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Report Name: India Biofuels Market - Opportunities and Challenges in a Changing Energy and Agricultural Landscape

Country: India

Post: New Delhi

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Report Highlights:

India's biofuels sector is advancing rapidly with strong government support. However, it faces challenges including feedstock variability, environmental concerns, and policy shifts that have caused uneven capacity utilization and resource competition. The expansion of sugar and grain-based ethanol production creates significant opportunities for U.S. stakeholders, particularly in exporting industrial ethanol supplies and advanced biofuel technologies. India has established Sustainable Aviation Fuel blending targets for international flights and is building domestic production capacity through strategic partnerships. Additionally, India is developing Sustainable Marine Fuel alternatives—including green hydrogen, ammonia, methanol, and biofuels. India Energy Week 2026 highlighted India's status as a major energy player with significant opportunities for the U.S. in energy technologies and alternative fuels.

Executive Summary:
India's rapidly evolving biofuels sector presents significant opportunities for U.S. agriculture, including in advanced biofuels, and animal nutrition. Ambitious government policies, rising energy demand, and commitments to lower carbon emissions are driving this transformation. U.S. exporters of industrial ethanol, related technologies, and animal feed products are well-positioned to help India meet growing demand as it expands production capacity and diversifies feedstock sources.

Realizing the full potential of this market will require sustained policy engagement, technical cooperation on regulatory standards, and innovative partnership models. Implementation details and regulatory harmonization will require ongoing attention.

India has achieved remarkable progress in ethanol blending. The country reached its E20 target (20 percent ethanol in gasoline) in June 2025—five months ahead of schedule—through aggressive expansion of both sugar-based and grain-based ethanol production. This success has strengthened sugar mills financially, enabled timely payments to farmers, and created hundreds of thousands of rural jobs.

Yet this rapid expansion has created challenges. The government's corn incentives are linked to a production surge that crashed domestic corn prices to half the minimum support price (MSP). Ethanol companies earn healthy profits while farmers sell at unsustainably low prices, sparking widespread protests in major producing states. Meanwhile, nearly half of India's installed ethanol production capacity sits idle due to feedstock supply volatility and regulatory obstacles. Without clear blending targets beyond E20, this underutilization threatens infrastructure investments and recent economic gains.

India's clean energy ambitions extend beyond road transport. The government has mandated that international flights use 1 percent Sustainable Aviation Fuel (SAF) by 2027, rising to 5 percent by 2030. The maritime sector is also transitioning to cleaner fuels under Maritime India Vision 2030 and Amrit Kaal Vision 2047, with policies promoting green hydrogen, ammonia, methanol, and biofuels for shipping, though officials have not yet set specific blending requirements.

As the world's third-largest energy consumer—a status reinforced at India Energy Week 2026—India offers substantial opportunities for U.S. companies across multiple sectors. Key future opportunities include:

- **Industrial ethanol and advanced biofuels:** SAF and marine fuels
- **Animal feed products**: Distillers dried grains with solubles (DDGS)
- **Other agricultural commodities**: to include potential for increased imports of oilseeds, pulses, and non-GE feed grains as farmers shift land to sugarcane and corn for ethanol

Introduction: India's government has made biofuels a national priority to diversify energy sources and boost farmer incomes. The strategy converts agricultural waste and surplus crops into fuel, creating new revenue streams for rural communities. Through its National Policy on Biofuels (2018), the government launched the Ethanol Blending Program (EBP), which set an ambitious target: a 20 percent blend rate of ethanol into gasoline (E20) by 2025. To achieve this goal, the government offered financial incentives and soft loans that encouraged sugar mills and grain-based distilleries to expand their production capacity. The strategy worked. India reached the E20 target in June 2025—five months ahead of schedule. This achievement marks a significant step toward cleaner energy, reduced dependence on imported oil, and stronger rural economies.

India's Ethanol Ecosystem: In January 2026, India continued to make progress and achieved a national average ethanol blending rate slightly above 20 percent, blending over 10.4 billion liters (BL) of ethanol into petrol. Industry sources expect the blend rate to exceed 23 percent by the end of the 2026 calendar year. Early achievement of the E20 target resulted from increased and diversified feedstock availability, including sugarcane, corn, and surplus rice. Despite this progress, India faces technical challenges in achieving uniform E20 blending nationwide due to regional disparities in feedstock supply and logistics. While national feedstock availability is sufficient, regional differences in fuel consumption and supply complicate implementation.

India has shifted from relying mainly on sugarcane to sourcing nearly half of its ethanol feedstock from grains, especially corn (46 percent) and rice from the Food Corporation of India (FCI) (15 percent). In the 2024/25 cycle, India contracted 5.2 BL of ethanol from corn and 1.68 BL from FCI rice. Actual receipts stood at 4.78 BL from corn and 1.32 BL from FCI rice, reflecting robust procurement but also some logistical constraints. According to market sources, almost 7 million metric tons (MMT) of corn could be diverted for ethanol and the remaining from FCI rice for the current year. This shift toward grain-based feedstocks ensures year-round production and supplements sugarcane-derived ethanol. The diversification balances food and fuel needs and stabilizes supply chains, but seasonal and regional fluctuations in feedstock availability continue to affect consistent ethanol production.

Evolution of Feedstock Market Dynamics: India's ethanol feedstock sources have shifted dramatically in response to weather patterns and policy changes. Sugar mills initially drove ethanol production using surplus sugar stocks. However, when the government accelerated its E20 target from 2030 to 2025, the strategy hit a climate obstacle: droughts sharply reduced sugarcane output.

The government responded by diverting Food Corporation of India (FCI) rice to ethanol production. But drought struck again in the 2023/24 season, lowering rice yields and forcing another pivot. Officials turned to corn, a more drought-resistant crop. To encourage farmers to plant corn, the government raised the corn-to-ethanol incentive to INR 71.86 per liter in ESY

2025 and maintained this rate in ESY 2026. It also increased the minimum support price (MSP) for corn to INR 2,400 per quintal while raising rice support prices.

These incentives worked—but created trade-offs. Farmers shifted land from millets, pulses, and oilseeds to corn, chasing better prices (see Table 1). According to the Ministry of Agriculture & Farmers Welfare, corn acreage and output rose 12 percent in 2024 and 2025, while oilseed acreage dropped 10 percent.

The weather pattern has now shifted again. In 2025, La Niña brought above-average rainfall, boosting sugarcane and rice production and increasing their availability as ethanol feedstocks. Forecasters expect similar weather patterns in 2026, which should support strong sugarcane and rice yields and ensure a robust feedstock supply.

Table 1: Ethanol Price for ESY 2022/23, 2023/24, 2024/25 and 2025/26 (INR per Liter)

Feedstock	ESY 2022/23	ESY 2023/24	ESY 2024/25	ESY 2025/26
Sugarcane Juice/Sugar Syrup/Sugar	65.61	65.61	65.61	65.61
B-Heavy Molasses	60.73	60.73	60.73	60.73
C-Heavy Molasses	49.41	56.28	57.97	57.97
Damaged Food Grains	55.54	64	64	64
Corn	-	66	71.86	71.86
Surplus Rice (from Food Corporation of India)	58.50	58.50	58.50	60.32

Source: MoPNG

Market Impacts and Farmer Response: The government's focus on corn incentives succeeded. Farmers planted so much corn that production surged, creating a market glut. Corn prices fell sharply—sometimes dropping to half the MSP—and high market arrivals continue to depress prices further.

Meanwhile, ethanol producers have shifted their preferences. They increasingly favor FCI rice over corn because rice delivers a higher conversion rate to ethanol (see Table 2). The government reinforced this trend by raising the price for ethanol produced from FCI rice in ESY 2025/26, making rice an even more attractive feedstock.[1] This policy change has increased demand for rice and further incentivized its use.

Sugarcane, however, remains the preferred feedstock overall. Sugar mills favor it for its high conversion efficiency and well-established supply chains. Although the government kept ethanol

[1] [1] "Sugar sector hit as ethanol prices from cane feedstocks remain unchanged". Business Line. Published on September 24, 2025

prices from molasses unchanged for ESY 2025/26, sugarcane's consistent availability ensures it remains a reliable choice for producers.

Table 2: Feedstock to Ethanol Conversion Table

Damaged Food Grains – 1 MT = 250 liters
Broken Rice – 1 MT = 440 liters
Sugarcane Juice – 1 MT = 76 liters
B-Heavy Molasses – 1 MT = 300 liters
C-Heavy Molasses – 1 MT = 217 liters
Corn/Maize – 1 MT = 380 liters
Ethanol – 1 MT = 1,270 liters

Source: FAS New Delhi Research

However, in ethanol supply year (ESY) 2024/25, grain-based ethanol production surpassed traditional molasses-based ethanol for the first time, driven by drought-induced sugarcane shortages. The government kept ethanol prices from corn unchanged for the current ESY, but these prices have remained the highest for two years. Corn also delivers the second-best conversion rate to ethanol after FCI rice, making it technically attractive to producers.

This combination — high ethanol prices and a 12 percent MSP increase — convinced farmers to expand corn acreage by 12 percent. However, market dynamics turned when the industry started to anticipate cheaper imports of U.S. feedstock for fuel use in ESY 2025/26. Then domestic corn prices crashed to less than half the MSP. Ethanol companies now earn healthy profits while farmers sell their corn at unsustainably low prices.

The price collapse has triggered widespread farmer protests, especially in major ethanol-producing states like Madhya Pradesh, Uttar Pradesh, and Maharashtra. State governments have responded by demanding a Maize Control Order—similar to the Sugar Control Order—to guarantee farmers fair prices.

The corn diversion has created another problem. The animal feed industry, which traditionally consumes 70 percent of India's corn output, now faces tighter supplies as ethanol producers claim a growing share of the crop.

Ethanol Production Capacity and Utilization Challenges: While farmers struggle with low corn prices, ethanol producers have been expanding rapidly. Over the last two years, Post has observed the proliferation of grain-based distilleries throughout India, with significant concentrations in Rajasthan, Bihar, Punjab, and Maharashtra.

These new distilleries follow an unusual location pattern. Investors do not locate them near key feedstock sources like corn fields or rice-growing regions. Instead, distilleries source raw

materials from surrounding regions or neighboring states. This strategy offers procurement flexibility but introduces logistical challenges—higher transportation costs and potential supply chain disruptions. The trend shows how distilleries leverage broader regional grain surpluses rather than relying on local production alone, increasingly integrating with national supply networks and affecting market prices and agricultural patterns across state lines.

Despite these heavy investments in new distilleries and upgrades to existing facilities, India's ethanol sector operates at only 40-45 percent capacity. Feedstock supply volatility and regulatory obstacles frequently idle production facilities. Post has observed that distilleries can access grain from across India, but they are not consistently operational.

Policy Reforms and Future Roadmap: Recognizing these logistical and operational challenges, the government is considering several policy reforms to support the next phase of ethanol expansion. Proposed measures include modifying the Goods and Services Tax (GST) on ethanol and related products, introducing incentives for flex-fuel and hybrid vehicles, and strengthening regulatory support for advanced biofuels. These reforms aim to create a more predictable investment environment and encourage technological innovation that could improve capacity utilization.

Feedstock Priorities Going Forward: As noted, corn has emerged as the dominant grain feedstock, accounting for nearly half of all contracted grain-based supply. Government procurement policies and distillery support have encouraged farmers to increase corn cultivation despite current price challenges. FCI rice allocations, while significant, depend on food security considerations and surplus management policies. Looking ahead, corn and sugarcane will likely remain the primary ethanol sources, with rice playing a supplementary role in years of surplus stocks.

Opportunities for U.S. Exporters: India's evolving ethanol ecosystem presents significant opportunities for U.S. exporters across multiple fronts. As India seeks to bridge supply gaps and adopt advanced production technologies, U.S. suppliers can contribute through technology transfer, joint ventures, and supply agreements. For example, the state of Iowa signed a Memorandum of Understanding (MoU) with Maharashtra in 2025, establishing a Sister-State partnership to promote cooperation in agriculture, food processing, renewable energy, and other sectors.

The distillers dried grains with solubles (DDGS) market offers another promising avenue. India's growing ethanol industry has surged production of DDGS, a valuable co-product used in animal feed. In 2024/25, DDGS production from corn reached 4.15 million metric tons (MMT). However, as domestic demand for animal feed rises—driven by expanding dairy, poultry, and aquaculture sectors—India may face supply gaps, particularly when corn diverts from feed to

fuel. This can leave opportunities for U.S. exporters of DDGS to supplement India's feed market during periods of tight domestic supply or price volatility. The evolving dynamics of government procurement, feedstock allocation, and co-product utilization will continue to shape both India's domestic agricultural markets and international trade flows, creating ongoing opportunities for U.S. engagement.

Sugar Sector Expansion: Impacts on Ethanol and Feed Markets: India's sugar industry has built impressive ethanol production capacity—exceeding 9 billion liters (BL) annually, enough to meet about half of the country's petrol blending needs. The Ethanol Blending Program (EBP) has strengthened sugar mills financially, enabling them to pay sugarcane farmers on time and create hundreds of thousands of rural jobs. Ethanol suppliers have offered 17.76 BL for ESY 2025/26—enough for a 32 percent blend—far exceeding the 10.48 BL demand for E20 blending. Yet nearly half of the installed ethanol production capacity sits idle. Without clear future blending targets beyond E20, this underutilization threatens to waste infrastructure investments, reduce mill revenues, and delay farmer payments—putting recent economic and social gains at risk.

Additionally, Sugar mills face mounting financial pressure. Since 2019, the minimum support price (MSP) for sugarcane has increased almost 30 percent, but the sugar MSP has remained fixed at INR 3,100 per quintal. Production costs now exceed selling prices, making sustainable operations difficult for many mills. Industry associations have urged the government to raise the sugar MSP to INR 40 per kilogram to reflect rising input costs. The government has responded partially by setting the Fair and Remunerative Price (FRP) for sugarcane at INR 355 per quintal for MY 2025/26—a 4 percent increase from the previous season.

Despite forecasts of a strong sugarcane crop in 2025/26, the government has cut the allocation of sugar-based ethanol for ESY 2025/26 to 2.89 BL (28 percent of projected 10.5 BL total output), down from 3.15 BL in ESY 2024/25. This decision will divert only 3.4 MMT of sugar to ethanol, likely creating a domestic surplus. The government has authorized exports of 1.5 MMT of sugar to address this surplus. The weakening Indian rupee against the U.S. dollar makes Indian sugar more competitive internationally, and countries such as Afghanistan and Sri Lanka have expressed interest in imports. The government is also discussing an additional 1 MMT export authorization to stabilize domestic prices and support mills.

Long-Term Expansion Plans: In the long-term, to support sugarcane farmers and meet biofuel targets, the government plans to establish 150 new sugar mills by 2047. This expansion is expected to increase demand for sugarcane and provide farmers with more stable and potentially higher incomes. States such as Uttar Pradesh, Karnataka, Uttarakhand, Haryana, and Punjab have already raised their state advised prices (SAP) for sugarcane to incentivize cultivation.

The expansion is also expected to increase production of molasses and bagasse, supporting ethanol production and creating opportunities for U.S. exporters of enzymes, yeast, and advanced

processing technologies. Surplus bagasse could open markets for U.S. firms specializing in biomass energy or value-added co-products.

Trade-offs and Import Opportunities: As sugarcane and corn cultivation expands for fuel ethanol, farmers are expected to continue a land shift away from other crops like soybeans, cotton, and pulses. This could tighten domestic food supplies and increase India's reliance on imports. U.S. exporters of oilseeds, pulses, and non-GE feed grains may find new opportunities if domestic production cannot keep pace with rising demand from both food and biofuel sectors.

Advanced Biofuels: Aviation and Maritime: India's energy ambitions extend beyond road transport. The government has established mandatory Sustainable Aviation Fuel (SAF) blending requirements for international flights: 1 percent by 2027, 2 percent by 2028, and 5 percent by 2030. These targets support India's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) commitments and emissions reduction objectives.

Private sector engagement is accelerating. Air India has partnered with Indian Oil Corporation to secure SAF supplies toward the 2030 target and the aviation industry's net-zero emissions goal by 2050. TruAlt Bioenergy Limited will deploy Honeywell's Ethanol-to-Jet technology to establish an 80,000 metric ton-per-annum SAF facility—one of India's first purpose-built SAF plants using ethanol feedstock. Companies such as LanzaTech and Honeywell are exploring SAF and carbon recycling solutions.

India is also advancing sustainable marine fuels to achieve objectives outlined in Maritime India Vision 2030 and Amrit Kaal Vision 2047. While the government has not yet established specific blending mandates, priority initiatives emphasize deploying alternative fuels including green hydrogen, ammonia, methanol, and biofuels.

India's Energy Leadership: India Energy Week 2026 highlighted India's position as the world's third-largest energy consumer and fourth-largest refiner. The event emphasized India's resilience in navigating global energy market volatility through diversified supply sources and transitions toward cleaner fuels. Officials recognized innovation across startups and industry while reaffirming India's role as a stable energy leader balancing security, affordability, and sustainability with emphasis on hydrocarbon and nuclear energy sectors. This presents opportunities for U.S. energy technologies, equipment, and expertise across hydrocarbon, nuclear, and renewable sectors.

Conclusion: India's rapid progress in ethanol blending and agricultural transformation creates both significant opportunities and complex challenges for global stakeholders. The expansion of sugar and grain-based ethanol production, ambitious government targets, and evolving regulatory frameworks have fostered a dynamic market with strong potential for ethanol, feedstocks, and advanced technologies. Key opportunities include rising demand for reliable industrial ethanol supply, advanced biofuel technologies, and high-quality animal feed co-products.

Success in this market depends on sustained, proactive engagement with Indian policymakers, industry leaders, and cooperatives, as well as willingness to adapt to local needs and regulatory changes. Innovation—both in product offerings and partnership models—will be essential to capturing India's market potential. By leveraging U.S. strengths in technology, sustainability, and supply chain management, stakeholders can help shape India's biofuel future while advancing shared economic and energy security goals under the newly strengthened bilateral partnership.

Attachments:

No Attachments.