

# IEA-Advanced Motor Fuels ANNUAL REPORT 2025

## INDIA



## India

### **Drivers & Policies**

India is among the world's largest energy consumers and is a major driver of the growth in global energy demand. According to the International Energy Agency (IEA) World Energy Outlook 2025, India's gross domestic product (GDP) is projected to grow at an annual rate of 6.1% over the next decade — faster than any other major economy — underpinning a sustained rise in energy demand. While India's energy system remains dominated by fossil fuels, their share is expected to decline progressively under various transition scenarios. At the same time, total energy demand is projected to more than double by 2050, reflecting industrialization, urbanization, and rising incomes.<sup>1</sup>

India has pledged to achieve net-zero emissions by 2070 and has adopted several short-term targets in pursuit of this goal, including expanding non-fossil power generation capacity under its Nationally Determined Contributions (NDC).<sup>2</sup> India achieved a landmark in its energy transition journey by reaching 50% of its installed electricity capacity from non-fossil fuel sources in June 2025 — more than five years ahead of its NDC target — signaling a structural shift in its energy mix.<sup>1</sup>

Currently, India imports over 88% of its crude oil and about 50% of its natural gas.<sup>3</sup> Growing concern about the nation's dependence on imported fuel, in tandem with environmental pollution issues, has driven India's need for alternative fuels. India plans to reduce import dependency in the oil and gas sectors by adopting a five-pronged strategy: increasing domestic production, adopting biofuels and renewables, establishing energy-efficiency norms, improving refinery processes, and implementing demand substitution.

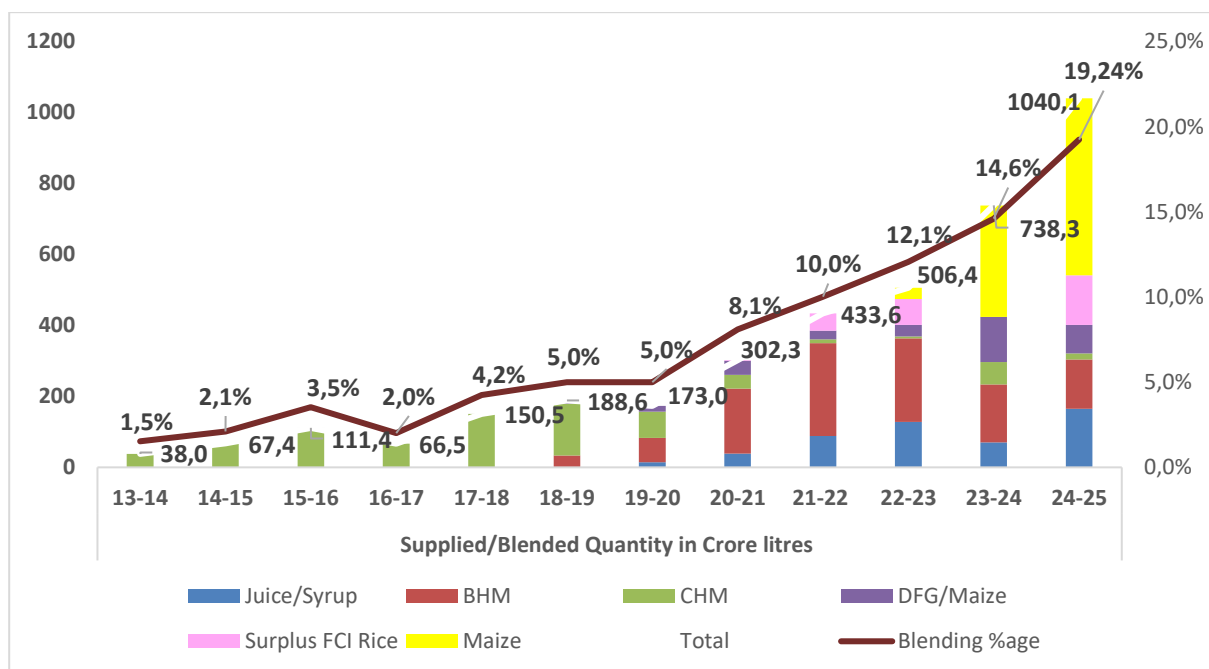
India has implemented a comprehensive policy framework to promote the use of biofuels and alternative fuels, anchored in the National Policy on Biofuels (NPB) (2018, amended 2022). The policy aims to achieve 20% ethanol blending in petrol by ethanol supply year (ESY) 2025–2026 and 5% biodiesel blending in diesel by 2030. Additional key targets include a phased compressed biogas (CBG) blending obligation in city gas distribution (CGD) networks, reaching 5% by 2028–2029, and the introduction of sustainable aviation fuel (SAF) blending in aviation turbine fuel (ATF), with targets of 1% in 2027, 2% in 2028, and 5% by 2030, initially applicable to international flights.

### **Advanced Motor Fuels Statistics**

#### **Ethanol Blended Petrol Programme**

India has adopted a structured and policy-driven approach to decarbonising the transport sector, anchored in the “Roadmap for Ethanol Blending in India 2020–2025,” which outlines a target to achieve 20% ethanol blending in petrol (E20) by ESY 2025–2026. In line with this roadmap, the government has permitted oil marketing companies (OMCs) to sell E20 fuel beginning 15 December 2022. Under the Ethanol Blended Petrol (EBP) Programme, public sector OMCs achieved a record average blending rate of 19.24% in ESY 2024–2025, with the 20% blending target effectively realized in 2025 — five years ahead of the original 2030 timeline.

The Government of India has taken several steps to increase the production and use of ethanol, including permitting procurement of ethanol produced from damaged and surplus grains, sugar diversion, and non-food feedstocks. The government has adopted an administered price mechanism for ethanol procurement under the EBP Programme, providing incentives for use of maize as a feedstock by prioritizing its procurement and encouraging the establishment of dedicated ethanol plants (DEPs). During ESY 2024–2025, ethanol distillation capacity increased substantially, reaching 19.9 billion litres per year in February 2026. Interventions over the last decade have facilitated the increase in blending percentage from 1.53% to 20%, making India the third-largest producer of ethanol in the world (see Figure 1).



BHM: B-heavy molasses, CHM: C-heavy molasses, DFG: damaged food grain, FCI: Food Corporation of India

Note 1: Public sector OMCs (Indian Oil Corporation Ltd. [IOCL], Bharat Petroleum Corporation Ltd. [BPCL], Hindustan Petroleum Corporation Ltd. [HPCL], Numaligarh Refinery Limited [NRL], and Mangalore Refinery and Petrochemicals Limited [MRPL]).

Note 2: ESY was defined as December–November until ESY 2022–2023; in ESY 2023–2024, it was revised to November–October.

**Figure 1. Trends in ethanol procurement/blending by public sector OMCs under EBP Programme, including different feedstocks (ESY 2013–2014 to 2024–2025)**

### Advanced Biofuels

The Government of India launched “Pradhan Mantri JI-VAN (JaivIndhan-Vatavaran Anukoolfasalawashesh Nivaran) Yojana” to provide financial assistance of approximately \$250 million USD from 2018–2019 to 2023–2024 (now extended to 2028–2029) to support commercial, as well as demonstration, projects for advanced biofuels. Financial assistance of about \$90 million USD has been approved for five commercial and four demonstration 2G ethanol plants, including public and private sector companies. India has commissioned multiple 2G ethanol projects, including IOCL’s Panipat plant (2022), NRL’s bamboo-based facility at Numaligarh (2025), and BPCL’s Bargarh plant (2026). HPCL’s Bathinda project is completed and expected to be operational in 2026. Further, in September 2025, the government of India notified the export policy for 2G ethanol, permitting its export under the “restricted” category.

### Biodiesel

In June 2017, the government allowed the direct sale of biodiesel (B-100) for blending with high-speed diesel to all consumers, in accordance with specified blending limits and Bureau of Indian Standards (BIS) requirements. The government issued “Guidelines for Sale of Biodiesel for Blending with High-Speed Diesel for Transportation Purposes 2019” on May 1, 2019. Biodiesel procurement increased from 0.6 million litres in FY2021–2022 (April 2021–March 2022) to 366.9 million litres in FY 2024–2025.

### Sustainable Aviation Fuel

The government has set indicative targets of 1%, 2%, and 5% blending of SAF in ATF initially for international flights effective in 2027, 2028, and 2030, respectively. To achieve these targets, OMCs are establishing plants at various locations. IOCL became the first Indian company to receive International Sustainability and Carbon Certification (ISCC) Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) for SAF production at its Panipat Refinery in August 2025; the company is expected to start production in 2026. Other public sector companies like BPCL and HPCL are also working for their ISCC SAF certification and are expected to begin production by the end of

2026. Further, Air India and IOCL signed a memorandum of understanding (MoU) to supply SAF, marking a significant step toward sustainable aviation.

#### **Compressed Biogas**

As part of an initiative under the NPB-2018, the Sustainable Alternative Towards Affordable Transportation (SATAT) initiative was launched in October 2018 to promote the use of CBG along with natural gas. India has also adopted a “whole-of-government” approach for the promotion and establishment of CBG projects under the GOBARdhan initiative.

The government has enabled CBG deployment through measures such as assured offtake pricing via long-term agreements with oil and gas marketing companies (OGMCs), financial support under the National Bio Energy Programme, additional assistance for municipal solid waste (MSW)-based projects under Swachh Bharat Mission Urban 2.0, recognition of bio-manure under the Fertilizer Control Order, market development assistance for organic fertilizers, regulatory facilitation (e.g., “White Category” classification), priority sector lending by the Reserve Bank of India (RBI) and dedicated bank financing of CBG projects.

Further support includes guidelines for CBG integration into CGD networks, pipeline infrastructure schemes, biomass aggregation machinery (BAM) schemes, and phased mandatory blending of CBG in the compressed natural gas (CNG) (transport)/piped natural gas (PNG) (domestic) segment of the CGD network. The CBG obligation will be 1%, 3%, and 4% of total CNG (transport)/PNG (domestic) consumption for FYs 2025–2026, 2026–2027, and 2027–2028, respectively. From FY 2028–2029, the CBG obligation will be 5%.

As of 31 March 2026, 206 CBG plants (~1,733 MT/day capacity) have been commissioned, while 319 additional plants are at various stages of construction.

#### **Green Hydrogen**

The government approved the National Green Hydrogen Mission (NGHM) on 4 January, 2023, with a total financial investment of approximately 2.5 billion USD (₹ 19,744 crore). This mission aims to scale up domestic production to 5 million metric tonnes per annum by 2030.

Under NGHM, five pilot projects have been sanctioned for deployment of 37 hydrogen-fueled vehicles (buses and trucks) with 9 hydrogen refueling stations (HRSs) along 10 different routes across India. The total financial support that the government of India will make available for selected projects will be around 22 million USD (INR 208 crore). These pilot projects are likely to be commissioned in the next 18–24 months, paving the way to the scaleup of such technologies in India.

### ***International Cooperation***

#### **Global Biofuel Alliance**

The Global Biofuels Alliance (GBA) is a unique multi-stakeholder alliance, launched during India’s G20 presidency in September 2023 in the presence of the leaders of nine countries, as the Chair’s initiative. GBA aims to enhance global development and deployment of sustainable biofuels by bringing together the biggest consumers and producers.

Since its inception, GBA has received tremendous enthusiasm. Supported by 19 countries and 12 international organizations at launch, the alliance has since expanded its membership to include 33 countries and 14 international organizations, with a trajectory of ongoing growth and membership interest from more countries. In addition, the alliance has been receiving tremendous support from industry, both in India and abroad.

### ***Research and Demonstration Focus***

Several organizations — the Centre for High Technology (CHT) (Technical Wing of the Ministry of Petroleum and Natural Gas [MoP&NG]); the Department of Biotechnology (DBT), Centre of Excellence in Oil, Gas and Energy IIT Bombay; and the Council of Scientific and Industrial Research – Indian Institute of Petroleum (CSIR-IIP), Dehradun — are working on different programs to support research and development (R&D) in renewable energy, with a major emphasis on advanced biofuels,

green hydrogen, etc. R&D centers of the oil and gas sector under MoP&NG have been developing cutting-edge technologies for clean energy and decarbonization of the energy sector. The major initiatives include the following:

- Production of Green H<sub>2</sub> using different pathways (biomass gasification, solar electrolysis, and steam methane reforming).
- In-house technology development at demonstration scale for 2G ethanol, CBG, and SAF.
- Technology development of batteries, fuel cells, electrolyzers, carbon capture, and new materials such as carbon nano tubes (CNTs), etc.
- Indigenous SAF production technology developed by IIP (Drop-in Liquid Sustainable Aviation Fuel and Automotive Fuel [DILSAAF]) is currently undergoing ASTM approval. In addition, HPCL has developed and patented the HP Trijet technology, which enables the conversion of used cooking oil (UCO) into SAF.
- HPCL, in collaboration with a private company, is working on utilizing seaweed as a feedstock for biocrude production and has conducted a continuous hydrothermal liquefaction trial.

## Outlook

The outlook for biofuels in India remains promising, considering the government's strong policy support and promotion of biofuels. Public sector OMCs reached ethanol blending of 10.4 billion liters in ESY 2024–2025, resulting in the highest-ever average blending percentage of 19.24%. The early achievement of 20% ethanol blending (E20) in 2025 marks a structural milestone, demonstrating the effectiveness of coordinated supply-side interventions, pricing mechanisms, and policy-driven demand mandates. Encouraged by this achievement, the Indian government is in the process of formulating a roadmap for Ethanol Blending beyond 2026. For the current ESY 2025–2026, the projected annual demand for ethanol is estimated at more than 12 billion liters. In addition, fuel suitable for flex-fuel vehicles is being made available at more than 400 retail locations across the country.

The SATAT initiative is helping India to reduce its dependence on fossil fuels, increase the share of gas in primary energy consumption, and integrate the vast retail network of companies with upcoming CBG projects. Overall, the CBG sector in India is witnessing strong growth, supported by a robust policy framework, expanding infrastructure, and increasing private sector participation. The government's phased program to blend CBG with natural gas in the CGD network will increase the use of CBG to 5% by 2028–2029.

The advanced biofuels segment, including 2G ethanol and SAF, is entering an early commercialization phase. Commissioning of multiple 2G plants and the preparedness of SAF production facilities by public sector OMCs signal the beginning of a domestic value chain for SAF.

These initiatives have already begun to impact India's biofuel industry. In the coming years, the advanced biofuel sector is expected to see significant progress in transport deployment, increased investments, project development, and strengthened R&D efforts.

## Additional Information Sources

- <sup>1</sup> [Scenarios Towards Viksit Bharat and Net Zero: An Overview](#)
- <sup>2</sup> [IEA World Energy Outlook 2025](#)
- <sup>3</sup> [www.ppac.gov.in](http://www.ppac.gov.in) for data on fossil fuels production, consumption, import and export
- <https://mopng.gov.in/en> for data related to the petroleum sector
- <https://mnre.gov.in/> for data related to green hydrogen
- <https://www.siamindia.com> for data on the automotive industry
- [Roadmap for Ethanol Blending in India 2020–2025](#)
- India Energy Scenario for 2023–2024 by BEE
- National Policy on Biofuels 2018 (amended in 2022).