

Indian Oil's petrochemical push:

Weighing the financial, climate, and energy security risks

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Key findings

IOCL's petrochemical expansion would benefit from closer consideration of market signals and evolving demand. It is adding capacity while global markets face oversupply, slowing demand, and weak margins. Its profitability depends on domestic consumption growth, which sustainability regulations could curb.

The petrochemical segment accounts for only around 3% of IOCL's revenue, while receiving a larger share of the company's capital investments.

IOCL's profitability faces growing structural pressure from global markets. Oversupply from the US, China, and West Asia, weak downstream demand, and high crude and naphtha prices have narrowed the gap between feedstock cost and polymer prices. IOCL is producing more, but higher volumes have not lifted earnings, raising questions about the segment's near term returns.

IOCL's decarbonisation strategy targets energy-related emissions, not its core challenges: Continued fossil fuel and petrochemical expansion. Scope 1 accounts for ~96% of operational emissions, but its net-zero strategy relies on renewable energy, green hydrogen, biofuels, and efficiency improvements. These target energy/combustion emissions, not process/feedstock emissions, and cannot offset expansion-driven growth. Scope 3 remains undisclosed.

With India importing 88% of its crude oil, making petrochemical expansion a national priority warrants scrutiny. Using more crude in petrochemicals, particularly non-essential plastics, may work against energy security goals.



Executive summary

India is the world's sixth-largest petrochemical producer and the third largest in Asia, yet the country remains heavily reliant on imports to meet demand. It imports around 45% of its chemical and intermediate requirements, including major polymers and petrochemical intermediates.

To reduce this reliance, the government aims to increase India's petrochemical intensity index (PII) — the percentage of crude oil a refinery converts into chemical feedstocks — from its current 5% to 15–20% and expand capacity from 29.62 million metric tonnes per annum (MMTPA) to 46MMTPA by 2030. This expansion is expected to be supported by around INR4.32 lakh crore (USD45 billion) in investments by public-sector companies such as the Indian Oil Corporation Limited (IOCL), Hindustan Petroleum Corporation Limited (HPCL), Bharat Petroleum Corporation Limited (BPCL), Gas Authority of India Limited (GAIL), and Oil and Natural Gas Corporation (ONGC).

This strategy, however, requires fossil feedstocks. Around 93% of India's petrochemicals are produced from crude oil, and the country imports around 88% of its crude requirements. This creates risks for the country's trade balance and energy security, while also increasing its exposure to global fossil-fuel price volatility.

IOCL, established in 1964 to strengthen India's energy security through oil refining, petroleum supply, and pipeline infrastructure, is a state-owned enterprise in which the Government of India directly holds 51.50% of the company, while total public ownership is about 71%, rising to 77% when Life Insurance Corporation of India's (LIC) stake is included. Operating through 11 wholly owned subsidiaries and 30 joint ventures, IOCL spans refining, oil and gas, petrochemicals, pipelines, ports, power, and emerging areas such as green hydrogen, biofuels, and battery technologies. Its refining capacity is expected to increase from 70.3MMTPA in 2024 to 107.4MMTPA by 2030.

IOCL has significantly expanded into petrochemicals since 2004-2005 and is now India's second-largest petrochemical producer, after Reliance Industries Limited (RIL), with a PII of 6.1%. It aims to raise this to 15% by tripling petrochemical capacity from 4.3MMTPA to 13.2MMTPA by 2030. Its portfolio spans basic petrochemicals and monomers, intermediates and polymers, alongside its refined-product business. The company is pursuing significant petrochemical expansion across base petrochemicals, intermediates, and polymers to strengthen integration and reduce dependence on transportation fuels. However, this strategy also increases IOCL's exposure to global oversupply, slower demand growth, and margin pressure.

IOCL's petrochemical business is built primarily on olefins — propylene and ethylene — which together make up 69% of its installed capacity for all base petrochemicals. As of 2025, the company held 28.84% of India's propylene capacity and 12.46% of its ethylene capacity, with major capacity additions planned through 2028. IOCL's investments at its Paradip and Panipat refineries aim to further expand its propylene- and ethylene-based polymer chains (polypropylene [PP] and polyethylene) alongside its para-xylene-purified terephthalic acid (PTA) chain for polyester production.

However, global capacity for these two feedstocks is growing faster than demand. This is already visible in a maturing polyethylene market and persistent oversupply in both polyethylene and monoethylene glycol (MEG), along with rising international competition. Together, these pressures could push down prices and reduce IOCL refineries' utilisation. Feedstocks such as propylene, benzene, and butadiene are better positioned, since demand for automotive, engineering plastics, and speciality chemicals is rising. However, IOCL's expansion is heavily weighted towards olefins, keeping it exposed to global overcapacity and weaker profit margins.

In petrochemical intermediates, IOCL produces ethylene oxide, ethylene glycol, and PTA, with PTA accounting for the largest share of its production. Ethylene glycol demand is forecast to grow 4–6% annually, driven by polyester, polyethylene terephthalate (PET) packaging, and industrial use, but rapid capacity additions, especially in China, are outpacing that demand growth, creating oversupply and squeezing margins. Margin pressure in ethylene glycol flows back to ethylene oxide, since about 75% of ethylene oxide goes into ethylene glycol.

Demand for PTA should continue to grow, particularly in India and other developing Asian countries, but heavy new capacity additions are likely to keep margins under pressure industry wide. IOCL is set to grow its own PTA capacity to approximately 3.4 times its 2021 level once the Paradip project is commissioned, strengthening its integration into polyester production. However, this also increases its exposure to an increasingly oversupplied and competitive market.

IOCL's polymer strategy focuses on PP, high-density polyethylene (HDPE), and linear low-density polyethylene (LLDPE) production, with expansion predominantly focused on PP through 2035. Although India remains a growing polymer market, moderate demand growth is expected, particularly for polyethylene. The compound annual growth rate (CAGR) for HDPE is projected to decline from 7.70% to 3.99%, while the CAGR for LLDPE is expected to fall from 5.57% to 4.24%. PP will remain relatively stronger at around 7.0% compared with the earlier 5.93%. Infrastructure, construction, packaging, and industrial applications will support demand, but market maturity, sustainability regulations, and slower urbanisation and industrialisation could limit growth.

Overall, IOCL's petrochemical expansion offers greater integration with downstream markets, but returns will depend heavily on capacity utilisation, feedstock economics and product spreads. The key risks to IOCL's core petrochemical bets are global oversupply, moderating demand growth, volatile feedstock costs, import competition, and sustained pressure on margins.

IOCL remains primarily a refining and petroleum-marketing company, with petrochemicals contributing only around 3% of revenue. Although the company's petrochemical revenue rose from about INR15,700 crore (USD1.64 billion) in financial year (FY) 2019-2020 to nearly INR28,000 crore (USD2.92 billion) in FY2024-2025, profitability deteriorated sharply as the segment swung from a profit of about INR2,008 crore (USD209 million) in FY2019-2020 to a loss of INR440 crore (USD46 million) in FY2024-2025, despite record sales volumes. Weak downstream demand; global oversupply from the US, China, and West Asia; pressure on PP, ethylene, and propylene margins; and relatively firm crude and naphtha prices have resulted in a tight profit gap between raw material

costs used to make plastic and the final selling price of that plastic. As a result, higher production volumes have not translated into stronger earnings, raising questions about the segment's ability to generate dependable returns.

Despite weak profitability, IOCL continues to commit a substantial share of its capital to petrochemicals. Around 24% of its INR1.04 lakh crore (USD10.86 billion) in major ongoing projects and about 10% of its planned FY2024-2025 capital expenditure are linked to the segment. The proposed INR61,000 crore (USD6.35 billion) Paradip Petrochemical Complex further underscores this commitment. However, this investment is yet to translate into financial efficiency. Asset efficiency in IOCL's petrochemical segment has weakened markedly since FY2022. Asset turnover dropped by about 47%, from 1.17 in FY2022 to 0.62 in FY2026. Segment assets nearly doubled to INR45,225 crore (USD4.71 billion) by March 2026, while revenue stayed flat at about INR28,100 crore (USD2.93 billion). Overall, petrochemicals currently appear to be a high-capital, high-risk contributor with uncertain earnings, rather than a dependable growth engine. This is particularly significant given the public sector's about 71% ownership of IOCL (77% including LIC) and the resulting exposure of public capital to continued petrochemical investment.

The larger issue is India's heavy reliance on imported crude oil, which creates significant vulnerabilities to global price volatility, geopolitical disruptions, inflation, currency pressures, and the trade deficit. Against this backdrop, diverting larger volumes of imported crude into petrochemical production raises a broader question of national interest. Does expanding petrochemical capacity through greater oil consumption and public investment strengthen or weaken India's energy security?

Rather than pursuing petrochemical growth indiscriminately, India's policy could focus on rationalising demand and reducing non-essential oil- and plastic-based applications, particularly where viable alternatives exist. This could lower petroleum demand and import exposure while encouraging alternative materials, more sustainable production and consumption models, and better environmental outcomes. Such an approach would align petrochemical policy more closely with energy sovereignty and long-term national interest, rather than treating import substitution alone as the primary objective.

Recommendations

Given the oversupplied market, it would be prudent for IOCL to review its strategy of expanding its petrochemical operations and increasing investments in the sector. The company also needs to revisit its plastic-centric petrochemical strategy. Globally, there is a growing recognition of the need to move away from producing low-value commodity polymers and towards speciality chemicals that have far more niche uses. This could help arrest the indiscriminate production and consumption of non-essential plastics. While revisiting its long-term strategy, IOCL should consider how it could contribute to the country's energy security by diversifying into alternative and renewable sources of energy.

In the immediate term, IOCL also needs to consider how it will address its Scope 1 emissions, including reconsidering carbon capture, utilisation, and storage (CCUS) as a decarbonisation pathway. Currently, its net-zero strategy relies on renewable energy, green hydrogen, biofuels, and efficiency improvements, that primarily target energy-related Scope 2 emissions, which account for a smaller share of the company's total emissions.

1. Background

India is the sixth-largest producer of petrochemicals in the world, and the third largest in Asia. The industry contributes 6% to the country's gross domestic product (GDP) and accounts for 15% of its total exports. Around 80% of India's petrochemical capacity is integrated with its refineries.¹ India's petrochemical intensity index (PII)² remains low at 5%, and the government aims to increase it to 15–20% over the next decade.³ India's current petrochemical capacity is 29.62 million metric tonnes per annum (MMTPA), and is projected to reach 46MMTPA by 2030, backed by INR4.32 lakh crore (USD45 billion)⁴ in ongoing investments.

While the private sector led the initial phase of petrochemical growth in India, developments over the past decade were significantly steered by public sector entities (PSEs), including the Indian Oil Corporation Limited (IOCL), Hindustan Petroleum Corporation Limited (HPCL), Bharat Petroleum Corporation Limited (BPCL), Gas Authority of India Limited (GAIL), and Oil and Natural Gas Corporation (ONGC). PSEs are likely to lead expansion over the next decade as well.

India is currently a net importer of chemicals and intermediates. The country imports about 45% of its chemical and intermediates requirements, including bulk polymers such as polypropylene (PP), polyethylene, and polyvinyl chloride (PVC), along with speciality chemicals and intermediates such as methanol, toluene, styrene, and acetic acid. Import substitution is a key driver of India's petrochemical expansion.

About 93% of petrochemicals in India are derived from crude oil, and the rest from natural gas. India currently imports about 88% of its crude oil needs.⁵ This heavy reliance on imported crude has implications for the country's economy and leaves its petrochemical industry exposed to supply disruptions and price volatility, vulnerabilities highlighted by the West Asia crisis.

2. IOCL: A brief profile

IOCL was incorporated in 1964 with the objective of serving national interests in oil and related sectors, ensuring smooth supplies of petroleum products, enhancing the country's self-sufficiency in oil refining, and to build expertise in laying crude oil and petroleum product pipelines.⁶

¹ Press Information Bureau (PIB). [Petroleum Minister Hardeep Puri Highlights India's Petrochemical Potential at India Chem 2024](#). 18 October 2024.

² Petrochemical intensity index (PII) is a metric that measures the percentage of crude oil that a refinery converts directly into chemical feedstocks — such as ethylene, propylene, and aromatics — rather than traditional transport fuels like gasoline and diesel.

³ Hardeep Singh Puri, Union Minister for Petroleum and Natural Gas, via LinkedIn. [Crude to Chemicals - The Next Chapter of India's Energy Story](#). December 2025.

⁴ USD1 = INR96

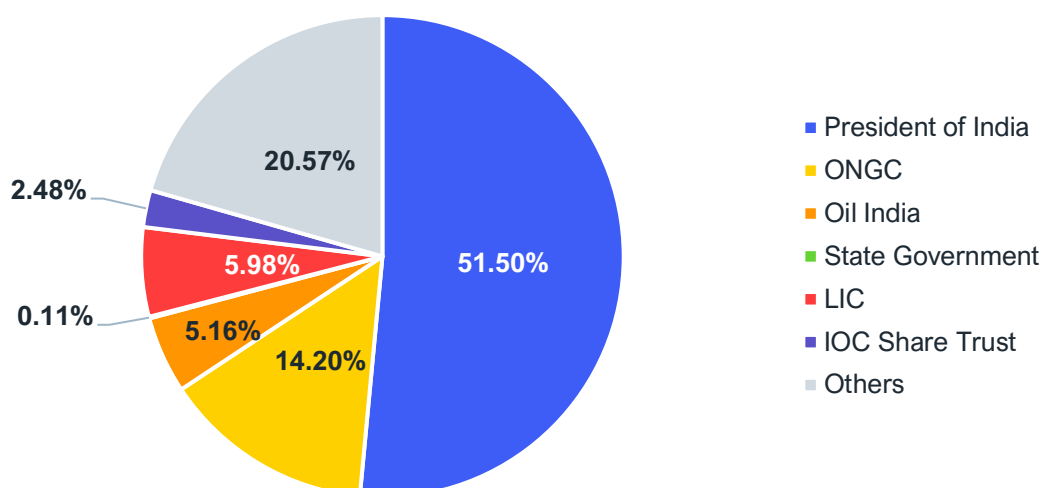
⁵ PIB. [Ethanol Blending in India](#). 5 July 2026.

⁶ Department of Personnel and Training, Public Enterprises Selection Board. 19 December 2022.

IOCL has a total of 11 wholly owned domestic and foreign subsidiaries and has entered 30 joint ventures. Together, these entities operate across a wide range of activities:

- Oil and gas exploration
- Refining
- Petrochemical production
- Power and energy production to fuel operations
- Infrastructure to transport feedstocks
- Building infrastructure for last mile connectivity, like ports and pipelines
- Infrastructure to manage environmental pollution, including developing green hydrogen production assets and associated renewable assets
- To advance biofuel technology by converting organic waste into compressed biogas
- Commercialisation of the aluminium-air (Al-air) battery technology, and battery swapping business in India

Figure 1: Ownership structure of IOCL



Source: IOCL shareholding pattern as of 30 September 2026, filed with BSE.

Note: The Government of India holds 7,272,199,767 shares (51.50%) directly, through the President of India. State-owned Oil and Natural Gas Corporation (2,005,822,884 shares; 14.20%), Oil India Limited (728,385,744; 5.16%), and a state government (16,200,000; 0.11%) hold a further 19.48%, bringing public-sector ownership to 70.98%. Including the state-owned Life Insurance Corporation of India (LIC) (844,854,549; 5.98%), public ownership is 76.96%. These figures exclude the 349,677,684 shares (2.48%) held by the IOC Shares Trust, which holds IOCL's own shares, and any holdings of other public-sector insurers, banks and mutual funds, which the filing does not disclose separately.

IOCL is a state-owned enterprise. The Government of India holds 51.50% of the company directly, and state-owned ONGC (14.20%) and Oil India (5.16%) together hold a further 19.36%, taking public-sector ownership to about 71%, rising to about 77% when Life Insurance Corporation of India's (LIC) stake of 5.98% is included (Figure 1).

In 2024, IOCL's total refining capacity across all its products was 70.3MMTPA.⁷ In 2025, this had increased to 80.8MMTPA.⁸ By 2030, it is expected to increase to 107.4MMTPA.⁹

IOCL established a significant presence in the petrochemical sector in 2004-2005 when it commissioned India's largest linear alkyl benzene (LAB) plant at its Gujarat Refinery. It expanded its petrochemical footprint in 2010 by setting up a naphtha cracker¹⁰ and polymer units.¹¹ In 2019, IOCL started producing petrochemicals at its Paradip Refinery in Odisha. Since 2020, the company has focused on increasing its PII. With a PII of 6.1%¹², today IOCL is India's second-largest producer of petrochemicals, the first being Reliance Industries Limited (RIL). The company aims to increase its PII to 15% by 2030, tripling its petrochemical capacity from 4.3MMTPA to 13.2MMTPA by 2030.^{13,14}

IOCL's primary refined products include desulphurised (desulf) light, middle, and heavy distillates; and refined end products including asphalt, lubricants, and biojet fuel. The company's petrochemicals portfolio includes basic petrochemicals or monomers, petrochemical intermediates, and polymers, which this report focuses on.

Table 1: IOCL's refining and petrochemical products

Refining	
Feedstocks and primary distillation	Crude
	Vacuum
Conversion units	Catalytic cracking
	Hydrocracking
	Coking
	Visbreaking
	Reforming
	Alkylation
	Isomerisation-naphtha
Treating/upgrading	Light distillates desulf
	Middle distillates desulf
	Heavy distillates desulf
Refinery products	Asphalt
	Lube

⁷ Priya Jestin. [Indian Oil's petrochemical capacity to more than triple by 2030, ICIS](#). 14 August 2024.

⁸ S&P Global. [Research Update: Indian Oil Corp. Assigned 'BBB' Issuer Credit Rating; Outlook Stable](#). 14 October 2025.

⁹ Priya Jestin. [Indian Oil's petrochemical capacity to more than triple by 2030, ICIS](#). 14 August 2024.

¹⁰ A naphtha cracker is an industrial facility that uses [steam cracking](#) to break down complex hydrocarbons in naphtha into simpler, lighter olefins like ethylene and propylene.

¹¹ Indian Oil Corporation Limited. [Annual Report 2004-05](#).

¹² Indian Oil Corporation Limited. [Annual Report 2024-25](#).

¹³ Indian Oil Corporation Limited. [Annual Report 2024-25](#).

¹⁴ Angel One. [Indian Oil to Invest ₹1.66 Trillion in Refining, Petrochemicals, and Green Energy](#). 1 September 2025.

	Biojet (sustainable aviation fuel)
Petrochemicals	
Basic petrochemicals – olefins	Ethylene
	Propylene
	Butadiene
Basic petrochemicals – aromatics	Benzene
	Toluene
	Mixed xylenes
	Para-xylene
Intermediates	Ethylene oxide
	Ethylene glycols
	Purified terephthalic acid
Polymers	High-density polyethylene
	Linear low-density polyethylene
	Polypropylene

3. Market outlook: Risks in IOCL's core bets

This section examines IOCL's strategy across petrochemical value chains that are expected to face slowing demand growth and persistent oversupply over the coming decade.

3.1. Base petrochemicals

IOCL produces two categories of base petrochemicals: **Olefins** (which include ethylene and propylene) and **aromatics** (including mixed xylenes and para-xylene). Of these, olefins account for the larger share of installed capacity.

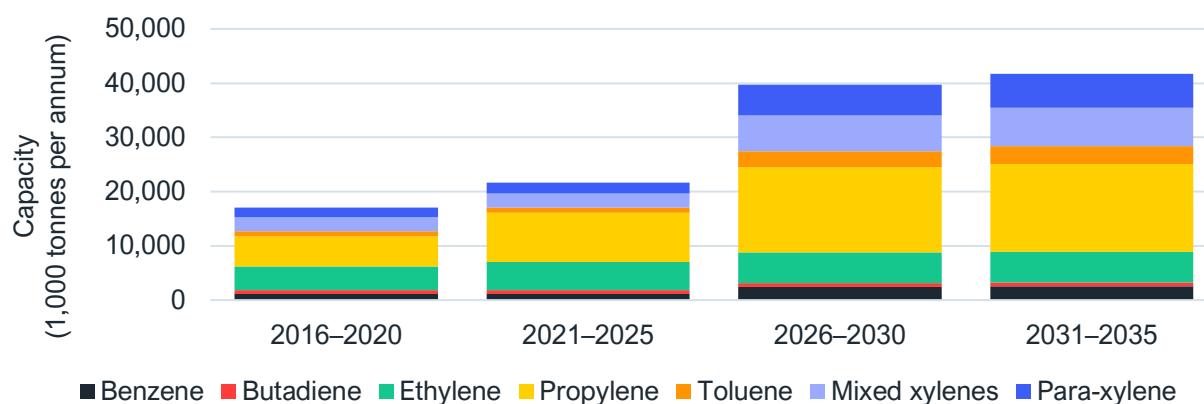
Ethylene and propylene are the two principal building blocks of the petrochemical industry and serve as feedstocks for most commodity plastics. Ethylene is primarily converted into polyethylene, ethylene oxide, and monoethylene glycol (MEG). Polyethylene grades include high-density polyethylene (HDPE), low-density polyethylene (LDPE), and linear low-density polyethylene (LLDPE). Propylene is predominantly used to manufacture PP, propylene oxide, and acrylonitrile.

Para-xylene, an aromatic hydrocarbon, is used almost exclusively in the production of purified terephthalic acid (PTA), which is then converted into polyethylene terephthalate (PET), polyester fibres, and polyester films. Mixed xylenes serve as both solvents in paints, coatings, pesticides and adhesives, and as feedstocks for para-xylene production.

In IOCL's base petrochemical category, propylene has the largest installed capacity, followed by ethylene, mixed xylenes, and para-xylenes. Together, ethylene and propylene account for 69% of IOCL's installed capacity for all base petrochemicals. In 2025, IOCL accounted for 28.84% of India's installed propylene capacity and 12.46% of its installed ethylene capacity.¹⁵ In the same year, its share of India's installed capacity for mixed xylenes and para-xylenes was 13.15% and 10%, respectively.

Most of IOCL's planned capacity additions are scheduled to take place between 2023 and 2028. After that, capacity is expected to remain largely unchanged, which suggests that the current investment cycle will be complete by then.

Figure 2: IOCL's base petrochemicals capacity



Source: ICIS

This expansion reflects IOCL's focus on strengthening downstream production of PP and other propylene derivatives, supported by existing projects at Paradip and the proposed Paradip Petrochemical Complex. Higher ethylene production would also provide the feedstock required for polyethylene, MEG, and future downstream petrochemical projects.¹⁶ The expansion is consistent with IOCL's ongoing investments in the para-xylene-PTA value chain, particularly at its Panipat Refinery in Haryana, and at Paradip. This reflects the company's strategy of deeper integration into polyester feedstocks through the ongoing para-xylene-PTA projects.¹⁷

3.1.1. Market outlook

Globally, ethylene and propylene markets are seeing a supply glut, and are expected to stay in a state of decline at least until 2030.¹⁸ Global ethylene demand is growing by around 4.7 million tonnes (Mt) per year, while more than 22Mt/year of net ethylene capacity is expected to be added between

¹⁵ IEEFA calculations based on ICIS.

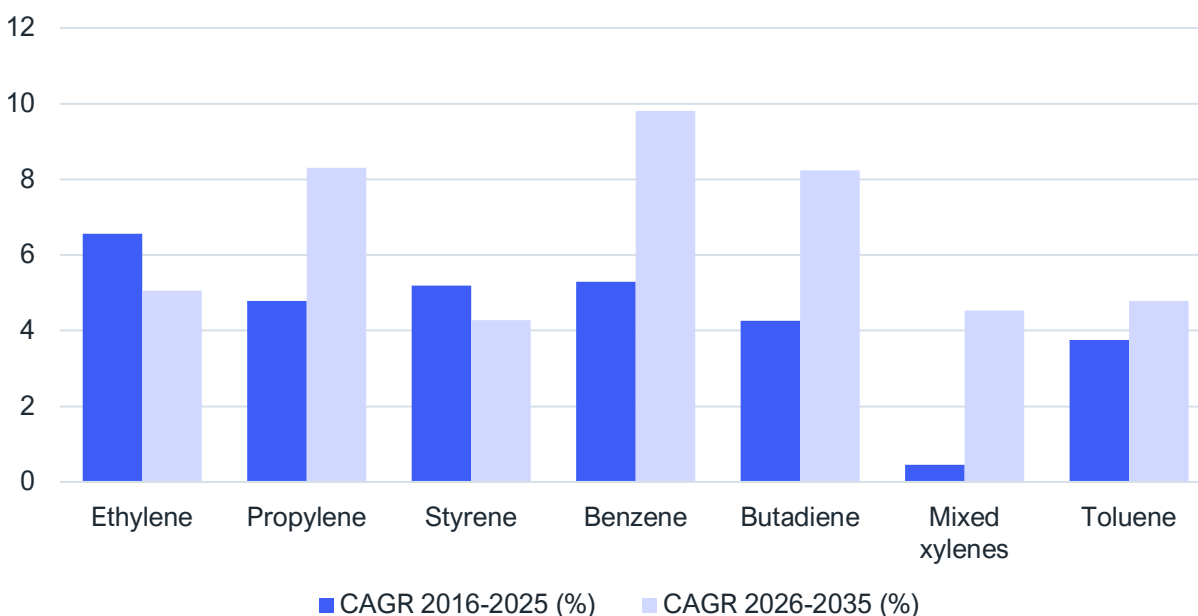
¹⁶ IOCL. [Petrochemicals](#).

¹⁷ IOCL. [Indian Oil Corporation Limited FY 2023-24](#).

¹⁸ Wood Mackenzie. [Petrochemicals in peril: oversupply crisis and energy transition threaten industry survival](#). 19 September 2025.

2025 and 2026. Meanwhile, demand for ethylene in its derivatives market also does not demonstrate encouraging prospects. Demand growth for polyethylene, which accounts for about 60% of ethylene consumption, has fallen by almost 80% from its peak between 2016 and 2020.¹⁹

Figure 3: Growth in India's consumption of key base petrochemicals



Source: ICIS

The projected demand trends suggest that India's petrochemical industry is becoming increasingly diversified. Growth is no longer expected to be uniform across all monomers. Ethylene will remain a key feedstock, but its demand growth is forecast to slow as traditional polyethylene markets mature and environmental regulations become more stringent. By contrast, demand for propylene, benzene, and butadiene is expected to accelerate, reflecting the expansion of higher-value downstream industries, including automotive manufacturing, engineering plastics, speciality chemicals, and industrial products.

IOCL's petrochemical expansion strategy is concentrated on olefins (primarily ethylene and propylene), and aromatics, with the largest capacity additions planned between 2025 and 2027.

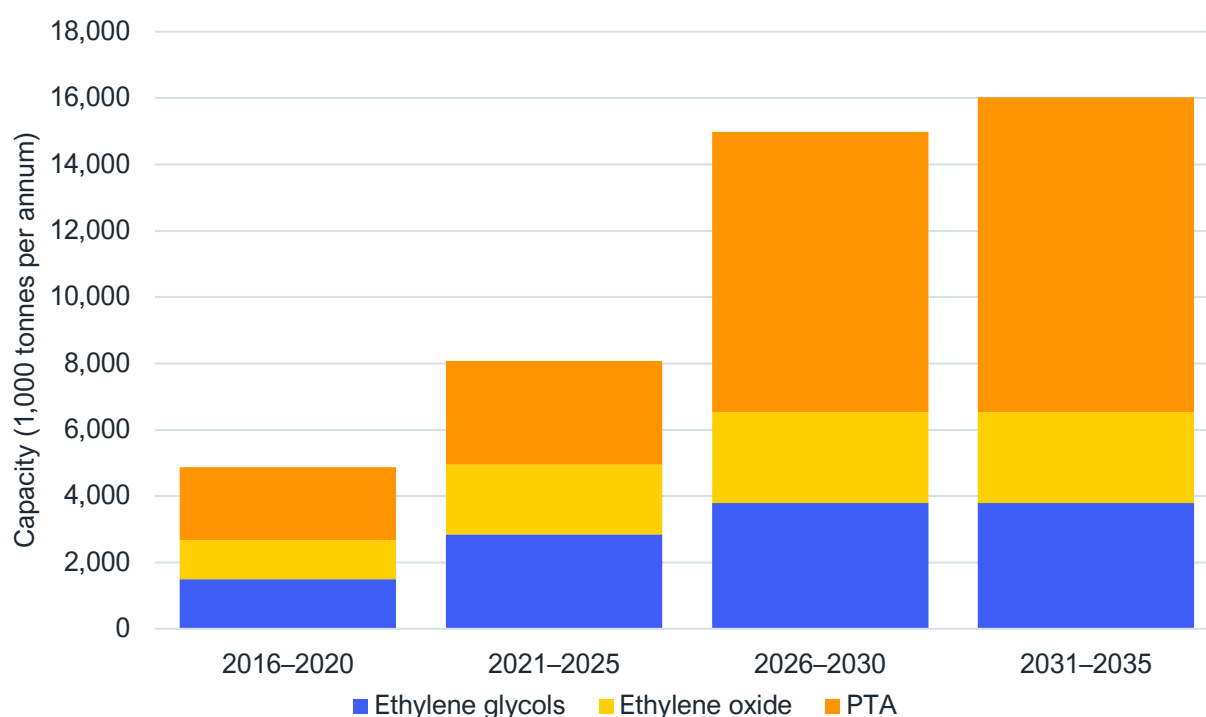
As one of IOCL's largest petrochemical products, ethylene presents a challenge: Demand for it is expected to continue growing but at a slower pace than in the previous decade. Meanwhile, persistent global oversupply of polyethylene and MEG, along with increased international competition, is likely to keep prices and margins under pressure.

¹⁹ BloombergNEF. Petrochemical Projects to Watch in 2026: Ethylene's Big Year. 2026.

3.2. Petrochemical intermediates

IOCL produces three petrochemical intermediates: Ethylene oxide, ethylene glycol and PTA. Of these, PTA is the most significant as it is a key ingredient in the production of textiles, PET bottles, films, coatings, and plasticisers. Ethylene oxide is used in the production of ethylene glycol, which is then used to make anti-freeze materials and PET. Ethylene oxide is also used to produce detergents and adhesives.

Figure 4: IOCL's petrochemical intermediates production capacity



Source: ICIS

3.2.1. Market outlook

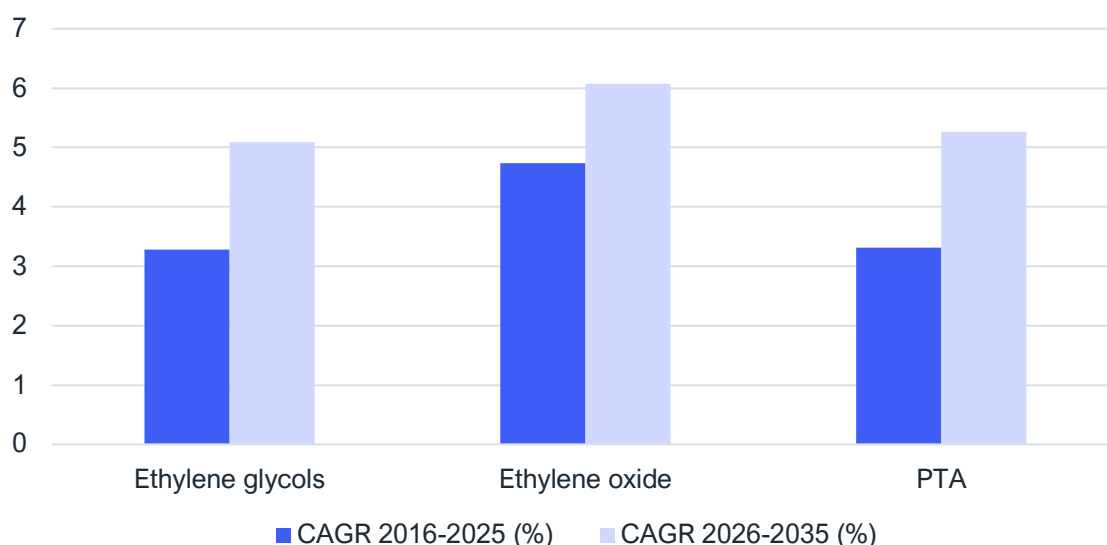
The global ethylene glycol market is expected to grow at a compounded rate of 4–6% annually over the medium term, driven by increasing consumption of polyester fibres, PET packaging, and industrial applications. Asia-Pacific remains the dominant market, accounting for more than 70% of global demand.²⁰ Like ethylene, ethylene glycol is experiencing oversupply, primarily due to China's

²⁰ Fortune Business Insights. [Ethylene Glycol Market Size, Share & Industry Analysis](#). 31 August 2026.

rapid expansion of production capacity.²¹ The ethylene oxide market is closely linked to ethylene glycol, which consumes approximately 75% of ethylene oxide production.²²

The PTA market is expected to experience healthy volume growth but challenging profitability. Demand from polyester and PET packaging is likely to continue rising, particularly in India and other developing countries in Asia. However, continued capacity expansion, especially in China²³, is likely to keep margins subdued and make operational efficiency a key competitive advantage.

Figure 5: Growth in India's consumption of key petrochemical intermediates



Source: ICIS

IOCL expanded its installed PTA capacity in 2023 and, upon commissioning the Paradip project, would increase capacity to approximately 3.4 times its 2021 level.

3.3. Polymers

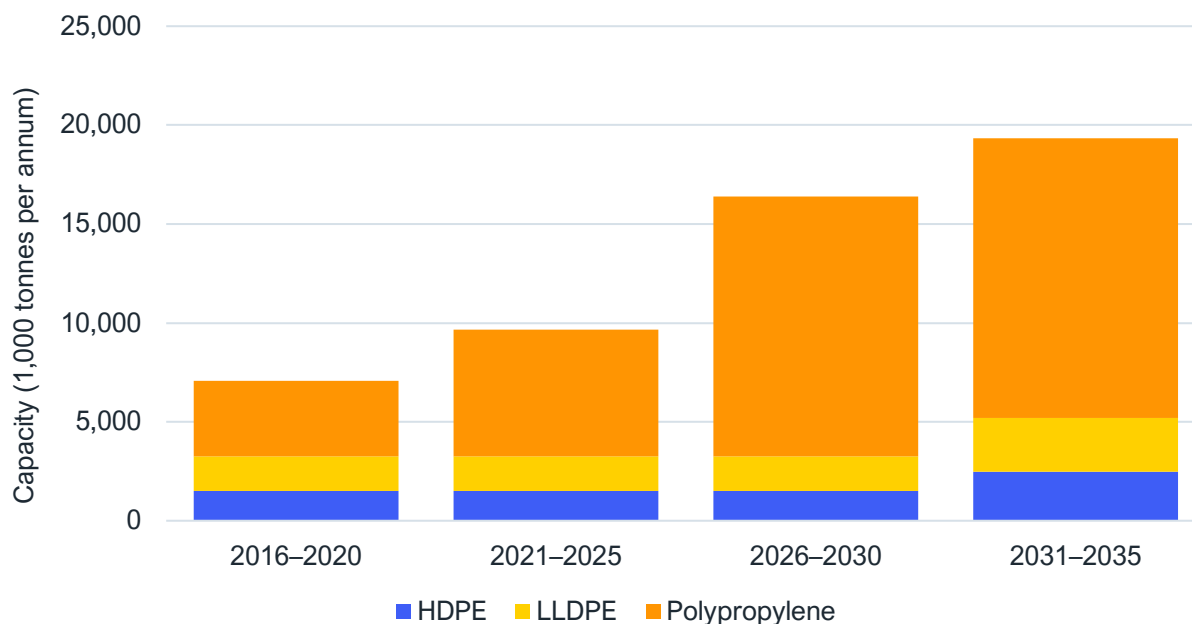
Polymers are downstream petrochemicals from which plastic products are manufactured. IOCL produces three key polymers: PP, HDPE, and LLDPE.

Figure 6: IOCL's polymer production capacity

²¹ SunSirs. [Oversupply of China Ethylene Glycol Likely to Persist in the Medium Term](#). 9 July 2026.

²² S&P Global. [Ethylene Oxide](#). May 2026.

²³ Reuters. [China aims to tackle over-capacity in some plastic and fibre petrochemicals](#). 28 October 2025.



Source: ICIS

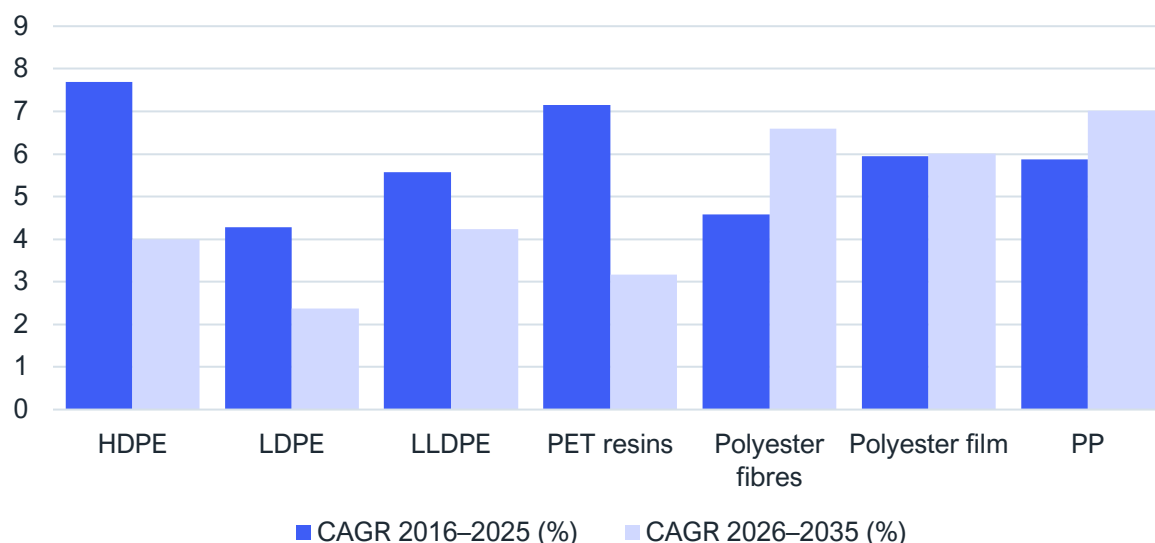
IOCL operates HDPE and LLDPE swing plants²⁴ in the Panipat, Paradip refineries. Figure 6 shows IOCL's planned expansion of its polymer production capacity between 2016 and 2035. PP capacity is rising sharply, while a more modest expansion is expected in HDPE and LLDPE. The expansion aligns with IOCL's strategy of increasing its petrochemical integration ratio and reducing its dependence on transportation fuels. However, the market outlook suggests that while these investments are strategically important, their profitability will depend on overcoming a challenging global supply environment and achieving high domestic capacity utilisation.

3.3.1. Market outlook

ICIS's projections for consumption in the polymer industry in India indicate that the compound annual growth rate (CAGR) for HDPE and LLDPE in the coming decade will be significantly lower than that of the past decade, while the growth rate for PP is projected to rise.

Figure 7: Growth projected in consumption of key polymers in India

²⁴ An HDPE/LLDPE swing plant is a flexible petrochemical facility that can switch production between HDPE and LLDPE using the same polymerisation reactors. This makes it difficult to estimate the exact installed capacity of both petrochemicals.



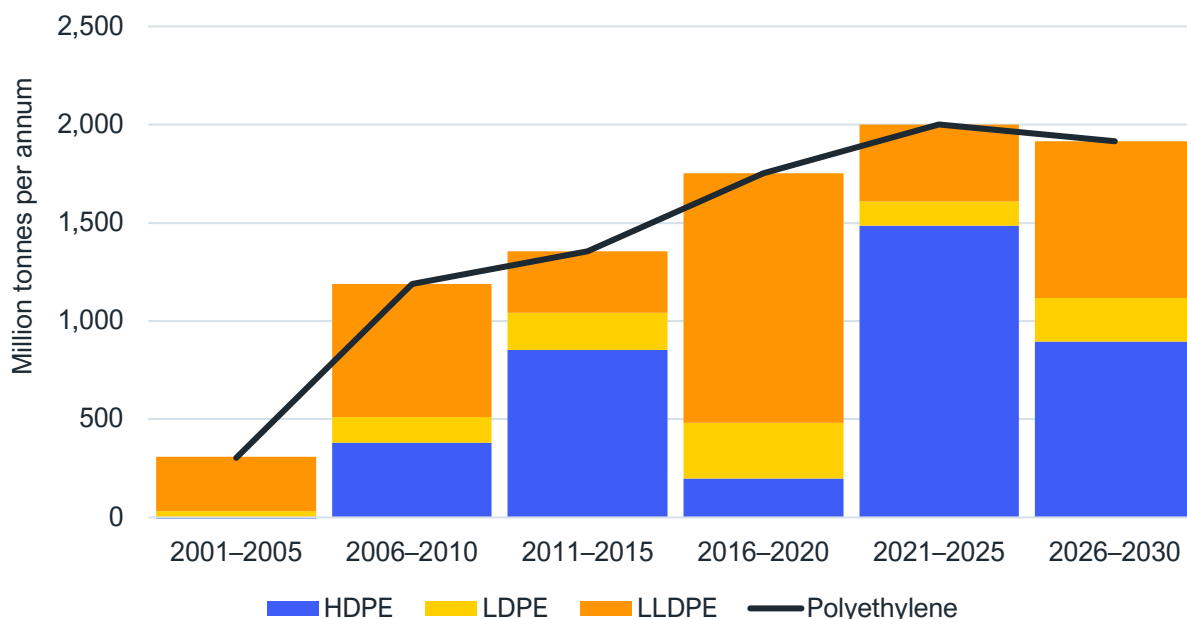
Source: ICIS, IEEFA calculations

HDPE demand is projected to slow from a CAGR of 7.70% to 3.99%, indicating that consumption will continue to increase, but at a more moderate pace. For IOCL, this implies that the planned increase in HDPE capacity may face a more competitive market.

LLDPE records a decline in projected growth, with its CAGR falling from 5.6% to 4.2%. Consequently, IOCL's future LLDPE investments may face greater pricing pressure, particularly given continued global oversupply.

Unlike polyethylene, PP demand growth is projected to accelerate, with its CAGR rising from 5.9% in 2016–2025 to about 7.0% in 2026–2035. However, despite favourable domestic demand, profitability remains constrained by substantial global overcapacity, particularly from Chinese refinery-petrochemical complexes and West Asian producers.

Overall, the outlook suggests that India's polymer market is entering a period of changing demand patterns, with growth increasingly concentrated in specific applications rather than spread evenly across all polymer types. While traditional packaging polymers such as HDPE, LDPE, LLDPE, and PET resins will continue to see demand growth, it is expected to be much slower than in the previous decade as these markets mature and sustainability regulations tighten. By comparison, PP and polyester-based products are expected to see stronger growth, driven by expanding demand from the manufacturing, textile, automotive, and industrial sectors.

Figure 8: Change in demand for polyethylene derivatives in India

Source: BloombergNEF

Figure 8 shows the YoY change in demand for polyethylene and its three main derivatives — HDPE, LDPE, and LLDPE — from 2001 to projected demand in 2030. The dotted line represents the overall change in demand for polyethylene, while the stacked bars show the contribution made by each polymer grade. Overall, the data suggests that demand for polyethylene has followed a cyclical pattern, with periods of strong growth interrupted by occasional slowdowns. Looking ahead, demand is expected to become more stable after 2025, although growth is unlikely to reach the levels seen during earlier periods of rapid expansion.

During the early 2000s, growth in polyethylene demand was relatively modest, reflecting the gradual development of India's plastics processing industry. Demand accelerated between 2005 and 2015, supported by rising consumption of packaged goods, infrastructure expansion, greater use of agricultural films, and increasing industrial activity. Throughout the period, HDPE remained the largest contributor to additional demand, driven by its widespread use in pipes, containers, and industrial packaging. LLDPE also made a significant contribution, particularly through its use in flexible packaging and films, while LDPE accounted for a relatively smaller share of overall demand growth.

Projections indicate that HDPE will continue to account for the largest share of future demand growth, driven by ongoing investment in infrastructure, construction, and industrial applications. However, overall growth in polyethylene demand is expected to moderate as the market matures and gains from rapid urbanisation, and as industrialisation begins to level off.

While India is one of the world's fastest-growing polyethylene markets, the global market presents a more challenging picture. Over the past few years, substantial new polyethylene capacity has come on stream in China, West Asia, and the US, outpacing growth in global demand. The resulting structural oversupply has kept polymer prices and producer margins under sustained pressure. Even as domestic demand in India continues to expand, it is unlikely to absorb the additional global capacity in the near term. Consequently, while India's domestic market offers significant opportunities, producers will continue to face competition from lower-cost imports unless domestic demand accelerates further or imports become less competitive.

Four factors will shape IOCL's profitability in this segment:

- **Capacity utilisation:** New polymer plants will need to operate at high utilisation rates to achieve economies of scale and recover the large capital investments made in petrochemical expansion.
- **Import competition:** Low-cost polyethylene imports from West Asia and China could limit IOCL's pricing power despite growing domestic demand.
- **Feedstock costs:** Polyethylene production depends on ethylene, which, in IOCL's case, is derived primarily from naphtha. Volatility in crude oil prices, particularly arising from geopolitical tensions in West Asia, could affect production costs.
- **Polymer spreads:** Profitability depends not only on polyethylene prices but also on the margin between ethylene feedstock costs and polymer selling prices.

3.4. Much of IOCL's planned expansion serves the single-use plastics (SUPs) market

The downstream demand profile of these petrochemicals indicates that IOCL's planned expansion is heavily concentrated on products destined for the plastics and polyester industries. Approximately 90% of global PTA production is consumed in the manufacture of PET resin and polyester fibres.²⁵ In turn, the packaging sector accounted for 82.4% of global PET market revenue in 2024, reflecting PET's dominant use in beverage bottles, food containers, and flexible packaging.²⁶

More broadly, the packaging industry is the largest consumer of plastics globally, accounting for approximately 36% of total plastic production, much of which is designed for single-use applications.²⁷ This concentration of demand exposes IOCL's petrochemical investments to increasing sustainability and regulatory risks. In India, The Plastic Waste Management Rules, 2016, and subsequent amendments — including the introduction of Extended Producer Responsibility (EPR), recycled-content targets, and restrictions on selected SUP items — demonstrate the Government of India's recognition of the environmental impacts associated with virgin plastic production and consumption.

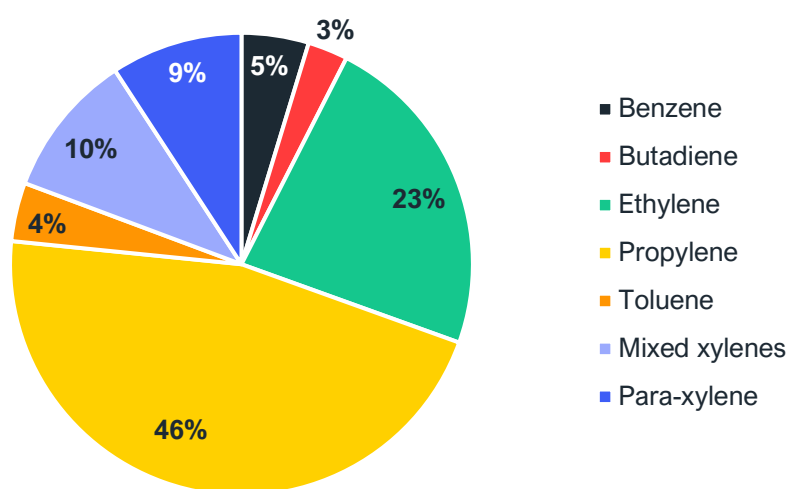
²⁵ United Raw Material PTE Ltd. [PTA – \(Pure Terephthalic Acid\)](#).

²⁶ Grand View Research. [Polyethylene Terephthalate Market \(2026 - 2033\)](#). June 2026.

²⁷ United Nations Environment Programme (UNEP). [Everything you need to know about plastic pollution](#).

A similar demand pattern exists for PP. According to the Plastindia Foundation²⁸, 32.1% of India's PP demand originates from the synthetic raffia industry, which manufactures cement bags, fertiliser bags, flexible intermediate bulk containers (FIBCs), agricultural bale wraps, fishing nets, ropes, and woven sacks. The injection moulding and high performance (IMHP) segment is the second-largest consumer, supplying the automotive, healthcare, electrical equipment, and consumer goods industries. Globally, packaging and sacks account for approximately 49.3% of synthetic raffia demand²⁹, while around 45% of PP consumption is attributable to packaging applications.³⁰

Figure 9: Distribution of IOCL's base petrochemicals installed capacity in 2025



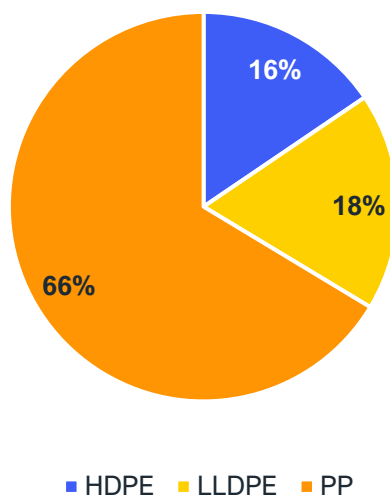
Source: ICIS

Together, these downstream demand patterns indicate that a substantial proportion of IOCL's planned petrochemical capacity is concentrated in plastic packaging, polyester packaging, synthetic textiles, and other plastic-intensive sectors. While these industries are expected to continue growing in India, they are simultaneously becoming the focus of stricter environmental regulation, recycled-content mandates, corporate sustainability commitments, and consumer pressure to reduce virgin plastic consumption.

²⁸ Plastindia Foundation. [Plastics Industry Status Report FY25](#). 2025.

²⁹ PW Consulting Chemicals & Energy Research Center. [Global Synthetic Raffia Products Market 2026](#). 14 June 2026.

³⁰ ITM. [Polypropylene: sustainability and post-consumer applications](#). Undated.

Figure 10: Distribution of IOCL's polymer production in 2025³¹

Source: [ICIS](#)

The capacity distribution reflects a downstream-oriented strategy, with approximately 69% of IOCL's base petrochemical capacity concentrated in ethylene and propylene, supporting the production of high-volume polymers such as HDPE, LLDPE, and PP. These products are expected to benefit from India's strong long-term demand in packaging, infrastructure, automobiles, and consumer goods. However, they are also the segments most exposed to global oversupply, particularly from capacity additions in China and West Asia, which are likely to keep margins under pressure in the near to medium term.

Of the remaining capacity, 19% is concentrated in mixed xylenes and para-xylenes, positioning IOCL to serve India's expanding polyester, textile, and PET packaging industries. Compared with polyolefins³², aromatics have relatively stronger domestic demand fundamentals.

Meanwhile, benzene, toluene, and butadiene account for only 12% of capacity, providing exposure to diversified downstream chemical markets.

A large share of IOCL's planned output is geared towards plastic production, including SUPs. This creates a contradiction: Where the Government of India is attempting to regulate SUPs, IOCL, a state-owned enterprise, is increasing production of the polymers used to make them.

³¹ The LLDPE share represents the swing plant's capacity of 350 kilotonnes per annum (KTA), which can produce either HDPE or LLDPE.

³² Polyolefins are a family of thermoplastic polymers made by polymerising simple olefins (alkenes).

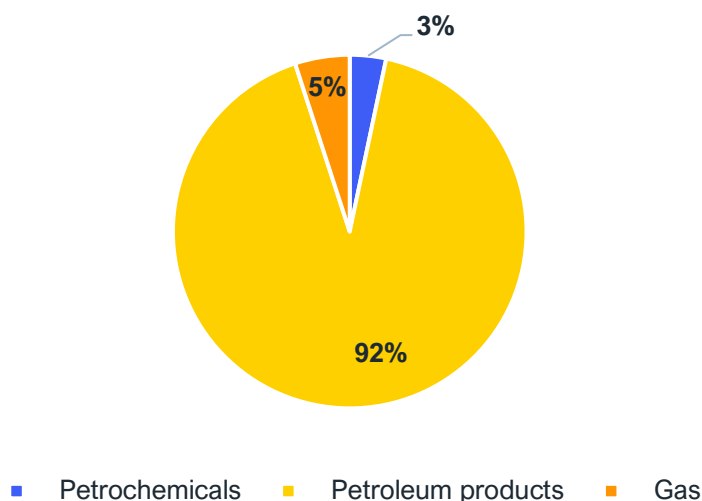
4. Financial analysis: Are petrochemicals a dependable bet for IOCL?

IOCL's primary business is the refining and marketing of petroleum products. Limited segment-level financial disclosures make it difficult to conduct deep financial analysis on the impact of the petrochemical segment in the company.

4.1. Revenue, earnings, and profit trends in IOCL's petrochemicals segment

The revenue composition demonstrates that IOCL remains predominantly a petroleum products company, with over 90% of its revenue generated from its core refining and fuel marketing business. The company has, however, invested heavily in petrochemicals and is expanding its gas business as part of its long-term diversification strategy. Petrochemicals currently contribute only 3% to the total revenue, and gas 5%, while other business activities contribute a negligible share (Figure 11).

Figure 11: Segment-wise share in total revenue in 2024-2025



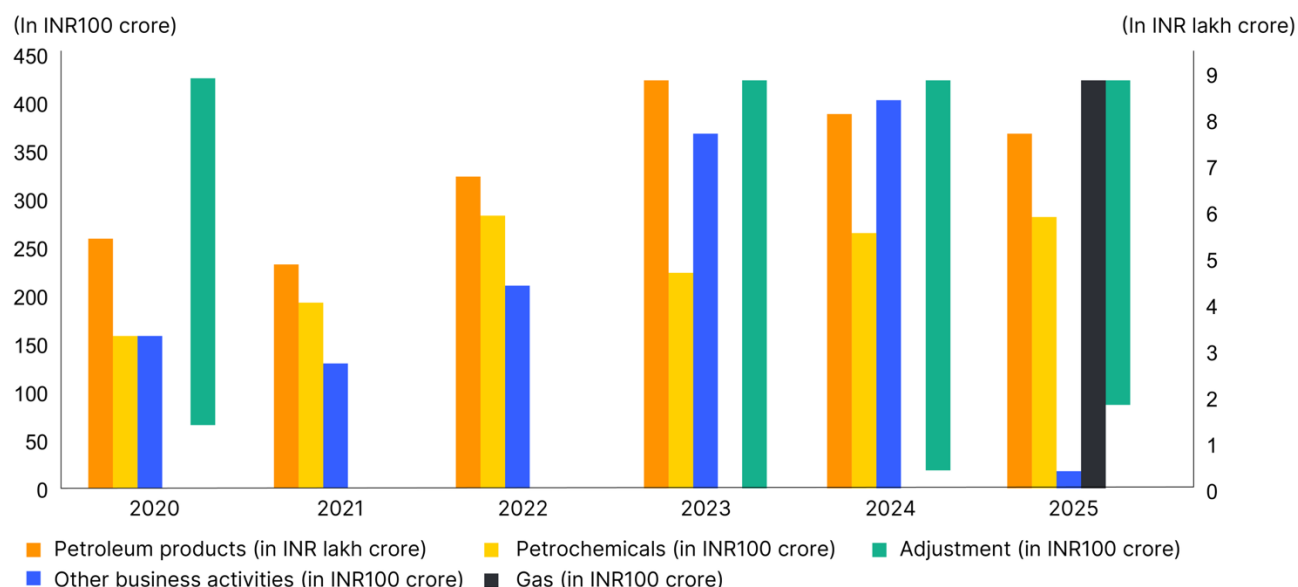
Source: Bloomberg

This suggests the success of IOCL's strategy will depend on increasing the scale, profitability, and operational efficiency of its petrochemical and gas businesses over the coming years.

According to IOCL, the year 2024-2025 saw the company's highest-ever sales volumes across all segments.³³ Although IOCL's petrochemical segment revenue rose from about INR15,700 crore (USD1.64 billion) in FY2019-2020 to about INR28,000 crore (USD2.92 billion) in FY2024-2025, profitability deteriorated sharply. The segment swung from a profit of INR2,008 crore (USD209 million) to a loss of INR440 crore (USD46 million) in the same period. The FY2024-2025 loss was wider than the INR344 crore (USD36 million) loss in FY2023-2024, despite record petrochemical sales of 3.24Mt. The weakness was evident early in the year: In the April to June quarter of FY2024-2025, segment profit fell by 86.5% YoY, from INR88.40 crore (USD9.21 million) to INR11.93 crore (USD1.24 million).^{34, 35}

In the fourth quarter (Q4) of FY2024, IOCL's petrochemical segment reported earnings before interest and taxes (EBIT) loss of INR399.75 crore (USD41.64 million), higher than the loss of INR196.21 crore (USD20.44 million) in Q3 of the same financial year (FY).³⁶

Figure 12: Segment-wise revenue data for IOCL (FY2020-2025)



Source: Bloomberg

³³ Indian Oil Corporation Limited. [Indian Oil Financial Performance FY 2024-25 \(Standalone\)](#). 30 April 2025.

³⁴ IOCL, [Audited Financial Results for the Quarter and Year Ended 31 March 2025, Segment-Wise Information \(Standalone\)](#), 30 April 2025; IOCL, [Audited Financial Results for the Quarter and Year Ended 31 March 2021, \(FY2019-2020 Comparatives\)](#) 19 May 2021; IOCL, [Unaudited Financial Results for the Quarter Ended 30 June 2024, filed with BSE](#), 30 July 2024; IOCL, [Q4 FY2024-2A25 Earnings Conference Call Transcript](#), 2 May 2025. Segment profit refers to segment results before tax, interest income, finance costs, dividend, and exceptional items. All accessed 13 October 2026.

³⁵ All profit figures are IOCL's standalone segment results, measured before tax, interest, finance costs and exceptional item.

³⁶ Moneycontrol. [Indian Oil Q4 net profit falls 49% to Rs 5,488 crore; declares dividend of Rs 7/share](#). 30 April 2024.

Overall, the data suggests that while IOCL is diversifying its revenue base, its long-term success will depend on improving the profitability and capital efficiency of its expanding petrochemical and gas businesses, rather than relying solely on revenue growth.

Revenue from the petrochemical segment increased over the four-year period, witnessing a brief drop in FY2023. It went from around INR15,700 crore (USD1.64 billion) in FY2020 to nearly INR28,000 crore (USD2.92 billion) in FY2025. The increase reflects expanding production capacity, growing domestic demand for polymers and petrochemicals, and IOCL's strategic emphasis on increasing the share of non-fuel businesses. However, given the company's rising capital employed and declining asset turnover in petrochemicals, the growth in revenue has not translated into proportionate improvements in capital efficiency.

Data presented in Figure 12 reinforces the segment's profitability challenges. Despite higher sales, volumes were offset by significantly weaker operating margins along with insufficient demand. There are three broad reasons for this:

- Ethylene and propylene are base petrochemicals that serve as feedstocks to produce polyolefins and a wide range of downstream derivatives used across the manufacturing, automotive, packaging, and consumer goods industries. Consequently, demand for these derivatives and their production rates are key determinants of demand for base petrochemicals.
- Demand in the automobile industry has been erratic since 2019. According to the Society of Indian Automobile Manufacturers (SIAM), 2019 saw the steepest sales decline in two decades.³⁷ Moreover, COVID-19 further impacted the automobile industry. Despite a slow recovery between 2023 and 2025, demand in the industry continued to be stressed.³⁸ The fast-moving consumer goods (FMCG) sector grew at a CAGR of 12% between 2005 and 2015.³⁹ However, growth in this sector over the past decade was choppy. As a result, in 2025, positive market-value growth did not necessarily mean an equivalent increase in the number of products purchased. Price increases, premium products, and changes in product mix contributed significantly to nominal growth.
- Out of IOCL's installed capacity mix, 69% of its base petrochemical capacity is concentrated in ethylene and propylene (see Figures 2 and 9), with PP alone accounting for 66% of installed polymer capacity. These products currently face the greatest margin pressure globally because of excess capacity and weak polymer prices.
- Although polyethylene and PP prices weakened significantly amid growing global oversupply, Asian naphtha prices remained comparatively elevated, with Brent crude averaging around

³⁷ Economic Times. [2019 witnesses worst-ever decline in auto sales: SIAM](#). 10 January 2020.

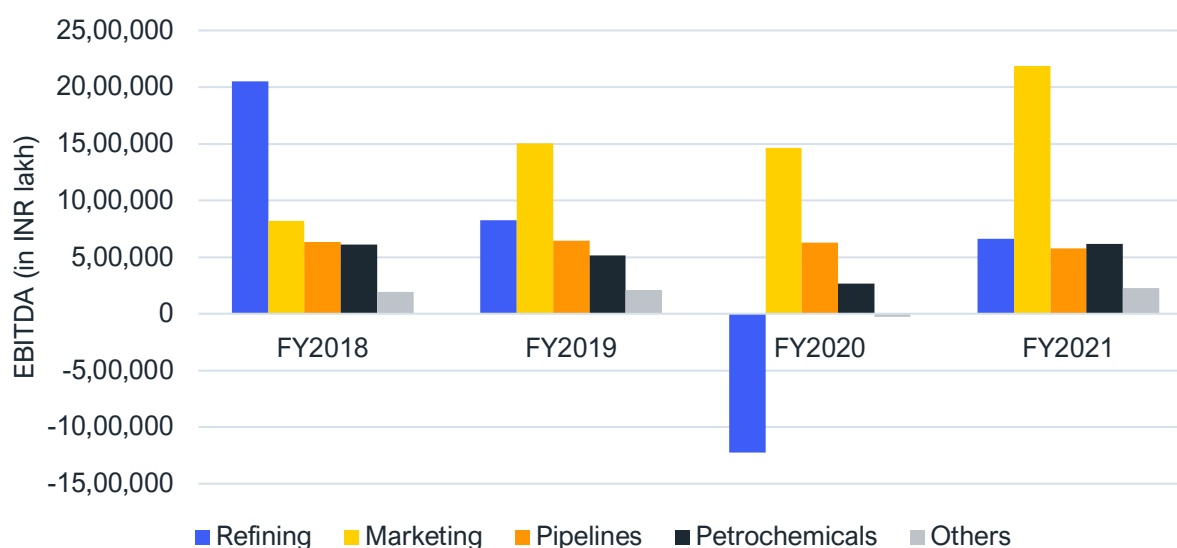
³⁸ Economic Times. [Auto retail sales skid 4.3% after three months in July with 19,64,213 units](#). 7 August 2025.

³⁹ Boston Consulting Group. [Re-Imagining FMCG in India](#). December 2015.

USD80–84 per barrel of crude oil (bbl) in 2024.⁴⁰ This contributed to pressure on polymer-naphtha spreads and petrochemical margins⁴¹, significantly reducing cracker margins and profitability for naphtha-based producers.

Overall, the chart and financial results demonstrate that volume growth is no longer an adequate indicator of financial performance in the petrochemical business. Despite record sales volumes and rising revenues, profitability has deteriorated because of weak global polymer prices, excess production capacity, compressed feedstock-product spreads, and increasing competitive pressure from lower-cost producers in China and West Asia.

Figure 13: IOCL's segment-wise earnings before interest, taxes, depreciation, and amortisation (EBITDA)



Source: Bloomberg

Segment-wise data on EBITDA is available for only four years, including the period impacted by COVID-19, making it difficult to identify a clear trend.

IOCL's earnings profile shifted significantly over the period, with refining being the primary EBITDA contributor in FY2017-2018 before weakening in the following years. By FY2020-2021, strong marketing earnings and stable pipeline income helped offset the substantial losses in the refining segment caused by the onset of the pandemic.

The petrochemical segment contributed moderately to overall EBITDA, increasing from approximately INR5,000 crore (USD521 million) in FY2018-2019 to around INR6,500–7,000 crore

⁴⁰ World Bank Group. [Global Commodity Prices Level Off, Hurting Prospects for Lower Inflation](#). 25 April 2024.

⁴¹ ICIS. [Record levels of oversupply and the "Doublespeak" of the old market language](#). 15 February 2024.

(USD677–729 million) in FY2020-2021. However, its contribution remained considerably smaller than those of refining and marketing. Although the segment showed resilience during these years, later financial data shows rising capital employed and declining asset turnover. This suggests that sustaining profitability has become more challenging as IOCL has expanded its petrochemical asset base amid weaker global petrochemical markets.

4.2. Capital expenditure and planned investments

Table 2: Ongoing investments in major IOCL projects

Projects	Estimated cost (INR crore)
Panipat Refinery expansion, from 15MMTPA to 25MMTPA (towards petrochemicals – INR3,250 crore)⁴²	38,231
Gujarat Refinery expansion, from 13.7MMTPA to 18MMTPA (towards petrochemicals – INR3,309 crore)⁴³	18,936
Barauni Refinery expansion, from 6MMTPA to 9MMTPA (towards petrochemicals – INR1,920 crore)⁴⁴	18,113
Para-xylene-PTA complex at Paradip Refinery	13,805
New Mundra-Panipat Crude Oil Pipeline, in Gujarat, Haryana, and Rajasthan	9,028
Indian Oil Technology Development and Deployment Centre at IOCL's R&D Campus-II	3,220
Poly butadiene rubber plant at Panipat, Haryana	2,949
Total	104,282

Source: Indian Oil Corporation Limited, Investor Presentation (2025-26)⁴⁵

About 24% of the above investments are towards IOCL's petrochemicals segment. According to the same presentation, petrochemicals form 10% of planned capital expenditure (capex) outlay in 2024-2025. In 2025, IOCL announced its intention to invest INR61,000 crore (USD6.35 billion) in Paradip to develop a petrochemical complex to produce PP, phenol, isopropyl alcohol (IPA), HDPE, LLDPE, PVC, and butadiene. This will further increase the company's plastic footprint.⁴⁶

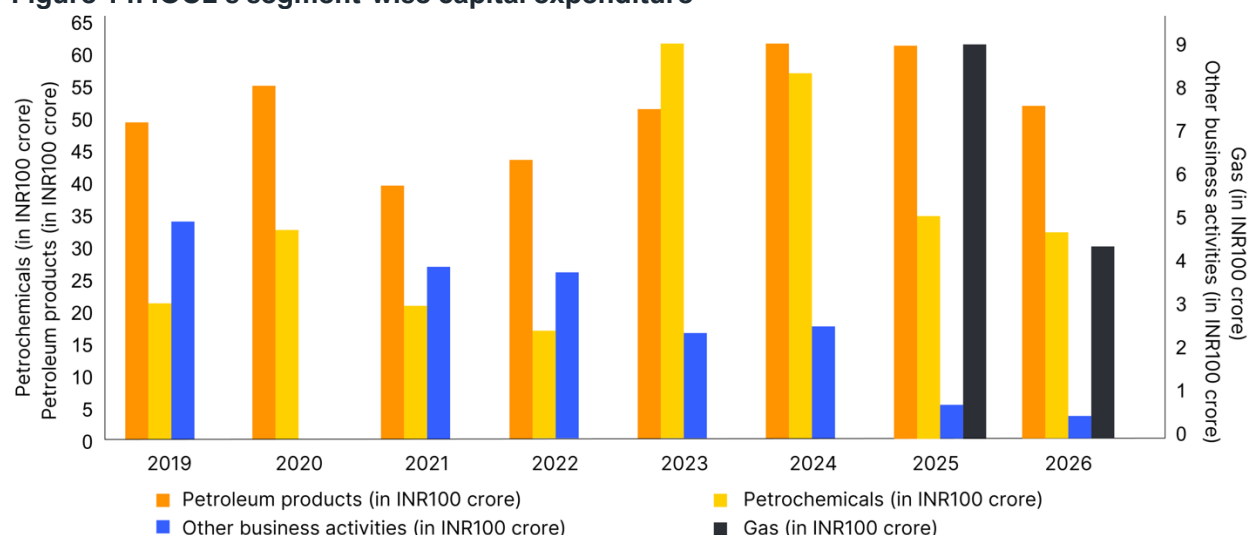
⁴² Data from 2023 – 24 [Investor Presentation](#).

⁴³ Data from 2023 – 24 [Investor Presentation](#).

⁴⁴ Data from 2023 – 24 [Investor Presentation](#).

⁴⁵ Data other than those referenced specifically are from [2025-26 Investor Presentation](#).

⁴⁶ The Telegraph Online. [IOCL to invest Rs 61,000 crore in Odisha for world-class petrochemical complex](#). 9 April 2025.

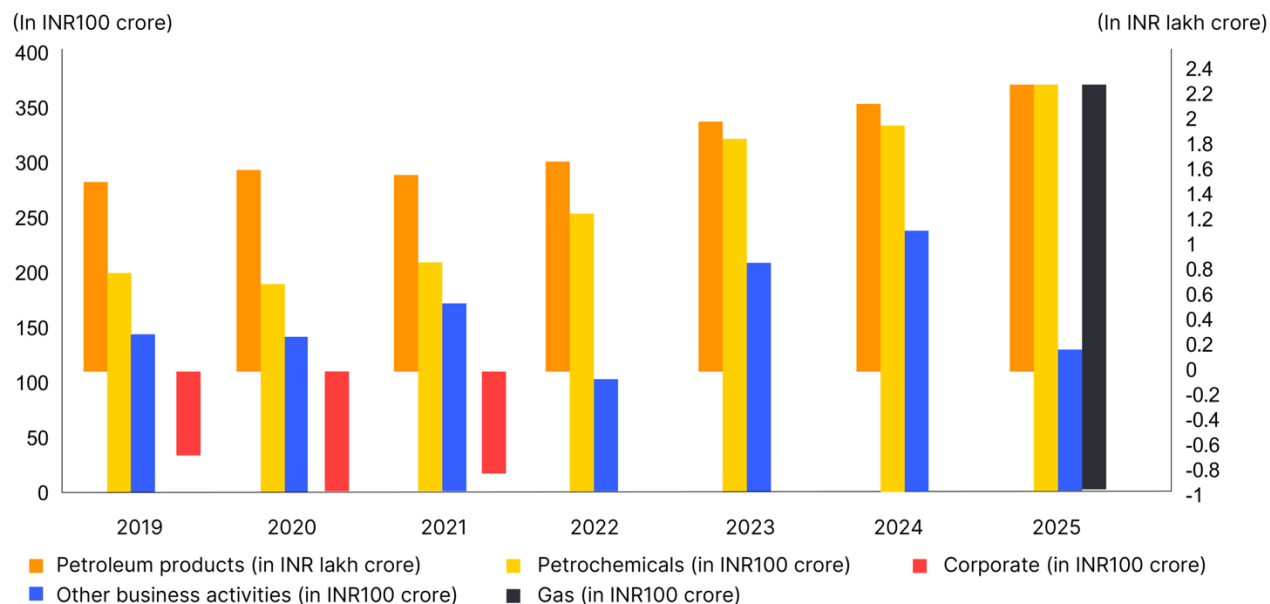
Figure 14: IOCL's segment-wise capital expenditure

Source: Bloomberg

Petrochemical capex shows the sharpest spike (in Figure 14), nearly tripling from about INR2,100 crore (USD219 million) in 2019 to about INR6,100 crore (USD636 million) in 2023, briefly exceeding petroleum products, before easing to about INR3,500 crore (USD365 million) in 2025. The sharp increase in 2023 reflects IOCL's strategic push into downstream petrochemicals. This aligns with the capital employed data (Figure 15), where petrochemicals became a much larger share of IOCL's asset base. However, the declining petrochemical asset turnover ratio suggests that the newly created capacity has not yet generated proportional revenue.

IOCL is in the process of expanding its refining capacity, with work progressing on the Panipat, Gujarat, Paradip, and Barauni refineries in 2023 and 2024. In 2023, IOCL also set up the IOC Global Capital Management IFSC Limited (IGCMIL) as a wholly owned subsidiary to provide comprehensive treasury and financial services to support the Indian Oil Group's global funding, liquidity management, and investment activities. In 2025, IOCL announced a five-year investment plan worth INR1.66 lakh crore (USD17.29 billion) to develop its oil operations and expand its renewable energy, petrochemicals, and gas businesses.⁴⁷

⁴⁷ Moneycontrol. [Indian Oil to pump Rs 1.66 trillion into refining, petrochemicals and green energy push](#). 30 August 2025.

Figure 15: Segment-wise capital employed in IOCL

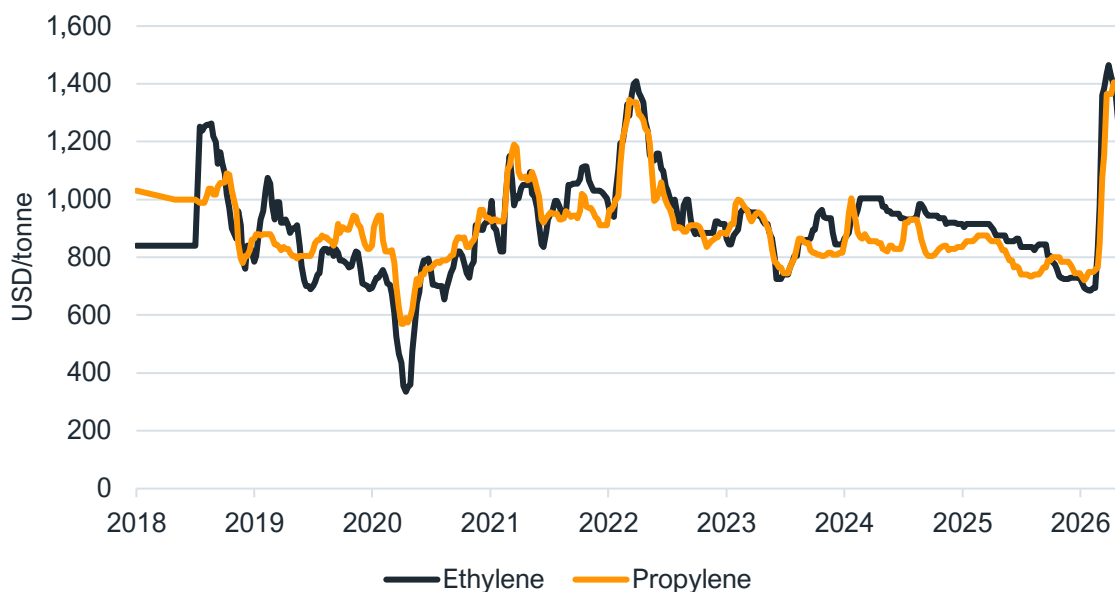
Source: Bloomberg

Data suggests that IOCL has significantly shifted its capital allocation towards petrochemicals over the past six years. While the segment now accounts for a much larger share of the company's capital employed, this investment has not translated into improved operational efficiency, as shown by the sharp decline in the segment's asset turnover ratio (see Figure 17). This suggests that either the returns on these investments are still maturing, or that the segment is operating in a challenging market environment characterised by weak petrochemical prices, global oversupply, and subdued margins.

From a strategic perspective, IOCL appears to be positioning petrochemicals as a key growth business to diversify beyond traditional fuels. However, the effectiveness of this strategy will depend on improving utilisation rates, increasing downstream demand, and generating higher revenues from the expanded asset base over the coming years.

4.3. Assessment of financial risk given market conditions

Ethylene and propylene prices have been volatile and have consistently been falling after seeing a brief post-COVID recovery.

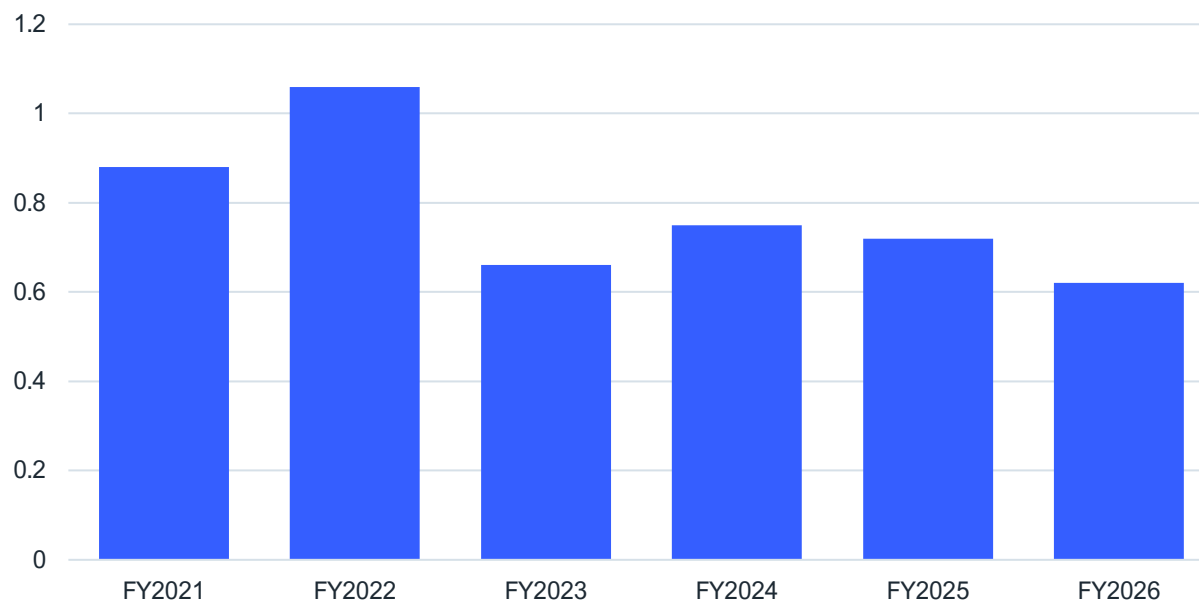
Figure 16: Ethylene and propylene prices in India (2018–2026)

Source: SourceSage Pte Ltd, Bloomberg

The decline in ethylene and propylene prices since 2022, alongside firm naphtha prices, has compressed cracker margins. IOCL's integrated operations mean it faces a squeeze on both cracker and polymer spreads. Consequently, despite significant investments in expanding its petrochemical capacity, IOCL has not yet realised commensurate improvements in revenue generation or asset efficiency. Going forward, profitability will depend less on the direction of ethylene and propylene prices and more on whether polymer and petrochemical spreads recover as global supply-demand balances improve.

A key measure of financial risk is the asset turnover ratio, which measures how efficiently a company uses its assets to generate revenue. It shows how much revenue is generated for every rupee invested in assets, with a higher ratio indicating that the company is using its assets more efficiently to drive sales.

Asset efficiency in IOCL's petrochemical segment has weakened markedly since FY2022. The asset turnover ratio peaked at 1.17 in FY2022, fell to 0.74 in FY2023, held at about 0.75 in both FY2024 and FY2025, and declined further to 0.62 in FY2026, a drop of about 47% from its peak. In other words, each rupee of petrochemical segment assets generated about INR0.62 of revenue in FY2026, compared with INR1.17 in FY2022. The decline reflects a widening gap between investment and sales as segment assets more than doubled, from INR21,734 crore (USD2.26 billion) in March 2021 to INR45,225 crore (USD4.71 billion) in March 2026, while segment revenue was essentially unchanged, at INR28,129 crore (USD2.93 billion) in FY2022 and INR28,102 crore (USD2.93 billion) in FY2026.

Figure 17: IOCL's petrochemical segment asset turnover ratio

Source: IOCL standalone segment information, audited annual results filings (FY2021–FY2026); IEEFA calculations.

Note: Segment revenue/average of opening and closing segment assets. FY2021 = April 2020–March 2021. FY2021 opening assets (March 2020); FY2026 opening assets as restated by IOCL.

A low asset turnover ratio could indicate any of the following scenarios:

- Under-utilisation of production capacity
- Large capital investments that have not yet generated corresponding revenue
- Weak petrochemical market conditions, including lower product prices and compressed margins
- Slower demand growth relative to capacity expansion

The sustained decline suggests that IOCL's expanding petrochemical asset base is not yet generating proportionate revenue. Some of this may reflect capital work-in-progress on projects not yet commissioned, which adds to segment assets before generating revenue. However, with revenue flat for four years and further large investments planned, including the proposed INR61,000 crore (USD6.35 billion) Paradip Petrochemical Complex, the segment will need materially higher utilisation, higher sales volumes, or wider product spreads to improve returns on capital.

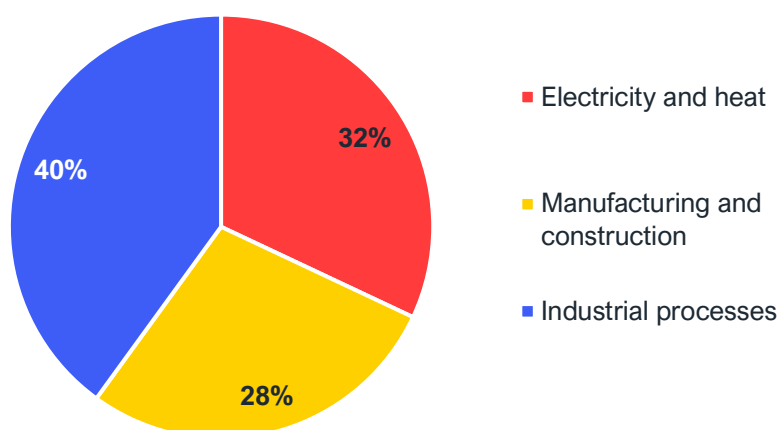
The petrochemical segment contributes only 3% to IOCL's revenue, yet it is receiving a growing share of capital allocation. Assessing the financials in the context of the previous section on market trends is imperative. Global oversupply of petrochemicals, an increased global and domestic policy push to limit consumption of SUPs, and the vulnerabilities exposed by the West Asia crisis all point to the petrochemical industry standing on shaky ground. This is particularly concerning, given that public-sector entities hold about 71% of IOCL and public money is at stake.

5. Impact on climate: Scope 1 emissions remain unaddressed

5.1. Global emissions profile of petrochemical production

According to the International Energy Agency (IEA), direct carbon dioxide (CO₂) emissions from primary chemical production reached 935Mt in 2022.⁴⁸ It also estimated that the annual greenhouse gas (GHGs) emissions from petrochemical production, excluding external energy generation, totalled 1.30 gigatonnes (Gt) of CO₂-equivalent (CO₂e) emissions in 2020⁴⁹, amounting to approximately 14% of global industrial GHG emissions and 2.5% of all anthropogenic GHG emissions.⁵⁰

Figure 18: Break-up of emissions from the petrochemical production process



Source: Yan, Yuxin et al. *Carbon dioxide-focused greenhouse gas emissions from petrochemical plants and associated industries: Critical overview, recent advances and future prospects of mitigation strategies*. August 2024

There are five major sources of direct emissions from petrochemical production:

- Process emissions from separation, conversion, or treatment processes
- Emissions from burning fuels for production and transportation purposes
- Fugitive emissions from leaking equipment or pipelines
- Ancillary emissions from boilers, cooling towers, waste handling areas, and sulphur recovery facilities
- Emissions from the storage and processing of crude oil, natural gas, and their derivatives

⁴⁸ International Energy Agency (IEA). [Chemicals: Tracking Clean Energy Progress](#). July 2023

⁴⁹ International Energy Agency. [Chemicals](#). Undated.

⁵⁰ Nature Chemical Engineering. [Reducing uncertainties in greenhouse gas emissions from chemical production](#). 26 March 2024.

Indirect emissions come primarily from the generation of electricity, steam, and other outsourced energy forms.⁵¹ Yan, Yuxin et al have proposed a break-up of emissions from the petrochemical production process, where process emissions account for 40% of emissions and energy-related emissions for about 60% (much of it from on-site combustion classified as Scope 1).

Recent research on the climate impact of primary plastic production has shown that emissions from the extraction of fossil fuels until polymerisation make up 83% of total emissions from primary plastic production.⁵² A 2025 review by Filho, W. Leal, et al have estimated the carbon intensity of different polymers.⁵³ Production and incineration are the two main points of emission in the plastic lifecycle. Polystyrene (PS) and PET have the highest carbon intensity in the production phase, followed by PVC.

Table 3: Climate impact across the plastic lifecycle (KgCO₂eq./kg plastic)

Polymer type	Production	Conversion	End-of-life				
			Collection	Sorting	Mechanical recycling	Incineration	Landfill
PS	 3.680	 0.510	 0.017*	 0.027*	 0.348	 2.730*	 0.08*
LDPE	 1.980	 1.130	 0.017*	 0.027*	 0.348	 2.730*	 0.08*
PVC	 2.50	 0.510	 0.017*	 0.027*	 0.348	 2.730*	 0.08*
PET	 2.950	 0.940	 0.017*	 0.027*	 0.510	 2.730*	 0.08*
HDPE	 1.930	 1.130	 0.017*	 0.027*	 0.348	 2.730*	 0.08*
PP	 1.9	 0.940	 0.017*	 0.027*	 0.348	 2.730*	 0.08*

 0-0.51
  0.52-1.01
  1.02-1.51
  1.52-2.01
  2.02-2.51
  2.52-3.01
  3.02-4.00

Source: Science of The Total Environment. Decarbonising the plastic industry: A review of carbon emissions in the lifecycle of plastics production. 15 October 2025

Note: Values marked with * are average values reported in the literature (not for specific polymer type)

⁵¹ Process Safety and Environmental Protection. [Carbon dioxide-focused greenhouse gas emissions from petrochemical plants and associated industries: Critical overview, recent advances and future prospects of mitigation strategies](#). August 2024.

⁵² Lawrence Berkeley National Laboratory. [Climate Impact of Primary Plastic Production](#). April 2024.

⁵³ Science of The Total Environment. [Decarbonising the plastic industry: A review of carbon emissions in the lifecycle of plastics production](#). 15 October 2025.

5.2. IOCL's transition plans: Operational decarbonisation without structural transition

IOCL aims to achieve net-zero operational emissions by 2046. According to the company, GHG emissions from its operations, including those of its subsidiaries, total approximately 24 million metric tonnes of carbon dioxide equivalent (MMTCO₂e). Of this, Scope 1 emissions constitute 96% and Scope 2 the remaining 4%. Refinery and petrochemicals operations account for 97% of the emissions, about 2% are on account of pipeline operations, and 1% are from marketing operations. Once the proposed expansions come online, emissions are expected to exceed 40MMTCO₂e by the end of this decade⁵⁴, an increase of 67% compared with its current levels.

IOCL does not currently disclose its Scope 3 emissions. Emissions from the combustion of petrol, diesel, liquefied petroleum gas (LPG), aviation fuel, and other petroleum products sold by the company are significantly larger than its operational emissions. For integrated oil companies, Scope 3 emissions typically account for 80–95% of total lifecycle emissions.⁵⁵

The company's decarbonisation efforts fall into five categories:

- Green hydrogen and fuel cell technology
- Renewable energy expansion
- Biofuels and circular economy
- Energy efficiency and operational improvements
- Carbon capture, utilisation, and storage (CCUS)

IOCL's net-zero strategy focuses on a technological and managerial approach to decarbonisation, while maintaining its existing fossil fuel business model. While the commitment acknowledges climate change and includes measures to reduce emissions from its operations, the company's core fossil fuel and petrochemical business model remains the same. Its strategy prioritises reducing the carbon intensity of production rather than reducing fossil fuel production or emissions associated with the consumption of its products.

5.3. Gap analysis: IOCL's decarbonisation levers cannot offset expansion-driven emissions growth

According to India's Department of Chemicals and Petrochemicals' (DCPC) 'Chemical and Petrochemical Statistics at a Glance 2025'⁵⁶, capacity utilisation was 95% for HDPE/LLDPE and 119% for PP. Assuming full capacity utilisation and based on the carbon intensity values in Table 3, it is

⁵⁴ Indian Oil Corporation Limited. [IndianOil to go Net Zero by 2046](#). Undated.

⁵⁵ Wood Mackenzie. [Few oil and gas companies commit to Scope 3 net zero emissions as significant challenges remain](#). 28 October 2022.

⁵⁶ DCPC. [Chemical and Petrochemical Statistics at a Glance](#). 2025.

estimated that IOCL's total emissions from HDPE and PP production in 2024 were 0.579MtCO₂e and 2.432MtCO₂e, respectively, just from the production of these polymers.

Because IOCL generates most of its heat, steam, and power on site, 96% of its operational emissions are Scope 1; purchased electricity accounts for just 4%. Therefore, measures that make its electricity supply more green address only a small share of the problem. Meanwhile, process emissions, which account for around 40% of the sector's emissions globally, remain untouched.

Other than CCUS, most of IOCL's proposed interventions address Scope 2 emissions, which account for a smaller share of IOCL's emissions. The efficacy of CCUS as an effective intervention to address Scope 1 emissions remains uncertain. Research has also demonstrated that this technology has limited evidence base, and potential to cause unknown harm as it remains untested.⁵⁷

6. Import substitution versus national interest

6.1. India's oil import dependence and energy sovereignty

India is the world's third-largest oil consumer. The country imports about 88% of its crude oil requirements. Recent data released by the Petroleum Planning and Analysis Cell (PPAC) shows that import dependency in the period from April 2025 to January 2026 has increased to 88.6%.⁵⁸ The reason for this is increased consumption and stagnation of domestic output. There has also been a structural shift in India's energy strategy in recent times. Russian crude formed 2.47% of India's import basket, which increased to 25.9% in 2024 post the Russia-Ukraine conflict. However, in January 2026 imports from Russia fell more than 40% YoY as a result of international geopolitics.⁵⁹ Oil import dependence has a direct impact on India's trade deficit and energy security. India is highly sensitive to changes in global crude oil prices. A high oil import bill puts pressure on the current account deficit, domestic inflation, the rupee's value, and overall economic growth. Continuing and new geopolitical conflicts over the past several years have demonstrated the volatility of the crude oil market.

6.2. The case for a rationalisation-focused petrochemical policy

In this context, it would not be prudent for India's key public sector oil company to divert oil to chemicals instead of maintaining its original purpose of energy security. IEEFA recommends that the government develop a petrochemical policy that is not centred around increasing oil consumption, but on rationalising its use.

⁵⁷ IEEFA's [perspective on CCUS as a decarbonisation strategy](#)

⁵⁸ Indian Express. [Why India's reliance on imported oil may hit fresh full-year high in FY26](#). 24 February 2026.

⁵⁹ The Economic Times. [India's oil import shift signals structural energy security pivot: GlobalData](#). 20 February 2026.

Rather than allocating additional budgetary and extra-budgetary resources to non-essential plastics production, which would divert more oil to chemicals and add to the plastic crises — for both the environment and public health — the government could undertake a detailed exercise to identify non-essential uses of oil-based chemicals. This would help reduce demand for oil and have a positive impact on the economy. Such an intervention would also create opportunities to develop alternative economic structures, materials, and systems of consumption and distribution.

7. Recommendations

7.1. On petrochemical and plastic focused growth

- Given global oversupply, IOCL should review its strategy of expanding its petrochemical operations and increased investments in the sector.
- IOCL should revisit its plastic-centric petrochemical strategy. World over, there is growing recognition of the need to shift away from production of low-value commodity polymers and towards chemicals necessary for essential purposes which have far more niche uses. This could help arrest the production and consumption of non-essential plastics.
- While revisiting its long-term strategy, IOCL could consider how it might contribute to the country's energy security by diversifying into alternative and renewable sources of energy.

7.2. On emissions

- In the immediate term, IOCL should consider how it will address Scope 1 emissions.

About IEEFA

The Institute for Energy Economics and Financial Analysis (IEEFA) examines issues related to energy markets, trends and policies. The Institute's mission is to accelerate the transition to a diverse, sustainable and profitable energy economy. www.ieefa.org

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