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NETWORTH CAPITAL

INITIATING COVERAGE

PRAJ INDUSTRIES LIMITED

June, 2025

ANALYSTS

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Praj Industries | BUY | TP: INR 630

At the core of energy transition

Initiating coverage

We initiate coverage on Praj Industries with a BUY rating and a Target Price of INR 630. A global technology leader with over four decades of expertise, Praj delivers innovative solutions across biofuels, energy transition and climate action, and Engineering, with installations spanning 100+ countries. Over 40% of revenue comes from repeat clients, supported by a network of 1,000+ customer references. Praj is strategically evolving beyond ethanol, tapping into high-growth segments like Sustainable Aviation Fuel (SAF), Compressed Biogas (CBG), and bioplastics. Its strong R&D engine, anchored by Praj Matrix and global alliances, drives continuous innovation. *Backed by a debt-free balance sheet, robust cash reserves, and improving operating metrics, Praj is well-positioned to achieve its ambitious FY30 revenue target of INR 100 bn.*

- **Pioneers in biofuel technologies driving India's ethanol revolution:** Praj Industries has been instrumental in advancing India's ethanol blending from below 5% to nearly 20% over the past two decades. Backed by its robust TEMPO model (Technology, Engineering, Manufacturing, Procurement, Operations), the company holds a dominant 60–70% share in domestic ethanol plant installations. Having mastered 1G ethanol with diverse feedstocks, Praj now leads in 2G ethanol, enabling efficient production from agri and forest residues and expanding global applicability. Its technology overcomes feedstock constraints while offering superior scalability. Internationally, Praj is seeing strong interest, particularly from US, Brazil, Argentina, and Paraguay, positioning it as a key global player in the bioenergy transition.
- **Global growth and diversification to fuel margin expansion:** With a growing international order book and a strategic shift toward a more diversified business mix, the company is well-positioned to sustain global growth. Currently, exports contribute ~25% of Praj's revenue, but the company is targeting an equal split between domestic and high-margin international markets. Praj has already executed projects across Europe, US, and several emerging markets. Its global expansion strategy will be led by 1G and 2G ethanol solutions, engineering business as well as new high-potential areas.
- **Next-Gen Biofuels to drive Praj's next phase:** Praj is well-positioned to lead the next wave of bioeconomy innovations, extending beyond ethanol into CBG, SAF, and other emerging technologies. Backed by strong R&D capabilities at its Praj Matrix innovation center and strategic partnerships, Praj continues to deliver technological breakthroughs that create long-term value for clients across sectors, from oil marketing companies (OMCs) to pharmaceuticals and engineering. *With a robust, debt-free balance sheet and healthy cash reserves, Praj is well-equipped to fund its growth initiatives*. We are factoring in a revenue/EBITDA/PAT CAGR of 19%/24%/23% over FY25-27E driven by strong order inflows, execution capabilities, and scaling of high-margin verticals.
- **Valuation, View & key risks:** We have valued Praj at 35x FY27E earnings of INR 17.9 to arrive at a TP of INR 630; and is aligned to our DCF-based valuation that suggests TP at INR 600. Praj Industries has demonstrated a resilient track record, having pioneered the ethanol revolution in India. The company is now expanding its footprint globally, not only in ethanol but also in next-generation biofuels and complex engineering solutions. ***FY27E is likely to be an inflection point, marking the company's transition to a more global and diversified revenue base. This should pave the way toward achieving a top-line milestone of INR 100bn by FY30, justifying scope for further re-rating***. **Key risks:** Regulatory & policy dependence, execution risk in new technologies, international market risks.

Target price	**630**
CMP*	489
Upside	28.3%

Price Performance (%)	**1M**	**6M**	**1Yr**
PRAJ	8.2	-40.4	-10.9
Nifty	1.7	1.8	6.2

Key Data	
Bloomberg Code	PRJ:IN
Curr Shares O/S (mn)	183.8
Diluted Shares O/S (mn)	183.8
Mkt Cap (INRbn/USDbn)	88/1bn
52 Wk H / L (Rs)	875/441
3M Average Vol. (thd)	867

Source: Bloomberg, NSE, Company

Shareholding pattern

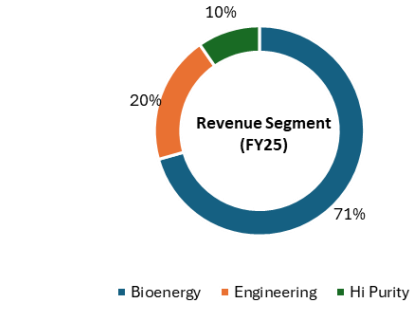
Particulars	Jun-24	Sep-24	Dec-24	Mar-25
Promoter	*32.8%*	*32.8%*	*32.8%*	*32.8%*
FIIs	*18.6%*	*19.1%*	*18.6%*	*17.2%*
DIIs	*16.6%*	*17.3%*	*18.2%*	*19.5%*
Public	*32.0%*	*30.8%*	*30.4%*	*30.5%*

Source: BSE

Why should you read this report?

- *Understand Praj's evolution from ethanol to a broader green technology platform*
- *Learn about Praj's technological strengths and strategic expansion plans*
- *Gain insights into the bioenergy industry landscape in India and global markets*

Praj's Revenue by Segment



Source: Company, MNCL Research

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Y/E (INR in mn)	Revenue	YoY (%)	EBITDA	EBITDA (%)	PAT	PAT (%)	EPS	RoAE	RoCE	P/E (x)	EV/EBITDA (x)
FY22	23,433	79.6%	1,938	8.3%	1,502	6.4%	8.2	17.5%	19.3%	59.8x	46.4x
FY23	35,280	50.6%	3,078	8.7%	2,398	6.8%	13.1	24.1%	26.9%	37.5x	29.2x
FY24	34,663	-1.8%	3,718	10.7%	2,834	8.2%	15.4	24.1%	25.7%	31.7x	24.2x
FY25	32,280	-6.9%	3,149	9.8%	2,189	6.8%	11.9	16.5%	15.3%	41.1x	28.6x
FY26E	36,497	13.1%	3,631	10.0%	2,296	6.3%	12.5	15.9%	16.9%	39.1x	24.8x
FY27E	45,504	24.7%	4,869	10.7%	3,293	7.2%	17.9	20.4%	22.2%	27.3x	18.5x
FY28E	58,496	28.6%	6,873	11.8%	4,721	8.1%	25.7	24.8%	28.5%	19.0x	13.1x

Source: Company, MNCL Research estimates

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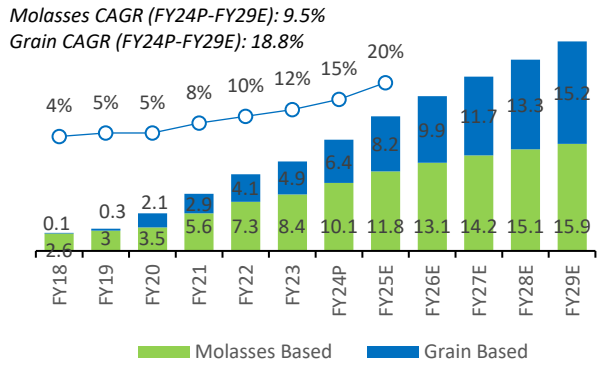
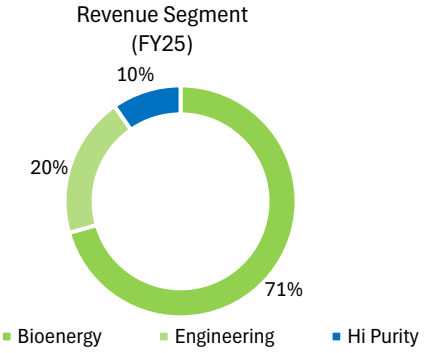
Investment Thesis in Charts

Exhibit 1: India Ethanol production capacity and outlook (bnL)



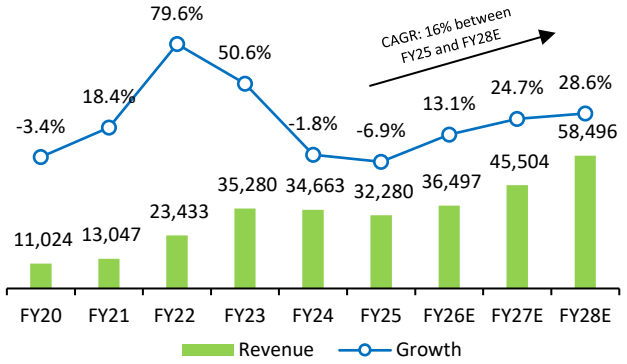
Source: Industry, MNCL Research

Exhibit 2: Bioenergy segment accounts for over 2/3rd of total revenue followed by Engineering segment



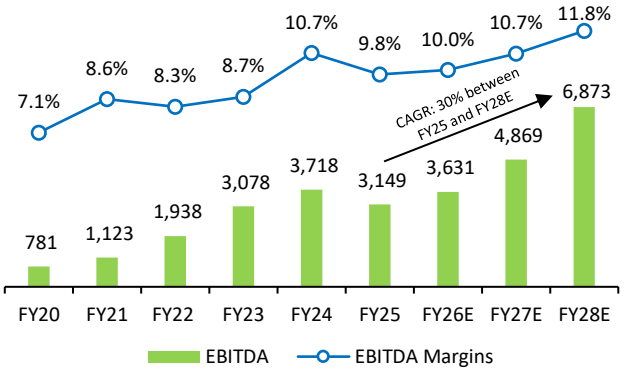
Source: Company, MNCL Research

Exhibit 3: Operating Revenue (INR mn) to grow at 16% CAGR over the next 3 years



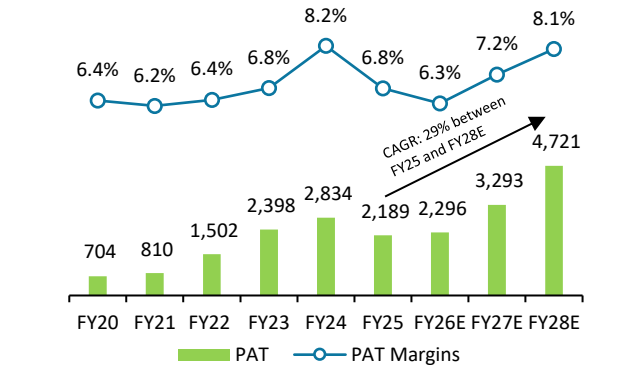
Source: Company, MNCL Research Estimates

Exhibit 4: EBITDA (INR mn) and Margins profile expected to improve over the next 3 years



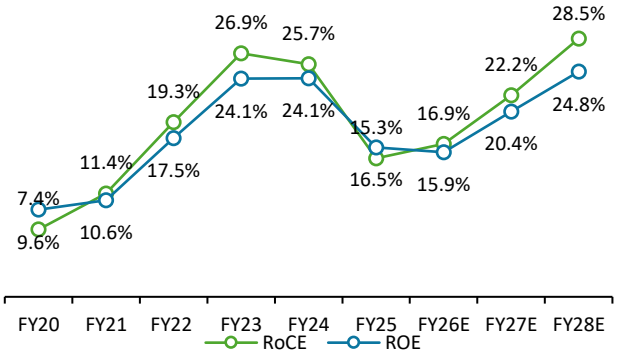
Source: Company, MNCL Research Estimates

Exhibit 5: PAT (INR mn) expected to grow by 29% between FY25 and FY28E



Source: Company, MNCL Research Estimates

Exhibit 6: Return Ratios remain healthy with further improvement expected



Source: Company, MNCL Research Estimates

Frequently Asked Questions

1. How has Praj Industries evolved from its early focus on ethanol production to becoming a global provider of bioeconomy solutions?

Praj Industries was established in 1983 by Dr. Pramod Chaudhari, an IIT Bombay graduate, with a focus on providing process solutions to the sugar industry. In its early years, the company concentrated on ethanol production technologies, helping sugar mills convert molasses into bioethanol, a niche yet relevant segment in India's agri-processing landscape. In 1987, Praj became one of the first companies to receive venture funding in India, backed by ICICI, which helped it formalize operations and build technical capabilities. The company went public in 1994, reflecting its growing credibility in process engineering. Through the late 1990s and early 2000s, Praj steadily expanded its scope beyond ethanol. It ventured into engineering segment including Critical Process Equipment & Modular Systems (CPEM), brewery technologies, water and wastewater treatment, and eventually into high-purity systems for the pharmaceutical and biotech sectors. As environmental sustainability became a global priority, Praj began aligning its R&D efforts toward renewable fuels and circular economy applications.

Today, Praj operates in over 100 countries and has broadened its portfolio to include 2G ethanol, compressed biogas, sustainable aviation fuel, and other value-added products including bioplastics. While its roots remain in ethanol and agri-based processing, its evolution mirrors the growing global emphasis on low-carbon technologies and integrated bioeconomy solutions.

2. What are Praj's current manufacturing capabilities across its various facilities, and how do they support the company's business segments?

Praj Industries operates four advanced manufacturing facilities across India, supporting its businesses in bioenergy, high-purity systems, and critical process equipment. All facilities hold international certifications like CE, ASME (U, U2, R, S stamps), US FDA, and WHO compliance.

- **Kandla, Gujarat (50,900 sqm)**: Specializes in stainless steel and alloy fabrication for biofuel (ethanol) and process equipment; export-focused due to Kandla Port proximity; holds ASME and CE certifications.
- **Wada, Maharashtra (70,000 sqm)**: Under Praj HiPurity Systems, caters to biopharma and healthcare; manufactures ultra-pure water systems and modular skids; compliant with WHO, US FDA, and UK MHRA norms.
- **Sanaswadi, Pune (28,800 sqm)**: Fabricates stainless steel, copper, and low-alloy components; annual capacity of 8,600MT.
- **Mangalore SEZ (1.385 million sqft covered + 625,000 sqft open)**: Industry 5.0 facility for Energy Transition & Climate Action (ETCA); builds equipment and modules for green/blue hydrogen, green ammonia, and carbon capture; core to Praj's critical process equipment strategy.

3. Considering, the current Ethanol blending mandate of 20% has been achieved, what is the outlook for ethanol blending in India, and how does it play for PRAJ?

As of February 2025, India has surpassed 19% ethanol blending in petrol, ahead of its target, driven by strong government policies and industry support. Blending has grown from 5% to nearly 20%, reducing crude oil imports and aligning with automakers' rollout of E20-compatible engines. While no formal flex-fuel (E85) policy exists yet, discussions with OEMs are happening. A phased increase to 30% blending by FY30 could be expected based on reports and news sources, which will significantly boost ethanol demand. Given capacity constraints, grain-based ethanol plants are likely to see major expansion-benefiting Praj, which specializes in grain and multi-feed technologies and is a leader in ethanol plant innovation with 60-70% market share.

4. How do Praj's Bio-Mobility and Bio-Prism platforms contribute to its overall strategic vision and growth roadmap?

Praj has developed two strategic platforms to drive its bioeconomy initiatives: Bio-Mobility and Bio-Prism. Both platforms are supported by Praj Matrix, Praj's dedicated R&D center, which plays a crucial role in developing and commercializing these technologies.

Bio-Mobility focuses on technologies for producing low-carbon transportation fuels such as 1G and 2G ethanol, compressed biogas (CBG), and sustainable aviation fuel (SAF) from bio-based feedstocks like sugar, starchy grains, and agri-residue, catering to surface, air, and marine mobility.

Bio-Prism, on the other hand, targets renewable chemicals and materials, including bioplastics and bio-bitumen, with advanced development in biopolymers like polylactic acid (PLA) and polyhydroxyalkanoates (PHA), aimed at replacing single-use plastics.

Through Bio-Mobility and Bio-Prism, Praj Industries contributes to the transition toward a circular bioeconomy by offering sustainable solutions for energy and material needs.

5. What is the significance of the Praj GenX facility?

Praj GenX, a new subsidiary of Praj Industries, commenced operations in late FY24 with a state-of-the-art, Industry 5.0-compliant manufacturing facility near Mangalore Port.

As a key part of Praj's Critical Process Equipment (CPE) division, it is equipped to produce pressure vessels, reactors, heat exchangers, distillation columns, and other proprietary equipment for energy transition projects such as Green/Blue Hydrogen, Green Ammonia, Waste-to-Energy, and Carbon Capture. Spanning over 186,000 sqm, the facility has already secured framework agreements with major clients and is poised to drive future order inflows. *Praj GenX is expected to be a key growth driver in the company's ambition to triple its turnover by FY30, representing a strategic investment in future-proofing the business through advanced green fuel technologies.*

6. How do the US tariff-related scenarios and other global uncertainties affect PRAJ?

The proposed increase in the US import tariffs from 5-7% to potentially 26% currently stands at a reduced rate of 10%, though it may be revised going forward. This primarily affects Praj's exports under its ethanol and critical process equipment segments. However, these tariffs are contractually borne by customers, not Praj. Currently, projects located in the US account for only 3-4% of total revenue, making the direct impact limited. Additionally, while customers are US-based, many end-projects are in Europe and Canada, further reducing exposure. Praj believes India may be better positioned on tariffs compared to competitors from China, Korea, or Taiwan, but the overall effect will depend on how the tariff policy evolves over the next 70–80 days.

7. What is the outlook for Praj's Engineering business segment?

Praj's engineering division remains well-positioned for significant growth, currently contributing ~20% to total revenues, with CPEMs as the primary growth driver. A major milestone was achieved with the commissioning of the advanced Mangalore facility in FY25, despite a two-quarter delay. The plant is now partially operational and has received audits and approvals from eight key customers, three of whom have entered into long-term framework agreements.

With the Kandla facility operating at full capacity, all new orders over the next 18 months will be routed through Mangalore. Order inflows are expected to pick up from Q1FY26, with revenue and profitability ramping up meaningfully from H2FY26.

This division is strategically positioned to execute larger, high-value, and highly customized projects, enhancing Praj's competitiveness in the global critical process equipment market. Notably, execution cycles for CPEMS orders typically range from 15–18 months due to the complexity, size, and extensive audit and approval requirements from customers.

8. What are the major collaborations and partnerships that PRAJ has been a part of?

Praj Industries has strategically partnered with leading global and Indian organizations to strengthen its position in bioeconomy, renewable fuels, and sustainable technologies. These collaborations span across advanced biofuels, bioplastics, aviation fuels, and compressed biogas, enabling access to cutting-edge technologies and new markets.

Below are some of Praj's major partnerships and joint ventures:

Exhibit 7: Praj's collaborations

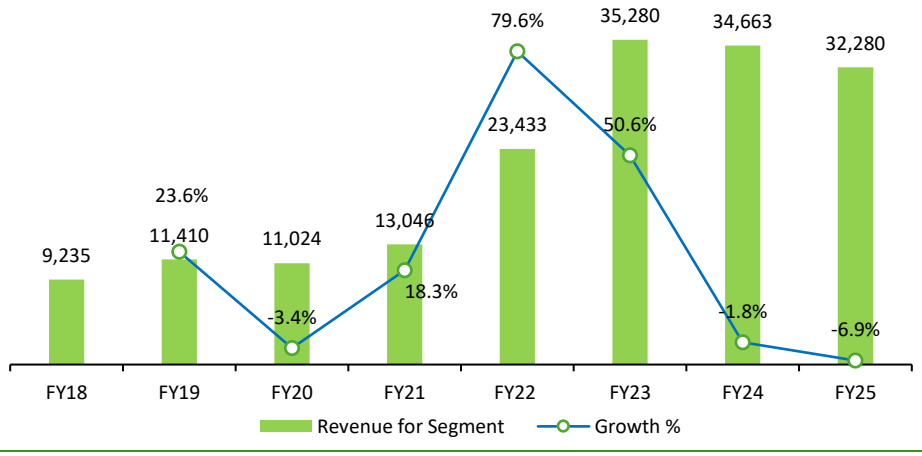
Company	Year	Purpose/project
GEVO (USA)	2019	Praj Industries had inked an agreement with Gevo Inc. (USA) to commercialize technology for producing high-energy renewable aviation fuels and isobutanol (intermediate to SAF fuel) from sugary and agri-residue feedstocks.
SEKAB (Sweden)	2020	Technology transfer agreement. Partnership with Sweden's Sekab E-Technology AB to upgrade and commercialize CelluAPP™ technology for producing advanced biofuels and biochemicals from forest residue.
Indian Oil Corporation Ltd (IOCL)	2021	Set up India's first 2G ethanol plant in Panipat using Praj's Enfinity - 2G Biomass to Bioethanol Technology. Praj Industries and Indian Oil had signed a term sheet to boost India's biofuel production across ethanol, SAF, CBG, biodiesel, and bio-bitumen, building on their 50:50 JV formed in 2021.
Hindustan Petroleum Corp Ltd (HPCL)	2021	Had inked agreement with HPCL for an initial CBG plant in 2021 utilizing its patented Rengas technology, where rice straw feedstock would be converted to CBG.
Institute of Chemical Technology (ICT)	2022	Jointly established Centre of Excellence and Innovation (CoEI) that is focused on biopolymers with focus on developing and implementing biopolymers.
Vasantdada Sugar Institute (VSI)	2022	Partnered to establish a Centre of Excellence (CoE) focused on bioeconomy and the Farm to Fuel approach.
Axens	2023	Signed MoU to work jointly on projects in India for production of Sustainable Aviation Fuel (SAF) from low carbon alcohols through Alcohol-to-Jet (ATJ) pathway.
Thyssenkrupp (Germany)	2025	Strategic partnership with ThyssenKrupp Uhde's subsidiary Uhde Inventa-Fischer (UIF) to jointly offer integrated, end-to-end technology for producing polylactic acid (PLA), a significant step in their foray into bioplastics
BPCL	2025	Recently signed an agreement for a 50:50 JV with BPCL for setting up of 10 CBG plants across India, a breakthrough in its CBG ambitions.

Source: Company, MNCL Research

9. How has Praj's financial performance evolved, and how is the outlook for future?

Between FY14-FY20, Praj's growth was subdued and uneven, with revenues hovering around INR 10bn and profits swinging due to volume and cost pressures. Despite operational efficiencies boosting PAT in FY15, the period saw stagnation amid policy uncertainty and macro disruptions like demonetization and GST. *The BioEnergy segment (primarily 1G ethanol) remained the core revenue driver, contributing 50-60% of orders. Key policy shifts such as centralized ethanol procurement (2016) and the National Biofuels Policy (2018) laid the groundwork for revival, though COVID-19 dented FY20's momentum. Overall, this phase was a slow growth phase*.

Exhibit 8: Operating Revenue (INR mn)



Source: Company, MNCL Research

From FY21, Praj entered a high-growth phase. Revenues surged from INR 13bn in FY21 to INR 35bn in FY23, while PAT nearly tripled, backed by aggressive ethanol blending targets where 20% blending mandate was advanced to 2025-26 from 2030 earlier, and also expanding feedstock approval, and strong execution.

FY24 and FY25 were challenging years for Praj due to a mix of macro, policy, and operational headwinds. The company's largest segment, bioenergy saw muted performance as India's 20% ethanol blending target (EBP20) was achieved ahead of schedule, leading to a pause in new sugar-based ethanol capacity

additions. While starch-based ethanol projects continued, sugarcane-linked projects slowed due to feedstock realignment mandates. Globally too, changing energy policies, carbon-linked incentives, and tighter financing norms pushed out investment timelines, delaying revenue recognition.

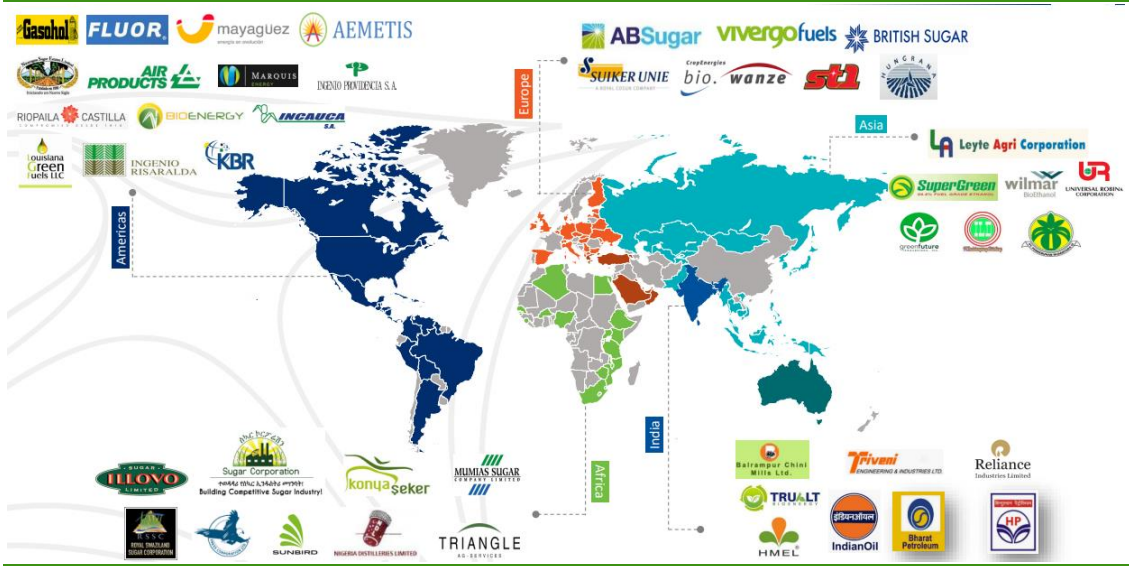
Post FY25 financial outlook: We anticipate ~10% revenue growth in FY26, driven by ~INR 43bn order book, with robust export execution and a possible return to double-digit EBITDA margins. The GenX facility is expected to break even in FY26, contributing significantly to revenue from FY27. Additionally, engineering segment, biopolymer (PLA) platform and diversification into bio-CNG and next-gen biofuels are set to boost long-term growth, aligning with the shift to a balanced 50:50 bioenergy-engineering revenue mix by FY30.

Praj Industries: Pioneering Energy Transition

Praj is a global leader with over four decades of legacy in delivering technology-driven solutions across diverse sectors, including Biofuels, Biomaterials, Energy Transition & Climate Action, Critical Process Equipment & Modularization, High-Purity Water Systems, Brewery & Beverages, and Zero Liquid Discharge Systems.

With a footprint in over 100 countries and more than 1,000 projects installed, Praj enjoys strong customer loyalty with over 40% of its business coming from repeat clients. The company's commitment to innovation is reflected in its portfolio of 300+ patents including international patents.

Exhibit 9: 1,000+ references in 100+ countries across 6 continents



Source: Company, MNCL Research

*Praj Industries commands a dominant position in India's ethanol plant installation market, holding a **market share ranging between 60% and 70%.***

Praj Industries has significantly expanded its global footprint, with operations spanning over 100 countries across six continents. This international presence is bolstered by regional offices in the USA, Thailand, and the Philippines, and a robust network of over 1,000 customer references worldwide. As of FY25, exports contribute ~24% to Praj's total revenue, with ambitions to increase this share to 50% by 2030, aligning with the rising global demand for sustainable technologies.

Exhibit 10: 1,000+ references in 100+ countries across 6 continents

Particulars (INR mn)	FY20	FY21	FY22	FY23	FY24	FY25
Domestic	**7,205**	**9,308**	**18,596**	**29,146**	**27,895**	**24,533**
% Growth		*29.2%*	*99.8%*	*56.7%*	*-4.3%*	*-12.1%*
% of sales	***65.4%***	***71.3%***	***79.4%***	***82.6%***	***80.5%***	***76.0%***
Exports	**3,818**	**3,739**	**4,836**	**6,134**	**6,767**	**7,747**
% Growth		*-2.1%*	*29.4%*	*26.8%*	*10.3%*	*14.5%*
% of sales	***34.6%***	***28.7%***	***20.6%***	***17.4%***	***19.5%***	***24.0%***
Total Revenue	**11,024**	**13,047**	**23,433**	**35,280**	**34,662**	**32,280**

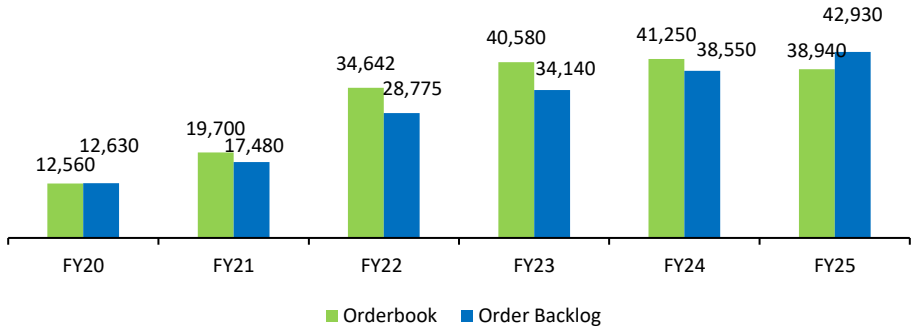
Source: Company, MNCL Research

Praj's burgeoning orderbook signals strong business traction

Praj Industries has seen a notable evolution in its orderbook over the past decade, reflecting the strategic pivot towards sustainable technologies and global expansion.

Historically, Praj's orderbook was dominated by conventional ethanol plants and engineering projects within India. However, with rising global awareness around climate change and decarbonization, the company has successfully diversified into advanced biofuels, compressed biogas (CBG), emerging technologies, wastewater treatment solutions and other high-value bio-based products.

Exhibit 11: Growing Orderbook (INR mn)



Source: Company, MNCL Research

Over the past few years, the orderbook composition has shifted from predominantly 1G ethanol projects to a balanced mix including 2G bioethanol, international turnkey projects, high-purity systems, and zero liquid discharge (ZLD) solutions. This evolution mirrors growing traction in sectors such as oil marketing companies (OMCs), breweries, and pharmaceutical industries.

Exhibit 12: Order Mix

Particulars	FY20	FY21	FY22	FY23	FY24	FY25
Bioenergy	59.9%	62.4%	77.9%	81.4%	68.5%	73.3%
Hi-Purity	*12.6%*	*9.9%*	*6.7%*	*6.5%*	*7.9%*	*9.1%*
Engineering	*27.5%*	*27.7%*	*15.5%*	*12.1%*	*23.7%*	*17.7%*

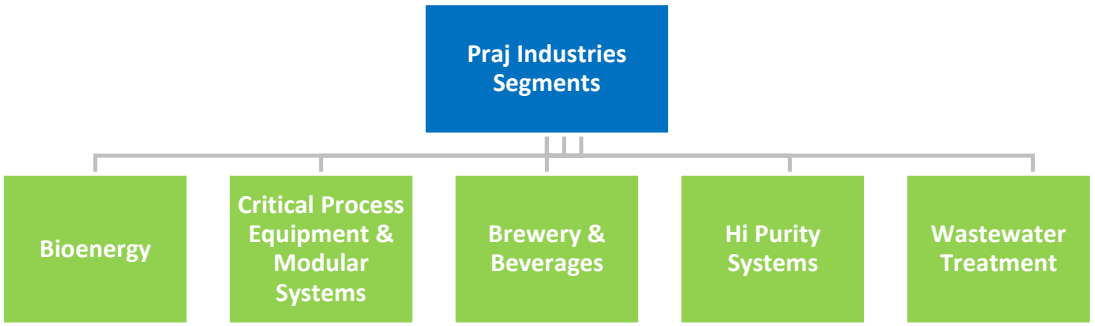
Source: Company, MNCL Research

Additionally, the scale and geographical spread of orders have expanded significantly. Strategic partnerships and government policy support such as the Ethanol Blending Program (EBP) and SATAT initiative have accelerated order inflow, boosting the size and quality of the orderbook. **The increasing share of export orders also underlines Praj's position as a global technology provider**.

Praj's well diversified segment overview

Praj's offerings are well-diversified, reflecting its evolution into a comprehensive bioeconomy solutions provider beyond its core ethanol business. The company is actively shaping the future of sustainable industry with emerging technologies in Sustainable Aviation Fuel, Compressed Biogas, bioplastics, and other high-value bio-based products.

Exhibit 13: Praj Industries Key Offerings



Source: Company, MNCL Research

Over the years, the company has not only strengthened its position in the biofuels sector but also expanded into several other strategic areas.

Exhibit 14: Revenue by Segment (INR mn)

Particulars	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Bioenergy	**4,802**	**5,819**	**6,614**	**8,826**	**16,683**	**26,107**	**25,650**	**22,800**
Growth %		*21.2%*	*13.7%*	*33.4%*	*89.0%*	*56.5%*	*-1.8%*	*-11.2%*
% of sales	***52.0%***	***51.0%***	***60.0%***	***67.7%***	***71.2%***	***74.0%***	***74.0%***	***70.6%***
Engineering	**2,678**	**4,039**	**2,976**	**2,583**	**4,690**	**6,703**	**6,239**	**6,370**
Growth %		*50.8%*	*-26.3%*	*-13.2%*	*81.6%*	*42.9%*	*-6.9%*	*2.1%*
% of sales	***29.0%***	***35.4%***	***27.0%***	***19.8%***	***20.0%***	***19.0%***	***18.0%***	***19.7%***
Hi-Purity	**1,755**	**1,552**	**1,433**	**1,637**	**2,059**	**2,470**	**2,773**	**3,110**
Growth %		*-11.6%*	*-7.7%*	*14.2%*	*25.8%*	*19.9%*	*12.3%*	*12.2%*
% of sales	***19.0%***	***13.6%***	***13.0%***	***12.5%***	***8.8%***	***7.0%***	***8.0%***	***9.6%***
Total Revenue	**9,235**	**11,410**	**11,024**	**13,046**	**23,433**	**35,280**	**34,663**	**32,280**
Growth %		*23.6%*	*-3.4%*	*18.3%*	*79.6%*	*50.6%*	*-1.8%*	*-6.9%*

Source: Company, MNCL Research

(I) Conventional biofuels: *A pioneer since the 1980s, Praj has continuously evolved its bioethanol platform, moving beyond traditional sugar-based inputs to a broader spectrum of feedstocks. The company* ***offers comprehensive solutions including greenfield multi-feed, multi-product plants and modernization of existing ethanol facilities,*** *helping clients future-proof their operations and align with global sustainability goals.*

a) **First Generation Bioethanol Technology (1G)**: With over 40 years of deep domain expertise, Praj is a global leader in First Generation (1G) bioethanol technology, specializing in the conversion of agricultural feedstocks into bioethanol. These include:

   a) **Sugary feedstocks:** Sugarcane juice, B & C molasses, BIOSYRUP

   b) **Starchy feedstocks:** Grains

   Backed by a **proprietary database of 10,000+ global feedstocks and 300+ patented technologies**, Praj delivers high-efficiency, flexible ethanol production solutions **tailored to both fuel-grade (as per country-specific mandates) and industrial-grade uses such as pharmaceuticals, perfumery, solvents, and rectified spirits**.

At the heart of Praj's success is its world-class engineering and manufacturing infrastructure, combined with a customer-centric approach that ensures high operational efficiency, adaptability, and compliance with local environmental and quality standards.

Key Benefits: Product maximization & co-product valorization; multi-feed, multi-product capabilities; lifecycle carbon intensity assessment integration; compliance with evolving environmental norms; production of low carbon intensity biofuels; significant reduction in energy and water footprints.

***Beyond sugar-based Ethanol in international market**: Praj has delivered a starch-to-ethanol plant for Fermap Industria De Alcool in Brazil, capable of producing 63,000 liters per day using corn feedstock. The plant features low energy consumption, high ethanol yield, zero liquid discharge, and a minimal carbon footprint.*

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b) **Bio-based performance enhancers:** Praj's bio-based performance enhancers are innovative, science-driven solutions that **add significant economic and operational value to biochemical and bioethanol production processes**. These **proprietary formulations leverage a blend of beneficial microbes** including bacteria, yeasts, fungi as well as enzymes, antimicrobial agents, and nutritional biomolecules.

Designed to optimize plant performance, these bio-products help in the following:

a) Enhance fermentation efficiency

b) Maximize ethanol recovery

c) Improve overall process stability and yield

By integrating these enhancers into production systems, clients benefit from reduced operational costs, improved output quality, and more sustainable processing outcomes.

(II) Advanced biofuels: *Praj is uniquely positioned to offer an integrated advanced biorefinery is capable of processing multi feedstock (sugary, starchy & lignocellulosic) to produce multiple products (various grades of bioethanol, compressed biogas, SAF, renewable chemicals and materials).*

a) **Second Generation Bioethanol Technology (2G) – Lignocellulosic Ethanol Technology:** Praj offers comprehensive end-to-end solutions for the design, engineering, installation, and commissioning of advanced biorefineries based on its proprietary Enfinity - 2G Biomass to Bioethanol Technology. This platform converts lignocellulosic biomass including agricultural and forestry residues into bioethanol, renewable chemicals, and value-added co-products.

Feedstocks processed include:

a) **Agricultural residues**: Rice straw, wheat straw, bagasse, corn stover, corn cobs

b) **Forestry residues**: Bamboo, softwood, wood chips, and empty fruit bunches

In addition to bioethanol, Praj's 2G biorefineries generate high-value co-products such as bio-bitumen, bio-fertilizers, and lignosulfonates, enhancing the overall economic and sustainability of the process.

Praj's Technology: By leveraging its technologies, Praj enables the development of integrated advanced biofuel refineries that align with global climate action and energy transition goals.

a) The **Enfinity technology** is already deployed at a commercial scale in India, establishing Praj as a frontrunner in next-generation biofuels.

b) In collaboration with Sekab (Sweden), Praj also offers **Celluniti, a 2G bioethanol technology specifically designed to convert forestry residues** into bioethanol and co-products.

Key Benefits: Provides a sustainable alternative to stubble burning; converts waste into clean energy; reduces air and soil pollution; boosts rural economy by generating additional revenue for farmers; produces low-carbon intensity biofuels and value-added co-products; minimizes carbon and energy footprints.

1. ***India's first 2G ethanol biorefinery - Panipat Biorefinery****: In collaboration with Indian Oil Corporation Ltd (IOCL),* ***Praj commissioned India's first 2G ethanol biorefinery in Panipat, Haryana****. This facility processes 200,000T of rice straw annually to produce ~30 million liters of ethanol, benefiting over 100,000 farmers and creating around 1,500 rural jobs. The plant is expected to eliminate around 320,000MT of CO_2 emissions annually, equivalent to removing nearly 63,000 cars from the road.*

2. ***Ongoing 2G Ethanol Projects****: Praj is in advanced stages of setting up additional 2G ethanol biorefineries for Hindustan Petroleum Corporation Ltd (HPCL) in Bhatinda, Punjab, and for Bharat Petroleum Corporation Ltd (BPCL) in Bargarh, Odisha.*

b) **Renewable Natural Gas (RNG)**: Praj has developed RenGas, its proprietary CBG technology, to produce RNG from a wide range of agricultural and industrial residues. With over 140 commercial plants commissioned across India, RenGas is a proven, scalable solution for clean energy production.

Feedstocks processed include:

a) **Agricultural waste**: Sugarcane bagasse, wheat straw, rice straw, corn stover, soybean straw, corn cobs

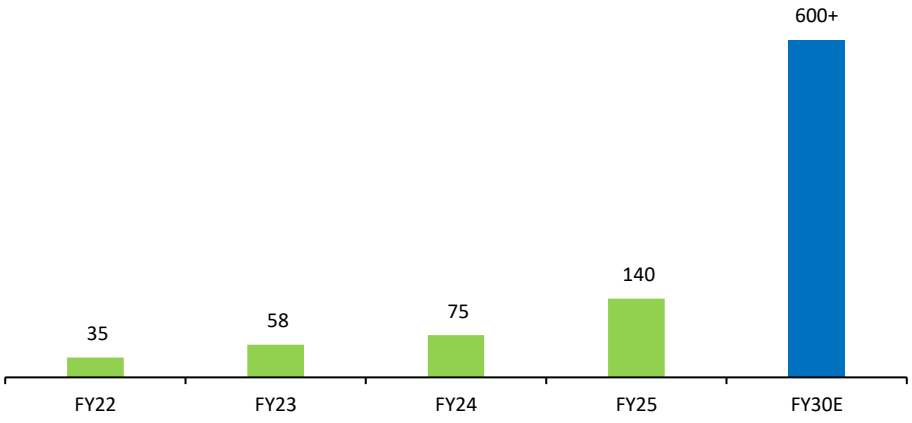
b) **Farm and industrial waste**: Chicken litter, press mud, cow dung, napier grass, corn biomass, empty fruit bunches (EFBs)

In addition to producing **vehicle-grade CBG**, the process generates **organic manure in both solid and liquid forms**, adding further value through **waste-to-nutrient conversion**.

Key Technology Highlights: Advanced bio-methanation process with proprietary microbiological pretreatment; plug Flow Reactor designed in collaboration with DVO Inc., USA; zero moving parts in the reactor ensure low maintenance and high reliability; unique microbial cultures optimize digestion and reduce operating costs by up to 30%; high yield and energy efficiency with maximum plant uptime; digestate converted into certified organic fertilizer, supporting circular economy principles.

Praj is leading CBG revolution in India having successfully commissioned over 45 industrial-scale renewable gas installations across India.

Exhibit 15: Total no. of CBG plants commissioned in India



Source: Industry, MNCL Research

Notable Project includes:

1. ***Budaun, Uttar Pradesh****: In collaboration with Hindustan Petroleum Corporation Limited (HPCL), Praj established a CBG plant processing 100MT of rice straw daily, yielding 14MT of CBG and 65MT of solid manure. This facility is designed with a Zero Liquid Discharge system and a Phosphate Rich Organic Manure (PROM) unit, contributing to both energy production and agricultural enhancement.*
2. ***Pressmud-Based Plants:*** *Praj has developed and commissioned India's first-of-its-kind pressmud-based CBG plants in both North and South India, showcasing the versatility of its technology in handling diverse feedstocks.*
3. ***Demonstration Facility in Pune****: At its R&D center, Praj operates a demonstration plant capable of producing up to 35,000 metric cubes of raw biogas annually from various organic wastes, serving as a testbed for optimizing technology across different feedstocks.*

(III) Next-generation biofuels: *Feedstocks are processed to produce mixed sugar streams & lignin-rich cakes. Mixed sugars streams undergo fermentation to produce bioethanol or renewable chemicals and materials or both. Bioethanol produced can be further processed into Sustainable Aviation Fuel (SAF). Further processing of lignin rich cakes can yield a variety of value-added products like bio-bitumen, lignosulfonates, marine biofuels.*

a) **Sustainable Aviation Fuel (SAF)**: Praj, in collaboration with Gevo Inc., USA, offers end-to-end solutions to produce SAF based on the ASTM-approved (American Society for Testing and Materials) Alcohol-to-Jet (ATJ) pathway. *This innovative process utilizes isobutanol derived from renewable feedstocks including sugary, starchy, and lignocellulosic biomass as a key intermediate for SAF production*. In addition to SAF, the process yields iso-octane, a high-value co-product used as a premium fuel for high-performance engines.

Praj's SAF platform supports the aviation industry's transition to low-carbon fuels, helping reduce greenhouse gas emissions and align with global decarbonization targets.

In a collaborative effort with Indian Oil Corporation Limited (IOCL) and AirAsia India, ***Praj produced SAF at its bench-scale setup, which was blended at 1% with ATF****. This blend powered India's first commercial passenger flight from Pune to New Delhi, marking a significant milestone in the country's aviation sector.*

b) **Marine Biofuel**: Marine biofuels derived from lignin-based bio-feedstocks are emerging as a promising low-carbon alternative for the maritime industry. With growing global pressure to decarbonize shipping, these sustainable fuels are attracting significant interest from international ocean carriers and freight operators seeking to reduce their carbon footprint and comply with evolving environmental regulations.

(IV) Engineering Businesses:

a) **Critical process equipment & modularization**: Praj delivers comprehensive engineering and manufacturing solutions to global leaders in clean tech, green tech, industrial gases, specialty chemicals, and conventional energy. This vertical specializes in the design, fabrication, and commissioning of modular process packages and critical process equipment, including reactors, high-pressure vessels, heat exchangers, distillation columns, custom-designed proprietary systems.

From ***extended basic engineering to manufacturing and modularization****, Praj ensures high precision, safety, and reliability tailored to each client's technical requirements.*

b) **Brewery & beverage Solutions**: Praj offers customized, end-to-end solutions for the brewery and beverage industry, covering plant design, equipment, and technology. These solutions are designed to ensure premium product quality, optimize capital and operating costs, minimize water and energy consumption, and support low-carbon, sustainable production.

By combining domain expertise with eco-efficient technologies*, Praj helps beverage producers achieve operational excellence while reducing their environmental footprint.*

c) **Zero Liquid Discharge Systems**: Praj provides integrated, energy-efficient ZLD solutions for a range of processing industries. These systems focus on effluent treatment and recycling, helping clients minimize freshwater consumption, achieve statutory compliance, reduce operational costs, and adopt sustainable practices based on the principles of reduce, reuse, and recycle

*Praj's ZLD offerings are **designed to treat complex industrial effluents** and enable a closed-loop water cycle, significantly contributing to environmental sustainability.*

(V) Hi-Purity Business: *Praj's Hi-Purity business offers advanced, customized solutions for the pharmaceutical, biotechnology, personal care, and healthcare industries, ensuring compliance with the highest global quality and regulatory standards.*

a) **Water Systems**: End-to-end solutions for water treatment from raw water processing to the delivery of Purified Water (PW), Water for Injection (WFI), and Technical Water (TS) at the point of use, ensuring reliability and regulatory compliance.

b) **Modular Process Systems:** Design and supply of modular, pre-engineered systems for liquid handling, formulation, and bioprocess applications, including sterile manufacturing in biotech and pharma environments.

c) **Value-Added Services:** Comprehensive lifecycle support, including post-sale service and maintenance, Comprehensive Maintenance Contracts (CMC), system upgrades and retrofits, training programs for operations and compliance

Integrated R&D, manufacturing engine fuels growth

At the heart of Praj's leadership in sustainable technologies lies **Praj Matrix, its state-of-the-art Research & Development Center**, which plays a pivotal role in driving the company's clean energy and circular bioeconomy agenda. This world-class facility underpins Praj's innovation pipeline and strengthens its competitive edge in emerging bio-industrial domains.

Praj Matrix is primarily focused on the development of biofuels, renewable chemicals and materials, enzyme technologies, and industrial biotechnology platforms. The center has 16 specialized laboratories and is staffed by a team of 90+ scientists and technologists, including more than 30 Ph.D. holders, who are engaged in cutting-edge research **across diverse areas such as protein engineering & production, microbial strain development, fermentation process optimization, biocatalyst and enzyme development using bacterial, yeast, and fungal systems**.

Praj Matrix is also distinguished as the first-of-its-kind private sector R&D facility in India to offer a complete value chain from scientific validation to rapid commercialization of bio-based technologies. This has made it a go-to partner for global collaborations and technology co-development in the field of sustainable bioprocessing.

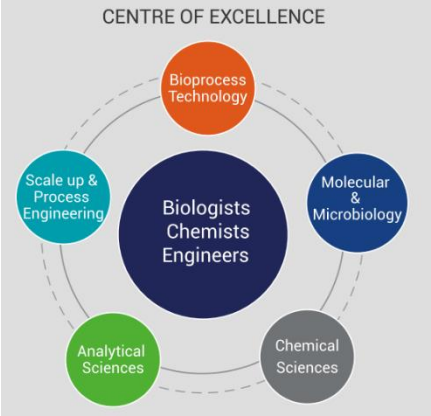
Praj Matrix- Key highlights:

d) **Recognized by the Department of Scientific and Industrial Research (DSIR)**, Government of India

e) **Holds over 300 national and international patents**, with more than 80 patents filed directly by Praj Matrix

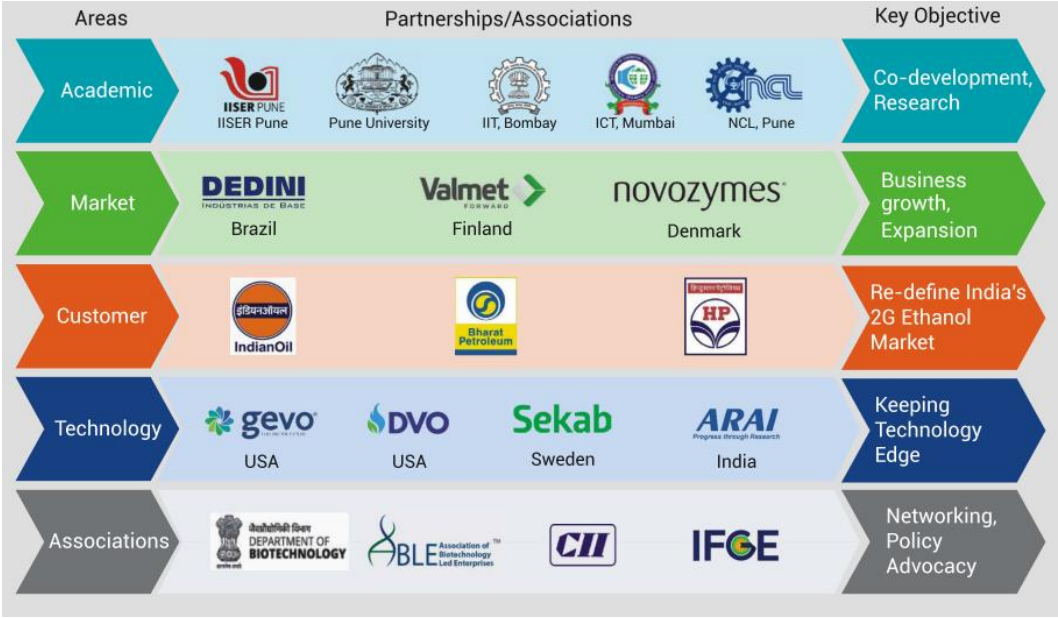
f) Equipped to accelerate lab-to-market translation through **advanced simulation, testing, and process scale-up capabilities**

g) **Actively collaborates with academic institutions, global biotech firms, and industrial partners** to remain at the forefront of innovation



Strategic global partnerships: Praj has forged strategic alliances with renowned organizations and institutions around the world to leverage complementary strengths.

Exhibit 16: Praj Key Partnerships and Associations



Source: Company, MNCL Research

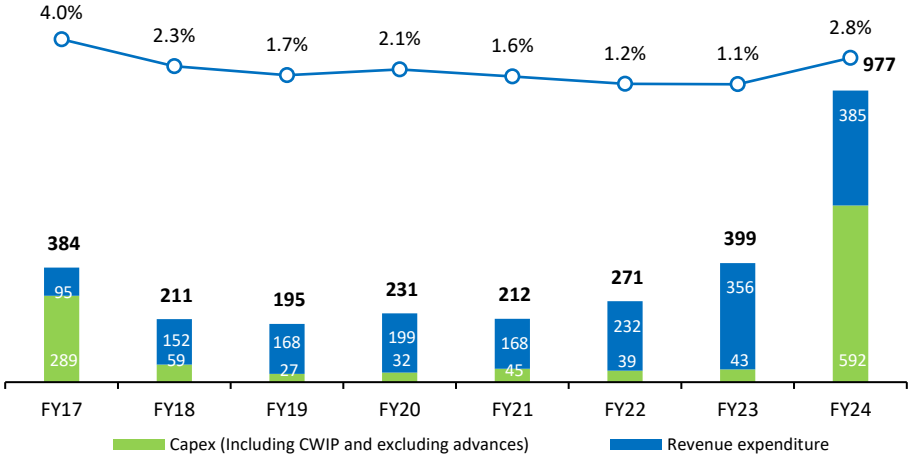
Exhibit 17: Key Collaborations over the years

Company	Year	Purpose/project
GEVO (USA)	2019	Inked an agreement with Gevo Inc. (USA) to commercialize technology for producing high-energy renewable aviation fuels and isobutanol from sugary and agri-residue feedstocks.
SEKAB (Sweden)	2020	Technology transfer agreement with Sweden's Sekab E-Technology AB to upgrade and commercialize CelluAPP technology for producing advanced biofuels and biochemicals from forest residue.
Indian Oil Corporation Ltd (IOCL)	2021	Set up India's first 2G ethanol plant in Panipat using Praj's Enfinity - 2G Biomass to Bioethanol Technology. Praj Industries and Indian Oil had signed a term sheet to boost India's biofuel production across ethanol, SAF, CBG, biodiesel, and bio-bitumen, building on their 50:50 JV formed in 2021.
Hindustan Petroleum Corp Ltd (HPL)	2021	Had inked agreement with HPCL for an initial CBG plant in 2021 utilizing its patented Rengas technology.
Institute of Chemical Technology (ICT)	2022	Jointly established Centre of Excellence and Innovation (CoEI) that is focused on biopolymers with focus on developing and implementing biopolymers, which are renewable and biodegradable materials.
Vasantdada Sugar Institute (VSI)	2022	Partnered to establish a Centre of Excellence (CoE) focused on bioeconomy and the Farm to Fuel approach. This partnership aims to advance low-carbon biofuel technologies and sustainable practices in the biofuels industry
Axens	2023	Signed MoU to work jointly on projects in India for production of Sustainable Aviation Fuel (SAF) from low carbon alcohols through Alcohol-to-Jet (ATJ) pathway.
Indian Sugar & Bioenergy Manufacturers Association (ISMA)	2024	Praj signed an MoU with the ISMA to jointly advance the bio-economy, focusing on bioenergy technologies such as 2G Ethanol, CBG, Green Methanol, and Green Hydrogen.
Bharat Petroleum Corporation Ltd (BPCL)	2025	Recently signed an agreement for a 50:50 JV with BPCL for setting up of 10 CBG plants across India.
Thyssenkrupp (Germany)	2025	Strategic partnership with Thyssenkrupp Uhde's subsidiary Uhde Inventa-Fischer (UIF) to jointly offer integrated, end-to-end technology for producing polylactic acid (PLA), a significant step in their foray into bioplastics.

Source: Company, MNCL Research

With its strong focus on research-driven, technology-led solutions, Praj Matrix continues to be the cornerstone of Praj's efforts in shaping a low-carbon, sustainable future, reinforcing its position as a technology-first bioeconomy player.

Exhibit 18: Expenditure on R&D activities (INR mn)



Source: Company, MNCL Research

State-of-the-art Manufacturing Facility

Praj Industries **operates four state-of-the-art manufacturing facilities across India**, each strategically designed to support its diverse business verticals, including bioenergy, high-purity systems, critical process equipment, and modular process skids. Praj's manufacturing facilities are equipped to meet the stringent requirements of various countries. This global compliance ensures that Praj can serve clients across different geographies with high-quality and certified equipment.

Exhibit 19: xxx

Praj's manufacturing facilities are equipped to meet the stringent requirements of various countries, including CE, EN, DOSH (Malaysia), MOM (Singapore), GOST-TR (Russia), and more. This global compliance ensures that Praj can serve clients across different geographies with high-quality, certified equipment.

Kandla, Gujrat Unit	a) **Unit I**: Specializes in stainless steel fabrication. b) **Unit II**: Focuses on alloy and carbon steel products. c) **Total Area**: 30,700 sqm (Unit 1); 20,200 sqm Unit 2) d) **Key Features**: » Proximity to Kandla Port facilitates efficient exports. » Equipped to handle large-scale fabrication projects. » Certified with ASME U, U2, R, S stamps, CE marking, NB, and IBR.
Wada Unit (Near Mumbai)	a) **Focus**: Dedicated to Praj HiPurity Systems, catering to the biopharmaceutical, biotech, cosmetics, healthcare, and food & beverage sectors. b) **Area**: 70,000 sqm. c) **Compliance**: Adheres to WHO, US FDA, and UK MHRA standards.
Sanaswadi Unit (Pune)	a) **Fabrication Capacity**: 8,600 MT per year. b) **Specialization**: Fabrication of stainless steel, copper, and low alloy steel components. c) **Area**: 28,800 sqm.
Mangalore SEZ	a) State of the art manufacturing facility based on Industry 5.0 principles b) **Specialization**: Equipment and Modules for ETCA c) **Area**: 1,385,000 sqft. (Covered), 6,25,000 sqft. (Open)

Source: Company, MNCL Research

The scale of fabrication capacity underlines Praj's strategic readiness to support large-scale energy transition projects, including second-generation (2G) biofuels, green hydrogen, compressed biogas (CBG), and sustainable aviation fuel (SAF) initiatives.

Praj Industries has a robust manufacturing infrastructure with a total fabrication capacity exceeding **16,500 metric tons per year**. This capacity reflects the company's ability to handle large-scale, high-quality fabrication projects across various sectors, including bioenergy, ethanol plants, critical process equipment, and emerging sustainable technologies.

Strong Clientele and Associations

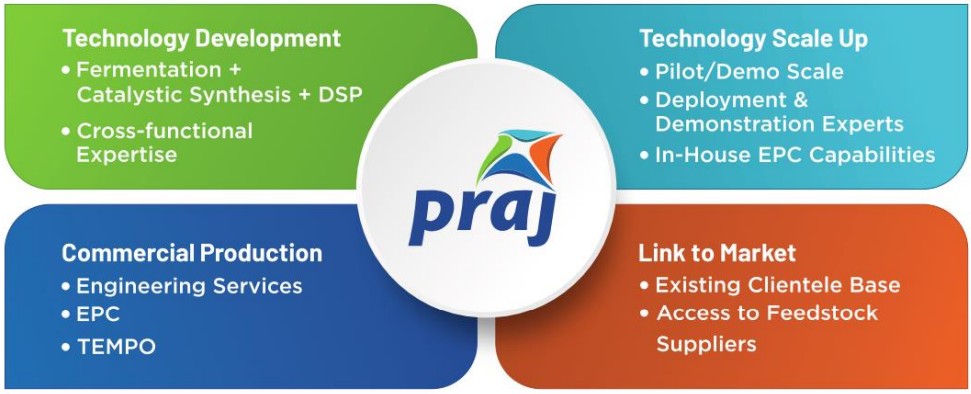
Praj Industries has built a distinguished portfolio of marquee customers across the globe, reflecting its deep domain expertise and trusted capabilities in bioenergy, high purity systems, and engineering sectors. The company's ability to cater to diverse industries demonstrates its technological leadership, reliability, and customer-centric approach.

Exhibit 20: Marquee Customers

Source: Company, MNCL Research

Why Praj Stands Out: Synergy of Science, Engineering, and Sustainability

Exhibit 21: End to End Integration



Source: Company, MNCL Research

- **Feedstock forward approach**: Exhaustive knowledge of agri-based sugary, starchy and cellulosic feedstocks
- **Cross functional expertise**: Amalgamation of competence in microbiology, synthetic biology, catalytical chemistry, and chemical engineering
- **Process optimization and integration**: Proven track record of technology scale-up, demonstration and deployment
- **Engineering Competencies**: Vast experience in inhouse manufacturing, EPC and engineering services
- **Focus on sustainable development**: Focus on technologies with low carbon intensity index, zero liquid / solid effluent and recycle and reuse of waste streams
- **Link to market**: Forward and backward integration with existing clients.

Exhibit 22: Evolution of Praj over the years:

Period	Key developments
1983-1990	Founded in 1983 to serve the Indian distillery industry with turnkey solutions across engineering, licensing, project management, and commissioning. Developed **SPRANHIHILATOR**, a zero-pollution effluent treatment system in 1986. Received venture capital funding from **ICICI** in 1988. Early entry into agri-based processing through sugar mill projects
1991-1998	Established **R&D center** in 1991; innovations here led to **7 patents**. Entered **brewery engineering** and developed starch-based ethanol tech for grains and tubers in 1993. Went public in 1994; gained international orders from **Indonesia and the Philippines**. Reoriented focus (1996–1999) towards ethanol tech, wastewater treatment, and brewery engineering with several grain-based ethanol plants commissioned.
1999-2007	Entered **South America** via office in Bogotá, Colombia. Pune plant achieved **ISO certification** for pressure vessels; introduced **multi-pressure distillation** system as industry standard. Commissioned India's **first molecular sieve dehydration** plant for fuel-grade ethanol in 2002. Expanded to **Eastern Europe** and **Australia** with ethanol engineering projects. Entered **Brazilian biodiesel** market in 2007; commissioned export unit in **Kandla SEZ**, Gujarat.
2008-2014	Awarded major **fuel-grade ethanol project** by **Maple, Peru**. Began in-house development of turnkey biodiesel solutions. Rebranded in 2014 with a new logo and identity reflecting a diversified portfolio.
2015-2020	Praj completed 100% acquisition of Hi-Purity Systems (ex-Neela Systems) in 2015, after initial stake purchase of 50% in 2012, marking its entry in to regulated fields like pharma and biotech. Received second **2G ethanol plant order** from **BPCL** in 2020. Formed strategic partnerships including with **SEKAB** for biofuels tech, and with **Gevo** for **Isobutanol** production under its **Bio-Mobility™** initiative.
2021-2025	Developed **BioSyrup**, a sustainable feedstock from sugarcane juice in 2021. In 2022, secured multiple contracts from a US-based industrial gases company for hydrogen plant equipment. In 2023, set up **India's first 2G ethanol plant** (Panipat, IOCL) and enabled **India's first passenger flight** using indigenous SAF; launched **Praj GenX Ltd** for low-carbon fuel projects. In 2024, commissioned **first rice-straw based CBG plant** (HPCL) and started operations at **Mangalore engineering facility**. In 2025, signed term sheet with **BPCL** and formed a JV to set up 10 **CBG plants**, and entered **PLA production tech** partnership with **Thyssenkrupp**.

Source: Company, MNCL Research

The Global Biofuel Industry Overview

Some of the most **widely recognized biofuels globally include ethanol, renewable diesel (or biodiesel), and a range of other alternatives such as sustainable aviation fuel (SAF) and compressed biogas (CBG)**. According to the International Energy Agency (IEA), countries like Brazil, the United States, and India have implemented policies that have supported annual biofuel growth rates exceeding 20% over a period of at least five years.

Ethanol's scalability, relatively mature technology, and compatibility with existing vehicle engines have made it a leading biofuel in the global transition to cleaner energy.

(I) Ethanol - One of the most popular biofuels: Among all biofuels, ethanol has seen the most significant global progress in terms of production, infrastructure, and policy support. Derived primarily from crops like sugarcane, corn, and other biomass, ethanol is widely used as a blending agent with gasoline to reduce greenhouse gas emissions and improve energy security.

According to the International Energy Agency (IEA), ethanol accounts for over half of all biofuel consumption worldwide and has been instrumental in decarbonizing the transport sector, particularly in countries like Brazil and the United States. Its scalability, relatively mature technology, and compatibility with existing vehicle engines have made it a leading biofuel in the global transition to cleaner energy.

Exhibit 23: Global Ethanol Production by Region (million gallons)

Country	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
USA	13,300	14,313	14,807	15,413	15,936	16,091	15,778	13,941	15,015	15,361	15,580	16,219
Brazil	6,267	6,190	7,093	6,840	6,730	8,060	8,860	8,100	7,430	7,400	8,470	8,780
European Union	1,371	1,445	1,387	1,190	1,250	1,300	1,350	1,280	1,350	1,460	1,390	1,440
China	696	635	813	730	850	810	1,010	930	900	920	1,070	1,200
Canada	523	510	436	460	460	460	497	429	434	447	454	464
Rest of World	1,272	1,490	1,147	1,417	1,544	1,819	1,835	1,790	2,181	2,632	2,966	3,107
WORLD	**23,429**	**24,583**	**25,683**	**26,050**	**26,770**	**28,540**	**29,330**	**26,470**	**27,310**	**28,220**	**29,930**	**31,210**

Source: Industry, MNCL Research

The global ethanol market experienced a downturn during the COVID-19 pandemic, driven by reduced feedstock availability and a sharp decline in consumption. However, production has steadily rebounded in the years since and is on track to surpass pre-pandemic levels. ***According to market projections, global ethanol production is expected to reach ~34.3 billion gallons by 2027E***.

Over the years, ethanol blending has gained momentum globally, with Brazil emerging as a pioneer through early adoption of blending mandates and large-scale implementation. *According to the Brazilian Sugarcane Industry Association (UNICA), Brazil's sugarcane-based ethanol production yields approximately 6,500 to 7,500 liters per hectare, significantly outperforming U.S. corn-based ethanol, which yields about 2,000 to 3,500 liters per hectare, difference attributable to the higher biomass content in sugarcane.*

The industry has also made significant strides in diversifying feedstock sources i.e., moving beyond traditional crops like sugarcane and corn to include a wider array of agricultural residues, waste materials, and non-agricultural inputs.

Feedstock dependency varies across regions, reflecting local resource availability and policy frameworks. While first-generation (1G) ethanol, produced from food-based feedstocks, remains dominant, ***many countries are actively investing in second-generation (2G) ethanol technologies that utilize lignocellulosic biomass, offering a more sustainable and less resource-intensive alternative.***

The chart below provides an overview of global ethanol production rankings, as well as the regional feedstock dependencies for ethanol:

Exhibit 24: Leading Ethanol Producers - 2024

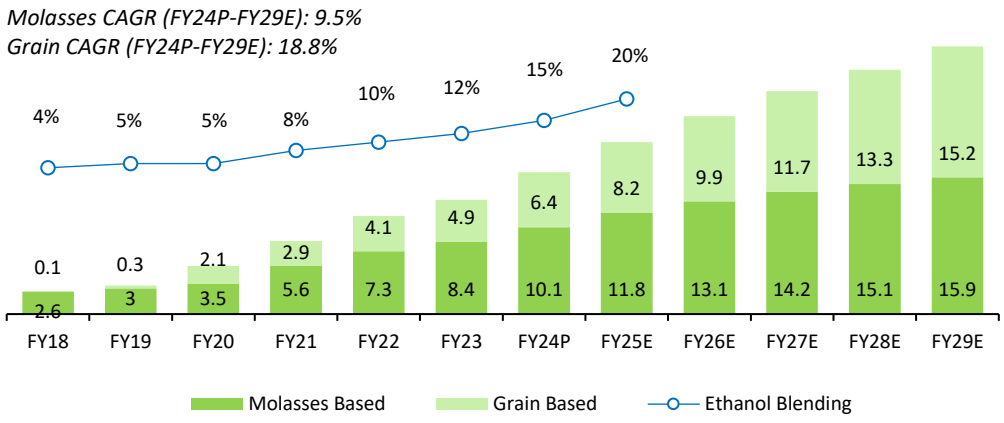
Countries	Rank	Ethanol Production %	Feedstock	Current Blending	Comments
United States	1	52%	Maize	10-15%	Exported a 6.6bnL of ethanol in FY24 marketing year. Key export destinations: Canada (37%), the UK (13%), and India.
Brazil	2	28%	Sugarcane / Maize	27%	Exports ~1.5bnL/year, mainly to South Korea, the U.S., & Japan.
India	3	5%	Molasses / Sugarcane / Maize / Wheat / Rice	20%	~6.4bnL produced in 2024; limited exports due to high domestic demand
European Union	4	5%	Sugar beet / Wheat / Maize	7%	~6.2bn litres production in 2024 with France and Germany being the major producers
China	5	4%	Maize / Cassava	< 10%	Projected ~14bnL production in CY25, ~16mnL exports in 2024; non-fuel ethanol
Canada	6	1%	Maize / Wheat	< 10%	~3.9bnL production, dependent on US for fuel ethanol imports
Thailand	7	1%	Molasses / Cassava / Sugarcane	15%	~1.3bnL production in 2024, limited exports as focus is on domestic consumption
Argentina	8	1%	Maize / Sugarcane / Molasses	12%	~1.2bnL annual production in 2023

Source: Industry, MNCL Research

India's ethanol industry is witnessing rapid expansion, fuelled by the National Biofuel Policy (2018), growing energy security needs, and abundant agricultural feedstocks. Ethanol production capacity has surged from **2.7bnL in ESY 2017-18 to 16.8bnL by ESY 2023-24**, marking a CAGR of 35.2%.

India: *While molasses-based ethanol still leads with a 61% share due to mature technology and established infrastructure, grain-based ethanol has steadily gained ground, rising from just 4% share in ESY 2017-18 to an estimated 39% in ESY 2024-25, reflecting the government's push for feedstock diversification.*

Exhibit 25: India Ethanol Production Capacity (bnL)



Source: Industry, MNCL Research | Note: 16.5bnL was later re-estimated to 16.8bnL in October 2024

Reduced Crude Imports: *At 10% blending, ethanol saves India INR 300bn annually (NITI Aayog), enhancing energy security and reducing forex outflows.*

Environmental Benefits: *Ethanol emits ~30% less CO_2 than petrol and lowers other harmful pollutants, supporting national carbon reduction and clean air goals.*

What's next in the Ethanol story: As of 2024, 2G ethanol still constitutes a **small fraction (less than 5%)** of total global ethanol production, primarily due to high capital costs, technology complexity, and feedstock logistics. The global biofuel industry is increasingly turning toward 2G ethanol, produced from non-food biomass. These feedstocks are more abundant, do not compete with food supply, and offer a lower carbon footprint over their lifecycle. Although 2G ethanol doesn't compete with food crops and utilizes agricultural waste, it is costlier (INR 75–100/litre) and technologically more demanding compared to 1G ethanol. *To support its commercialization, the government has launched schemes like PM JI-VAN, offering financial incentives and Viability Gap Funding (VGF) to public and private players setting up 2G ethanol plants.*

Global progress in 2G Ethanol:

- India is a global front-runner in scaling up 2G ethanol, with government-backed initiatives like the Pradhan Mantri JI-VAN Yojana and operational plants such as the Indian Oil Corporation's 2G ethanol facility in Panipat.
- The United States and Brazil have also launched commercial 2G projects, though many have faced financial and technical hurdles that have limited widespread adoption.
- The European Union is supporting 2G ethanol through policy incentives under the Renewable Energy Directive II (RED II), aiming to reduce dependency on food-based biofuels.
- China is conducting pilot-scale 2G ethanol projects, although commercial production remains limited.

Key advantages of 2G Ethanol:

- Higher GHG reduction potential compared to 1G.
- Utilizes waste and non-edible biomass, enhancing resource efficiency.
- Supports rural economies through demand for agricultural residues.
- Avoids food vs. fuel conflict, a major criticism of 1G ethanol.

Challenges in Scaling 2G Ethanol:

- High capital and operating costs.
- Limited commercial-scale success due to technical reliability issues.
- Complicated feedstock collection, handling, and preprocessing.

II) Compressed Biogas (CBG) - The Next Chapter After Ethanol

GoI launched SATAT (Sustainable Alternative Towards Affordable Transportation) in October 2018 for promoting use of CBG (Compressed biogas). SATAT aims to establish an ecosystem for production of CBG from various waste/ biomass sources in the country.

CBG possesses calorific value and combustion characteristics comparable to Compressed Natural Gas (CNG), making it a viable, eco-friendly substitute in both transportation and industrial/commercial applications.

India currently imports around 50% of its natural gas requirements, making energy security a critical national concern. CBG offers a sustainable, domestic alternative to fossil fuels such as crude oil and natural gas. By leveraging agricultural waste and organic residues, CBG not only helps reduce import dependency but also supports the development of a circular economy. The widespread adoption of CBG offers several strategic benefits:

- **Reduced Natural Gas Imports**: Enhancing energy independence and conserving foreign exchange reserves.
- **Lower Greenhouse Gas (GHG) Emissions**: Supporting national climate goals and commitments under the Paris Agreement.
- **Mitigation of Stubble Burning**: Providing an economic alternative to burning agricultural waste, thereby improving air quality.
- **Farmer Income Augmentation**: Creating a market for agri-waste and enabling additional revenue streams for rural communities.
- **Job Creation**: Driving employment across the value chain from waste collection to biogas distribution.
- **Efficient Waste Management**: Transforming organic waste into clean energy, reducing landfills and urban pollution.
- **Efficient byproduct**: CBG production process yields bio-manure as a valuable co-product. Rich in essential macro and micronutrients, as well as organic carbon, this bio-manure enhances soil health and supports the transition to organic farming. It also reduces dependency on chemical fertilizers, contributing to long-term agricultural sustainability.

The **production of CBG** involves the anaerobic digestion of organic material in the absence of oxygen, a process that generates raw biogas composed primarily of methane and carbon dioxide. This raw biogas is then purified to enhance methane content to over 90%, making it suitable for compression and use as CBG, a clean, renewable fuel comparable to CNG.

One of the key strengths of the CBG ecosystem is its ability to process a wide variety of organic materials. This versatility enhances both availability and sustainability:

Exhibit 26: Varieties of feedstock used for CBG production

Feedstock Type	Examples	Benefits
Agricultural Residues	Rice straw, wheat straw, sugarcane tops	Utilizes farm waste, reduces stubble burning
Animal Waste	Cattle dung, poultry litter	High availability in rural areas, supports village-scale plants
Agro-industrial Waste	Press mud, spent wash, fruit & vegetable waste	Promotes zero-waste industrial practices
Municipal Solid Waste (MSW)	Segregated organic fraction	Aids in urban waste management and landfill reduction
Energy Crops	Napier grass, maize silage	High biogas yield, ideal for dedicated large-scale plants
Food Waste	Household and commercial kitchen waste	Valuable urban feedstock, reduces methane emissions from landfills

Source: Industry, MNCL Research

Exhibit 27: Feedstock Requirement for per ton of CBG and respective Yield

Feedstock	Requirement for production of 1Ton CBG as per Conventional Technology	Yield
Agriculture Residue	10 ton	8-15% (can reach up to 20–25%)
Press Mud	25 ton	3.-5%
Spent Wash	10 ton	3-5%
Municipal Solid Waste	20 ton	3-5%
Cattle Dung	50 ton	<3% (can reach up to 7–8%)
Napier Grass	10 ton	~5%

Source: Industry, MNCL Research

The capital cost for setting up a CBG Plant varies largely as per capacity, feedstock, technology, location and other factors. The construction period for a CBG Plant is about 12-18 months. Tentative project costs based on various feedstocks are provided below:

Exhibit 28: Cost of CBG Plant

Feedstock	Plant Capacity	CBG Output	Project Cost
Paddy Straw	100 TPD	12 TPD	700-800mn
Press Mud	100 TPD	5 TPD	250-300mn
Cow Dung / Chicken Litter	100 TPD	5 TPD	~310mn

Source: Industry, MNCL Research

The following are some of the perceived risks of CBG Plants:

- Lack of steady supply of feedstock at long term stable price.
- Discontinuation of available subsidies viz. Central Financial Assistance by MNRE.
- Demand of CBG in the region and competition with other replaceable fuel.
- Marketing of Bio manure (FOM (Fermented Organic Manure)/LFOM) at remunerative price.
- The tentative Internal Rate of Return (IRR) of CBG projects is about 8-12% (without CFA).

When CNG retails at INR 75-80/kg, CBG is priced similarly to remain competitive. Producers typically earn INR 59/kg for deliveries within 75 km. *For distances beyond 75 km, the procurement price is adjusted upward to account for transportation and handling costs, ensuring viability across the supply chain.*

Pricing of CBG:

- The procurement price, i.e. what a CBG producer earns, is mapped to 85% of the prevailing CNG price in that market with the minimum procurement price of CBG ensured not lower than INR 46/kg + applicable taxes for the period up to FY29.
- The Retail Selling Price (RSP) of CBG in a market shall be at par with the RSP of CNG (as provided by the authorized CGD entity).

Exhibit 29: Investment in CBG Plants by Private Company

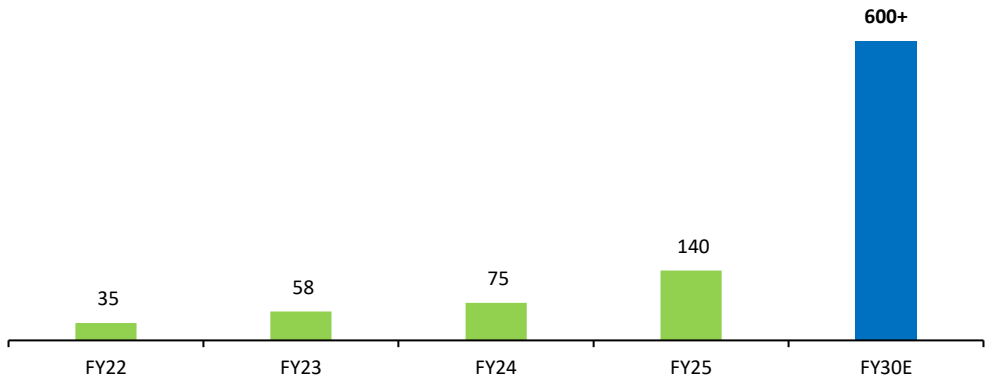
Company	Reliance	Adani Total Gas	EverEnviro, ONGC
Operational plants	3 (2 Jamnagar, 1 UP)	1 (Barsana, UP)	1 (Indore, MP)
No of plants planned	500	10	10 (JV with ONGC); 100+ (EverEnviro)
Estimated CBG Capacity (MMTPA)	3.9	0.02	0.32
Estimated fertilizer production (MMTPA)	1.1	NA	0.01
Investments by 2030 (INR bn)	650	NA	20+

Source: Industry, MNCL Research

According to IEEFA, replacing 20% of natural gas consumption with CBG and biomethane by FY2030 could cut India's LNG import bill by nearly US$ 29bn.

Others investing in CBG include Shell, Total Energies, Mahindra & Mahindra, Nester, BP, amongst others.

Exhibit 30: No. of CBG Plants Commissioned in India



Source: Industry, MNCL Research

According to the IEA's India Gas Market Report 2025, India is likely to have around 600+ operational CBG plants by 2030, based on current investment trends and execution pace. While this falls short of the SATAT scheme's ambitious target of 5,000 plants, it still represents meaningful progress. With stronger policy support, improved waste segregation, and greater private sector participation particularly in financing and supply chain infrastructure, the actual number could rise significantly, potentially aligning with or surpassing original targets.

Global Progress:

Europe currently leads the global landscape, with nations like Germany, Sweden, and the Netherlands aggressively integrating CBG into public transport and utility pipelines. In Germany alone, there are over 250 upgrading plants that convert raw biogas into biomethane suitable for CBG use. Meanwhile, the United States is expanding its Renewable Natural Gas (RNG) network, with major investments driven by California's Low Carbon Fuel Standard (LCFS). China, although dominated by raw biogas, is now piloting CBG for vehicular and residential use in urban regions

Ethanol and CBG - Policy Landscape in India

Ethanol: India's ethanol demand is anchored by aggressive policy measures and support at the central level, driven by the need to reduce crude oil imports and reduce emissions with additional benefits in terms of forex savings.

The ethanol blending program has scaled rapidly, with the E20 target preponed to 2025-26. Blending levels hit ~19.6% as of Jan'25, up from ~15% in FY24. This has been enabled by strong policy push including administered pricing, feedstock diversification, interest subvention, and clear regulatory guidelines.

Exhibit 31: Ethanol Blending in India under EBP programme

Particulars	FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25
Ethanol Blended (Bn Liters)	1.1	0.67	1.51	1.91	1.71	3.02	4.34	5.09	7.07	10.16
Blending % achieved	*4%*	*2%*	*4%*	*5%*	*5%*	*8%*	*10%*	*12%*	*15%*	*20%*

Source: Industry, MNCL Research

Blending rates rose from 5% in FY20 to 12.0% in FY23, 14.6% FY24 and reached ~19.6% by Jan'25.

OMCs procure ethanol via annual tenders, with sugarcane and grains as primary feedstocks. ***Flexibility in movement across states, low GST (5%), and approval for E20-compatible vehicles further aid rollout****. Ethanol will remain key to India's clean fuel transition, with discussions ongoing for higher blends (E25/E30) and advanced (2G) ethanol.*

Key policies to support ethanol business:

- **Ethanol Blending Programme (EBP)**: Initiated in the early 2000s and scaled up post-2015, the EBP targets 20% blending by ESY 2025-26, reducing fossil fuel use and creating long-term demand visibility. The program ensures that Oil Marketing Companies (OMCs) procure ethanol at government-notified prices, offering revenue certainty for producers. It also supports the creation of ethanol blending infrastructure, such as dedicated blending terminals and storage facilities, across the country.
- **National Biofuel Policy (2018)**: This flagship policy provides the strategic direction for India's ethanol roadmap. It promotes ethanol production from sugarcane and surplus grains, reducing agri-waste and import dependence while strengthening the EBP framework. It also promotes the use of second-generation (2G) feedstocks, such as agricultural residues and non-food biomass, to ensure sustainability and reduce competition with food crops.
- **Financial Incentives**: To encourage ethanol production, the government offers a range of financial incentives. The Interest Subvention Scheme provides subsidized loans for setting up new ethanol plants or expanding existing ones. Additionally, a price support mechanism ensures differential pricing based on feedstock type, making ethanol production from less economical raw materials viable. Tax incentives, such as excise duty waivers and GST concessions, further lower capital and operational costs for ethanol manufacturers.

Compressed Biogas (CBG): The **SATAT scheme** laid the foundation for India's CBG rollout, but momentum has shifted to a mandate-led approach via the **CBG Blending Obligation (CBO)**. Starting FY26, CBO requires 1% CBG blending in PNG/CNG, rising to 5% by FY29. This aims to create guaranteed offtake and unlock investments, with 750+ plants planned under NBCC coordination.

SATAT*: Launched in 2018 by the Ministry of Petroleum and Natural Gas, the SATAT initiative encourages entrepreneurs to establish CBG plants and supply CBG to Oil Marketing Companies (OMCs) for retailing as automotive fuel. As of December 2024, 120 CBG projects had been commissioned under SATAT, with an ambitious target of setting up 5,000 plants producing 15MMT of CBG annually, although the current run rate is not strong enough to achieve this goal.*

Other policies and initiatives to promote the development of Compressed Biogas (CBG) infrastructure include:

- **GOBARdhan Scheme**: The Galvanizing Organic Bio-Agro Resources Dhan (GOBARdhan) scheme, part of the Swachh Bharat Mission (Grameen), focuses on converting cattle dung and organic waste into biogas and compost. It supports the establishment of biogas plants in rural areas, promoting cleanliness, reducing greenhouse gas emissions, and providing additional income to farmers.
- **National Bioenergy Programme**: Implemented by the Ministry of New and Renewable Energy (MNRE), this program provides Central Financial Assistance for setting up biogas, biomass, and waste-to-energy projects. ***For CBG projects, the incentive is INR 40mn per 4,800 kg/day capacity, with a maximum of INR 100mn per project.***
- **Priority Sector Lending**: The Reserve Bank of India has included CBG projects under the priority sector lending framework, enabling easier access to credit for entrepreneurs and developers involved in the CBG sector.

- **CBG Blending Obligation (CBG)**: India's CBG Blending Obligation (CBO) policy mandates the blending of CBG with natural gas in the City Gas Distribution (CGD) sector. The policy aims to reduce carbon emissions, promote renewable energy, and enhance energy security. The blending obligation is set to be voluntary until FY25 and will become mandatory from FY26, starting at 1% and increasing to 5% by FY29.
- **State-Level Initiatives**: States like Madhya Pradesh have introduced their own biofuel policies to support CBG infrastructure. *The Madhya Pradesh Biofuel Policy offers capital assistance ranging from 10% to 40% of eligible fixed capital investment, infrastructure development assistance, and subsidies for biomass aggregation equipment*.

(III) Sustainable Aviation Fuel (SAF) – Next Generation Fuel

Worldwide, aviation accounts for 2% of all carbon dioxide (CO2) emissions and 12% of all CO2 emissions from transportation.

Sustainable Aviation Fuel (SAF) is an alternative to conventional jet fuel, produced from non-petroleum feedstocks such as waste oils, agricultural residues, and municipal solid waste. SAF can significantly reduce greenhouse gas emissions over its lifecycle, contributing to the decarbonization of the aviation sector. *According to the International Civil Aviation Organization (ICAO), over 360,000 commercial flights have utilized SAF at 46 airports worldwide, primarily in the United States and Europe*.

Exhibit 32: SAF Feedstocks

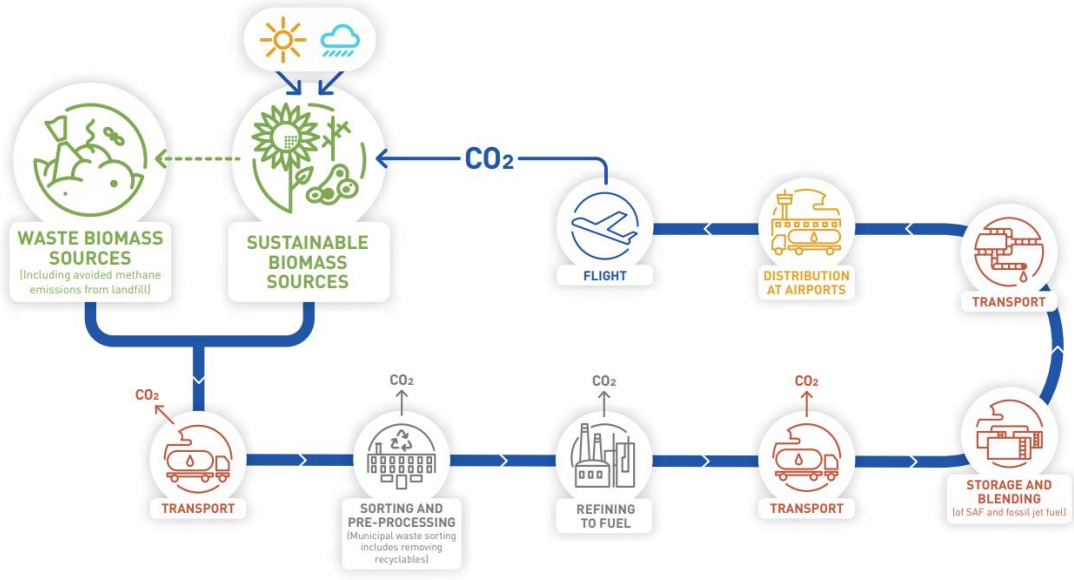
Feedstock	Primary Source	Prominent Geographies
Waste Oils & Fats	Used cooking oil, animal fats, industrial grease	USA, Europe, Asia
Municipal Solid Waste (MSW)	Urban residential and commercial waste	USA, EU, India, Brazil
Cellulosic Waste	Agricultural residues (corn stover, straw), forestry waste	USA, Canada, Brazil, China
Camelina, Carinata, Pennycress	cover or rotational oil seed crops	USA, Canada, Europe, Australia
Jatropha	Jatropha seeds (oilseed shrub)	India, Africa, Southeast Asia
Halophytes	Salt-tolerant plants (e.g., Salicornia)	UAE, Mexico, Australia
Algae	Microalgae and macroalgae cultures	USA, China, India, Israel

Source: Industry, MNCL Research

SAF is compatible with existing aircraft engines and infrastructure when blended with conventional jet fuel. The maximum allowable blending range varies depending on the production pathway:

- **Fischer-Tropsch (FT-SPK) and Hydroprocessed Esters and Fatty Acids (HEFA-SPK)** pathways permit up to a 50% blend.
- **Synthesized Iso-Paraffins (SIP) and Hydroprocessed Hydrocarbons (HC-HEFA-SPK)** have a maximum blend limit of 10%.

Exhibit 33: Carbo Lifecycle: SAF Production from Waste and Other Biomass Sources

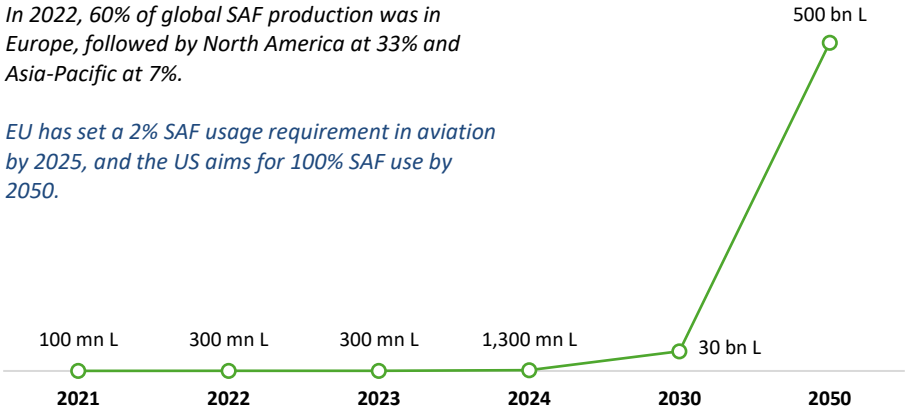


Source: Industry, MNCL Research

Exhibit 34: Global SAF Production

In 2022, 60% of global SAF production was in Europe, followed by North America at 33% and Asia-Pacific at 7%.

EU has set a 2% SAF usage requirement in aviation by 2025, and the US aims for 100% SAF use by 2050.



Source: Industry, MNCL Research

US SAF Grand Challenge: Scaling Sustainable Aviation Fuel for a Net-Zero Future: Launched in 2021, the Sustainable Aviation Fuel Grand Challenge is a collaborative initiative by multiple US Federal Agencies, including the Department of Energy (DOE), Department of Transportation (DOT), and Department of Agriculture (USDA). The program aims to scale up the production and use of SAF to meet ambitious climate and energy goals. The Grand Challenge sets forth the following objectives:

- Produce 3 billion gallons of SAF annually by 2030.
- Achieve at least a 50% reduction in lifecycle greenhouse gas emissions compared to conventional aviation fuel.
- Expand SAF production to 35 billion gallons per year by 2050, sufficient to meet 100% of projected US aviation fuel demand.

Renewable hydrocarbon biofuels offer many benefits, including:

- Engine and infrastructure compatibility - SAF blended with conventional jet fuel can be used in existing aircraft and infrastructure.
- Fewer emissions - Compared with conventional jet fuel, 100% SAF has the potential to reduce greenhouse gas emissions by up to 94% depending on feedstock and technology pathway.
- More flexibility - SAF is a replacement for conventional jet fuel, allowing for multiple products from various feedstocks and production technologies.

On December 1, 2021, United Airlines made aviation history by flying the first passenger flight powered by 100% SAF - taking passengers from Chicago O'Hare International Airport (ORD) to Ronald Reagan Washington National Airport (DCA).

Some of the key challenges that remain include:

- Ensuring that the cost is competitive, in order to compete with petroleum-based jet fuel.
- Ensuring an adequate supply of sustainable feedstock and low-carbon energy.
- Ensuring that aviation receives an appropriate allocation, relative to other forms of transport, of available sustainable feedstocks.
- Ensuring that governments implement appropriate policy mechanisms to allow the SAF industry to scale up and deliver the economy of scale benefits, including incentivizing the use of feedstocks to aviation as a priority over other sectors.
- Reducing the risk for private investors to enable investment for more rapid SAF production capacity growth.
- Ensuring all aircraft are compatible with the use of 100% SAF – a task expected to be complete around 2030. Until then, the 50% blend limit of SAF and conventional jet fuel will remain.
- **High production cost- SAF is 2-6x more expensive than conventional jet fuel depending on the technology**: The production cost of SAF ranges between US$ 4 to 18 per gallon, depending on the technology and feedstock used. This is notably higher than conventional jet fuel (US$ 2 to 3 per gallon), which underscores the need for supportive policies and incentives to bridge the cost gap.

While HEFA synthetic paraffinic kerosene (SPK) is currently the only commercial pathway being used at scale to produce SAF, current feedstocks are limited.

Alcohol-to-Jet (AtJ) pathway presents a compelling opportunity for Praj

AtJ converts sugary or starchy biomass like corn and sugarcane into ethanol, which is then processed into aviation fuel. While feedstocks are easy to grow and transport, sugarcane must be processed quickly, requiring ethanol plants to be close to both feedstock sources and refineries. Though corn and sugarcane are used for fuels in the Americas, limited supply and competing demand have so far prevented commercial-scale SAF production via AtJ. As ground transport electrify, more feedstocks may become available for aviation. However, AtJ offers lower carbon reduction compared to other SAF technologies, so additional measures like carbon capture and biogas integration are essential to improve its climate performance.

It takes 2 liters of ethanol to produce 1 liter of SAF.

Indian Oil Corporation has partnered with LanzaJet to set up a commercial-scale SAF plant*, marking a key step in building domestic supply chains. Such collaborations are crucial to scale SAF production and adoption.*

For Praj Industries, a global leader in ethanol production, the AtJ pathway presents a compelling opportunity. Leveraging its established infrastructure and deep expertise in ethanol technologies, Praj is strategically positioned to lead the commercial rollout of AtJ-based SAF. The company has already initiated global collaborations and technology development projects aimed at scaling SAF production through this route, making it a strong contender in the next phase of aviation decarbonization. ***In January 2024, the company's first-of-its-kind fully integrated ATJ technology based SAF demonstration facility at Praj Matrix was inaugurated by GoI.***

Exhibit 35: India Biofuels Targets by FY30

Fuel	FY25	FY26	FY27	FY28	FY29	FY30	Remarks
Ethanol	20% (achieved)	-	-	-	-	-	Ethanol blending target of 20% was set for 2025-26, but 20% has been achieved as per recent data. Clarity regarding next blending target is subject to official notification.
CBG	0%	1%	3%	4%	5%	5%	As per govt estimates, this phased blending will facilitate setting up of 750+ plants by 2030.
SAF	-	-	1%	2%	2%+	5%	Blending will be initially done for international flights.

Source: Industry, MNCL Research

India initially set a target of 20% ethanol blending by 2030, but this was advanced to 2025-26 under the National Biofuel Policy. As of 2025, the country has already achieved ~20% blending. The government is now in talks with automotive and industry stakeholders to explore raising the mandate to 30% by 2030. However, this would require compatible engines supporting above E20; **no formal decision has been made yet**.

(IV) Other Value-Added Products

1 km pilot project utilizes lignin-based bio-bitumen, developed by Praj Industries in collaboration with CSIR-CRRI and NHAI, replacing 15% of conventional petroleum-based bitumen.

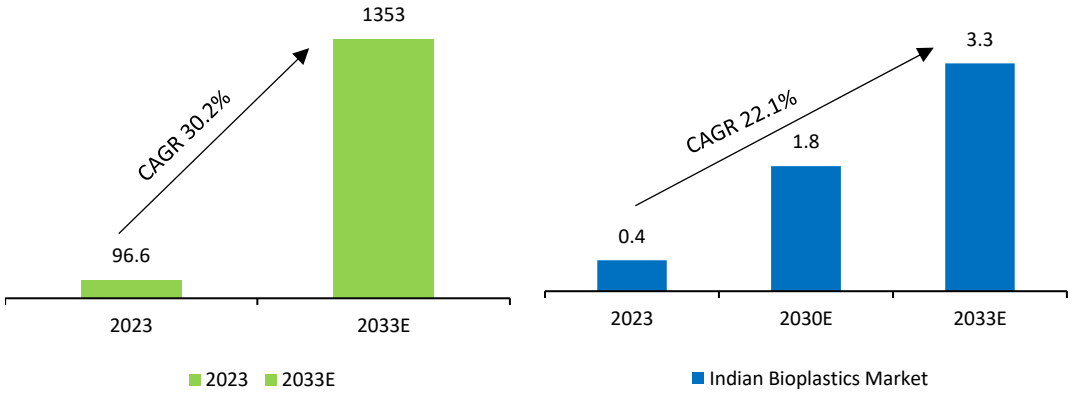
(a) Bio-Bitumen - A Sustainable Alternative in Road Construction: Bio-bitumen, derived from renewable biomass sources such as lignin, a byproduct of paper and bioethanol industries, offers a sustainable alternative to conventional petroleum-based bitumen. ***Praj Industries has pioneered the development of lignin-based bio-bitumen, showcasing its application in the construction of the Nagpur-Mansar Bypass on NH 44.*** This innovation not only reduces greenhouse gas emissions by up to 70% compared to traditional bitumen but also promotes the utilization of agricultural residues, aligning with circular economic principles.

According to Fortune Business Insights, the global bitumen market was valued at ~US$ 73.3bn in 2024 and is projected to reach US$ 98.6bn by 2032, growing at a CAGR of 3.9%. A significant trend within this market is the shift towards bio-based alternatives, driven by environmental concerns and the push for sustainable infrastructure solutions.

According to the IMARC Group, the Indian bitumen market reached US$ 3.3b in 2024, with projections indicating growth to US$ 4.2bn by 2033 at a CAGR of 2.70%. The country's heavy reliance on bitumen imports, accounting for about 50% of consumption, has led to significant foreign exchange expenditures. To mitigate this, the Indian government is exploring the integration of bio-bitumen into traditional bitumen mixtures, allowing for up to 35% substitution***. This strategy could potentially save ~INR 100bn annually in import costs according to the government***.

(b) **Bioplastics - Renewable and Biodegradable, alternative to Conventional Plastics**: Bioplastics are plastics derived from renewable biological sources such as corn and sugarcane. Unlike conventional plastics, which are fossil-based, bioplastics can be either biodegradable or non-biodegradable. However, they typically have lower tensile strength than conventional polymers like PET, often requiring additives or blending with other plastics to enhance performance. Despite higher costs, their recyclability, biodegradability, and potential for conversion to biofuels offer long-term sustainability advantages over traditional plastics.

Exhibit 36: Global Bioplastics market, Indian bioplastics market sizes (US$ bn)



Source: Industry, MNCL Research

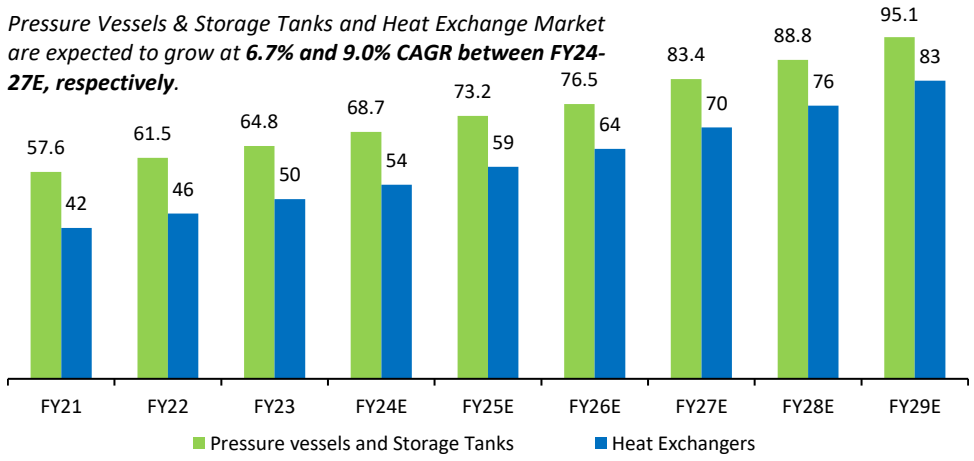
Strategic Implications for Players like Praj: India's status as a net importer of PLA, alongside rising global demand opens up both domestic and export opportunities. With the Indian government's growing focus on bio-based manufacturing under the BIO-E3 policy and increasing corporate interest in sustainability, companies engaged in the PLA value chain could play a pivotal role in reducing dependence on fossil-based polymers and tapping into high-growth global markets.

Key development in bioplastics in India: *India is accelerating its shift to sustainable materials, with Balrampur Chini Mills investing INR 20bn in a bioplastics project set to launch by 2026. With a planned capacity of 75,000 tons and expected revenue of INR 17-18bn, the move could raise its green portfolio to over 50% by FY27-28. Aligned with India's ban on 19 single-use plastics and high plastic imports, the company aims to tap into rising global demand for bioplastics (currently just 1% of total plastics) by leveraging the country's abundant biomass resources.*

(V) Critical Process Equipment and Engineering

India's process equipment market, including reactors, pressure vessels, storage tanks, heat exchangers, and modular skid systems, is witnessing strong momentum driven by rapid industrialization, infrastructure growth, and energy transition initiatives. *Growing adoption across sectors like oil & gas, chemicals, pharmaceuticals, food, and renewables is further supported by the government's 'Make in India' push and demand for faster, cost-efficient project execution through modularization*.

Exhibit 37: Pressure Vessels & Storage Tanks and Heat Exchange Market (INR bn)



Source: Industry, MNCL Research

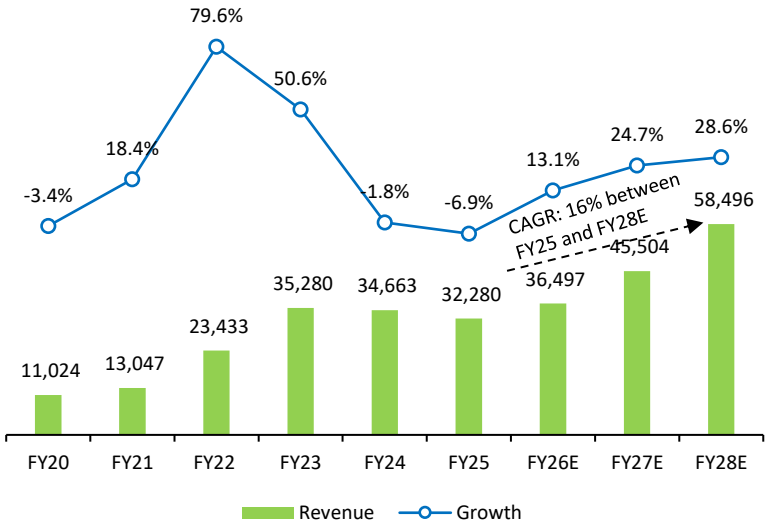
Key Growth Drivers:

- **Oil & Gas:** Refining expansion to 450 MMTPA by 2030 and global LNG/Petrochemical capex spur demand for high-pressure, modular systems.
- **Chemicals:** US$300bn sector by 2025 demands corrosion-resistant, high-purity systems for specialty and green chemistry projects.
- **Pharma & Food:** Growth at 10-12% CAGR backed by need for CIP/SIP stainless systems under GMP/hygiene standards.
- **Energy Transition:** Green hydrogen, CCUS, nuclear, and biofuels need high-efficiency heat exchangers and skid-mounted units.
- **Renewables & HVAC:** India's 500 GW non-fossil target and expanding HVAC market boost heat exchanger uptake.
- **Modularization Benefits:** Plug-and-play skids reduce installation time by 40–50% and costs by 20–30%, supporting fast scalability, especially for SMEs.

PRAJ's engineering division is booming; contributing ~20% to overall revenues and is poised for strong growth with the commissioning of its advanced Mangalore facility in FY25. Despite a two-quarter delay, the plant is now partially operational and has received audits and approvals from eight key customers, with three already signing long-term framework agreements. With Kandla facility running at full capacity for the next 18 months, all new orders will now be routed through Mangalore. Order inflow is expected to pick up from Q1FY26, with revenue and profit contribution ramping up meaningfully from H2FY26 onward. The division is strategically positioned to handle larger, high-value projects, enhancing Praj's presence in the global critical process equipment market.

Financial Analysis

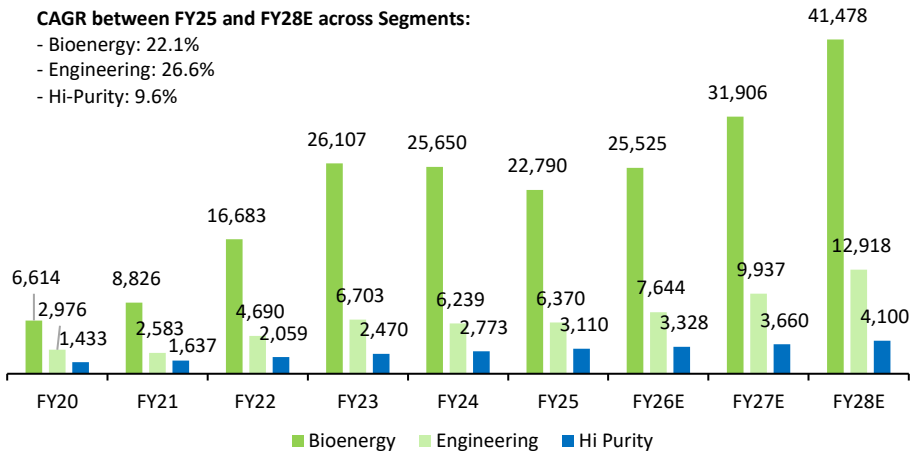
Exhibit 38: Revenue from Operations (INR mn)



Source: Company, MNCL Research Estimates

We expect Praj Industries to grow at a CAGR of ~16% over FY25-28E, supported by favorable macros including the global energy transition, climate action, and enabling government policies, areas where Praj is well aligned. With ~65% market share in bioenergy, Praj stands to benefit from the growing shift towards biofuels, expanding its scope beyond ethanol. Ethanol continues to gain momentum, with the blending mandate potentially rising to 25-30%, as India met the 20% target ahead of schedule. Praj also aims to balance its geographic mix, targeting a 1:1 split between domestic and international markets, and has set a revenue target of INR 100bn by FY30.

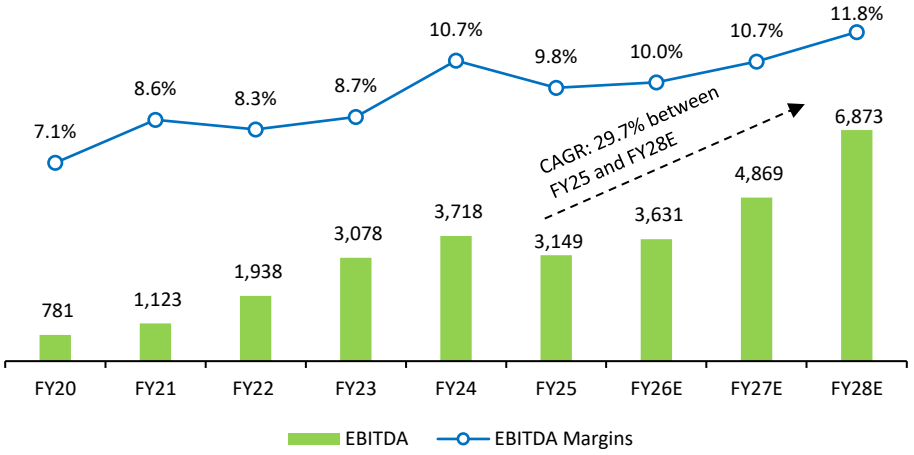
Exhibit 39: Segment Revenue Breakup (INR mn)



Source: Company, MNCL Research Estimates

Praj's revenue mix remains heavily skewed towards bioenergy, which contributes over two-thirds of total revenue. While bioenergy will continue to be the core driver, other segments are also expected to see healthy growth. The Engineering and Hi-Purity segments are projected to grow at a CAGR of 26.6% and 9.6%, respectively, over FY25-28E. Praj is actively revamping its Engineering segment, having incurred ~INR 4bn in capex, and aims to scale this business to INR 20-25bn by FY30, supported by improving capacity utilization and increasing traction in international markets.

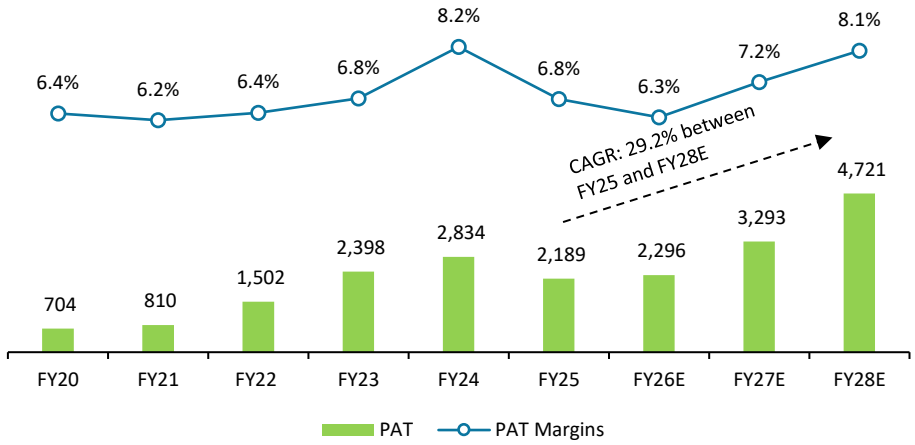
Exhibit 40: EBITDA and EBITDA margin (INR mn)



Source: Company, MNCL Research Estimates

We estimate Praj's EBITDA to grow at a CAGR of 29.7% over FY25-28E, with margins expanding from 9.8% to 11.8% by FY28E. This improvement will be driven by operating leverage and a rising contribution from the international business, which currently accounts for ~24% of revenue. Praj is targeting a balanced 1:1 revenue mix between domestic and international markets, which is expected to further support profitability and scale.

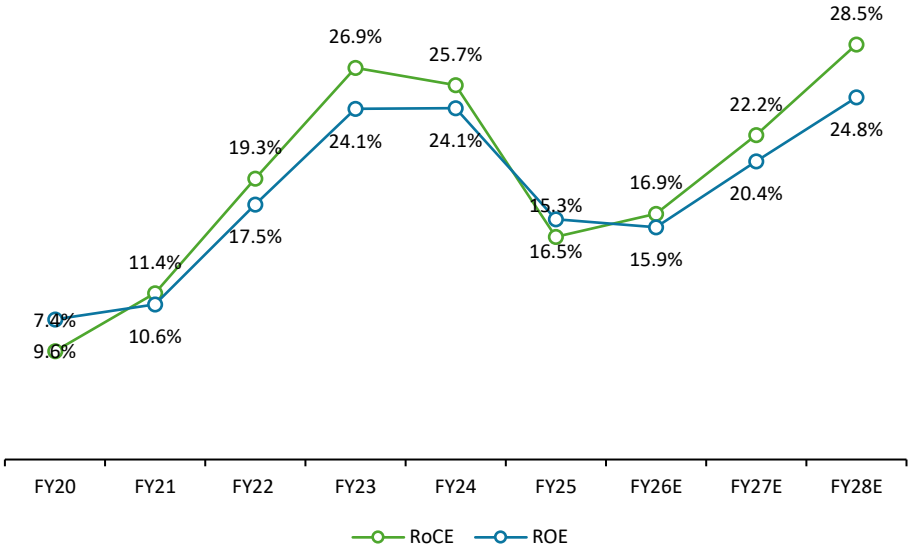
Exhibit 41: PAT and PAT margin (INR mn)



Source: Company, MNCL Research Estimates

We expect Praj's PAT to grow at a CAGR of ~29.2% over FY25-28E, supported by strong revenue growth, operating leverage, and its debt-free balance sheet. Margin expansion will be aided by higher international contribution, improving capacity utilization, and a better product mix across segments. Continued policy tailwinds and scale benefits position Praj well for sustained earnings growth.

Exhibit 42: Return Ratios



Source: Company, MNCL Research Estimates

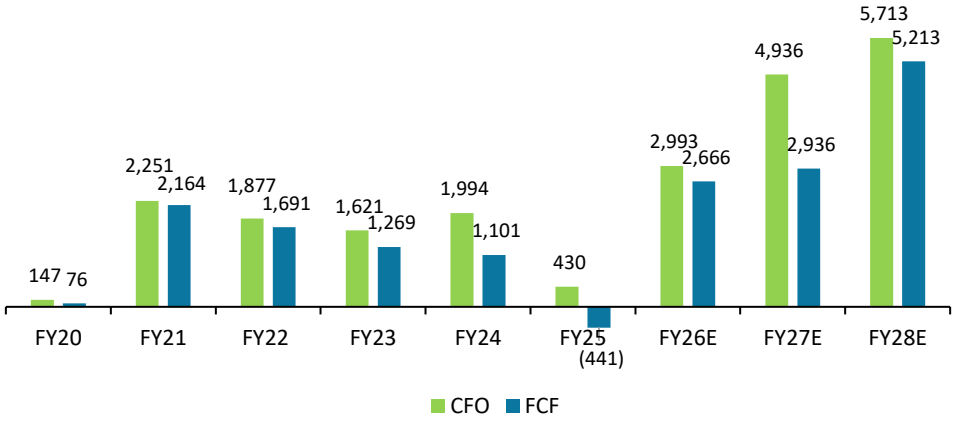
Our forecast indicates a return on equity (ROE) and a return on capital employed (ROCE) to reach 24.8% and 28.5%, respectively by FY28E. This improvement will be driven by a favorable product mix, operating leverage, improved capacity utilization, and increasing contribution from international markets.

Exhibit 43: DuPont Analysis

Particulars	FY20	FY21	FY22	FY23	FY24	FY25	FY26E	FY27E	FY28E
Profit-to-sales	6.4%	6.2%	6.4%	6.8%	8.2%	6.8%	6.3%	7.2%	8.1%
Sales-to-assets	0.92x	0.95x	1.23x	1.46x	1.26x	1.07x	1.12x	1.26x	1.40x
Assets-to-equity	1.64x	1.81x	2.22x	2.43x	2.34x	2.28x	2.27x	2.24x	2.20x
ROAE	**9.6%**	**10.6%**	**17.5%**	**24.1%**	**24.1%**	**16.5%**	**15.9%**	**20.4%**	**24.8%**

Source: Company, MNCL Research Estimates

Exhibit 44: Cash Flow (INR mn)



Source: Company, MNCL Research Estimates

The company is expected to maintain healthy cash flow from operations (CFO) and free cash flow (FCF) over the long term. In FY25, FCF was impacted by planned capex to scale up the Engineering segment, along with margin pressure stemming from investments in the Praj GenX platform. Despite this, the underlying cash generation remains strong, supporting future growth.

Valuation and view

TP at INR 630 representing an upside potential of 28.3%

Praj Industries represents a compelling long-term structural growth story at the intersection of technology, sustainability, and industrial transformation.

Praj Industries has firmly established itself as a prominent engineering and technology company within India's capital markets. Renowned for its leadership in the country's ethanol ecosystem, Praj has evolved into a diversified bioeconomy player. What began as a first-generation ethanol story has now transitioned into a broader green technology platform, encompassing cutting-edge segments such as Compressed Bio-Gas (CBG), Sustainable Aviation Fuel (SAF), and advanced bio-solutions including bio-plastics and bio-bitumen.

This strategic diversification is underpinned by a solid execution track record, a robust balance sheet, and a well-managed working capital cycle that position Praj as a credible frontrunner in India's and the world's ongoing energy transition. The company's ambition to scale its revenue to INR 100bn is being driven by several transformative initiatives including an enriched product mix featuring next-generation technologies, a reinvigorated focus on the high-potential engineering and high-purity segments, geographical expansion, and a growing roster of marquee domestic and global clients.

Given Praj's consistent financial performance, scalability in future-ready sectors, and the strong industry tailwinds from global decarbonization and bioeconomy adoption, we assign a 35x multiple on FY27E EPS. This premium valuation reflects our confidence in the company's future growth potential including the following:

- Strategic positioning in high-growth green technology markets.
- Proven technological capabilities and innovation leadership.
- Strong visibility on earnings growth through a diversified revenue base.
- Deep client relationships and partnerships across geographies.
- Financial strength to invest in R&D, capacity building, and global expansion.

Exhibit 45: Players Operating in Engineering Segment

Particulars (INR mn)	Market Cap.	Revenue CAGR		EBITDA Margin			ROE			Forward P/E Multiples		
		FY21-25	FY25-28E	FY25	FY26E	FY27E	FY25	FY26E	FY27E	2025	2026E	2027E
Domestic Players												
Praj Industries	89,719	26.8%	21.90%	9.8%	10.0%	10.7%	16.5%	15.9%	20.4%	41.1x	39.1x	27.3x
Thermax Ltd	4,10,934	21.3%	12.60%	8.7%	9.6%	10.2%	13.5%	15.4%	17.8%	64.9x	49.4x	40.7x
ISGEC Heavy Engineering	88,280	4.3%	NA	9.0%	NA	NA	NA	NA	NA	31.0x	NA	NA
Triveni Engineering & Indus	94,301	5.0%	6.09%	8.4%	10.8%	12.1%	8.1%	12.6%	14.2%	35.3x	23.2x	18.5x
Balrampur Chini Mills Ltd	1,19,122	3.0%	12.08%	13.0%	15.0%	16.1%	12.1%	12.5%	13.8%	25.3x	22.9x	18.3x
Average										**39.5x**	**33.7x**	**26.2x**
International Players	**US$ mn**	**CY21-24**	**CY24-27E**	**CY24**	**CY25E**	**CY26E**	**CY24**	**CY25E**	**CY26E**	**CY24**	**CY25E**	**CY26E**
Babcock & Wilcox	69	-0.3%	7.3%	7.5%	8.5%	10.2%	-8.3%	NA	NA	NA	NA	23.3x
KBR Inc.	6,771	1.8%	9.2%	11.4%	11.1%	11.1%	26.4%	32.2%	29.0%	20.5x	13.6x	12.2x
Tetra Tech	9,207	17.4%	-3.7%	13.0%	13.8%	14.3%	20.6%	23.0%	22.8%	36.9x	23.7x	22.5x
Wartsila	11,844	7.4%	8.1%	12.9%	13.0%	13.1%	21.2%	21.0%	20.6%	20.1x	18.2x	16.8x
GEA Group	10,932	1.8%	5.3%	14.2%	15.8%	16.2%	16.0%	18.4%	19.0%	20.1x	20.8x	18.6x
Chevron Corporation	2,38,732	7.5%	0.8%	20.5%	21.4%	24.4%	11.3%	9.8%	12.0%	17.3x	17.0x	13.7x
Alfa Laval AB	17,566	9.9%	NA	19.1%	20.5%	NA	18.7%	NA	NA	NA	20.2x	NA
Novozymes A/S	33,481	20.4%	10.2%	28.7%	37.6%	39.0%	4.7%	6.9%	7.7%	NA	31.9x	28.8x
Average										**23.0x**	**20.8x**	**18.8x**

Source: Company, Industry, MNCL Research Estimates

Exhibit 46: Qualifies for Higher Multiple

Valuation	As on FY27E
Market Cap	89,858
Net Debt	137
Enterprise Value	**89,995**
EPS	17.93
Assigned PE	35x
Target Price	**630**
CMP	**489**
Potential Upside	***28.3%***

Source: Company, MNCL Research Estimates

We have further further substantiated the valuation using DCF analysis.

We have conducted a DCF-based valuation of Praj Industries, reflecting the company's current growth trajectory and its transition into a broader bioeconomy platform. **The company is presently in its expansion phase, with significant strategic efforts underway to scale emerging business verticals including CBG, SAF, and other value-added bio-solutions alongside its established leadership in 1G and 2G ethanol.** *We believe FY27E represents a key inflection point, by which time these new segments are expected to gain material commercial traction, thereby contributing meaningfully to revenue and margin expansion*.

Exhibit 47: DCF Valuation Assumption

Discount Rate	
Rf	6.70%
RM	12.50%
Beta	0.96x
Cost of Equity	12.20%
Cost of debt	7.30%
WACC	11.60%
Discount Rate	11.60%
Terminal Growth Rate	4.00%

Source: MNCL Research Estimates

Exhibit 48: Valuation Table

Valuation	As on FY27E
Market Cap	**110,296**
Net Debt	137
Enterprise Value	**110,159**
Target Price	**600**
CMP	489
Potential Upside	***22.6%***

Source: MNCL Research Estimates

Sensitivity Analysis

Two-way data tables to evaluate Target Price and Price Variation

To capture valuation outcomes under varying macroeconomic and business assumptions, we have also conducted a two-way sensitivity analysis using a matrix of Discount rates (WACC) and Terminal growth rates.

Exhibit 49: Sensitivity Analysis using two variables

Discount Rate \ Perpetual Growth Rate	3.0%	3.5%	4.0%	4.5%	5.0%
10.0%	717	757	803	858	924
10.4%	675	710	750	797	853
11.0%	607	635	667	703	746
11.6%	551	574	**600**	629	662
12.0%	522	542	565	591	620
12.5%	487	504	524	545	570
13.0%	456	470	487	506	527

Source: MNCL Research Estimates

Exhibit 50: Price Variance in different scenarios

Discount Rate \ Perpetual Growth Rate	3.0%	3.5%	4.0%	4.5%	5.0%
10.0%	46.7%	54.8%	64.3%	75.5%	89.0%
10.4%	38.0%	45.1%	53.4%	63.0%	74.5%
11.0%	24.1%	29.8%	36.3%	43.8%	52.6%
11.6%	12.8%	17.4%	**22.6%**	28.6%	35.5%
12.0%	6.8%	10.9%	15.6%	20.8%	26.8%
12.5%	-0.4%	3.1%	7.1%	11.5%	16.6%
13.0%	-6.8%	-3.8%	-0.4%	3.4%	7.7%

Source: MNCL Research Estimates

Even under conservative assumptions, the company continues to offer an attractive risk-reward profile, underpinned by strong execution, robust cash flows, and strategic alignment with the global clean energy transition.

Key risk to the thesis:

- **Regulatory and Policy Dependence**: Praj's core ethanol and bioenergy businesses are significantly influenced by government policies, subsidies, and mandates such as the Ethanol Blending Program (EBP). Any reversal, delay, or ambiguity in these policies, especially in key markets like India or other developing nations, could adversely impact order inflows and project execution timelines.
- **Execution Risk in New Technologies**: Praj is expanding into advanced areas like CBG, SAF, bio-bitumen, and bioplastics. These emerging technologies involve longer gestation periods, evolving regulatory frameworks, and uncertain demand curves. Delays or technical setbacks in scaling or commercializing these solutions could affect growth expectations.
- **International Market Risks**: As Praj expands globally, it is exposed to geopolitical risks, currency fluctuations, and compliance with international norms and certifications. Failure to navigate these effectively could impact overseas growth and profitability.
- **Technological Disruption**: The biofuel and clean-tech space is fast-evolving. Competing technologies (such as green hydrogen or electric mobility) could divert attention and funding away from biofuels, potentially diminishing the addressable market for Praj's solutions over the long term.

Key Management Personnels Details

Dr. Pramod Chaudhari (Promoter, Chairman): Founder of Praj Industries, Dr. Chaudhari is a Distinguished Alumnus of IIT Bombay and an alumnus of Harvard Business School (AMP). Since 1983, he has led Praj's growth into a global bioeconomy-focused engineering firm. With over 40 years of leadership in clean and green technologies, he has received several accolades, including the George Washington Carver Award (2020). He has also held roles in bodies like the World Bioeconomy Forum, Indian Federation of Green Energy, etc.

Mr. Shishir Joshipura (CEO, Managing Director): A Mechanical Engineer from BITS Pilani and an Advanced Management Graduate from Harvard Business School, Mr. Joshipura brings ~40 years of experience across engineering sectors. Before joining Praj in 2018, he served as Managing Director of SKF India and held several key leadership roles at Thermax, culminating as Executive Vice President. He is a founding director of the Alliance for Energy Efficient Economy (AEEE) and actively contributes to bioenergy and sustainability advocacy through roles in industry bodies like CII. *Mr. Shishir is expected to retire as CEO at the end of his tenure around June 30, 2025, with Mr. Ashish Gaikwad to succeed him in the role as Managing Director of the company.*

Mr. Ashish Gaikwad (Managing Director - Designate): An Electrical & Electronics Engineer from BITS Pilani, Mr. Gaikwad brings over 34 years of experience in industrial automation, digitalization, and energy transition. He spent a major part of his career at Honeywell, including as Managing Director of Honeywell Automation India Ltd., holding leadership roles across geographies such as India, Southeast Asia, Asia Pacific, and the USA.

Mr. Sachin Raole (CFO & Director of Resources): He is a Chartered Accountant and Cost Accountant with over 30 years of experience across manufacturing, pharmaceuticals, project businesses, and financial services. His areas of expertise include corporate finance, M&A, treasury, and restructuring. Before joining Praj Industries in 2016, he was the CFO at RPG Life Sciences.

Mr. Venkatesh Rao (Business Head, Liquid Biofuels): Mr. Rao holds a BE in Chemical Engineering from Manipal Institute of Technology and a PGDBM from NMIMS. He has over 21 years of experience across GE Power, Thermax, Frost & Sullivan, and FLSmidth. He joined Praj in 2023.

Mr. Ajay Pratap Singh (Business Head, Gaseous Biofuels): A Chemical Engineer with a postgraduate qualification in Piping Engineering from VIT Pune, along with certifications in International Business. He brings around 21 years of experience across India and the EMEA region. He joined Praj in 2025 from Tata Consulting Engineering.

Mr. Abhijit Dani (Chief Business Officer and Wholetime Director, Praj GenX Ltd): A Mechanical Engineer with an MBA in Marketing and Finance, and a Fulbright Scholar from Carnegie Mellon University. He joined Praj in 2009 and has led the engineering division to a lot of milestones across the hydrocarbon, biotech, and chemicals sectors.

Mr. Mihir Mehta (Wholetime Director, Praj HiPurity Systems): A Mechanical Engineer from Mumbai University and a Fulbright Scholar from Carnegie Mellon University. He is a recognized expert in pharmaceutical and water systems, with a credit of over 550 water plants and 200+ critical process plants installed In India and globally.

Mr. Vasudeo Joshi (Head of Operations, Liquid Biofuels): A Chemical Engineer with over 33 years of experience in biofuels, dairy, and food processing industries. He has been associated with Praj for more than 24 years, contributing across business development, engineering, and project execution. He played a key role in commissioning Praj's 2G ethanol demonstration plant.

Mr. Ghanashyam Deshpande (President – Technology and Engineering): Mr. Deshpande holds a Master's degree in Chemical Engineering from ICT, Mumbai. He has over 30 years of experience in advanced biofuels, process design, and the development of sustainable low-carbon fuel solutions.

Dr. Pramod Kumbhar (Chief Technology Officer, Praj Matrix): Dr. Pramod Kumbhar holds a Ph.D. in Chemical Engineering from ICT, Mumbai, and completed postdoctoral research in France. He has previously held R&D leadership roles at GE and SI Group. He holds multiple patents, has authored over 25 publications, and is a Fellow of the Maharashtra Academy of Sciences.

Appendix: Praj Industries Financials

Exhibit 51: Consolidated Income Statement

Particulars (INR mn)	FY20	FY21	FY22	FY23	FY24	FY25	FY26E	FY27E	FY28E
Operating Revenue	11,024	13,047	23,433	35,280	34,663	32,280	36,497	45,504	58,496
COGS	5,524	7,361	14,637	22,014	19,621	16,546	19,343	23,889	30,418
Gross Profit	**5,500**	**5,686**	**8,796**	**13,266**	**15,042**	**15,734**	**17,153**	**21,614**	**28,078**
Gross Margins	*49.9%*	*43.6%*	*37.5%*	*37.6%*	*43.4%*	*48.7%*	*47.0%*	*47.5%*	*48.0%*
Employee Benefit Expense	1,640	1,722	2,176	2,576	3,187	3,489	3,942	4,914	6,142
Other Expenses	3,080	2,840	4,682	7,612	8,136	9,097	9,580	11,831	15,063
EBITDA	**781**	**1,123**	**1,938**	**3,078**	**3,718**	**3,149**	**3,631**	**4,869**	**6,873**
EBITDA Margins	*7.08%*	*8.61%*	*8.27%*	*8.72%*	*10.73%*	*9.75%*	*9.95%*	*10.70%*	*11.75%*
Depreciation & amortization	218	221	226	302	441	864	937	1,003	1,156
EBIT	**562**	**902**	**1,712**	**2,776**	**3,278**	**2,284**	**2,694**	**3,866**	**5,718**
EBIT Margins	*5.10%*	*6.92%*	*7.31%*	*7.87%*	*9.46%*	*7.08%*	*7.38%*	*8.50%*	*9.77%*
Finance Costs	31	29	25	46	98	188	164	134	120
Interest Income	300	257	241	356	435	508	547	683	731
Exchange (gain) / loss	-	-	(121)	(102)	(160)	(100)	-	-	-
Exceptional Item	-	-	-	-	-	282	-	-	-
PBT	**831**	**1,131**	**2,049**	**3,187**	**3,775**	**2,986**	**3,078**	**4,414**	**6,329**
Tax	127	320	546	789	941	796	782	1,121	1,608
PAT	**704**	**810**	**1,502**	**2,398**	**2,834**	**2,189**	**2,296**	**3,293**	**4,721**
PAT Margin	*6.4%*	*6.2%*	*6.4%*	*6.8%*	*8.2%*	*6.8%*	*6.3%*	*7.2%*	*8.1%*
EPS	**3.85**	**4.42**	**8.18**	**13.05**	**15.42**	**11.91**	**12.49**	**17.92**	**25.69**

Source: Company, MNCL Research Estimates

Exhibit 52: Consolidated Balance Sheet

Particulars (INR mn)	FY20	FY21	FY22	FY23	FY24	FY25	FY26E	FY27E	FY28E
Property, plant & equipment	2,167	2,064	2,085	2,366	4,072	4,465	4,048	5,066	4,435
Capital work-in-progress	21	4	14	69	32	173	-	-	-
Investment property	137	137	137	137	-	-	-	-	-
Goodwill	626	626	626	626	626	626	626	626	626
Intangible assets	8	8	12	39	46	580	559	538	514
Intangible assets UD	-	3	7	1	402	5	5	5	5
Investments	398	398	652	845	945	698	698	698	698
Other Current Assets	279	241	169	173	501	494	482	501	585
Deferred tax assets (net)	181	104	19	111	91	262	262	262	262
Total Non-current Assets	**3,817**	**3,585**	**3,722**	**4,367**	**6,715**	**7,303**	**6,680**	**7,696**	**7,125**
Inventories	1,111	1,289	3,450	3,336	2,209	2,533	2,756	3,273	4,250
Investments	1,237	2,950	3,979	4,584	4,021	3,584	3,584	3,584	3,584
Trade receivables	3,301	4,534	5,118	7,948	6,432	5,560	6,799	8,103	10,257
Cash and cash equivalents	458	1,011	1,075	986	1,684	1,259	2,278	3,699	7,524
Other bank balances	35	313	476	462	443	553	553	553	553
Other current assets	1,656	2,255	4,358	4,503	7,450	10,812	11,062	11,489	11,812
Total Current Assets	**7,799**	**12,354**	**18,455**	**21,820**	**22,240**	**24,301**	**27,031**	**30,700**	**37,980**
Total Assets	**11,616**	**15,938**	**22,178**	**26,187**	**28,954**	**31,604**	**33,712**	**38,396**	**45,105**
Equity share capital	366	366	367	367	368	368	368	368	368
Other equity	6,833	7,659	8,790	10,413	12,378	13,451	14,645	16,836	20,455
Total Equity	**7,199**	**8,025**	**9,158**	**10,781**	**12,746**	**13,819**	**15,013**	**17,203**	**20,822**
Lease liabilities	-	113	148	263	1,417	1,503	1,176	902	786
Other non-current liabilities	323	157	177	138	200	232	232	232	232
Total Non-current Liabilities	**323**	**270**	**324**	**401**	**1,618**	**1,735**	**1,408**	**1,134**	**1,018**
Lease liabilities	-	63	63	159	276	446	392	386	337
Trade payables	1,875	3,416	4,248	5,050	4,968	4,823	5,564	6,545	7,917
Other current liabilities	2,219	3,897	8,084	9,029	8,560	10,395	10,949	12,741	14,624
Total Current Liabilities	**4,094**	**7,643**	**12,696**	**15,005**	**14,591**	**16,049**	**17,291**	**20,058**	**23,264**
Total Equity and Liabilities	**11,616**	**15,938**	**22,178**	**26,187**	**28,954**	**31,604**	**33,712**	**38,396**	**45,105**

Source: Company, MNCL Research Estimates

Exhibit 53: Cash Flow Statement

Particulars (INR mn)	FY20	FY21	FY22	FY23	FY24	FY25	FY26E	FY27E	FY28E
PBT	831	1,131	2,049	3,187	3,775	2,986	3,078	4,414	6,329
D&A	218	221	226	302	441	864	937	1,003	1,156
Finance Costs	24	22	19	42	-	185	164	134	120
Other Adjustments	14	(134)	(190)	(63)	(206)	(576)	-	-	-
Changes in Working Capital	(763)	1,159	223	(1,222)	(971)	(2,000)	(404)	506	(284)
Income Tax	(178)	(149)	(450)	(625)	(1,045)	(1,028)	(782)	(1,121)	(1,608)
CFO	**147**	**2,251**	**1,877**	**1,621**	**1,994**	**430**	**2,993**	**4,936**	**5,713**
Purchase of PPE	(71)	(87)	(185)	(352)	(893)	(870)	(327)	(2,000)	(500)
Interest received	105	70	87	80	159	149	-	-	-
Other Adjustments	587	(1,626)	(1,299)	(572)	632	1,434	-	-	-
CFI	**621**	**(1,643)**	**(1,397)**	**(844)**	**(101)**	**712**	**(327)**	**(2,000)**	**(500)**
FCF	**76**	**2,164**	**1,691**	**1,269**	**1,101**	**(441)**	**2,666**	**2,936**	**5,213**
Proceeds from ESOPs	26	3	26	4	9	-	-	-	-
Dividend paid	(949)	(4)	(397)	(771)	(827)	(1,102)	(1,102)	(1,102)	(1,102)
Long-term borrowings	(0)	-	-	-	-	-	-	-	-
Short-term borrowings	-	-	-	-	-	-	-	-	-
Interest on Lease Liability	(24)	(22)	(19)	(31)	(94)	(180)	(164)	(134)	(120)
Lease payment	(32)	(40)	(54)	(125)	(327)	(322)	(381)	(279)	(165)
Interest paid	(0)	-	(0)	(11)	(0)	(4)	-	-	-
CFF	**(980)**	**(63)**	**(444)**	**(934)**	**(1,239)**	**(1,608)**	**(1,648)**	**(1,515)**	**(1,387)**
Net Changes and FX Effects	**(177)**	**553**	**63**	**(89)**	**698**	**(425)**	**1,019**	**1,421**	**3,826**
Beginning CCE	636	458	1,011	1,075	986	1,684	1,259	2,278	3,699
Ending CCE	**458**	**1,011**	**1,075**	**986**	**1,684**	**1,259**	**2,278**	**3,699**	**7,524**

Source: Company, MNCL Research Estimates

Exhibit 54: Key Ratios

Particulars	FY20	FY21	FY22	FY23	FY24	FY25	FY26E	FY27E	FY28E
Growth %									
Operating Revenue	-3.4%	18.4%	79.6%	50.6%	-1.8%	-6.9%	13.1%	24.7%	28.6%
EBITDA	-1.6%	43.9%	72.5%	58.8%	20.8%	-15.3%	15.3%	34.1%	41.2%
EBIT	-0.3%	60.5%	89.7%	62.1%	18.1%	-30.3%	18.0%	43.5%	47.9%
PAT	3.3%	15.1%	85.4%	59.6%	18.2%	-22.7%	4.9%	43.4%	43.4%
Margins %									
EBITDA	7.1%	8.6%	8.3%	8.7%	10.7%	9.8%	10.0%	10.7%	11.8%
EBIT	5.1%	6.9%	7.3%	7.9%	9.5%	7.1%	7.4%	8.5%	9.8%
PAT	6.4%	6.2%	6.4%	6.8%	8.2%	6.8%	6.3%	7.2%	8.1%
Returns Ratio %									
ROAE	9.6%	10.6%	17.5%	24.1%	24.1%	16.5%	15.9%	20.4%	24.8%
ROACE	7.4%	11.4%	19.3%	26.9%	25.7%	15.3%	16.9%	22.2%	28.5%
Leverage Ratio									
Asset/Liability	2.63x	2.01x	1.70x	1.70x	1.79x	1.78x	1.80x	1.81x	1.86x
Debt to Equity	0.00x	0.02x	0.02x	0.04x	0.13x	0.14x	0.10x	0.07x	0.05x
Net Debt to Equity	-0.07x	-0.14x	-0.15x	-0.10x	-0.03x	0.01x	-0.08x	-0.17x	-0.33x
Interest coverage	18.15x	31.58x	68.28x	59.96x	33.49x	12.13x	16.44x	28.86x	47.66x
CFO/EBITDA	0.19x	2.00x	0.97x	0.53x	0.54x	0.14x	0.82x	1.01x	0.83x

Source: Company, MNCL Research Estimates

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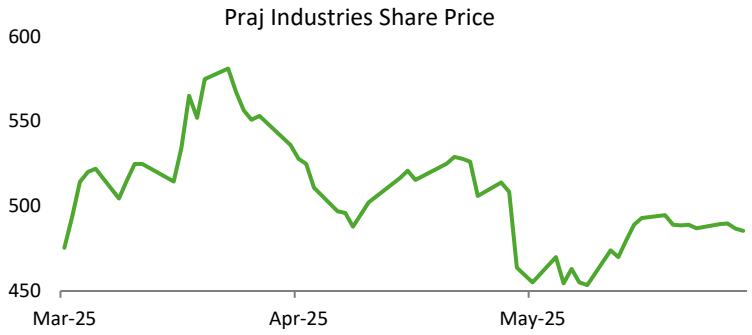

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