

Bioethanol – Exploiting the Potential Now

Prepared for the 22nd International Conference on Renewable Mobility

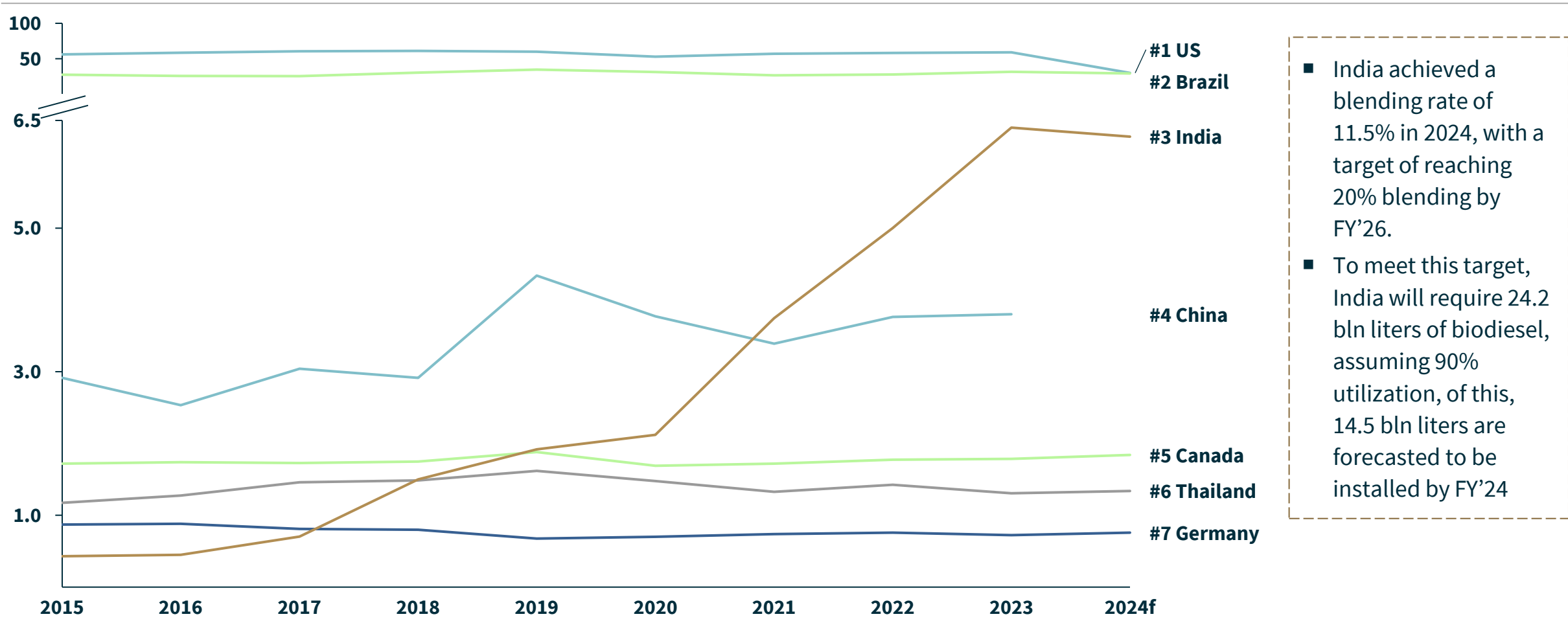
January 2025



ETHANOL PRODUCTION DEVELOPMENT BY COUNTRY

India aims to achieve 20% bioethanol blending by FY'26 to reduce crude oil imports and enhance self-sufficiency and is aggressively pursuing this target as part of its energy independence strategy

ETHANOL PRODUCTION FOR FUEL (BLN LITRES)



- India achieved a blending rate of 11.5% in 2024, with a target of reaching 20% blending by FY'26.
- To meet this target, India will require 24.2 bln liters of biodiesel, assuming 90% utilization, of this, 14.5 bln liters are forecasted to be installed by FY'24

European companies can leverage the potential of Indian biofuel industry by adopted a step-by-step approach, starting with evaluating the biofuel ecosystem, identifying gaps, and evaluating the opportunities

3. Future Targets and Gaps

20% Blending target is set for FY'26, which will require additional capacities of 10 bln litres of ethanol posing challenges in terms of 1G and 2G feedstock

2. Bioethanol Status Quo

India's bioethanol industry is estimated at 7.1 bln litres in 2024 and has achieved 11.5% blending rate using primarily sugarcane-based feedstock and recently started using grain-based feedstock

1. Market Drivers

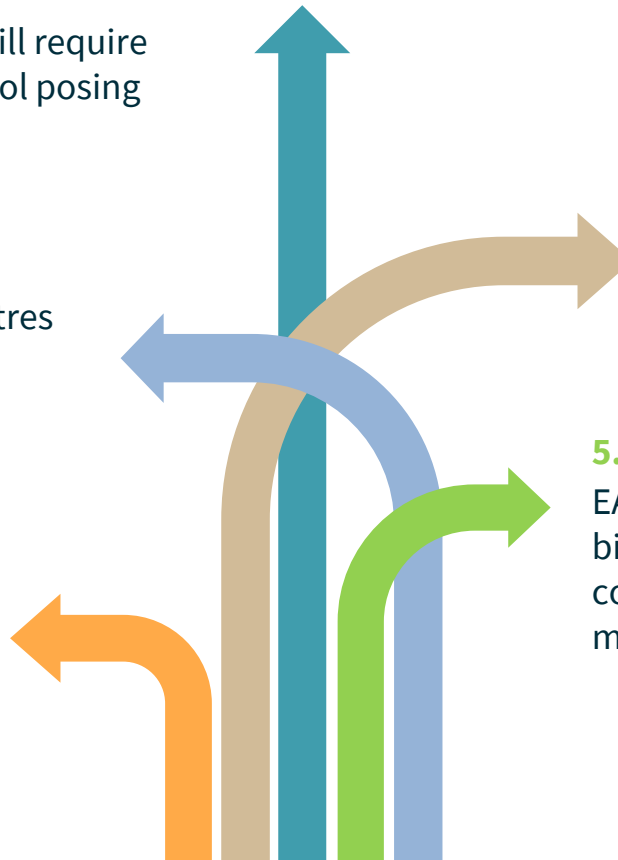
India is aggressively advancing its biofuel initiatives to achieve 20% blending by FY'26 to reduce crude oil imports, enhance energy security by implementing various policies

4. Opportunities

Both greenfield and brownfield opportunities are present for European companies to cater the need of Indian bioethanol Industry

5. EAC As a Partner of Choice

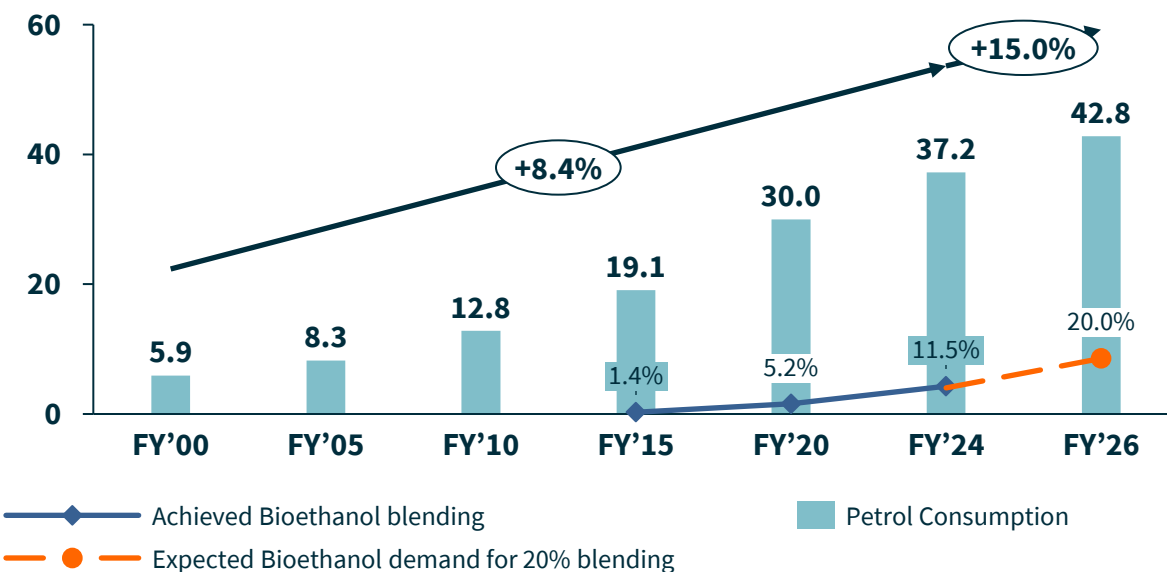
EAC has a strong team with understanding of Indian biofuel industry dynamics and can support companies to evaluate and grow in the Indian market



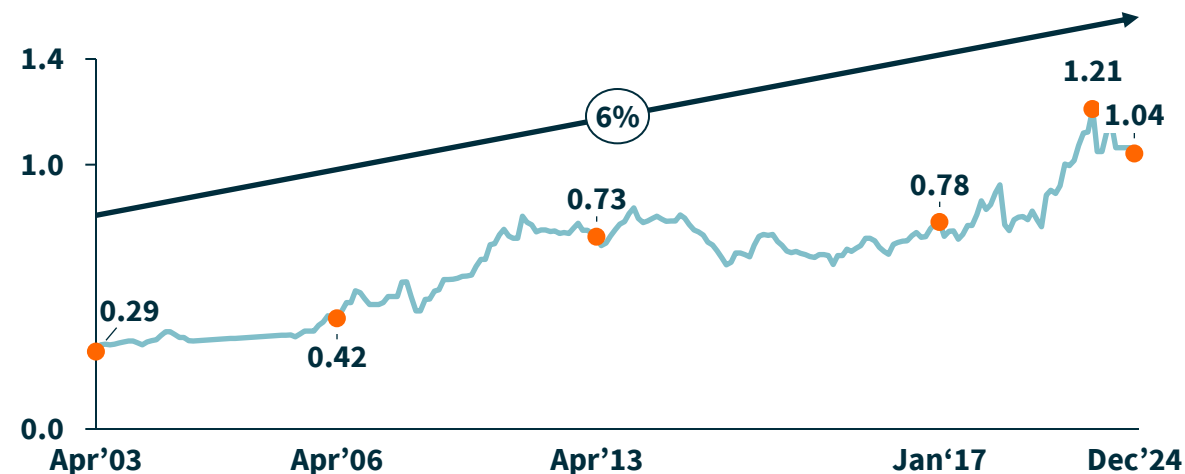
PETROL CONSUMPTION AND PRICE DEVELOPMENT – INDIA

India is aggressively advancing its biofuel initiatives, with a target of 20% ethanol blending by FY'26 to reduce crude oil imports, enhance energy security, and address environmental concerns

PETROL CONSUMPTION IN INDIA, MIO TONNES



PETROL CONSUMPTION IN INDIA, MIO TONNES



- **India is the 3rd largest importer of crude oil** accounting for **11% of globally** after the US and China; **imports ~85% of the crude oil consumption**
- **Petrol prices have grown 4x** from FY'04 to reach 1.04 EUR/Litre in FY23; **Prices are influenced** by factors like **crude oil rates, excise duties and VAT**
- **In 2003, government introduced Ethanol Blended Petrol Program** to boost energy security, cut fuel imports, save forex, address environ. concerns
 - **Target of 20% ethanol blending was advanced from 2030 to FY'26 in 2022** to increase usage of biofuels in the energy and transportation sectors and reduce imports
 - **Achieved 10% blending rate in FY'22 and 11.5% in FY'24**

NATIONAL BIOFUEL POLICY – BIOETHANOL

In 2018, govt. introduced National Biofuel Policy a increase usage of biofuels and as well targets to achieve 20% bioethanol blending by 2030 however, in 2022, govt. advanced the blending target of 20% to be achieve by FY'26 through various feedstocks

TARGET

- **Govt. introduces NBP** which targets **20% blending of bioethanol with petrol by 2030**, encourage sugar mills and stand-alone distilleries to **divert surplus sugar/ sugarcane juice and derivatives and procure excess grains from FCI to produce ethanol under the EBP**
- **2022 amendment** advances the 20% ethanol blending to FY'26 under 2022 amendment, which allow more feedstock for production of various feedstock, promote the production in the country under Make in India initiatives and finally to delete/revise the certain phrases in the Policy

FINANCING



- Offer financial assistance to sugar mills to expand ethanol production capacity
- **Pradhan Mantri JI-VAN** Yojana, a government initiative aimed at providing "viability gap funding" to **2G bioethanol manufacturing** projects with aim to boost ethanol production

FEEDSTOCK



- Various **feedstocks for ethanol production including:**
 - Sugarcane juice and its by products, corn (maize), food grains like broken rice and wheat, non-suitable grains for human consumption,
 - Other non-food sources for 2G

BLENDING



- **Encouraging ethanol blending** to supplement petrol and enabling **sugar mills or standalone distilleries** to enter **long-term agreements** to sell ethanol to **OMCs** at pre-determined rates
- Import of biofuels will not be allowed for blending

PRADHAN MANTRI JI-VAN YOJANA – 2G ETHANOL

Schemes focuses on promoting 2G ethanol production and provide Viability Gap Funding to 2G ethanol projects; Commercial 2G ethanol projects are in advance stages of construction and competition

KEY OBJECTIVE

- **Launched in March 2019**, the objectives of schemes are:
 - **To establish commercial viability** of 2G ethanol and **promote EBP** programme
 - To provide **remunerative income to farmers** for their otherwise waste agricultural residues
 - **Indigenisation of 2G biomass to ethanol technologies**
 - Create **employment opportunities**

FINANCIAL IMPLICATIONS

- **Total financial outlay of 216 mio EUR for period from FY'19 to FY'24**
 - 198 mio EUR has been allocated for supporting **12 Commercial projects**
 - 16.5 mio EUR has been allocated for supporting **10 demonstration projects**
 - 1 mio EUR will be **provided to Centre for High Technology (CHT)** as administrative charges

IMPLICATIONS

- Under this scheme, **12 Commercial Scale and 10 demonstration scale 2G ethanol projects** will be provided a **Viability Gap Funding (VGF)** support in two phases:
 - **Phase-I (2018-19 to 2022-23):** 6 commercial projects and 5 demonstration projects
 - Whereas remaining in **Phase-II (2020-21 to 2023-24)**

KEY HIGHLIGHTS

- Oil CPSEs are setting up 2G ethanol bio-refineries at **Panipat (Haryana), Bathinda (Punjab), Numaligarh (Assam), and Bargarh (Odisha)**
 - Commercial projects at other locations are in **advanced stages of construction**
- **Other companies who have availed financial assistance** under this scheme are BPCL, HPC, Mangalore Refinery and Petrochemicals, Shell India and Numaligarh Refineries

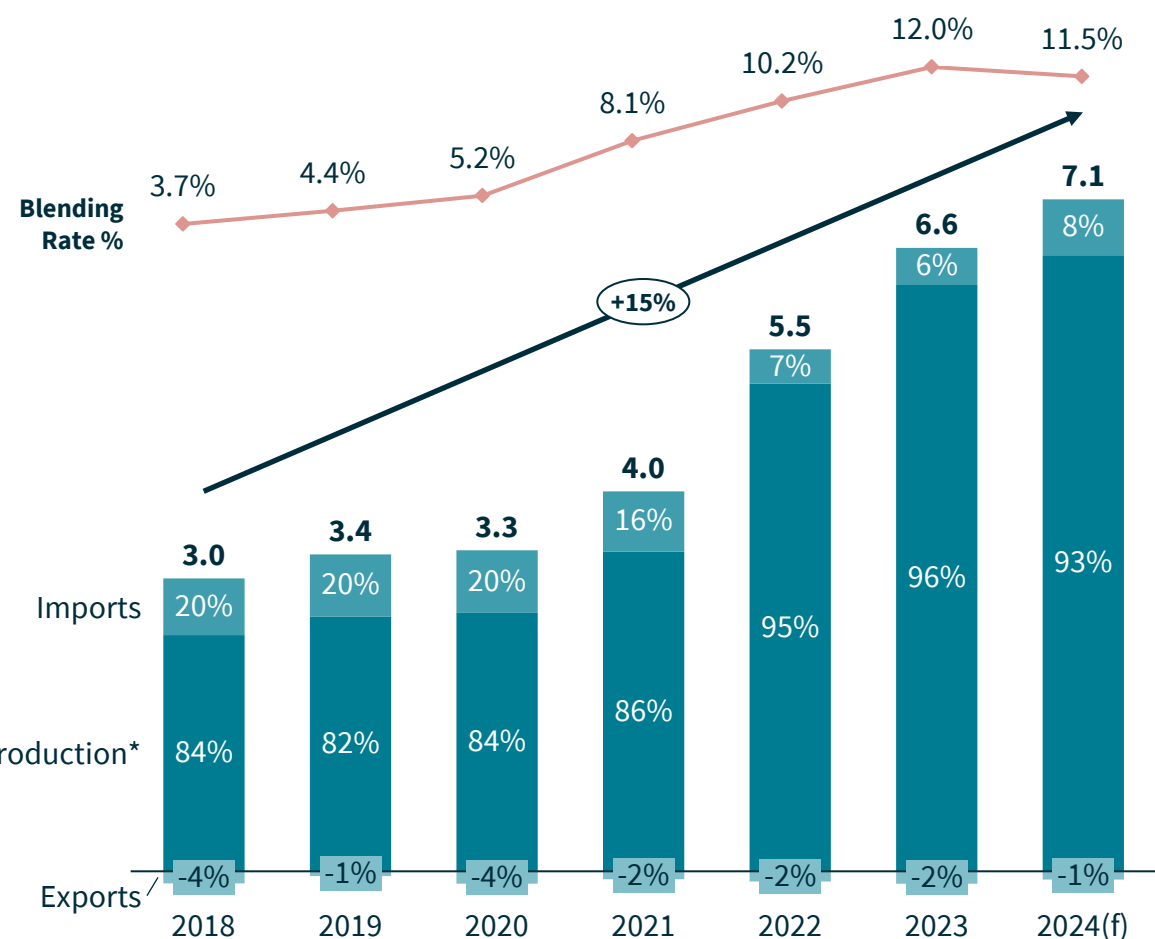
“India is exploring agricultural residues like bamboo, paddy straw, and cotton straw for bioethanol production, but consistent supply is challenging due to the lack of a proper market for these residues. Ethanol yield per tonne ranges from 200 to 240 liters. Ethanol from 2G feedstock commercial projects must be supplied to OMCs for petrol blending”

- General Manager, Globus Spirit Ltd

INDIAN BIOETHANOL INDUSTRY – OVERVIEW

India's bioethanol industry is estimated at 7.1 bln litres in 2024 and has achieved 11.5% blending rate; imports have been impacted due to restrictions from govt. under the National Biofuel Policy 2018 for blending purpose

CONSUMPTION OF BIOETHANOL IN BLN LITRES CY 2018- 2023



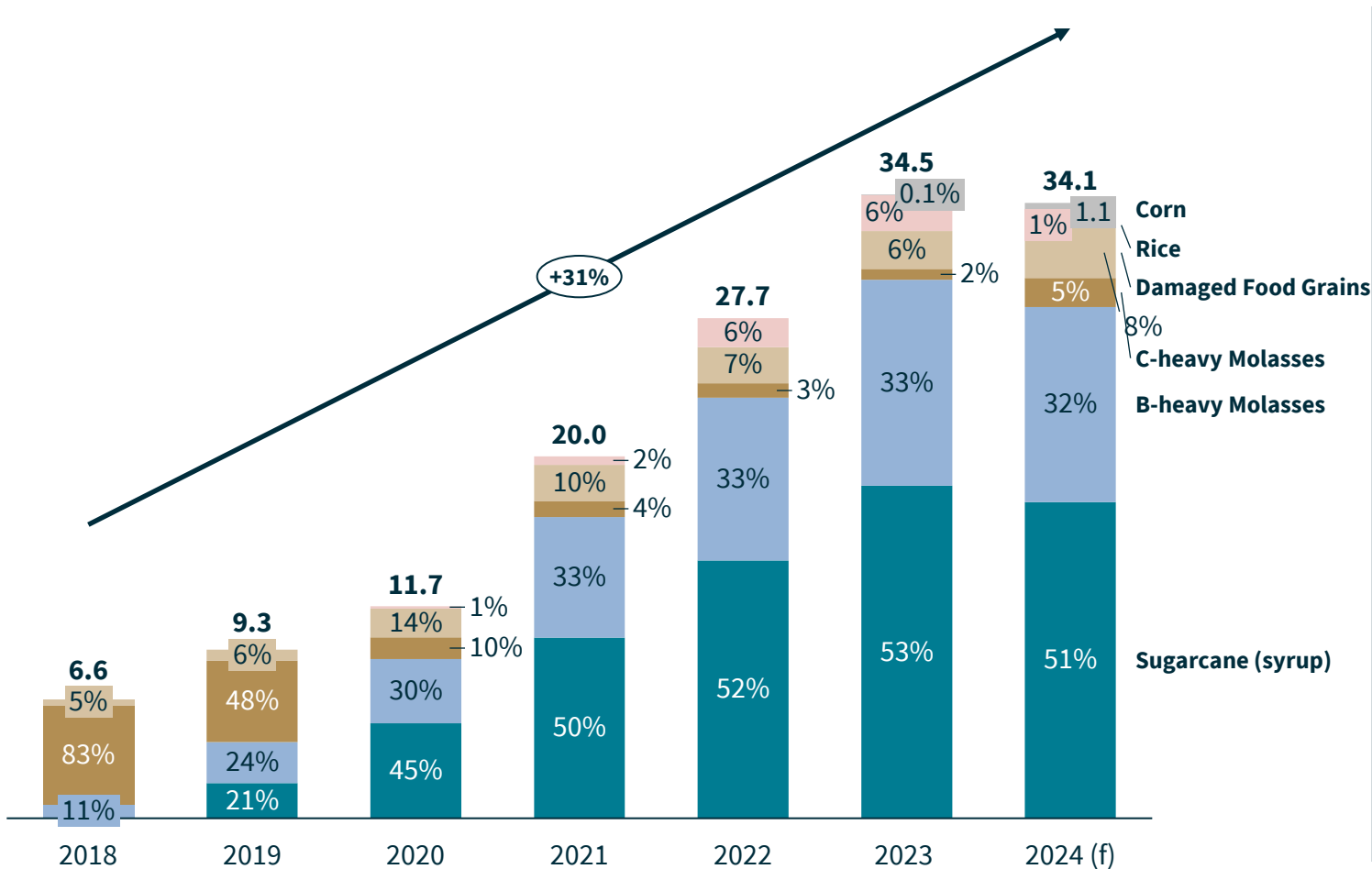
KEY HIGHLIGHTS

- India has achieved blending rate of 11.5% in 2024 and targets to achieve 20% blending rate by 2026
- Fuel remains major applications segment Key applications for bioethanol are fuel, industrial processes, personal care products, food, medical-grade alcohol and portable liquor
- Bioethanol storage capacity of OMCs has increased >6x from 2017 to 2022
 - From 54 mio litres in 2017 to 344 mio litres in 2022
- Imports and exports of bioethanol for blending purpose is banned however industrial usage is exception
 - Imports have reduced since 2020 from 20% to 8% in 2023; US is the largest exporter accounting 90% of total imports
 - India exports are steady in the range of 90 to 130 mio litres for the last five years; African countries are the destination countries
- By 2025, at 20% blending level, ethanol demand will increase to 10.1 bln litres and to comply E20 guidelines govt. is pushing for greater multi-feedstock and grain-based distilleries

BIOETHANOL PRODUCTION – FEEDSTOCK USED

India has significantly moved from C molasses to multiple feedstock through strong govt. support which increased the ethanol production; to achieve 20% blending govt is further pushing for diversion of excess sugar, grain-based and damaged food grains

DOMESTIC FEEDSTOCK USED FOR ETHANOL 2018- 24 (THSD MT)



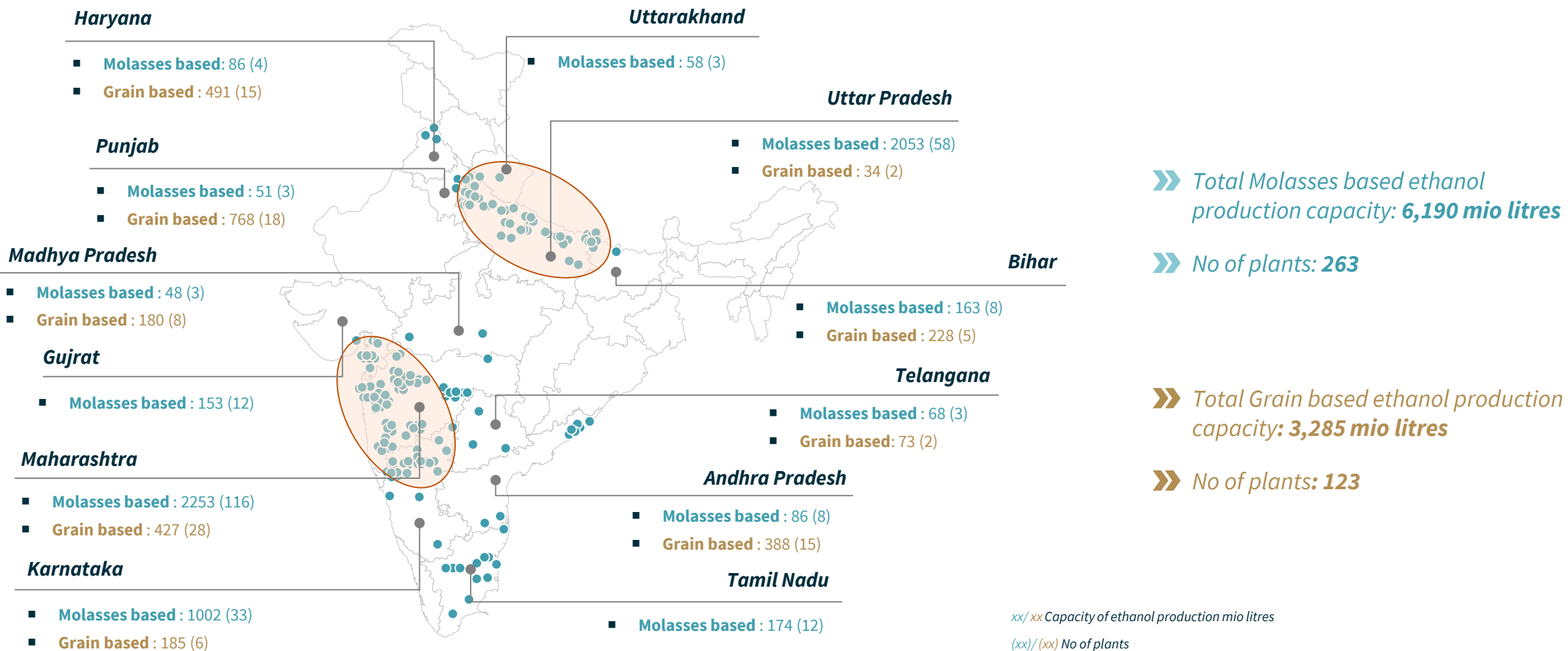
1) Food Corporation of India

KEY HIGHLIGHTS

- National Biofuel Policy 2018 allows feedstock like B-molasses and grain-based feedstock beyond C molasses (100% used until 2017)**
- 2022 amendment further allows corn, maize, damaged grain, broken rice as feedstock that resulted in 25% ethanol production growth from 2022 to 2023**
- Imported Feedstock is banned for blending but could be used for industrial ethanol production**
- Govt. is encouraging to divert excess sugar for ethanol production and allowed feedstock like maize, damaged food grains, and surplus rice with FCI¹⁾ to achieve 20% blending by FY'26**
- Prices of ethanol produced in India are higher in comparison to global players, as cost of various feedstocks are fixed by the government to support the farming community**

ETHANOL PRODUCTION CAPACITY MAPPING – AS OF SEPTEMBER 2022

Ethanol production capacity as of September 2022 stands 9.4 bln litres, Maharashtra is state with highest production capacity and No of plants followed by Uttar Pradesh and Karnataka



DRIVERS FOR SUGAR MILLS OWNERS TO PRODUCE ETHANOL

Commercially viable for sugar mills, added profits, timely payment to farmers, right use of surplus sugarcane/ syrup and strong government push are the reasons encouraging sugar mills to add distillery for ethanol production



COMMERCIAL VIABILITY

- Sugar mills with their own distillery plant are commercially viable due to an uninterrupted supply of feedstock, low prices of feedstock, no logistics cost, utilization of surplus stock; Added profits with ethanol sales



TIMELY PAYMENT TO FARMERS

- Sugar mills struggle with paying farmers due to government-imposed sugar sale limits, but receive timely payments within 21 days from OMCs for ethanol sales, ensuring faster farmer compensation



RIGHT USE OF SURPLUS SUGARCANE

- Diverting surplus sugarcane to ethanol reduces the risk of overproduction, preventing a collapse in sugar prices and protecting sugar mill margins



GOVERNMENT PUSH

- Government is encouraging sugar mills and distilleries **to increase their distillation capabilities** by offering loans from banks, and it covers either 6% interest or half of the interest charged by the banks, whichever is less

“Sugar mills have a surplus of both sugar and sugarcane, so paying credits to farmers and ethanol production carrying warehouse expense becomes a challenge. Therefore ethanol production becomes an attractive options for sugar mill owners, which smoothens the finance inflow and we receive returns on our investments”
-GM Production, Bindals Sugars

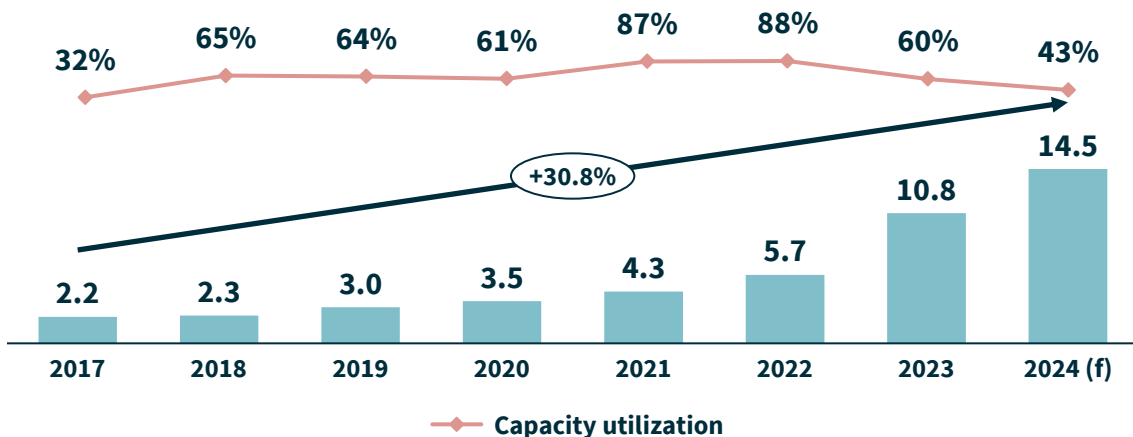
“Ethanol prices are regulated by the government; hence it ensures fixed prices. Whereas sugar prices are volatile in nature and highly influenced by market dynamics”
- GM Manufacturing, Renuka Sugars

“Sugar industry is driven by govt., whereas income from ethanol production is very stable, we get the money from OMCs within 21 days after the delivery of the order, this helps us to make timely payments to farmers”
- General Manager, Mawana Sugars

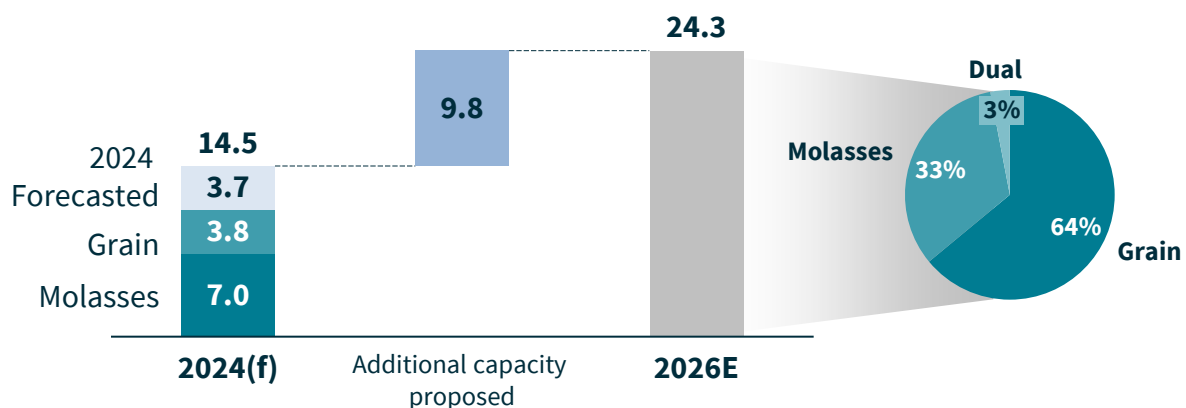
ETHANOL CAPACITY DEVELOPMENT

In 2024 ethanol capacity is forecasted to be 14.5 bln litres with 43% capacity utilization; to achieve the target of E20 10 bln litres of ethanol will be required; the government has approved the proposal of 13 bln litres of capacity in FY'23

CAPACITY DEVELOPMENT OF ETHANOL IN BLN LITRES



CAPACITY DEMAND OF BIOETHANOL IN BLN LITRES



ENABLERS AND CHALLENGES

- Department of Food and Public Distribution** has introduced the financial assistance scheme to increase ethanol production during 2018-2021 aiming to boost the ethanol production capacity
- As of 2023 capacity stands at **10.8 bln litres**
 - ~ **65% molasses based** and ~**35% grain-based** capacity
- Government has also launched an **Ethanol interest subvention scheme in 2020** inviting applications from entrepreneurs to set up ethanol plant
 - 299 proposals** are approved under this scheme in the **FY'23** adding up to **13 bln litres of capacity by 2026**
 - Out of which 3.7 bln litre capacities to be installed in 2024**
 - Additional 10 bln liters** is the ethanol requirement to achieve the E20 target

FEEDSTOCK REMAINS THE KEY CHALLENGE

Low availability of sugarcane-based feedstock for standalone ethanol plants and high supply uncertainty of grains are the challenge for the ethanol producers

Standalone Sugarcane based feedstock plant

Limited Feedstock Availability

- 70-80% of sugar mills have distilleries or ethanol plants, and this figure is expected to rise to 90% in the next 2-3 years. As a result, the availability of sugarcane-based feedstock for standalone ethanol plants is very limited

Low availability of Sugar Syrup & B Molasses

- Good feedstock for ethanol is scarce, as sugar mills sell only C-molasses and reuse B-molasses for sugar production. Contamination of sugar syrup during transport reduces its quality, leading to limited availability of sugar syrup and B-molasses

Grain-based feedstock plant

Supply Uncertainty Of Grains

- The supply of grains like rice, damaged food grains, and maize for ethanol is highly regulated and depends on market demand, leading to fluctuating availability and price increases, making it commercially unviable at times

“Utilizing B molasses for standalone plants is challenging as sugar mills either divert it for ethanol production or use it for sugar, leaving C molasses for the market, while contaminated sugarcane juice requires complex preservation for fermentation”

- GM (Ethanol), Mawana Sugars

“Standalone distilleries face limited access to sugarcane-based feedstock due to sugar mills' self-consumption, while grain supply for ethanol is uncertain, with the government currently restricting rice use and delaying approval for new grain-based distilleries”







- Head of Marketing, ISGEC

“Ethanol in India is mainly produced from sugarcane, with uncertain grain supply for feedstock. The government has restricted rice for ethanol, leading the industry to shift to maize, while other grains like bajra and jowar remain limited”

- GM, Globus Spirit

AVAILABILITY OF FEEDSTOCK IN INDIA

Availability of all feedstock has high-mid attractiveness due to high availability while grains supply is uncertain depending on market dynamics and govt. while sugarcane-based feedstock is mainly consumed by in-house distilleries

Feedstock	SUGARCANE BASED FEEDSTOCK			GRAIN BASED FEEDSTOCK		
	Molasses B	Molasses C	Syrup	Damaged Food Grains	Surplus rice	Maize
Annual demand availability	~29 mio tonnes	19 mio tonnes	69 mio tonnes (~10 to 15% of sugar syrup is used for ethanol)	6 -7 mio tonnes	22 mio tonnes (surplus rice: ~ 17% of total rice produced)	17 mio tonnes (~ 53% of total maize produced)
Current usage as a feedstock for bioethanol	11 mio tonnes (~37%)	0.6 mio tonnes (~2-3%)	18 mio tonnes (~26%)	2 mio tonnes (~30 to 34%)	2 mio tonnes (~9%)	50 thsd tonnes (>1%)
Market Characteristics	<ul style="list-style-type: none"> 6% of the total sugarcane produced Sugar mills must divert 19% of B-molasses for liquor production and rest for ethanol and sugar ~70% sugar mills divert B molasses to own distilleries, while the rest of sugar mills use it for sugar production, leading to non-availability for standalone plant 	<ul style="list-style-type: none"> 4% of the total sugarcane produced Sugar mills must divert 26% of C-molasses for liquor and rest for ethanol Higher yield in molasses B compared to C, the usage of C-molasses has drastically shifted towards molasses B 	<ul style="list-style-type: none"> Sugar mills utilize 10 to 15% of surplus sugarcane for ethanol production With lower yield of 5.5%, sugarcane syrup accounts for 53% of total feedstock used while contributing 19% to ethanol produced 	<ul style="list-style-type: none"> Post 2018, govt. allowed use of damaged grains for ethanol production Broken rice is considered under damaged food grains for ethanol production while majority of grains is used for liquor production 	<ul style="list-style-type: none"> With introduction of multiple feedstocks for ethanol, producers can use surplus rice with FCI for ethanol With starch content of 70%, rice provides the highest yield of ~36% for ethanol production Availability is highly fluctuating based on demand-supply of rice 	<ul style="list-style-type: none"> To reduce dependence on water-intensive crop i.e rice, govt. introduced maize for ethanol production Limited availability due to high volatility in corn trade and majorly used by poultry and starch manufacturer Ethanol producers are selling by-product to feed industry
Availability potential for bioethanol						

Low  High

FEEDSTOCK – PRICES AND OPPURTUNITIES

Grains provides high yield for ethanol production but are highly priced compared to sugarcane-based feedstock; syrup has the lowest yield of 5.5% with low feedstock price

Feedstock	SUGARCANE BASED FEEDSTOCK			GRAIN BASED FEEDSTOCK		
	Molasses B	Molasses C	Syrup	Damaged Food Grains	Surplus rice	Maize
Feedstock Price (EUR/ tonne)	145 – 170	90 – 100	35 – 45	300 – 325	300 – 325	225 – 250
Yield (%)	23-25%	17-19%	~5%	30-32%	~35%	~ 30%
+ Favourable Factors	<ul style="list-style-type: none"> High yield compared to other sugarcane-based feedstock 	<ul style="list-style-type: none"> Low-cost feedstock 	<ul style="list-style-type: none"> Low-cost feedstock 	<ul style="list-style-type: none"> High yield 	<ul style="list-style-type: none"> Provides the highest yield of all the feedstock due to high starch content 	<ul style="list-style-type: none"> High yield
- Un-favourable Factors	<ul style="list-style-type: none"> Low availability for standalone ethanol plants Highly priced compared to other sugarcane-based feedstock 	<ul style="list-style-type: none"> Low yield 	<ul style="list-style-type: none"> Not recommended for standalone plants as syrup gets contaminated during transport Lowest yield of all the feedstock 	<ul style="list-style-type: none"> Uncertain availability of feedstock High price feedstock 	<ul style="list-style-type: none"> Uncertain availability of feedstock High price feedstock 	<ul style="list-style-type: none"> Limited availability as majorly used by poultry and starch manufacturer High price feedstock

BIOFUEL OPPORTUNITIES FOR EUROPEAN COMPANIES

Indian bioethanol sector offers greenfield and brownfield opportunities for both local and European companies to tap the growth potential

OPPORTUNITIES FOR EUROPEAN COMPANIES



Greenfield Opportunities

- Setting up a new bioethanol plants to addressed requirement of additional 10 bln litres of bioethanol mostly using non-sugar-based feedstock, i.e. grain-based and cellulosic feedstocks



Brownfield Opportunities

- Upgrading the existing plants and providing plant equipment, machinery and engineering to optimize the production efficiency



Technology Collaboration

- Collaborate with the Indian companies on the technology front for grain (1G) and cellulosic (2G) – based production of bioethanol

EAC SUPPORT OPTIONS

- **Feedstock Feasibility**
- **Business Feasibility**
- **Partner Identification**
- **Sourcing**
- **Location Assessment**

INDIA MARKET ENTRY – EXISTING CASES

European companies have employed both greenfield and brownfield strategies to enter the Indian market; EAC is proud to have supported Verbio in successfully navigating its market entry into India

VERBIO launches its first and India's largest BioCNG plant Punjab, helping to prevent stubble burning

Biorefinery is based on rice straw as raw material that would otherwise be burned. VERBIO concept strengthens security of energy supply and prosperity in rural areas. Internationalization is ongoing.

Leipzig/Chandigarh/Lehragaga, October 26, 2022 – In April 2022 VERBIO India Pvt. Ltd. started producing compressed biogas (CBG/BioCNG) from agricultural residues, primarily paddy stubble normally burnt by farmers after the paddy harvest. This is the first, largest and only plant of its kind in India, as well as in Asia. It will consume 100,000 tonnes of agricultural residues per year, and will have a production capacity of 33 TPD (tonnes per day) of BioCNG (CBG) and 650 TPD (tonnes per day) of bio-manure.

German firm BioEnergy enters Indian market in start-up partnership

BioEnergy, a German company that provides technology and engineering design for biomass-based gas plants, has entered the Indian market in partnership with a Noida-based start-up, Gruner Renewable Energy (GRE).

A welcome & greetings ceremony was held in Nagpur, India, on 5 August, which invited partners, attendees, media representatives and guests.



■ Mode of Entry:

- Greenfield Entry: Setting up of 100% agri-residue based 33TPD CNG plant in the state of Punjab

■ Entry Rationales/ Strategy

- Growing demand of biofuels along with feedstock availability and solving environmental issues in the region

■ Mode of Entry:

- Brownfield Entry: Partnerships with local start-up companies active in the biofuel sector

■ Entry Rationales/ Strategy

- Provide technology and engineering expertise to local companies to indigenous solutions as per the local requirements

EAC AS A PARTNER OF CHOICE

EAC's 30 years of consulting experience of growth strategy projects and strong team with understanding of Indian biofuel industry dynamics, can immensely contribute in building robust biofuel ecosystem in India

■ 30+ years of international consulting expertise

- Founded in 1993, EAC is an international consulting firm with strong presence in EU, Asia and America; Have executed >3,000 projects in growth markets including assignments in strategy, M&A, partner search, and operational excellence

■ Functional Expertise – Growth Strategy

- With the systematic and pragmatic approach, EAC has supported multiple international manufacturing companies (incl. India market leaders) to define addressable market, growth strategy, and implementation roadmap for not only India but also for global growth markets

■ Industry Expertise – Biofuel Industry

- EAC has unmatched experience of executing feasibility study for one of the largest commercial plant in India (Verbio), and followed by select interesting projects with Carbon Masters and BPCL
- EAC has also published knowledge papers for Industry stakeholders

■ EAC India team of subject matter experts

- EAC India biofuel team consists of members with consulting as well as technical background to evaluate the industry dynamics and to define key strategic implications for industry players



**EAC as a Partner of Choice
for the Indian Biofuel Industry**

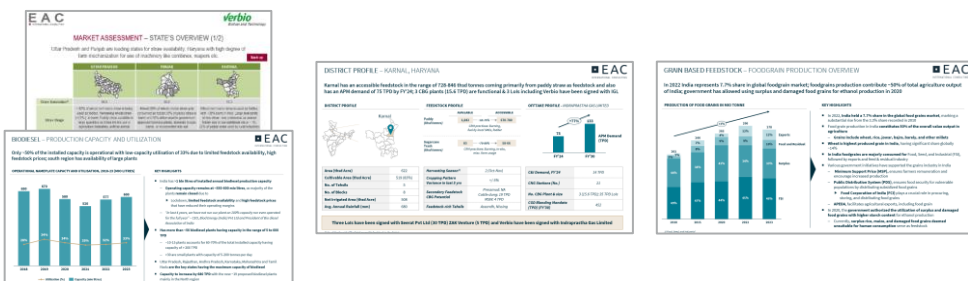
EAC CASE STUDY – VERBIO ENTRY IN INDIA

EAC has successfully supported Verbio AG to set up ‘waste-to-energy’ plants in India by providing not only strategic advisory but also hands-on implementation support for achieving its India targets

VERBIO- AG



- **Verbio** indigenously developed technology for **production of bio-fuels from agri-waste**
- Considered **India** as an **attractive market** due to:
 - Large unused feedstock
 - Lack of energy in remote areas
 - Encouraging investment climate
- **EAC support requested**
 - Market attractiveness for bio-methane plant among different states in India
 - Location assessment, recommendation of plot and business plan for plant setup in India
 - Implementation support
 - Pan-India Investment strategy for CBG based on supply chain dynamics and risks
 - Other biofuels market analysis



EAC PROJECT SOLUTION



SUPPORT

- **Market Transparency**
 - Feedstock availability
 - Bio-CNG demand assessment
 - Logistics feasibility
- **Liaison Support**
 - Meeting with Minister of Power
 - Meeting with Public Sector Companies/ operation partners
- **India Business Set-up**
 - Company Incorporation
 - Initiating Banking Activities
 - Location assessment for plants
 - Human Resource
- **Securing Agri-waste Supply**
 - Identifying Supply Regions
 - Establishing an Organized Supply Network with Local Villagers/ Farmers
- **Project Management**
 - Construction management
 - Equipment sourcing
 - PMO Overall monitoring and execution
- **Pan-India Investment strategy**
 - District-level analysis of risks, feedstock availability and gas network penetration
 - Selection of top-10 districts for CBG plant based on feedstock availability/ accessibility and offtake potential
- **Other biofuels market analysis**
 - Transparency on feedstock (vegetable oil, MSW) and biofuels (bioethanol, biodiesel)
 - Assessment of market dynamics and trigger points influencing biofuels production

RESULTS

- Verbio set-up a **33 TPD plant**, the largest (at the time of set-up) in India using **paddy straw** as primary feedstock; Plant **operational** since **May'22**
- **MoU** with **IOCL** under SATAT scheme

CLIENT REFERENCES – OVERVIEW

EAC’s high-calibre consulting solutions are recognized by international MNCs and hidden champions

EAC – YOUR PARTNER OF CHOICE

30

YEARS OF EXPERIENCE

IN OVER

50

COUNTRIES AROUND THE GLOBE

MORE THAN

3,000

PROJECTS IN GROWTH MARKETS

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2021 Heft 19
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2024 Heft 28
Beste Unternehmensberater



For four years in a row, EAC has been one of the best management consultancies in Germany.

EAC – SELECT BIOFUEL RELEVANT REFERENCES

EAC has done significant work in the Indian biofuel sectors include feedstock assessment, offtake potential, business models, biomass collection mechanization, recommendation on feasibility/ viability of the projects, and finding a right locations



DFR for CBG Plant

- One of the largest Indian oil refinery company is evaluating a feasibility of 15TPD biogas plant based on agri straw

Conducted >250 interviews with >70 villages within 60km radius to assess feedstock accessibility



Biofuel and Technology

India Market Entry

- Market attractiveness (IN/ CN/ SEA), location analysis for CBG plant, company registration, CAPEX supplier search, investment strategy

Recommended India for an investment in Asia; assessed 6 states based on strategic and operational factors



Biofuel and Technology

SEA Market Assessment

- Focused on the assessment of biofuel industry and feedstock potential

Assess feedstock and biofuel (CBG/ Bioethanol/ Biodiesel) potential in 5 SEA countries



Investor Pitch

- Prepared an investor pitch documents with detailed assessment and analysis for new planned plants

Revenue forecast based on offtake models and analysis of financial fundamentals to create an investor pitch



Indian Federation of Green Energy

Knowledge paper

- Published a whitepaper on Indian Biogas Industry covering challenges and success factors

Conducted interviews with 5 operational plants in India



Agri Machinery (Harvesters/ Balers)

- Turnaround strategy: Product strategy & new business models for India business

Interviewed >230 stakeholders across ~150 districts to collect insights into harvesting mechanization and requirements

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EAC Munich

EAC - Euro Asia Consulting PartG

Widenmayerstraße 29

80538 München

Phone: +49 89 92 29 93-0

Our Other Global Offices:

- 📍 Mumbai
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- 📍 Kuala Lumpur
- 📍 New York



MR. KETAN JADHAV

Partner

ketan.jadhav@eac-consulting.de



MR. RITURAJ SHAIENDRA

Principal

rituraj.shailendra@eac-consulting.de



DR. RAJESH RAUT

Managing Consultant

rajesh.raut@eac-consulting.de

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