle East Asian countries.

Styrene prices were on the uptrend as crude volatility left limited space for price normalization for overseas manufacturers. Consequently, SBR prices have also been robust in Q1 22/23, and a significant climb was observed in the market.

As of the 1st week of March, SBR prices were assessed at INR 172410 per MT (USD 2260.48 per MT) on an Ex-location basis. In the third quarter of 2022-23, Styrene-Butadiene Rubber prices followed the downward trend in the Indian market (average USD 1481 per MT). Since January 2023, the prices for SBR have witnessed a uptrend from an average of USD 1463 in Jan to USD 1810 per MT on 17th March 2023.

SBR which accounts for 40% of the total synthetic rubber demand is consumed mostly in the tyre sector. Considering the large amount of SBR that is being consumed in the manufacture of tyres and tyre products, demand is very much dependent on the automotive industry and tyre sectors as a whole.

On a positive note, growing use of low-rolling-resistance tyres to reduce fuel consumption and decrease CO2 emissions should increase SBR demand. Low rolling resistance tires are acquiring significant popularity, with heightened emphasis on improving vehicular performance outcomes catalyzing growth. Furthermore, growing consciousness about environmental sustainability is prompting manufacturers to incorporate several changes in the nature of materials used during the production process. This trend has boded well for overall market growth. In the long-run, low rolling resistance tires with a wide band width are expected to account for bulk of the overall demand, while sales across the aftermarket segment are anticipated to surge incredibly.

In India, the Styrene-Butadiene Rubber market has been termed as stable to firm owing to high feedstock prices and robust demand fundamentals. India imports all its Styrene, and major exporters have been Far East Asian, Southeast Asian and Middle East Asian countries. SBR industry remained flat in FY23 largely due to slowdown in its largest downstream application of two wheeler softness and shutdowns by both RIL & ISRL and is expected to clock a modest growth of around 6% in next two fiscals.

The Board of Indian Oil Corporation Ltd (IndianOil) at its meeting held on 16th March 2022 had accorded approval for implementation of Poly-Butadiene Rubber (PBR) Project at Indian Oil's Naphtha Cracker Complex at Panipat, Haryana at an estimated investment of Rs.1459 crore which is expected to be operational by 2025. The plant will have a PBR production capacity of 60,000 tonnes per annum based on state-of-the-art technology provided by Goodyear Tire & Rubber Company which is also the leading global manufacturer of automotive tyres. Butadiene is the primary raw material for the production of PBR which shall be available from existing Naphtha Cracker Complex of the Company.

Table 20: Demand Supply Balance of PBR, SBR, NBR, EPDM, BUTYL RUBBER & HALO BUTYL RUBBER

PBR	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	135	135	135	135	135
Production	129	133	126	135	135
Imports	90	96	100	107	118
Exports	23	21	2	4	1
Demand	200	210	224	238	253
Demand Growth (%)	**8.2%**	**4.9%**	**6.7%**	**6.3%**	**6.3%**
SBR	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	270	270	270	270	270
Production	205	225	199	235	251
Imports	77	91	85	87	86
Exports	22	11	6	9	9
Demand	273	292	292	311	328
Demand Growth (%)	**8.6%**	**6.7%**	**0.0%**	**6.7%**	**5.5%**
NBR	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	14	14	15	16	17
Production	12	13	14	16	17
Imports	34	30	37	40	43
Exports	0	0	1	1	1
Demand	46	43	51	55	59
Demand Growth (%)	**-1.8%**	**-7.1%**	**20.0%**	**7.4%**	**7.3%**
EPDM	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	0	0	0	0	0
Production	0	0	0	0	
Imports	42	50	61	63	65
Exports	0	0	0	0	0
Demand	42	50	61	63	65
Demand Growth (%)	**-6.7%**	**19.0%**	**22.7%**	**2.7%**	**3.2%**
BUTYL RUBBER+HALO BUTYL RUBBER	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	120	120	120	120	120
Production	54	56	78	108	120
Imports	85	79	61	50	39
Exports	25	19	17	33	28
Demand	114	115	121	125	131
Demand Growth (%)	**15.2%**	**1.1%**	**5.3%**	**2.6%**	**5.3%**

Tyre industry is the largest consumer of PBR in India with more than 80%, while balance is for other industries such as footwear, conveyor belts, etc. In view of the present deficit in PBR production in India and the steadily growing demand, the demand-supply deficit is expected to grow considerably in the future.

The implementation of the Project would reduce nation's import dependency for PBR, thereby, aiding to Atmanirbhar Bharat and Make in India vision for the nation. With the commissioning of this project, the Petrochemical Intensity Index of Panipat Refinery & Petrochemical Complex will increase from 15.9% to 18.05% along-with other upcoming projects. EPDM demand rebounded and witnessed a healthy growth of 6% in 2021-22. However, in next two fiscals the growth is forecasted to be a tad lower at around 4%. EPDM gets its name from the chemicals (monomers) that are mixed together in various proportions: ethylene, propylene and diene, where the ethylene content is usually between 45% to 75%.

Roofing made from EPDM can last 30-50 years, and liners can last for 20 years. Today EPDM manufacturing is one of the fastest growing segments of the synthetic rubber market, being the primary choice for automotive and industrial applications. It has long replaced natural rubber. EPDM is used in automotive and industrial hose products due to their thermal and oxidative stability and chemical resistance to polar organic and aqueous inorganic fluids. Excellent physical properties of EPDM make EPDM hoses extremely durable.

They may have a longer lifespan than the car itself that they are built in. EPDM has great noise reduction properties and it also bonds quickly with metal which gives a strong barrier against weather conditions as well as the environment, road surface and engine vibration. What's more it has low electrical conductivity and is also steam and water resistant.

EPDM is used in the automotive and construction industry for sealing purposes, as window and door seals, protective pads and electrical gaskets, as well. EPDM is used in heating, ventilation and air conditioning machinery, such as compressor grommets, mandrel-formed drain tubes, pressure switch tubing. EPDM can also be found in vehicle weather stripping, seals, sealant, wire and cable harnesses, and brake systems. Blends of EPDMs and other polymers (PP) are also used for car bumpers, fender extensions, and rub strips.

Growing demand for cars and building and production coupled with demand increase for other software areas is expected to power the call for EPDM rubber. Moreover, increasing call for electricals is also an influencing component helping demand upward push for EPDM. Moreover, as the demand for electric vehicles is

increasing, it is expected that in the future, EPDM will also thrive as it is used heavily in automotive products.
In a study it has been found that the ethylene-propylene-diene-monomer (EPDM) rubber waste from discarded non-tire automotive rubber parts is explored as an asphalt binder modifier.

Offtake of EPDM has been impacted as the microchips s hortage continue to crimp operations at automotive plants. In second-half 2022, rising global inflation took another toll on the automotive sector, as poor end-use consumer confidence limited growth and recovery of new car sales in India and China, both of which are major car markets in the region. Asian spot prices for ethylene propylene diene monomer (EPDM) imports hit new lows for the year 2022 in Q4-2022, and a near-term recovery seems unlikely if the persistently bearish global economic conditions remain.

On 30 November, CFR (cost & freight) SE (southeast) Asia/India prices for EPDM were at an average of $2,400/tonne, a level not seen since March 2021, ICIS data shows.

The continuing territorial disputes with neighbouring countries have increased the demand for defensive equipment in India. This has resulted in greater usage of synthetic elastomer-based goods by government military product manufacturing agencies, such as the Defence Research & Development Organisation (DRDO). For instance, in August 2022, DRDO announced procuring EPDM-kevlar rubber lining for ASTRA MK-2 air-to-air missile, which will be used to protect the rocket casings from hot gases. Such developments are expected to provide a necessary push for the product demand in defence applications.

Reliance is the only producer of PBR in India. PBR demand grew at 7% in 2022-23 on the back of strong demand from downstream segments of Passenger Vehicles & Commercial Vehicles and is forecasted to grow at a modest rate of 6.3% in next two fiscal years.

While Butyl rubber demand grew at a robust rate in 2022-23, Halo butyl rubber demand de-grew at 5% in 2022-23. Nitrile Butadiene Rubber Latex (NBR) is one of the most commonly used rubber compounds across a wide range of industries.

NBR which has a demand in end use applications like Auto components, Rice Rollers, Hoses, NBR/PVC blend, Insulation Foam, moulded Rubber Parts, Cots & Apron, Jointing Sheets, LPG Tubing, Oil Seals, Industrial Parts, Cork Sheets, Gaskets, Belts, Compounds, Cooker Gasket, Industrial Rollers, Footwear, Brake pads & Clutches etc., witnessed a staggering demand growth of 20% in 2022-23, however is expected to slow down to around 7% in next two fiscals. Apcotex is the sole producer of NBR in India.

The demand for nitrile butadiene rubber in India, China, and ASEAN countries stems mostly from bulk manufacture of molded and extruded polymer products and automotive components. In September 2022, the Indian cabinet approved a USD 3.5 billion incentive scheme to promote the production of fuel-cell and battery-electric vehicles, as well as drone manufacturing.

These incentive programs are projected to drive the Indian automobile market and have an influence on the NBR market throughout the forecast period.

Because of increased investment in the healthcare business, there is likely to be an increase in demand for NBR gloves, notably in the medical sector. To prevent the transmission of pathogens into the patient's body during operations and examinations, gloves are frequently utilized.

A further factor projected to speed up market value growth over the coming years is the increased demand for disposable gloves across a variety of industries, particularly in the food sector.

xxiii. Surfactants

LAB continues to be work horse for the surfactant industry with demand hovering around 700 KTA. To cater growing demand, IOCL expanded their capacity from 140KT to 162KTA during FY'23. Domestic O/R was @93% (excluding RIL 60KT shut capacity). Due to IOCL DBN shutdown, Indian production for FY'23 is ~400KT and the balance demand was met by imports.

With capacity addition, Indian imports requirement for next year is likely to be reduced to 200 to 230KT. Due to increase in the crude and energy prices, LAB prices were at elevated level leading to flat LAB demand growth. With falling raw material prices, demand is poised to grow. IOCL LAB plant has undergone a revamp during 2022 to an increased capacity of 162 KTA now from earlier 120 KTA. With 162 KTA, IOC now stands as the single largest LAB supplier in India.

In August 2022, Cepsa supplied the first batch of NextLab (Linear alkyl Benzene) to Unilever for linear alkylbenzene sulphonate (LAS)-based surfactant manufacturing. NextLab is the first linear alkylbenzene (LAB) to be both renewable and biodegradable as an alternative to the traditional fossil LAB. Cepsa in April 2022 had introduced NextLAB, a sustainable linear alkyl benzene made from renewable and recycled raw materials. NextLAB is mainly used to produce biodegradable household laundry and cleaning products.

Early 2022, the Asian market for linear alkyl benzene (LAB) started on a bullish trend as the availability of upstream Benzene was low owing to the failure to meet the supply need of upstream crude oil in the Asian countries. The prices hiked in March again as production in China remained halted on the account of winter Olympics. LAB imports were seen higher in 2022-23 and is expected to see a dip next year as well. While there was marginal quantity of exports in 2021-22 however further no exports have taken place nor is expected to take place in next two fiscals. Imports from Saudi Arab, Qatar, Thailand, and China are coming into India. Imports from Saudi Arab have seen an increase from 68 KT in 2017-18 to 156 KT in 2021-22 and ~136 KT in April- Jan period, estimating 182 KT in 2022-23.

Domestic demand for LAB was negative in 2022-23 registering a de-growth of 3% which is expected to witness a bounce back and clock 3% growth in 2023-24.

In recent times, India is one of the largest producers of soaps and detergents, globally. Government initiatives, such as the Swachh Bharat Mission, promote health and hygiene. Such initiatives, along with growing usage of soaps and detergent, have led to the growth of the manufacturing industry, which is further boosting the demand for LAB in the country.

The heightened focus on home and personal hygiene due to COVID-19 had bolstered the demand for detergents, liquid soaps, industrial cleaners, and sanitizers, most of which require the benzene-based chemical in their production.

However, sales of such cleaning agents remain much lower than their peak and there is much scope in demand to pick up with the upcoming monsoon season in India and an uptick in related diseases thereof is expected to keep the demand intact. The spreads of the chemical—the difference between manufacturing and distributor price—have increased in the last few weeks as the supplies in the domestic market have sold out due to the tight demand situation, analysts said.

Indian EO demand of 310 KT is expected to grow at 5 to 6% in FY’23 in line with GDP. EO is not directly Imported in India due to its hazardous nature, however, EO derivatives are imported. Reliance industries has increased its capacity by 40KTA in DMD during FY’23 and has plans increase further in FY’24 to cater to growing Indian demand. Demand for EO is expected to clock double digit growth of 13% in 2023-24.

Table 21: Demand & Supply of LAB & EO

LAB	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	550	550	572	597	597
Production	449	457	405	488	488
Imports	253	273	303	232	245
Exports	0	2	0	0	0
Demand	706	723	701	721	733
Demand Growth (%)	**5.6%**	**2.3%**	**-3.0%**	**2.8%**	**1.7%**
EO	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	293	303	320	368	382
Production	263	302	320	363	377
Imports	0	0	0	0	0
Exports	1	1	1	1	1
Demand	264	303	320	363	377
Demand Growth (%)	**5.1%**	**14.9%**	**5.5%**	**13.4%**	**3.9%**

EO domestic demand is driven by Infrastructure, HPC (health and personal care), agrochemicals, solvents, antifreeze, textiles, detergents, adhesives, polyurethane foam, and pharmaceuticals. Smaller amounts are present in fumigants, sterilant for spices and cosmetics, as well as during hospital sterilization of surgical equipment. Persistent hike in demand for the product is due to enormous production of MEG for polyester fabrics and PET. Increasing consumption of DEG in plasticizers industry is also contributing to the rising demand of the product.

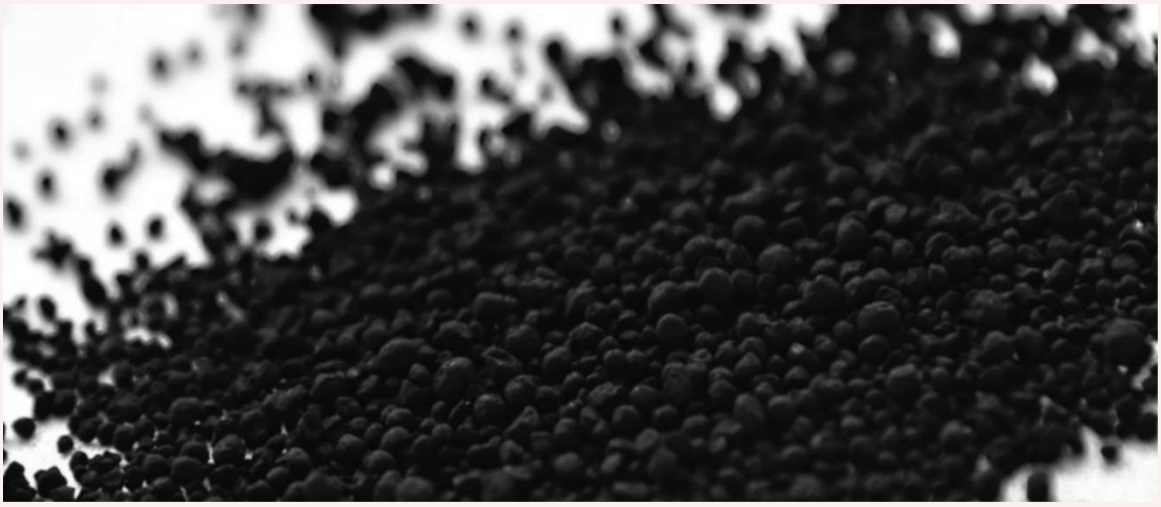
xxiv. Carbon Black Feedstock & Carbon Black

Carbon black is one of the reinforces that frequently used in tyre industry owing to its effect on mechanical and dynamic properties of tyres. It is used in various formulations with different rubber types to customize the performance properties of tires. It is used in various formulations with different rubber types to customize the performance properties of tyre.

Industrial carbon black is an important resource used in tyre production and in the manufacture of other industrial rubber products. Carbon black recovered from end-of-life tyres saves fossil raw materials and will contribute significantly to reducing CO2 emissions. The specific use of carbon black in rubber compounds increases the stability, strength and durability of tyres. In a standard passenger car tyre, the amount of carbon black to which tyres owe their black color is 15-20 percent.

- Growth in the adoption of electric cars and self-driving cars is likely to act as an opportunity in the future.
- Asia-Pacific dominated the market across the globe with the largest consumption from the countries such as China and India.

CBFS demand is high but availability from US refineries is limited. Under COVID situation poor demand of gasoline witnessed. Refineries are running with lower throughput. Whereas high demand for Carbon Black is there both for domestic as well as in international market. USGC market is therefore under premium $7-9 per bbl instead of conventional discounted rate.



Carbon Black demand across OHT segments remained strong in FY22 on account of higher global food prices which improved farmer realizations as well as profitability and increased capex spends by various governments which aided growth for mining and construction equipment.

Demand momentum to continue across geographies and segments, driven by pick-up in economic activities, government spending on infra worldwide and robust prices of commodities and agricultural commodities. There is good demand from mining as well as agriculture sectors in the OHT segment.

Balkrishna Industries Ltd. (BIL), a Mumbai-based Indian multinational engaged in the manufacture of tyres for agricultural, industrial, and OTR (off-the-road) vehicles, has completed the expansion plan of a 55,000 MTPA (metric tonne per annum) carbon black project and power plant in Bhuj, Gujarat, as on December 31, 2022. Post the Brownfield capex, capacity of the tyre plant will stand at 335,000 MTPA. This would require an investment of Rs. 800 crores.

In a bid to cater to the growing demand in the marketplace, Balkrishna Industries, a supplier of tyres to off-highway and agriculture segments has put off its plans to shut its old plant in Waluj, Maharashtra. Instead, it will use it to meet incremental demand along with the newly commissioned greenfield plant which is just five kms from the old plant. Given the current business outlook, the company has now decided to continue operations at both the plants along with modernizing the old plant, the company said in a statement.

The capex of around Rs 350 crore allotted for it, will help bring economies of scale. This will take up the overall capacity to over 55,000 MTPA at a single site and is expected to be ready by H1FY24. “The achievable capacity will increase back to 3,60,000 MTPA by H1FY24 post commissioning of the Waluj brownfield project,” the company informed investors. The project of advanced carbon material for 30,000 MTPA will be commissioned in Q4FY23. Capex for this purpose would amount to Rs. 650 crores.

The third part of capex would be invested in modernization, automation, and technology upgradation at its Bhuj and Gujarat plants. Capex cost for this purpose is estimated around Rs. 450 crore and is expected to be completed by end-H1FY23. Capex plans are embarked, given the current market demand, both domestic and global. The company manufactures and distributes off-highway tyres (OHT) for agricultural and construction vehicles and has also pivoted to earth-moving and mining tyres.In April 2022, Continental inaugurated its 149,000 square feet greenfield surface solutions plant in Pune. The manufacturing facility, which has an investment of Rs 200 crore, will produce premium surface materials for car interiors (including EVs) and two-wheeler seats for its domestic market and exports. The plant, Continental’s 16th facility globally, will initially manufacture Acella Eco and Acella Lux material, with the addition of eco-friendly foam foil Yorn and Yorn Light material in the future. It has an annual production capacity of five million square metres of surface material, which can be dialled up to 10 million.

Continental is consistently expanding its activities in the area of circular economy. To this end, the premium tire manufacturer has signed a development agreement with Pyrum Innovations, a specialist in the pyrolysis of end-of-life tires.

The aim of the collaboration is to further optimize and expand the recycling of end-of-life tires through pyrolysis. In the future, among other things, particularly high-quality recovered carbon black (rCB) is to be obtained for tire production of Continental.

Continental Carbon India Limited (CCIL) is in process of establishing a state-of-the-art green field plant in Visakhapatnam, Andhra Pradesh, India. The new plant will comprise of two manufacturing lines of name plate capacity totaling 150,000 TPA of furnace grade carbon black for application mainly in the rubber industry. About 40 MW Power and 35 TPH steam will be by–products of the manufacturing process. Continental Carbon Eco Technology Private Limited (CCET), a subsidiary of CSRC, plans to build a new Carbon Black Plant with a design annual capacity of 150000 TPA Carbon Black Plant with 16 MW cogeneration (waste heat recovery) power plant in GIDC, Dahej Industrial Estate Gujarat, India.

Epsilon Carbon, a coal tar derivatives company, has established India's first integrated carbon black complex with Rs 550 crore investment at Bellary, Karnataka. With the new investment, the company will scale its production from an installed annual capacity of 115,000 tonnes to 215,000 tonnes.

As part of Phase-II, Epsilon will expand its capacity by 65,000 tpa at an additional investment of Rs 350 crore, taking the total investment close to Rs 900 crore. The anthracene oil generated in the coal tar distillation process will be used as a clean feedstock in the carbon black unit. The security of raw materials and consistency in feedstock quality help Epsilon Carbon produce consistent quality carbon black.

In a first, the integrated carbon complex uses waste coke oven gas from the steel plant as a fuel, and the tail-gas from the carbon black unit is fed back to the steel complex for pre-heating operations. Compared to other plants that use three per cent sulphur as feedstock, Epsilon Carbon's new unit uses 0.3-0.5 per cent captive low-sulphur as feedstock. Epsilon Carbon has manufacturing facilities in Karnataka, Chhattisgarh and Orissa — strategically close to raw material sources and customers.

Epsilon Carbon plans expansion into Europe, US markets. Further, the company will expand its carbon black capacity to 3,00,000 tpa to become the country's largest single-location carbon black plant. The unit enjoys natural competitive advantage by providing a complete backward integration support for Raw material sourcing. The Anthracene oil generated in the coal tar distillation process will be used as a clean feedstock in the carbon black unit.

Epsilon Carbon, the world's leading producer of carbon black, plans to venture into the cathode sector with world's first polymetallic nodule plant with an investment of Rs 1,200 crore. Epsilon Carbon Private Ltd., a carbon black company, has signed a Memorandum of Understanding with Nasdaq-listed The Metals Company Inc. (TMC) to jointly undertake a pre-feasibility study for a commercial-scale deep-sea nodule processing plant in India. Following this study, both firms plan to jointly set up the "world's first commercial polymetallic nodule processing plant" in India

Epsilon, with its commercial production of synthetic graphite and a pipeline to produce 30,000 TPA of NMC and 20,000 TPA of LFP by 2025, will contribute significantly towards helping Indian giga factories of the future to meet their local-content requirement. The agreement involves TMC supplying 1 million tonnes of nodules from which the proposed commercial polymetallic nodule plant will process 30,000 tonnes of cathodes that can create 25 GW of cell capacity by 2025. TMC will supply 1 million tonnes of dry nodules that can create a production capacity of over 30,000 tonnes of intermediate nickel-copper-cobalt product per annum, which is sufficient to manufacture 25 GW of cell capacity. Epsilon already makes anodes for traditional acid batteries and this plant is a move to enter the lithium-ion batteries space. Since no local company is making lithium-ion batteries, there is no domestic demand now, but the government sees the market growing to 1 lakh tonnes by 2030.

Phillips Carbon Black Ltd (PCBL) is in the process to commercialize greenfield capex in Chennai with a 150 ktpa carbon black plant likely to start production from December 2022 and the company is coming up with a brownfield project in Mundra of 40 KT. One line of capacity of roughly 20,000 on a gross basis and this is Phase 1 and this should be through by last quarter of this financial year or maybe little early next financial year. So that is the target PCBL is looking at and with this 20,000 additional, the total capacity on gross basis of specialty will go up from 72,000 to 112,000 tonnes, this is gross capacity.

Russia is a major supplier of carbon black so is the case with China. Because of this issue, Russia is little bit getting restricted in terms of supply of carbon black to different countries, particularly Western countries. So that is one advantage to Indian producers, say that on the supply side there is a challenge maybe constraint from Russian side. On the other side, China is the largest producer of carbon black, but in that country over a period there is consolidation, which is happening. Also, there is a drive from government on restriction of pollution and consequently many small players of carbon black they have shut their shops.

And thirdly also the availability of raw material, which basically used to come from steel industry of China, that availability also shut because of technological shift in manufacturing process of steel from blast furnace to electric arc furnace technology and consequently the availability of raw material has gone down.

Hence, China is no longer such a strong player what it used to be at one point of time in carbon black.

For Indian manufacturers it is an opportunity, as on one side Russia is impacted, on the other side, China is not as strong as it was in the past. So, in spite of this Russia-Ukraine issue and pandemic issue, one should be looking at positive and decent growth going forward.

Demand-supply environment for carbon black is expected to remain favourable supported by strong demand outlook, which bodes for high carbon black margin in the near term. The problems the carbon black industry has faced in the last few years—short supply, logistics problems, difficulties in increasing capacity, competition from silica, and the costs of environmental compliance.

Table 22: Demand Supply Balance of CBFS & Carbon Black

CBFS	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	2822	2822	2900	3050	3100
Production	2258	2254	2404	2720	2720
Imports	2032	1894	2512	2432	2500
Exports	480	42	580	650	650
Demand	2258	2254	2412	2532	2743
Demand Growth (%)	**-9.8%**	**-0.2%**	**7.0%**	**5.0%**	**8.3%**
Carbon Black	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	1542	1542	1610	1750	1800
Production	1234	1230	1388	1550	1580
Imports	30	30	50	50	50
Exports	210	400	380	450	450
Demand	1264	1268	1360	1480	1595
Demand Growth (%)	**-4.9%**	**0.3%**	**7.3%**	**8.8%**	**7.8%**

Indian Carbon black manufacturers are expecting positive demand and adding capacities as well. Carbon black industry grew at a flat rate in 2020-21 at 0.3% while it grew at a 7.3% in 2021-22 and 8.8%in 2022-23. It is expected to grow at a healthy robust growth of 7.8% next fiscal before clocking a flat 0.3% growth in 2024-25. Meanwhile, CBFS too registered a growth of 7% in 2022-23 and expected to be grow at 5% by 2023-24.

xxv. Other Key Petrochemicals

Overall other key petrochemicals demand in 2022-23 witnessed a growth of 8% and is expected to grow around 9% in next fiscal year. Benzene demand which saw double digit growth in 2022-23 growing at 15.7%. While the next fiscal it is expected witness no growth.

In the last few years, Benzene export volume has been larger than domestic demand. However, in 2022-23, exports were down from previous year. Haldia exported 113 KT of benzene in CY22.Between 2017 and 2022, Indian Subcontinent benzene production increased from around 1.6 million metric tons to almost 2.1 million metric tons. After the 2022 capacity increase from Mangalore Refinery and Petrochemical Ltd's reformer/transalkylation = PX operations on the back of deteriorated PX margins and reformate base benzene production. Benzene production is forecasted to grow, in line with new capacity addition by Indian Oil Corporation Limited's refinery and paraxylene (PX) unit in 2025.

India is a major benzene exporter and will remain so over the next few years. Exports increased from 0.7 MMT in 2017 0.8 MMT which was a dip, however, it is expected to increase to 1.3 million metric tons in next year 2023-24. In the last five years, Indian benzene export volume had been substantially larger than domestic demand. Despite steady demand growth, India is expected to export approximately 1.3-1.1 million metric tons of benzene per year in the next two years and it will increase further supported mainly by new pygas based benzene capacity additions.

Reliance Industries accounts for slightly more than half of the benzene capacity in the Indian Subcontinent in 2022-23. From 2023, HPCL Mittal Energy is expected to start a pygas-based extraction unit with a benzene capacity of 240,000 metric tons per year in line with a new naphtha cracker. Benzene production will reach almost 2.22 million metric tons in 2025, with pygas, reformate, and transalkylation continuing to be the major supply sources.

The largest part of regional benzene demand comes from cumene, which represented 29% of total benzene demand in 2023. The next-largest derivatives were alkylbenzene and chlorobenzene, which represented 36% and 15%, respectively, of total 2022-23 benzene demand.

The Asian benchmark FOB Korea benzene market has been on a rollercoaster ride since March 2023. The prices opened low at 924 $/Mt on 1 March 2023 but soon surged by about 20$ in the first week, reaching 944 $/Mt. However, the prices lowered back by nearly 13$ in the second week to settle at 931 $/Mt due to lowered crude oil and naphtha prices. The benzene prices are under pressure as the conversion cost to downstream products looks negative due to narrowed cracking spreads.

The downstream solvents phenol and styrene prices are also below the break-even range due to lower prices caused by weak demand. As a result, the benzene outlook looks bearish for March 2023, as significant price corrections are anticipated to bring downstream conversion break even. The current market conditions require producers to be cautious and keep a close eye on the developments in the industry to make informed decisions.

The benzene market is dynamic and staying ahead of the curve will be crucial for businesses to succeed in the long run.

Toluene, an essential chemical compound in the global market, has been experiencing a mixed trend in March 2023. The international market saw toluene prices opening at 891 $/mt FOB Korea and jumping nearly 13$ in the first week to 904 $/mt on increased demand from China. However, prices fell almost 10$ in the second week to 894 $/mt due to upstream crude and naphtha prices.

Table 23: Demand Supply Balance of Benzene, Toluene, MXS & OX

(KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Benzene					
Capacity	2470	2470	2470	2710	2710
Production	2003	2124	1698	2195	1978
Imports	0	0	0	0	0
Exports	1483	1508	888	1385	1168
Demand	600	700	810	810	810
Demand Growth (%)	**-11.8%**	**16.7%**	**15.7%**	**0.0%**	**0.0%**
Toluene	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	175	175	175	175	175
Production	120	120	130	130	130
Imports	556	510	510	550	550
Exports	18	17	11	0	0
Demand	658	613	629	680	680
Demand Growth (%)	**14.6%**	**-6.8%**	**2.6%**	**8.1%**	**0.0%**
MXS	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	90	90	90	90	90
Production	57	62	56	58	58
Imports	160	275	310	330	350
Exports	0	0	0	0	0
Demand	199	335	365	386	407
Demand Growth (%)	**-39.2%**	**68.1%**	**9.0%**	**5.8%**	**5.4%**
OX	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	450	450	450	450	450
Production	522	512	406	384	384
Imports	25	15	19	152	206
Exports	252	173	52	34	34
Demand	297	357	368	502	556
Demand Growth (%)	**6.1%**	**20.3%**	**3.1%**	**36.4%**	**10.8%**

On the domestic front, toluene prices fell nearly 8 Rs/kg in two weeks to Rs. 81 Ex Kandla and Mumbai due to weak demand and high port inventory. In addition, demand for Toluene did not improve as anticipated from pharma, paints coatings, and packaging due to the Holi festival holidays and the financial accounting year closing ahead. The domestic outlook for toluene in March 2023 looks mixed due to high inventory at all the ports and poor demand from downstream, resulting in lower domestic manufacturer prices, which makes toluene bearish.

Toluene has the capability to dissolve several organic compounds and hence it is gaining popularity as solvent in paints, lacquers, thinners, glues, correction fluid and nail polish remover.

Toluene being a major by - product in the manufacturing process of Styrene, has applications in the production of Toluene diisocynate for further manufacturing of Polyurethane which is further used in the manufacturing of foams for furniture, seats etc.

Toluene is also used in manufacture of Trinitrotoluene (TNT) which is used in small quantities for making explosives. With the increasing demand of cleaner and better fuels for automobiles, Toluene is used as an ingredient to produce better quality fuel by using it in the blending of petrol.

Toluene witnessed a negative demand in 2021-22. However, it rebounded and witnessed a positive growth of 2.6% in 2022-23 and is expected to witness a robust growth of 8% next fiscal. Toluene prices in the domestic market witnessed a low in dec'22 touching $831/MT. A consistent rise in Toluene prices was observed since then till March 2023, bolstered by a prominent recovery in industrial activities post decline in pandemic cases in India. Around 24th Mar'23, toluene prices were around $970/MT. Furthermore, the usage of packaging made up of polystyrene, an intermediate derived from benzene, has increased in food and e-commerce applications, which, in turn, has stimulated the market demand for benzene.

Among all segments, Ortho-Xylene has witnessed the highest growth rate and will continue to do so in the forecast duration, owing to its extensive use as a solvent in several industries. Ortho-xylene is also used as an industrial feedstock to produce phthalic anhydride, which is then used in the production of plastic in end-user industries. In terms of application, the automotive segment is expected to see a considerable shift due to its extensive use in coating of automotive parts such as the engine, interior & exterior parts and others. The rising demand for polyethylene terephthalate (PET) and pure isophthalic acid (PIA) is expected to drive the market during the forecast period. Furthermore, the increasing use of the product in various sectors such as paints & coatings and textile will also contribute to the growth.

MXS had witnessed a double-digit staggering growth in demand at 68% in 2021-22, after witnessing a dip of 39% in previous year. However, in 2022-23 the demand grew by 9%. MXS mainly goes into Paints sector. Consumer demand in paints revived after taking a hit in the first two months of 2022 following 20-23% price hike. Russia-Ukraine conflict had an adverse impact on raw material prices for the Indian paint & coating producers during the most of 2022. High crude prices for the most part of the year 2022 resulted in high raw material costs for Indian paint & coating producers. Major paint producers increased their prices five times in quick succession during May- October 2022.

Thankfully Prices of key inputs such as crude-based monomers and titanium dioxide eased during October- December 2022 period, providing a much-needed relief for the paint & coating producers.

High raw material prices had an adverse impact on the profitability of the paint & coating producers. Despite the successive price hikes, paint producers were unable to pass-on the full increased costs to consumers.

According to a forecast by Indian Paint Association, Indian paint & coating industry will be worth INR 1,000 billion ($12.34 billion) during the next five year, a growth of 43pc from the current levels. Architectural segment has been the mainstay of Indian paint & coating industry. The segment witnessed strong growth in 2022 on the back of vibrant construction sector. Healthy construction pipeline in the country, ambitious schemes by Indian government such as 'Housing for All', and rising urbanization have been the main demand drivers of architectural coatings in the country. These factors are expected to play a major role in the future growth of the architectural paint consumption in the country in the medium and long term.

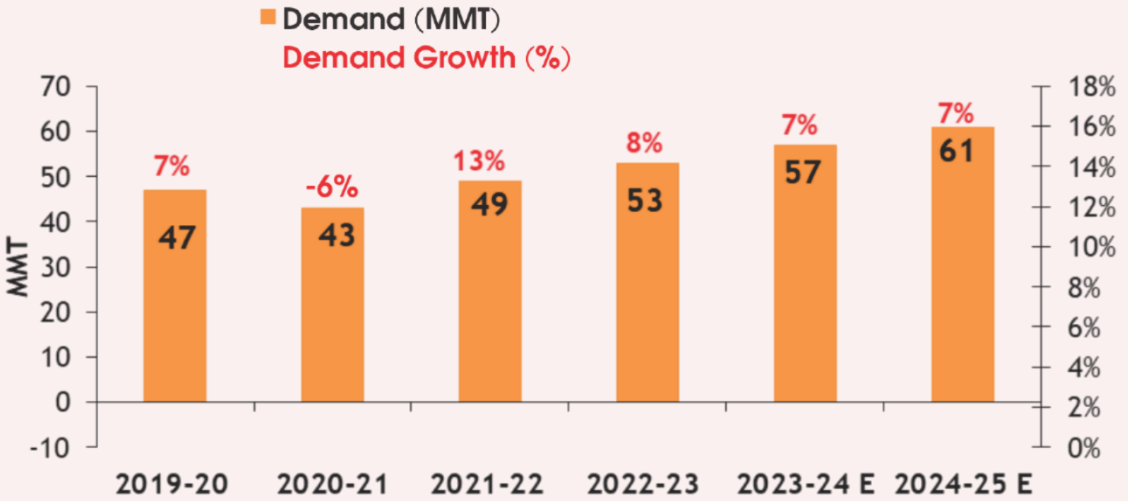
Accounting for more than 30 percent of India's paint & coating industry, industrial segment of the paints & coating industry has rapidly grown over the years. Primarily driven by steady growth in the automotive segment, industrial coating segment is expected to increase its share in the overall paint & coating industry in the coming years. Growth in the automotive coating segment has been driven by growing automotive industry in the country. India has overtaken Japan to become the third largest vehicle market in 2022 after China and the US, selling more than 4.25 million vehicles riding on pent- up demand and enhanced production by carmakers.

Imports in case of MXS are expected to rise to 206 KT by 2024-25.
Meanwhile, OX registered a growth of 3.1% in 2022-23, and is forecasted to witness double-digit growth of 36% in 2023-24. There is no new capacity addition lined up for OX.

xxvi. Outlook for the Overall Indian Petrochemical Industry

India's aggregated demand for petrochemicals declined by 7% in 2020-21 due to the pandemic which affected the demand supply and had affected the supply chain, had grown by 13% in 2021-22. However, in 2022-23 it showed a slower growth but modest growing at 8%. The forecast for next two year shows the growth to grow around 7%. It is forecasted that the overall industry would have a healthy growth in next fiscal and the demand will touch 56 MMT and a further increase to touch 60 MMT by 2025, which reinstates the increase in consumption of petrochemicals across value chains in the future and healthy growth of the industry.

Figure 6: Aggregate Petrochemical Demand (All key segments – MMT)



Polymers are likely to register a healthy growth in the coming year 2023-24 and lock around 7.5% growth. Polyolefins are also expected to grow at 7.7% in 2023-24. Surfactants are projected to grow at 6% in the same period. Synthetic rubbers are expected to register demand growth of 6% in the said period. Other key petrochemicals expected to grow at a 9% in the same period.

xxvii. Overview of circularity in plastic industry

Increase Plastic Circularity, Decrease Plastic Waste

Preamble

Plastics play an undeniable role in the fast tracking of urbanization. From its inception, they have provided an ease of living like no other towards the pocket as well as towards overall functionality.

They are very resource-efficient due to their ability to provide high strength-to-weight ratio, stiffness, toughness, ductility, corrosion resistance, bio-inertness, high thermal and electrical insulation, non-toxicity, and excellent durability at a relatively low lifetime cost when compared to other materials.

But with the plethora of benefits that plastics have brought us in all sectors of consumption, especially healthcare, they have also brought in a lackadaisical attitude of littering and waste pollution.

In 2020, the world produced 367 million metric tons of plastic waste, a number that is only set to increase in the coming years. While it is imperative to reduce the generation of plastic waste, efforts to manage and dispose of the existing waste are on the forefront to address the plastic pollution crisis.

Figure 7: Plastic waste generated from 1950 - 2020

According to the UNEP Global Waste Management Outlook, 3 billion people do not have access to controlled disposal services for solid waste, and 2 billion people still lack access to regular waste collection. Therefore, a large portion of plastic waste is either littered or inadequately disposed. Hence, if we want to continue reaping the benefits of plastics, we need to keep the material in the supply chain for as long as possible and reduce its careless disposal. To make that happen, everyone in the supply chain needs to work towards creating a closed loop.

World Plastics Scenario

As per baseline report on plastic waste by United Nation Environmental Program (UNEP), plastic waste generated by different countries is given below. This reflects that China generated the largest amount waste with the US running in a close second. India with its large amount of population, generated the fifth highest amount of plastic waste in the world.

Table 24: Plastic waste generation in different countries

S.No.	Countries	Plastic waste (MT)	Reference Year
1.	China	61	2016
2.	US	34.5	2015
3.	Indonesia	9.6	2018
4.	Japan	8.9	2018
5.	India	3.5	2020
6.	Canada	3.2	2016
7.	Australia	2.5	2016
8.	Sweden	1.6	2016
9.	UK	1.5	2018
10.	Israel	0.9	2018
11.	Switzerland	0.78	2019
12.	Denmark	0.35	2017
13.	Zimbabwe	0.3	2019

Source: Baseline report on plastic waste and CPCB
https://gridarendal-websitelive.s3.amazonaws.com/production/documents/:s_document/554/original/UNEP-CHW-PWPWG.1-INF-4.English.pdf?1594295332

Global production of plastics in million tons (Plastic Atlas 2019 | Plastic soup foundation)

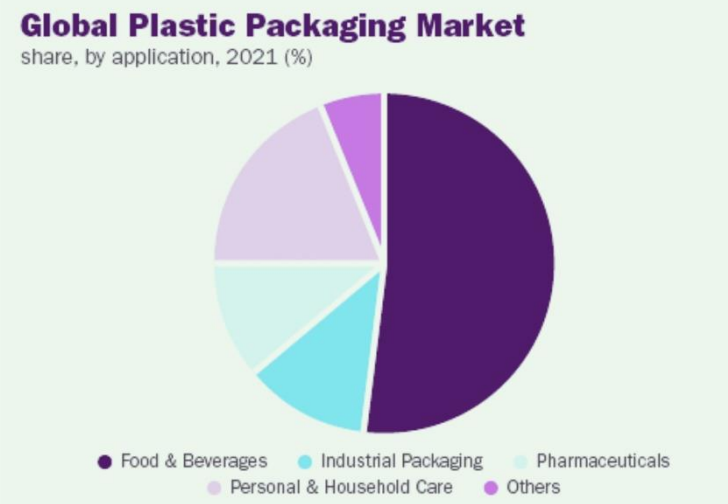
The global plastic packaging market size was valued at USD 355.0 billion in 2021 and is expected to expand at a compound annual growth rate (CAGR) of 4.2% from 2022 to 2030. The expanding size of key application industries including food and beverages, pharmaceuticals, personal and household care, and growing penetration of organized as well as e-retail across the world, are primarily fueling growth in the industry.

Due to its flexibility, rigidity, transparency, and lightweight nature, plastic packaging is favoured by key industries such as personal care, food and beverage, and industrial, over other materials such as metal or glass.

Plastics have a significant environmental footprint compared to many other materials. This is due to several factors, including the large amounts of energy required to produce and transport plastics, as well as their persistence in the environment.

The demand for single-serve consumer packaging has been rapidly increasing due to its convenience, particularly in the past few years. The rise in awareness about waterborne diseases, the growing focus on health and well-being, and the increase in spending capacity among consumers have led to a surge in the demand for packaged drinking water globally, which is expected to have a positive impact on the industry.

Figure 8: Plastic Packaging Market

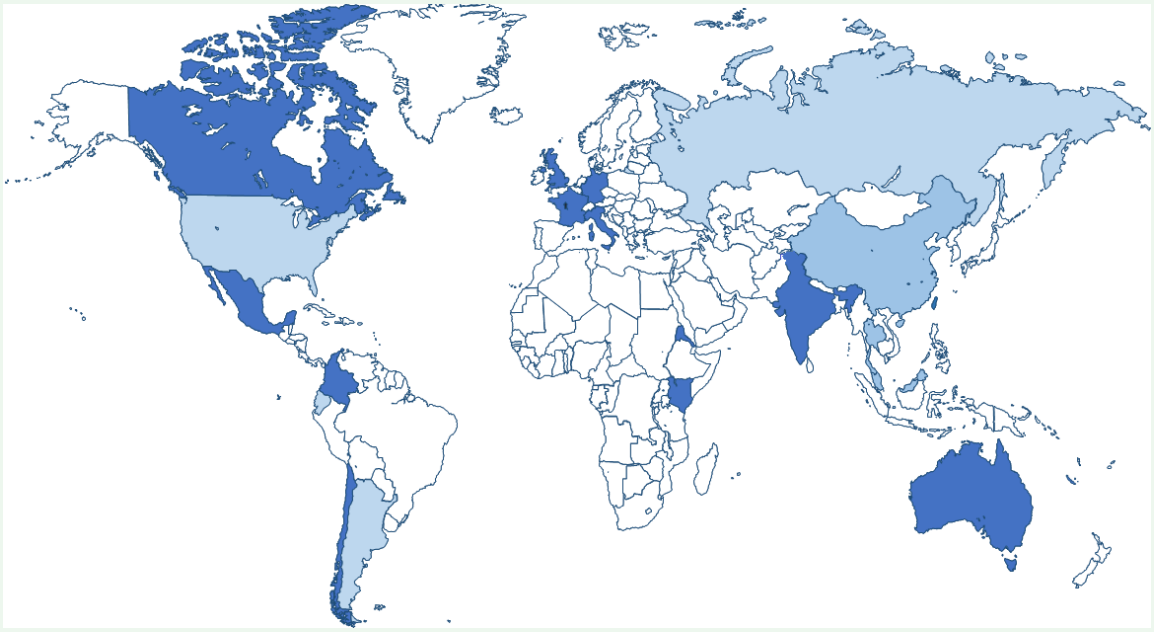


To decrease the waste caused by single use plastics, as of September 2021, around 127 countries have implemented some form of regulation or ban on single-use plastics (SUPs), including plastic bags, straws, utensils, and polystyrene foam containers.

The Government of India banned Single Use Plastics in July 2022.
Some of the countries that have implemented full or partial bans on SUPs include Canada, France, Germany, Italy, the United Kingdom, Australia, India, China, Rwanda, Chile, Columbia and Kenya, among others.

There is no federal ban on single-use plastics (SUPs) in the United States, but some cities and states have implemented their own regulations eg.. New York, Hawaii, Maine etc.

Figure 9: SUP ban across the globe



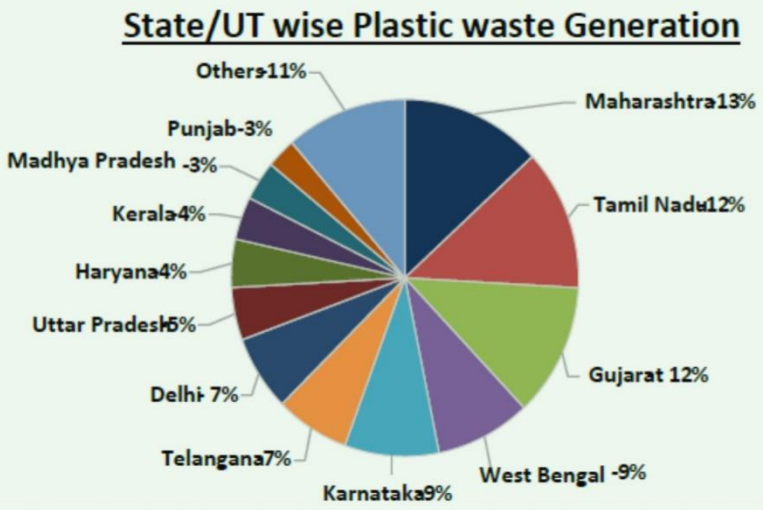
Therefore, the need for a change has been identified and actions are being taken through various channels and pacts. Work needs to be done towards building a robust collection and recyclable ecosystem.

Indian Plastics Scenario

The Plastics Industry is a significant source of employment in India, contributing to a considerable portion of the workforce, and valued at approximately INR 5.1 lakh crore (USD 73 billion). Due to the widespread use of plastics in various sectors, the industry is experiencing rapid growth and is considered to be one of the fastest-growing industries.

As per details provided by 35 States/UTs on implementation of Plastic Waste Management Rules, it is estimated that plastic waste generation during the year 2019-20 is approximately 34,69,780 TPA.

Figure 10: State/UT wise plastic waste generation (CPCB)



In India, the recycling and recovery of plastic waste accounts for 60% of the total amount generated. While this number is much larger as compared to the global rate, we still need to hold ourselves to higher recycling and environmentally conscious standards.

Regulations

The Indian Government has implemented various environmental laws pertaining to plastics, with a particular focus on managing and reducing plastic waste pollution. These policies have been key focus areas for the government in their efforts to address the environmental impact of plastics in the country.

In an effort to address littering caused by lightweight plastic carry bags, the Indian Government has mandated an increase in their thickness. As of December 31, 2022, the minimum thickness of plastic carry bags has been increased from 50 microns to 120 microns. The aim is to reduce the use of flimsy plastic bags and encourage the use of more durable ones, thereby reducing plastic waste and its impact on the environment.

The Plastic Waste Management Rules 2016 published on 16th February 2022 stress the minimization of plastic waste, segregation at source, recycling, and implementing the polluters pay principle for the sustainability of the waste management system. The Rules hold Producers, Importers, and Brand Owners (PIBOs) responsible for managing the plastic packaging waste that they put in the market and provide incentives to Plastic Waste Processors (PWPs) for collection and recycling of the waste.

Below are the targets for Extended Producer Responsibility (EPR) as per the PWM Rules 2022 that begin with collection and move further to Recycling, use of Recycled content and Reuse. The plastic packaging has been divided only the following categories:-

- Category I : Rigid plastic packaging
- Category II : Flexible plastic packaging of single layer or multilayer (more than one layer with different types of plastic), plastic sheets or like and covers made of plastic sheet, carry bags, plastic sachet or pouches;
- Category III : Multilayered plastic packaging (at least one layer of plastic and at least one layer of material other than plastic)
- Category IV : Plastic sheet or like used for packaging as well as carry bags made of compostable plastics.

Table 25 EPR Targets for obligated entities (2021-22 waived off)

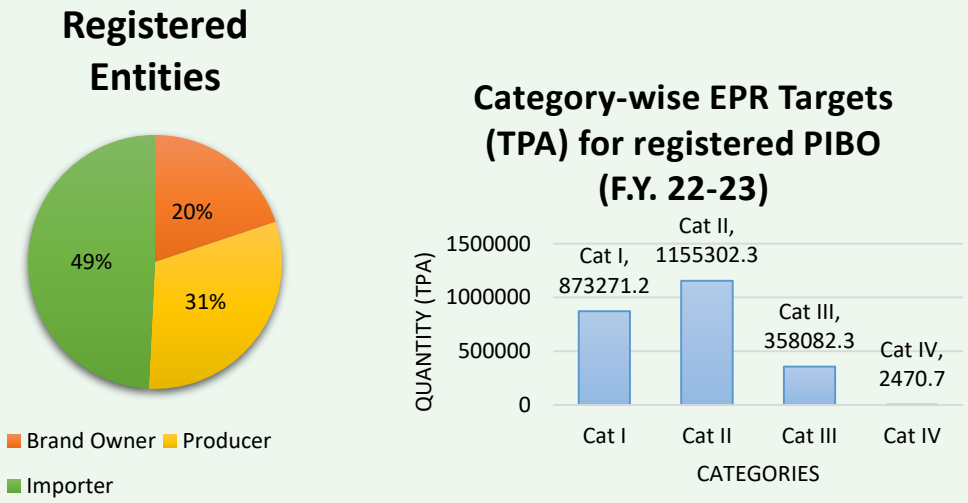
	EPR Targets	Recycling Obligation Excluding EOL				Recycled Content			Reuse	
Year		Cat. I	Cat. II	Cat. III	Cat. IV	Cat. I	Cat. II	Cat. III	Cat. IA	Cat. IB
2021-22	25									
2022-23	70									
2023-24	100									
2024-25	100	50	30	30	50					
2025-26	100	60	40	40	60	30	10	5	10	70
2026-27	100	70	50	50	70	40	10	5	15	75
2027-28	100	80	60	60	80	50	20	10	20	80
2028-29 Onwards	100	80	60	60	80	60	20	10	25	85

Category 1A (0.9 litre or kg but less than 4.9 litres or kg)
Category 1B (> 4.9 litres or kg)

The Industry has been supportive and compliant of all the various initiatives led by the Government of India. By the end of 2023 financial year, more than 6650 obligated entities had registered on the CPCB portal.

Figure 11: Status of registration of EPR (F.Y. 22-23) as of 27th March 2023

Category-wise EPR Targets (TPA) for registered PIBO (F.Y. 22-23)



The government has emphasized the importance of resource efficiency, circular economy practices, and the use of recycled plastics. On the other hand, the plastics Industry has also recognized the need for responsible waste management and has implemented several initiatives, such as improving the recyclability of plastic products and increasing the use of recycled plastic in their manufacturing processes.

Furthermore, the industry has also invested in research and development to identify alternative materials and production methods that are more environmentally sustainable.

Collaborative efforts between the government and the plastics industry are crucial in reducing plastic waste pollution while promoting economic growth and increasing sustainability and circular economy.

INDIAN PETROCHEMICAL INDUSTRY

INDIA COUNTRY REPORT 2023

SECTION 3

STATISTICAL APPENDIX

Feedstock

Naphtha (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Production	19381	19922	17016		--
Imports	1199	1246	893		--
Exports	6509	6861	5676		--
Apparent Demand	14100	14255	12047		--
Demand Growth%	**-1.2%**	**1.1%**	**-15.5%**		**--**
Natural Gas (MMSCM)	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Production	28672	34024	33573	--	--
Imports	33031	31906	27021	--	--
Exports	0	0	0	--	--
Apparent Demand	60815	65037	60594	--	--
Demand Growth%	**-5.2%**	**6.9%**	**-6.8%**	**--**	--
Coal Bed Methane (MMSCM)	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Production	642	683	674	--	--
Imports	--	--	--	--	--
Exports	--	--	--	--	--
Apparent Demand	--	--	--	--	--
Demand Growth%	--	--	--	**--**	**--**
Methanol (KT)	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	634	634	661	757	804
Production	205	204	172	235	293
Imports	2173	2470	2677	2643	2681
Exports	9	16	16	16	16
Apparent Demand	2368	2632	2833	2862	2958
Demand Growth%	**3.5%**	**11.2%**	**7.6%**	**1.0%**	**3.4%**

Building Blocks (KT)

Ethylene	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	7477	7477	7853	8677	8677
Production	7158	7311	7312	7595	7761
Imports	50	59	56	31	60
Exports	134	118	35	70	120
Net Availability	**7074**	**7253**	**7333**	**7557**	**7701**
Propylene	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	6614	6614	7071	7602	7602
Production	5621	5835	5908	5735	5923
Imports	10	27	15	0	0
Exports	15	0	0	0	0
Net Availability	**5615**	**5862**	**5923**	**5735**	**5923**
Butadiene	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	605	605	605	605	605
Production	461	505	462	505	505
Imports	0	0	0	0	0
Exports	134	163	150	159	155
Apparent Demand	327	342	312	346	350
Demand Growth%	**-0.6%**	**4.6%**	**-8.8%**	**10.9%**	**1.2%**
Styrene					
Imports	738	889	1173	1266	1368
Exports	0	0	0	0	0
Net Trade	738	889	1173	1266	1368
Demand Growth%	**-15.8%**	**20.5%**	**31.9%**	**7.9%**	**8.1%**
EDC	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	247	247	247	247	247
Production	244	244	245	245	245
Imports	471	490	510	510	510
Exports					
Apparent Demand	715	734	755	755	755
Demand Growth%	**-18.1%**	**2.7%**	**2.9%**	**0.0%**	**0.0%**
VCM	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	996	996	996	996	996
Production	974	1007	943	963	977
Imports	500	500	521	525	525
Exports					
Apparent Demand	1474	1507	1464	1488	1502
Demand Growth%	**-4.2%**	**2.2%**	**-2.9%**	**1.6%**	**0.9%**

Aromatics	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
PX					
Capacity	5860	5900	5900	6101	6760
Production	5109	4839	3756	3703	5256
Imports	615	557	540	671	671
Exports	2242	1670	600	390	1137
Apparent Demand	3297	3772	3696	3984	4789
Demand Growth%	**-15.6%**	**14.4%**	**-2.0%**	**7.8%**	**20.2%**

Intermediates (KT)

Fibre Intermediates (KT)

ACN	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	0	0	0	70	70
Production	0	0	0	35	65
Imports	135	176	222	215	205
Exports	0	0	0	0	0
Apparent Demand	135	176	222	250	270
Demand Growth%	**-23.3%**	**30.4%**	**26.1%**	**12.6%**	**8.0%**
Caprolactam	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	70	120	120	120	120
Production	72	86	90	94	100
Imports	68	74	74	74	74
Exports	6	0	0	0	0
Apparent Demand	134	160	164	168	174
Demand Growth%	**-11.3%**	**19.4%**	**2.5%**	**2.4%**	**3.6%**
PTA	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	6440	6440	6440	6440	6440
Production	5082	5616	5645	5796	5796
Imports	611	1350	1550	1800	2200
Exports	130	53	2	0	0
Apparent Demand	5563	6913	7193.056	7596	7996
Demand Growth%	**-14.6%**	**24.3%**	**4.1%**	**5.6%**	**5.3%**
MEG	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	2215	2215	2279	2705	2705
Production	2036	1969	1642	2225	2396
Imports	648	950	1400	1000	1000
Exports	284	27	20	30	30
Apparent Demand	2400	2892	3022	3195	3366
Demand Growth%	**-7.3%**	**20.5%**	**4.5%**	**5.7%**	**5.4%**

Polymers (KT)

LDPE	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	650	650	650	650	650
Production	619	583	583	623	620
Imports	265	345	345	344	390
Exports	134	47	47	49	0
Apparent Demand	783	865	865	928	1010
Demand Growth%	**3.1%**	**10.5%**	**0.0%**	**7.3%**	**8.9%**
EVA	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	0	0	0	0	0
Production	0	0	0	0	0
Imports	190	182	208	225	233
Exports	0	0	0	0	0
Apparent Demand	190	182	208	225	233
Demand Growth%	**-2.1%**	**-4.2%**	**14.3%**	**8.2%**	**3.6%**
LLDPE	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	2545	2545	2545	2945	2945
Production	2372	2392	2025	2798	2798
Imports	476	532	845	460	625
Exports	452	268	86	100	100
Apparent Demand	2518	2650	2781	2983	3225
Demand Growth%	**9.4%**	**5.3%**	**5.0%**	**7.3%**	**8.1%**
HDPE	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
HDPE Capacity	2665	2665	2665	3515	3515
LLDPE Capacity	2545	2545	2545	2945	2945
Total Capacity	5210	5210	5210	6460	6460
Production	2473	2415	2041	3339	3339
Imports	547	599	1220	450	600
Exports	370	173	30	30	100
Apparent Demand	2775	2933	3200	3500	3730
Demand Growth%	**8.8%**	**5.7%**	**9.1%**	**9.4%**	**6.6%**
All PE	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	5860	5860	5860	7110	7110
Production	5464	5390	4648	6760	6757
Imports	1287	1476	2410	1254	1615
Exports	956	488	163	179	200
Apparent Demand	6076	6448	6846	7411	7965
Demand Growth%	**8.3%**	**6.1%**	**6.2%**	**8.3%**	**7.5%**

PP	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	6100	6100	6220	6600	7110
Production	5210	5710	5401	6270	6755
Imports	682	954	1473	646	691
Exports	815	486	300	100	100
Apparent Demand	5358	6089	6370	6816	7293
Demand Growth%	**1.9%**	**13.6%**	**4.6%**	**7.0%**	**7.0%**
Polyolefins	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	11960	11960	12080	13710	14220
Production	10674	11100	10049	13030	13512
Imports	2159	2612	4091	2124	2539
Exports	1771	974	463	279	300
Apparent Demand	11624	12719	13424	14452	15491
Demand Growth%	**5.0%**	**9.4%**	**5.5%**	**7.7%**	**7.2%**
PVC	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	1557	1557	1617	1672	1717
Production	1367	1414	1493	1508	1510
Imports	1394	1433	2186	2416	2650
Exports		19			
Apparent Demand	2745	2834	3679	3934	4170
Demand Growth%	**-15.8%**	**3.3%**	**29.8%**	**6.9%**	**6.0%**
PS	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	490	490	518	518	518
Production	212	240	260	315	330
Imports	42	34	65	60	60
Exports	27	30	25	60	60
Apparent Demand	227	240	300	315	330
Demand Growth%	**-9.9%**	**5.7%**	**25.0%**	**5.0%**	**4.8%**
EPS	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	150	183	190	262	284
Production	97	103	120	142	160
Imports	6	10	2	1	1
Exports	1	1	2	12	20
Apparent Demand	101	120	120	131	141
Demand Growth%	**-14.4%**	**18.8%**	**0.0%**	**9.2%**	**7.6%**

Polymers (KT)	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	14157	14190	14405	16132	16709
Production	12350	12857	11922	14995	15512
OR (%)	**87%**	**91%**	**83%**	**93%**	**93%**
Imports	3601	4089	6344	4601	5250
Exports	1799	1024	490	351	380
Net Trade	**-1802**	**-3065**	**-5854**	**-4250**	**-4870**
Apparent Demand	14696	15913	17523	18832	20132
Demand Growth%	**0.0%**	**8.3%**	**10.1%**	**7.5%**	**6.9%**

Vinyls (KT)

	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
PVC					
Capacity	1557	1557	1617	1672	1717
Production	1367	1414	1493	1508	1510
Imports	1394	1433	2186	2416	2650
Exports		19			
Apparent Demand	2745	2834	3679	3934	4170
Demand Growth%	**-15.8%**	**3.3%**	**29.8%**	**6.9%**	**6.0%**

Styrenics (KT)

PS	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	490	490	518	518	518
Production	212	240	260	315	330
Imports	42	34	65	60	60
Exports	27	30	25	60	60
Apparent Demand	227	240	300	315	330
Demand Growth%	**-9.9%**	**5.7%**	**25.0%**	**5.0%**	**4.8%**
ABS	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	205	215	225	230	230
Production	122	123	180	195	200
Imports	88	100	60	60	60
Exports	0	0	0	0	0
Apparent Demand	210	223	240	255	260
Demand Growth%	**-16.0%**	**6.2%**	**7.6%**	**6.3%**	**2.0%**
SAN	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	170	170	170	175	175
Production	107	111	145	155	160
Imports	8	14	15	12	12
Exports	0	0	0	0	0
Apparent Demand	115	125	160	167	172
Demand Growth%	**-19.0%**	**8.7%**	**28.0%**	**4.4%**	**3.0%**

PET (KT)

PET	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	2020	2055	2241	2574	2610
Production	1757	1788	2062	2394	2427
Imports	165	105.5	98	90	75
Exports	802	711	649	837	708
Demand	1120	1182	1510	1646	1794
Demand Growth (%)	**-0.4%**	**5.5%**	**27.7%**	**9.0%**	**9.0%**

Synthetic Fibres (KT)

PSF	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	2702	2762	2784	2919	2950
Production	1500	1650	1760	1813	1867
Imports	25	24	20	20	20
Exports	216	274	218	177	177
Demand	1290	1378	1530	1576	1622
Demand Growth (%)	**-11.3%**	**6.9%**	**11.1%**	**3.0%**	**2.9%**
POY	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	3480	3480	3480	3766	4088
Production	2190	2861	2931	3238	3529
Imports	144	75	162	70	50
Exports	106	179	86	108	120
Demand	2228	2757	3007	3200	3459
Demand Growth (%)	**-12.6%**	**23.7%**	**9.1%**	**6.4%**	**8.1%**
PTY	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	2640	2995	3115	3335	3645
Production	1911	2460	2817	3010	3269
Imports	13	13	17	14	14
Exports	360	503	338	420	540
Demand	1564	1970	2496	2604	2743
Demand Growth (%)	**-12.1%**	**25.9%**	**26.7%**	**4.3%**	**5.3%**
IDY	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	62	69	69	69	70
Production	41	54	56	62	67
Imports	36	51	50	55	63
Exports	9	10	8	9	9
Demand	71	92	98	113	130
Demand Growth (%)	**18.3%**	**30.0%**	**6.5%**	**15.3%**	**15.0%**
FDY	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	1254	1259	1313	1475	1493
Production	629	929	989	1163	1366
Imports	52	146	215	100	60
Exports	19	25	14	30	70
Demand	686	1033	1194	1333	1416
Demand Growth (%)	**-28.1%**	**50.7%**	**15.6%**	**11.6%**	**6.2%**

Synthetic Rubber (KT)

PBR	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	135	135	135	135	135
Production	129	133	126	135	135
Imports	90	96	100	107	118
Exports	23	21	2	4	1
Demand	200	210	224	238	253
Demand Growth (%)	**8.2%**	**4.9%**	**6.7%**	**6.3%**	**6.3%**
SBR	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	270	270	270	270	270
Production	205	225	199	235	251
Imports	77	91	85	87	86
Exports	22	11	6	9	9
Demand	273	292	291.5	311	328
Demand Growth (%)	**8.6%**	**6.7%**	**0.0%**	**6.7%**	**5.5%**
NBR	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	14	14	15	16	17
Production	12	13	14	16	17
Imports	34	30	37	40	43
Exports	0	0	1	1	1
Demand	46	43	51	55	59
Demand Growth (%)	**-1.8%**	**-7.1%**	**20.0%**	**7.4%**	**7.3%**
EPDM	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	0	0	0	0	0
Production	0	0	0	0	
Imports	42	50	61	63	65
Exports	0	0	0	0	0
Demand	42	50	61	63	65
Demand Growth (%)	**-6.7%**	**19.0%**	**22.7%**	**2.7%**	**3.2%**
BUTYL RUBBER+HALO BUTYL RUBBER	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	120	120	120	120	120
Production	54	56	78	108	120
Imports	85	79	61	50	39
Exports	25	19	17	33	28
Demand	114	115	121	125	131
Demand Growth (%)	**15.2%**	**1.1%**	**5.3%**	**2.6%**	**5.3%**

Other Key Petrochemicals (KT)

	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Benzene					
Capacity	2470	2470	2470	2710	2710
Production	2003	2124	2174	2358	2222
Imports	0	0	0	0	0
Exports	1483	1508	888	1385	1168
Apparent Demand	600	700	810	810	810
Demand Growth%	**-11.8%**	**16.7%**	**15.7%**	**0.0%**	**0.0%**
Toluene	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	175	175	175	175	175
Production	120	120	130	130	130
Imports	556	510	510	550	550
Exports	18	17	11	0	0
Apparent Demand	658	613	629	680	680
Demand Growth%	**14.6%**	**-6.8%**	**2.6%**	**8.1%**	**0.0%**
MXS	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	90	90	90	90	90
Production	57	62	56	58	58
Imports	160	275	310	330	350
Exports	0	0	0	0	0
Apparent Demand	199	335	365	386	407
Demand Growth%	**-39.2%**	**68.1%**	**9.0%**	**5.8%**	**5.4%**
OX	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	450	450	450	450	450
Production	522	512	406	384	384
Imports	25	15	19	152	206
Exports	252	173	52	34	34
Apparent Demand	297	357	368	502	556
Demand Growth%	**6.1%**	**20.3%**	**3.1%**	**36.4%**	**10.8%**

Surfactants (KT)

LAB	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	550	550	572	597	597
Production	449	457	405	488	488
Imports	253	273	303	232	245
Exports	0	2	0	0	0
Apparent Demand	706	723	701	721	733
Demand Growth%	**5.6%**	**2.3%**	**-3.0%**	**2.8%**	**1.7%**
EO	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	293	303	320	368	382
Production	263	302	320	363	377
Imports	0	0	0	0	0
Exports	1	1	1	1	1
Apparent Demand	264	303	320	363	377
Demand Growth%	**5.1%**	**14.9%**	**5.5%**	**13.4%**	**3.9%**

Carbon Black & CBFS (KT)

CBFS	2020-21 A	2021-22 A	2022-23 A	2023-24 E	2024-25 E
Capacity	2822	2822	2900	3050	3100
Production	2258	2254	2404	2720	2720
Imports	2032	1894	2512	2432	2500
Exports	480	42	580	650	650
Demand	2258	2254	2412	2532	2743
Demand Growth (%)	**-9.8%**	**-0.2%**	**7.0%**	**5.0%**	**8.3%**
Carbon Black	**2020-21 A**	**2021-22 A**	**2022-23 A**	**2023-24 E**	**2024-25 E**
Capacity	1542	1542	1610	1750	1800
Production	1234	1230	1388	1550	1580
Imports	30	30	50	50	50
Exports	210	400	380	450	450
Demand	1264	1268	1360	1480	1595
Demand Growth (%)	**-4.9%**	**0.3%**	**7.3%**	**8.8%**	**7.8%**

Chemicals & Petrochemicals Manufacturers' Association

- CPMA is the apex forum representing the Indian Petrochemical Industry, Established in 1993, and the Association offers its members a podium to collectively present their ideas, voice their concerns and offer suggestions on relevant issues. It provides a linkage between the industry, the Government and society. It interacts with policy makers and industry associations to develop and maintain harmonious and conducive business conditions.

- The Association, registered under the Indian Societies Act, is widely recognized as one of the national apex bodies of the Indian Petrochemical Industry by all Ministries and Departments of Government of India, apex Chambers of Commerce and Industry and other related Associations in India and abroad. CPMA is affiliated to the Confederation of Indian Industry (CII). The Association is also a Steering Committee Member of the Asia Petrochemical Industry Conference (APIC) and had successfully hosted the annual APIC 2010 conference on May 13-14, 2010 in Mumbai.

- CPMA has various sub-committees constituted to effectively focus on key areas within petrochemicals like Polyolefins, Vinyl's, Styrenics, Glycols, Elastomers, Fibre Intermediates and Surfactants. CPMA has also taken the lead to set up and promote the India Centre for Plastics in the Environment (ICPE) to deal with all environmental issues connected with the usage of plastics.

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Associate Members

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