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MARKET DYNAMICS AND VALUE CHAIN ANALYSIS OF COMMODITY POLYMER GRADES (HDPE, LLDPE AND PP) PRODUCED AT GAIL'S PATA PETROCHEMICAL COMPLEX

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ABSTRACT

This is a research paper on the market and value chain of the commodity polymer grades (HDPE, LLDPE and PP) produced at GAIL (India) Limited's Pata Petrochemical Complex in UP. It is entirely based on secondary data from GAIL's annual reports, investor presentations, press releases, government trade data, industry publications and market reports. The analysis covers the market dynamics in terms of demand and supply, price and feedstock linkages, import dependence, competitive forces, downstream applications and the polymer value chain. The conclusion is that the market is growing but is highly competitive and import dependent. GAIL has in fact improved its position through higher utilisation of capacity, greater polymer sales and entry into PP. The paper recommends that GAIL should focus on grade specific customer segmentation, develop stronger relationships with its distributors and converters, look at opportunities for import substitution, focus on value added polymer grades and improve the resilience of the supply chain.

KEYWORDS: HDPE, LLDPE, Polypropylene, commodity polymers, value chain, GAIL, Pata Petrochemical Complex, Indian polymer industry.

CHAPTER 1

INTRODUCTION

1.1 Background of the Study

Commodity polymers are the high volume plastic raw materials used in packaging, agriculture, pipes, household goods, automotive parts, consumer goods and infrastructure.

The three polymer grades which are the subject of this research paper are High Density Polyethene (HDPE), Linear Low Density Polyethene (LLDPE) and Polypropylene (PP).

HDPE is used in pipes, blow-moulded containers, crates, drums and industrial packaging. LLDPE is used in films, flexible packaging, agricultural mulch film, liners and bags. PP is used in moulded products, fibres and textiles, automotive parts, rigid packaging, household goods and a range of industrial applications.

Gail (India) Ltd operates a gas based petrochemical complex at Pata, District Auraiya, UP (approx 380 km from Delhi). The complex is based on solution polymerisation technology licensed from NOVA Chemicals and produces HDPE and LLDPE.

1.2 Company Profile

Gail (India) Ltd is India's leading natural gas company and has diversified into petrochemicals, LPG, transmission and city gas distribution. Its Pata Petrochemical Complex is one of its major polymer manufacturing facilities.

GAIL's Pata complex had a nameplate polymer capacity of 810 KTA (HDPE and LLDPE). In Feb 2026 a 60 KTA PP plant was commissioned at Pata (marketed as G Pro) bringing the total polymer capacity at Pata to 870 KTA.

GAIL also operates Brahmaputra Cracker and Polymer Limited (BCPL) in Assam with 280 KTA of polymer capacity. So GAIL's total polymer capacity is about 1090 KTA (excluding the new PP capacity).

1.3 need for the study

India's polymer demand is driven by urbanisation, consumption of packaged food, the growth of e-commerce, agriculture, infrastructure and flexible packaging. Domestic producers are under pressure from volatile feedstock prices, the global polymer price cycle, imports and capacity additions by the competition.

This is a study which is needed to understand where GAIL's Pata produced HDPE, LLDPE and PP fit into the Indian polymer value chain and how the company can improve its competitiveness.

1.4 Objectives of the Study

1. To look at the market for HDPE, LLDPE and PP in India.
2. To look at the value chain of the commodity polymers produced at GAIL's Pata Petrochemical Complex.
3. To look at GAIL's production, sales and capacity utilisation performance.

4. To identify the demand drivers, the challenges and the competitive forces which are impacting GAIL's polymer business.
5. To recommend strategies for improving GAIL's market position in HDPE, LLDPE and PP.

1.5 Scope of the Study

The study covers the Indian commodity polymer market, with special reference to GAIL's Pata Petrochemical Complex. It focuses on HDPE, LLDPE and PP and uses secondary data from FY 2022-23 to FY 2025-26, where available.

1.6 Limitations of the Study

1. The study is based only on secondary data.
2. Grade-wise production and sales data for HDPE, LLDPE, and PP are not always disclosed separately by GAIL.
3. Real-time polymer prices and company-wise market shares may vary across sources.
4. The study does not include primary research through customer interviews or surveys.

CHAPTER 2
REVIEW OF LITERATURE

Commodity polymers are undifferentiated, high-volume products whose prices are strongly influenced by feedstock costs, global supply-demand conditions, crude-oil movements, freight rates and regional capacity additions.

Value-chain analysis explains how value is created from raw-material procurement to final consumption. In the polymer industry, the chain includes feedstock supply, cracking/polymerisation, grade development, packaging, storage, logistics, distribution, converters, brand owners and end consumers.

Porter's Five Forces framework is useful for analysing the Indian polymer industry. Competitive rivalry is high because several large domestic producers operate in the same commodity segments. Buyer power is moderate to high because converters can switch suppliers based on price, delivery and technical support. Supplier power is significant because polymers depend on feedstocks such as ethylene, propylene, natural gas and propane. The threat of substitutes is moderate, while the threat of new entrants is limited because petrochemical projects require high capital investment and long gestation periods.

Previous industry studies suggest that Indian polymer demand is closely linked to packaging, agriculture, construction and consumer goods. Increased domestic capacity can reduce imports, but it may also intensify price competition when supply grows faster than demand.

CHAPTER 3
RESEARCH METHODOLOGY

3.1 Research Design

The research uses a descriptive and analytical research design. It describes the current market structure and analyses trends in production, sales, capacity, imports and value-chain activities.

3.2 Sources of Data

The study is based solely on secondary data. Major sources include GAIL annual reports, investor presentations, press releases, polymer brochures, Ministry of Commerce and Industry/DGCI&S trade data, Plastics Export Promotion Council reports, industry reports and GAIL's Pata environmental statements.

3.3 Period of Study

The primary analysis period is FY 2022-23 to FY 2025-26. Historical data are used where necessary to identify trends.

3.4 Tools and Techniques Used

1. Trend analysis
2. Ratio and percentage analysis
3. Value-chain mapping
4. SWOT analysis
5. Porter's Five Forces analysis
6. Tables and charts

CHAPTER 4
MARKET DYNAMICS OF HDPE, LLDPE AND PP

4.1 Market Overview

India is one of the fastest-growing polymer markets in the world. Flexible packaging, agriculture, pipes, consumer goods, automotive components, construction and e-commerce drive demand for HDPE, LLDPE and PP.

HDPE and LLDPE together account for a major share of polyethene consumption. LLDPE is preferred for films and flexible packaging, whereas HDPE is preferred for rigid applications such as pipes, containers and industrial packaging. PP has diverse applications across moulded products, fibres, packaging and automotive components.

4.2 Demand Drivers

1. Growth in packaged food and fast-moving consumer goods.
2. Expansion of e-commerce and logistics packaging.
3. Increasing use of agricultural films, drip irrigation and mulching films.
4. Growth in water supply, sanitation and infrastructure pipelines.
5. Rising automobile production and use of lightweight plastic components.
6. Urbanisation and growth in household appliances and consumer durables.
7. Replacement of traditional materials such as metal, glass and paper with plastics.

4.3 Supply-Side Factors

Domestic cracker capacity, plant shutdowns, feedstock availability, global trade flows and new capacity additions influence India's polymer supply. Increased domestic availability can reduce imports, but it may also create price pressure.

Industry data indicate that India's HDPE production increased from 2,049 KT in FY 2022-23 to 2,764 KT in FY 2024-25, while imports declined sharply from 1,595 KT to 921 KT over the same period. LLDPE production increased from 2,049 KT to 3,110 KT, while imports declined from 868 KT to 694 KT.

HDPE	2,049 KT	2,609 KT	2,764 KT	921 KT
LLDPE	2,049 KT	2,671 KT	3,110 KT	694 KT

4.4 Price Dynamics

Polymer prices are closely linked to crude oil, naphtha, ethylene, propylene, propane and international polymer prices. Since GAIL's Pata complex is gas-based, feedstock availability and natural-gas economics are important determinants of cost competitiveness.

Polymer prices generally rise when crude oil and feedstock prices increase, when global supply is constrained, or when domestic demand is strong. Prices decline when new capacity enters the market, demand weakens, or imports increase.

The Indian PE market experienced intense competition in FY 2024-25 due to improved domestic supply and pricing pressure among producers.

4.5 Competitive Environment

GAIL competes with major Indian polymer producers including Reliance Industries, Indian Oil Corporation, OPaL, Haldia Petrochemicals and HMEL. Competition is based on price, product quality, grade availability, delivery reliability, technical service and distribution network.

GAIL reported approximately a 15% share of India's polyethene market in its FY 2024-25 investor presentation. In FY 2025-26, GAIL's share in India's total petrochemical production was about 13%, while its share in total petrochemical sales was about 10.5%.

CHAPTER 5

GAIL PATA PERFORMANCE ANALYSIS

5.1 Production and Capacity

GAIL's Pata complex has an installed polyethene capacity of 810 KTA. The company's polymer production increased sharply from 442 TMT in FY 2022-23 to 777 TMT in FY 2023-24 and further to 827 TMT in FY 2024-25.

FY 2022-23	442 TMT	810 TMT	54.57%
FY 2023-24	777 TMT	810 TMT	95.93%
FY 2024-25	827 TMT	810 TMT	102.14%

5.2 Polymer Sales

GAIL's polymer sales increased by 97% from 399 TMT in FY 2022-23 to 787 TMT in FY 2023-24. In FY 2024-25, GAIL sold 845 KTA of polymers, while total polymer sales including BCPL reached 1,141 KTA.

FY 2022-23	399 TMT	-
FY 2023-24	787 TMT	97%
FY 2024-25	845 KTA	About 7%
FY 2025-26	About 785 KTA	Slight decline

5.3 Revenue from Petrochemicals

GAIL's petrochemical segment revenue increased from Rs. 4,917 crore in FY 2022-23 to Rs. 7,753 crore in FY 2023-24, representing 58% growth. In FY 2025-26, polymer revenue from operations was reported at approximately Rs. 7,574 crore.

5.4 Entry into Polypropylene

GAIL entered the PP segment by commissioning a 60 KTA PP plant at Pata on 4 February 2026. The plant is branded G Pro and increases Pata's polymer capacity from 810 KTA to 870 KTA.

This is strategically important because PP has a large and diversified Indian market. It also reduces GAIL's dependence on polyethene and allows the company to serve a wider customer base.

CHAPTER 6

VALUE CHAIN ANALYSIS

6.1 Value-Chain Framework

The value chain of GAIL's commodity polymer business can be divided into feedstock sourcing, polymer manufacturing, product grading, packaging and storage, logistics and distribution, marketing and sales, downstream processing and end-use markets.

Feedstock sourcing	Natural gas, ethane, propane and other feedstock procurement	Cost efficiency and production continuity
Polymer manufacturing	Cracking, polymerisation, grade development and quality control	Conversion of feedstock into saleable polymer
Product grading	HDPE, LLDPE and PP grades for different applications	Customer-specific solutions
Packaging and storage	Bagging, silo storage, quality testing and inventory management	Product protection and supply reliability
Logistics and distribution	Road, rail and port movement; dealer and distributor networks	Timely availability across markets
Marketing and sales	Customer engagement, pricing, technical support and brand promotion	Market access and customer retention
Downstream processing	Converters manufacture films, pipes, moulded products and packaging	Conversion of polymer into finished products
End-use markets	Packaging, agriculture, infrastructure, automotive and consumer sectors	Final consumption

6.2 Upstream Value Chain

GAIL's Pata complex is gas-based, which provides an advantage in feedstock sourcing compared with naphtha-based producers. Reliable natural-gas supply supports production continuity and can improve cost competitiveness.

Feedstock price volatility remains a major risk. Changes in crude oil, natural gas, propane and imported feedstock prices can affect polymer margins.

6.3 Manufacturing Value Chain

At Pata, GAIL produces HDPE and LLDPE using solution polymerisation technology. The company produces different grades for applications such as film, pipes, raffia/monofilament and rotational moulding.

Adding PP enables GAIL to enter a new product category. PP is used in injection moulding, fibres, films, textiles, automotive components and rigid packaging.

6.4 Downstream Value Chain

1. Film converters use LLDPE for packaging films, bags, liners and agricultural films.
2. Pipe manufacturers use HDPE for water, gas and sewerage pipelines.
3. Moulders use HDPE and PP for crates, containers, household goods and automotive components.
4. Textile and fibre producers use PP for ropes, carpets, non-woven fabrics and industrial yarns.
5. Packaging companies use PP and polyethene for flexible and rigid packaging.

6.5 Distribution Value Chain

GAIL's polymer distribution involves direct sales to large customers, dealers, distributors and converters. Effective distribution is important because polymer buyers require timely delivery, consistent quality, technical assistance and flexible order quantities.

CHAPTER 7

SWOT ANALYSIS OF GAIL'S POLYMER BUSINESS

7.1 Strengths

1. Gas-based feedstock advantage at Pata.
2. Large HDPE/LLDPE capacity of 810 KTA.
3. Strong national infrastructure and distribution reach.
4. Improving capacity utilisation and sales.
5. Entry into PP with G Pro brand.

7.2 Weaknesses

1. Exposure to feedstock price volatility.
2. Limited PP presence until 2026.
3. Commodity products face price-based competition.
4. Grade-wise market segmentation may require strengthening.
5. Dependence on cyclical polymer prices.

7.3 Opportunities

1. Growing packaging, agriculture and infrastructure demand.
2. Import substitution in high-value grades.
3. Expansion into PP through Pata and Usar projects.
4. Development of speciality and value-added grades.
5. Stronger customer technical support and digital sales.

7.4 Threats

1. Global polymer price volatility.
2. New domestic capacity and price competition.
3. Crude-oil and feedstock cost uncertainty.
4. Environmental regulations and sustainability expectations.
5. Import competition from the Middle East and other regions.

CHAPTER 8

PORTER'S FIVE FORCES ANALYSIS

Competitive rivalry	High	Multiple producers compete in HDPE, LLDPE and PP
Buyer power	Moderate to high	Converters can switch suppliers based on price and service
Supplier power	Moderate to high	Feedstock availability and pricing affect margins
Threat of substitutes	Moderate	Paper, glass, metal and other materials can replace plastics in some uses
Threat of new entrants	Low to moderate	High capital cost limits entry, but capacity expansion by existing players increases competition

FINDINGS

1. GAIL's Pata complex is a major domestic producer of HDPE and LLDPE, with 810 KTA polyethene capacity.
2. Polymer production increased from 442 TMT in FY 2022-23 to 827 TMT in FY 2024-25, showing strong operational recovery.
3. Capacity utilisation improved from 54.57% in FY 2022-23 to 102.14% in FY 2024-25.
4. Polymer sales rose sharply from 399 TMT in FY 2022-23 to 787 TMT in FY 2023-24, followed by 845 KTA in FY 2024-25.
5. GAIL's entry into PP through the 60 KTA Pata plant strengthens its product portfolio and reduces dependence on polyethene.
6. India's HDPE and LLDPE imports declined in FY 2024-25 due to improved domestic availability, but imports remain important for certain grades.
7. The Indian polymer market is highly competitive, and pricing pressure is a major challenge for producers.
8. GAIL's gas-based Pata complex provides a potential feedstock advantage, but profitability remains exposed to feedstock and polymer price cycles.

CHAPTER 10

RECOMMENDATIONS

1. Strengthen grade-wise marketing: GAIL should develop application-specific marketing strategies for film, pipe, moulding, raffia and PP grades.

2. Expand technical customer support: Technical service teams can help converters improve processing efficiency and increase customer loyalty.
3. Focus on import substitution: GAIL should identify imported speciality and high-performance grades that can be replaced with domestically produced material.
4. Improve PP market penetration: Since the Pata PP plant is new, GAIL should build strong relationships with moulders, fibre producers, packaging companies and automotive-component suppliers.
5. Develop value-added grades: The company should gradually move beyond commodity grades into specialised grades with better margins.
6. Use digital sales channels: Online product catalogues, order tracking, technical documentation and customer portals can improve buyer convenience.
7. Strengthen supply-chain resilience: Better inventory planning, logistics coordination and feedstock sourcing can reduce delivery disruptions.
8. Promote sustainable polymers: GAIL should explore recyclable, bio-based and lower-carbon polymer solutions to meet changing customer and regulatory expectations.

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