IEA Bioenergy ExCo-98 Meeting

15th October 2026

Bioenergy Situation in India

Role in the energy system and strategies for regional collaboration collaboration



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Biofuels merely alternative resources?

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~88%
of crude oil is imported

~50%
of natural gas is imported

20%
ethanol blending target

2070
net-zero climate goal

Energy Security

- Cuts import dependence on crude oil and gas
- Firm, non-intermittent baseload green power
- Decarbonizes aviation and heavy transport via SAF and CBG

Environmental Impact

- Turns stubble and crop residue into 2G ethanol and CBG
- Converts municipal, animal and organic waste into biogas and bio-fertilizer
- Builds a circular economy through schemes like GOBARdhan

Rural Prosperity

- Gives biomass a market value, lifting farmers' incomes
- Creates local green jobs at regional plants
- Backed by the National Bioenergy Programme

Driving Global Decarbonisation India's Biofuel Revolution

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- **Push started from 2001 onwards**
- **National Policy on Biofuels announced in 2009**
- **National Policy on Biofuels, 2018 (amended in 2022)**
  - 20% Ethanol Blending in Petrol by 2025-26
  - 5% Biodiesel Blending in Diesel by 2030
  - Promotion of Advanced Biofuels, SAF

E20 Milestone

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2014 — 1
Blending at **1.5%** (38 crore litres ethanol)

2019 — 2
E10 availability pan India

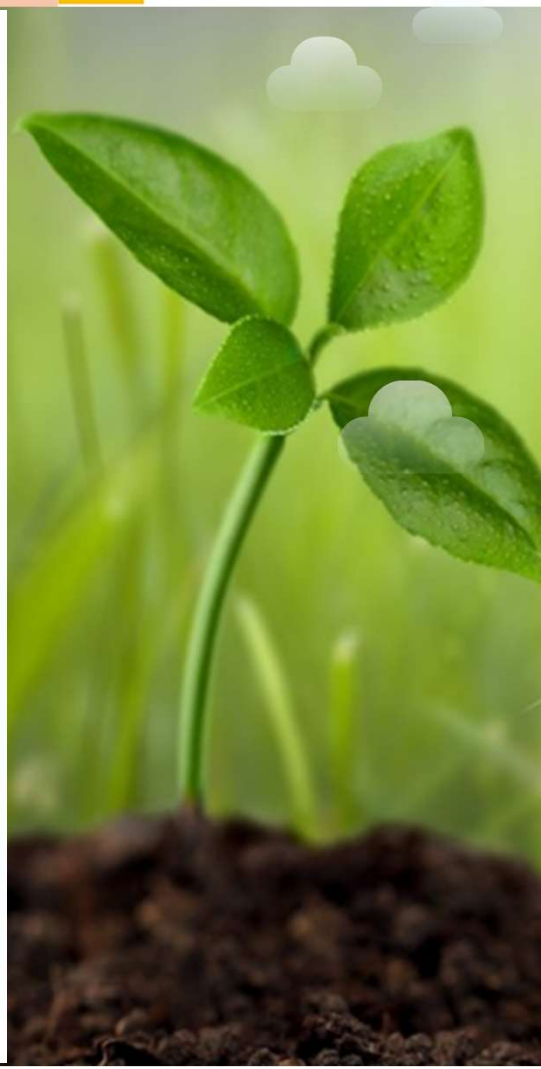
3 — **2021**
NITI Aayog Roadmap released

2023 — 4
Mandatory E20-ready vehicles begin production

5 — **2025**
Achieved **20% blending (E20)** — 5 years ahead of schedule

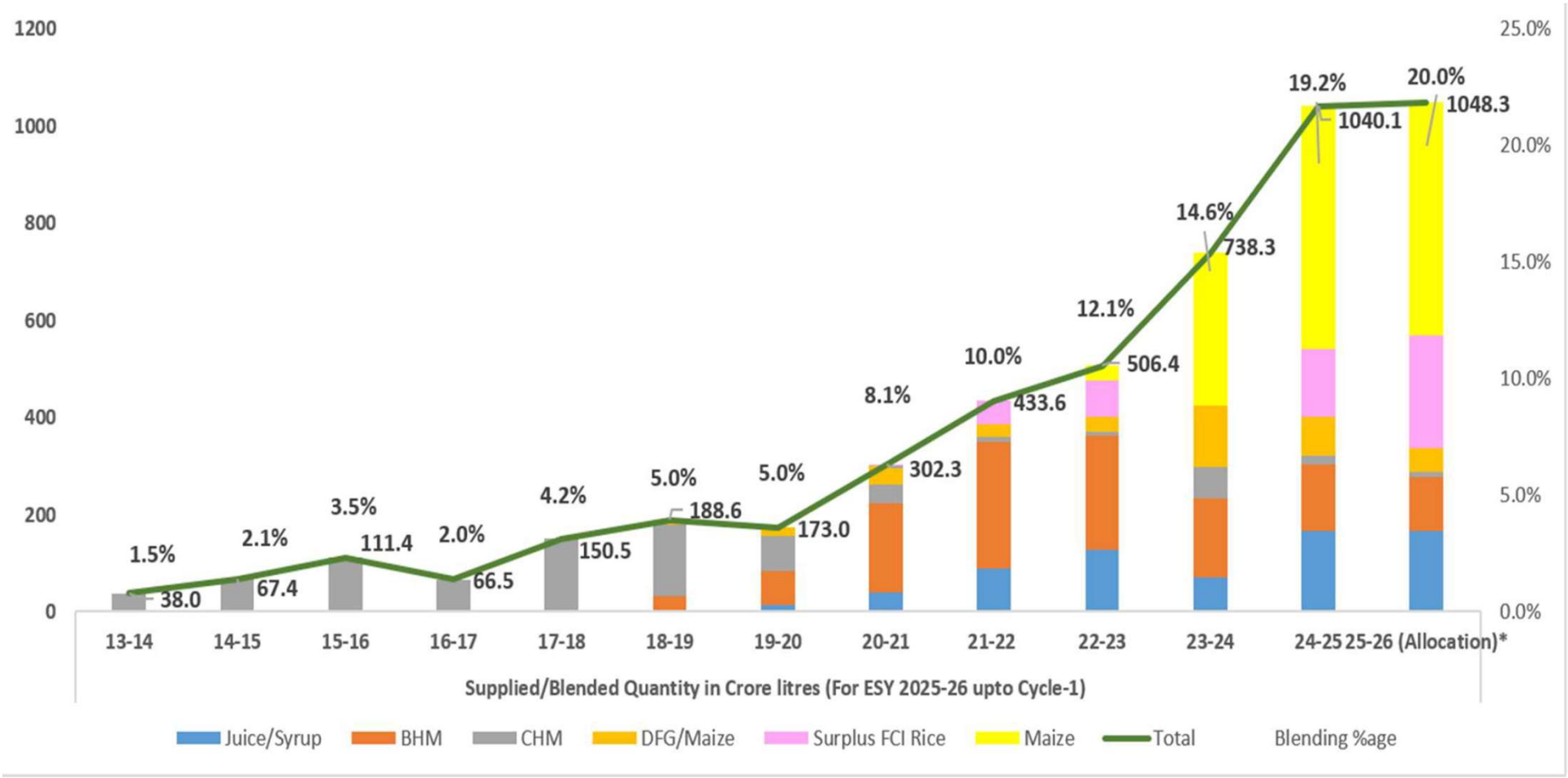
2026 — 6
Production reached **more than 1,000 crore litres ethanol**

Future beyond E20 will be based on IMC report, stakeholder consultations, and Govt's final decision



Blending Performance under EBP Prgm – from 2013-14

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Supplied/Blended Ethanol Quantity and Blending % — ESY 2013-14 to 2025-26 (Cycle-1)

Policy at the cornerstone

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Rs. 1.7+ lakh core payment to farmers
Farmers now earn as "Urjadaatas"

993 lakh metric tones CO2 reduction

Rs. 2+ lakh crore saving in Forex

330 lakh metric tones Crude oil substitution

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Feedstock Diversification & Shift towards 2G ethanol

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Pradhan Mantri JI-VAN Yojana (Scheme)-2019 (amended in 2024)

₹1,969.50 crore

Total scheme outlay (~USD 225 million), 2018-19 to 2028-29

10 + 7

Projects approved for financial assistance: Ten commercial-scale and Seven demonstration-scale 2G ethanol

Purpose: financial assistance (FA) for setting up integrated bio-ethanol projects using lignocellulosic biomass and other renewable feedstocks. FA is available to both public and private sector companies.

Second Generation (2G) ethanol plant status

Plant	Capacity	Status
Panipat (commercial)	100 KLPD	Commissioned in 2022
Numaligarh (commercial)	185 KLPD	Commissioned in 2025
Bargarh (commercial)	100 KLPD	Commissioned in 2026
Bathinda (commercial)	100 KLPD	Mechanically completed in 2026
Panipat (demo plant)	2.5 KLPD	Final stage of commissioning

Biodiesel Blending Programme

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- Government in 2019, notified the "Guidelines for Sale of Biodiesel for Blending with High-Speed Diesel for Transportation Purposes"
- To encourage further investment in biodiesel production, the GST rate on biodiesel supplied to Oil Marketing Companies (OMCs) for blending with diesel was reduced from **12% to 5%** starting in October 2021.
- **Production**:
  - Commercial transesterification plants using **non-edible oils/animal fats/UCO**;
  - Installed production capacity: 579 crore lt
  - **Feedstock networks**: RUCO (FSSAI) + OMC procurement channels for **used cooking oil (UCO)**; multiple LOIs issued to UCO aggregators and biodiesel units
  - ~94% of the Biodiesel in the country is produced using Palm Stearin Oil (PSO) as feedstock..

India's CBG Potential and Strategic Relevance

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CBG is produced from biomass and waste organic material

India's CBG Opportunity

4-6 MMT

Near-term CBG potential

20%

of NG imports can be substituted by CBG

Strategic Importance of CBG

1. **Energy Security**
   (currently ~50% import dependence for gas)
2. **Environmental outcomes**
   (methane cuts, cleaner air)
3. **Circular economy**
   (waste to wealth, soil restoration)
4. **Rural and Peri-Urban development**

Earlier Schemes have laid the foundation for CBG

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- Earlier SATAT scheme was launched on 1.10.2018 by Ministry of Petroleum and Natural Gas to promote CBG
- Envisages production of 15 MMTPA CBG and 50 MMTPA bio-fertilizer production **(Estimated forex saving would be ~USD 9 billion/INR 75,000 crore)**

Ministry	Scheme
Ministry of New and Renewable Energy	Central Financial Assistance (CFA)
Department of Fertilizers	Market Development Assistance (MDA)
Ministry of Petroleum & Natural Gas	Biomass Aggregation Machinery (BAM)
	Development of Pipeline Infrastructure (DPI)
	CBG-CGD Synchronization Scheme
	Sustainable Alternative Towards Affordable Transportation (SATAT)

Current State of the Sector

217 **Operational plants**
(Installed capacity:~1773 TPD)

328 **Under construction**
(Proposed capacity:~2778 TPD)

20 **Plants connected through pipelines**

550 **CBG retail outlets**

GOBARdhan Scheme: 1 Ministry , 1 Payment and 1 Policy

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Scheme Components

1
CBG Offtake Assurance Mechanism

Plant mapping to CGD entities and provision for firm offtake



2
CBG Pricing Framework

Administered CBG Price of **₹2,110/MMBtu**



3
Capital Assistance for CBG Projects

Up to ₹2.0 Cr/TPD: 1.25 Cr/TPD for plant, 0.75 Cr/ TPD for feedstock + organic manure machinery



4
Development of Pipeline Infrastructure

50% capex support for CGD connectivity; **80% support** for trunk pipeline connectivity



5
Credit Guarantee Support

85% credit guarantee for eligible MSMEs; up to **₹20 Cr / ₹25 Cr**



6
Ecosystem Challenge Fund

District incentives + technology/ ecosystem funding



Total Scheme Outlay: ₹23,731 crore

Frontiers for 2026 and beyond: SAF

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- To align with CORSIA requirements, India has set indicative SAF blending targets

  1% by 2027,

  2% by 2028,

  5% by 2030, (initially for International Flight)



- India's first commercial flight using an indigenously produced SAF blended ATF was successfully operated between Pune and Delhi on 19th May, 2023.

- IOCL's Panipat Refinery and BPCL's Mumbai refinery received ISCC CORSIA certification for SAF co-production in August 2025 and in May 2026 respectively.



- Memorandums of Understanding (MoUs) signed with airlines for the supply of SAF.

Estimated SAF Demand in India

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Year	Indian Industry: Demand						
	ATF Demand for Flights on International Routes (Million Ltr PA)			SAF-ATF Blend Rate (%)	SAF Demand (Million Ltrs PA)		
	International Airlines	Domestic Airlines	Total		International Airlines	Domestic Airlines on Intnl. Routes	Total
2027	4790	3090	**7890**	1%	48	30	**79**
2028	5130	3310	**8440**	2%	102	66	**168**
2030	5860	3780	**9640**	5%	292	189	**481**

OMC's plan to produce SAF

- 12.15 Cr. Litre per annum through co-processing utilising Used Cooking oil(UCO) as feedstock in the existing refineries
- 50.95 Cr. Litre per annum through new stand alone plants using UCO and 1G ethanol
- Total = About 63 Cr. Litre per annum.

Corporate Average Fuel Efficiency (CAFÉ) Norms

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- CAFÉ norms were first notified by the Government in 2017, under the Energy Conservation Act, 2001 to mitigate fuel consumption by lowering CO_2 emissions.
- These norms are applicable for petrol, diesel, LPG, CNG, hybrid, and electric passenger vehicles with gross vehicle weight (GVW) <3500kgs.
- Paves way for Automobile Manufacturers to adopt fuel efficient alternative and diversify their vehicle fleet leading to reduction in CO2 emissions.

CAFE Norm Phase	Effective Years	Thrust given to newer technology
CAFE-I (Stage I)	2017–18 to 2022	Improved ICE engines, lightweight materials, better aerodynamics, low rolling-resistance tyres
CAFE-II (Stage II)	2022–23 to 2027	Engine downsizing & turbocharging, hybrid/mild-hybrid systems, start-stop systems, improved transmissions (CVT/DCT), EVs
CAFE-III (Stage-III)	2027–28 to 2032	Full hybrids, plug-in hybrids, flex-fuel vehicles (FFVs), EVs, low/zero-emission technologies*

- *Under the proposed CAFÉ-III, a Carbon Neutrality Factor (CNF) of 8% on tailpipe CO_2 emissions shall apply to petrol vehicles operating on E20–E30 blends; a CNF of 22.3% shall apply to Flex Fuel Ethanol Vehicles and Strong Hybrid Electric Vehicles (Flex Fuel Ethanol); and for CNG vehicles, a CNF of 5% or the CBG blending percentage as notified by MoP&NG, whichever is higher, shall be applicable.
- FFVs shall be eligible for super credits through a volume derogation factor of 1.5, thereby providing additional compliance flexibility to manufacturers.

Vision of an Integrated Asia-Pacific Bioeconomy

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From resource diversity to regional circularity.

Seeking collaboration on:

1. Development of cost effective cellulosic enzymatic solution and 2G ethanol cost reduction.

2. Integration of Biomass aggregation and supply chain network

3. Development of Carbon Accounting framework for SAF

Bioeconomy Delivers Multiple Benefits

- Climate change mitigation.
- Energy security.
- Rural income generation.
- Waste management and circular economy development.
- Industrial competitiveness.

India's Contribution to a Regional Bioeconomy

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Biomass & circular feedstocks

Agricultural residues, used cooking oil and municipal solid waste.

Technology development

2G ethanol and an emerging SAF ecosystem, including CSIR-IIP technologies.

INDIA

Regional partner

Processing infrastructure

Established refining and fuel-distribution capacity to support scale-up.

Growing aviation market

Potential demand anchor and regional SAF supply-chain partner.

India can be a biomass, refining, technology and aviation-demand hub.



THANK YOU!