Transition of Sugar Biorefineries

Investment in India's Biofuel Ecosystem

Presentation by
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India-Japan Public-Private Business and Investment Forum on the JCM

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The Indian Sugar Industry – A Global Trailblazer

01.

India has been at the forefront since Vedic times and is currently the 2nd largest sugar producer in the world with the cheapest sugar and the highest percentage payment to farmers

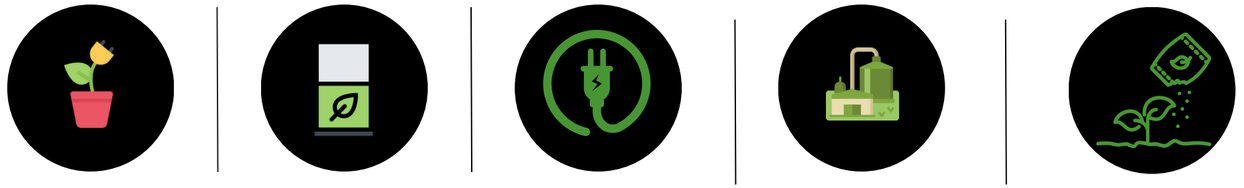
02.

ISMA, the largest consortium of bioenergy manufacturers in India, consistently champions biofuels in achieving the nation's net-zero ambitions and transforming 55 million sugarcane farmers from **Anna Dattas** (food producer) to **Urja Dattas** (energy producer).

03.

ISMA is facilitating the development & deployment of advanced biofuels enabling the **transformation sugar biorefineries into bio-energy hubs**,

Present Offerings



Sugar | Bio Ethanol | Bio Electricity | Bio Gas | Bio Fertliser

Future Offerings

Sustainable Aviation Fuel | Hydrous Ethanol | 2nd Generation Ethanol | Bio-Plastics | Green Hydrogen

The Global Rush Towards Biofuels

1. Goal

- Significant increase in biofuel production is needed to get on track with India's Net Zero Emissions by 2070 (NZE) Scenario and deliver the associated emission reductions.

  Biofuel production and use of sustainable fuels globally to increase at least four times by 2035 from 2024 levels

2. Demand

- Global demand for Biofuels is predicted to increase by 30% by the IEA and cross 38 Billion Litres by 2028.

- Majority of the demand will be predominatly driven by ethanol and Sustainable Aviation Fuel (SAF)

- **This demand would be largely driven by developing economies**

3. Opportunity

- One of the most successful outcomes of India's G-20 leadership in 2023 was the formation of the Global Biofuels Alliance.

- ***India can become the world's biggest supplier of Biofuels given our agri-landscape. Most upcoming opportunity is to become a SAF export hub to the MENA region.***

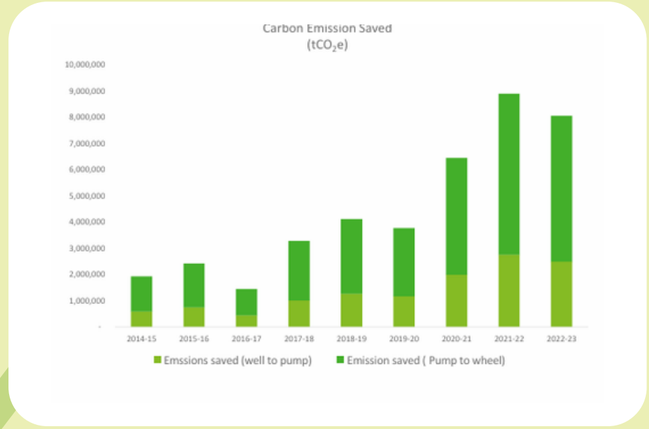
1. https://www.iea.org/energy-system/low-emission-fuels/biofuels
2. Osaka Ministerial Meeting (Co-Chair's Summary)

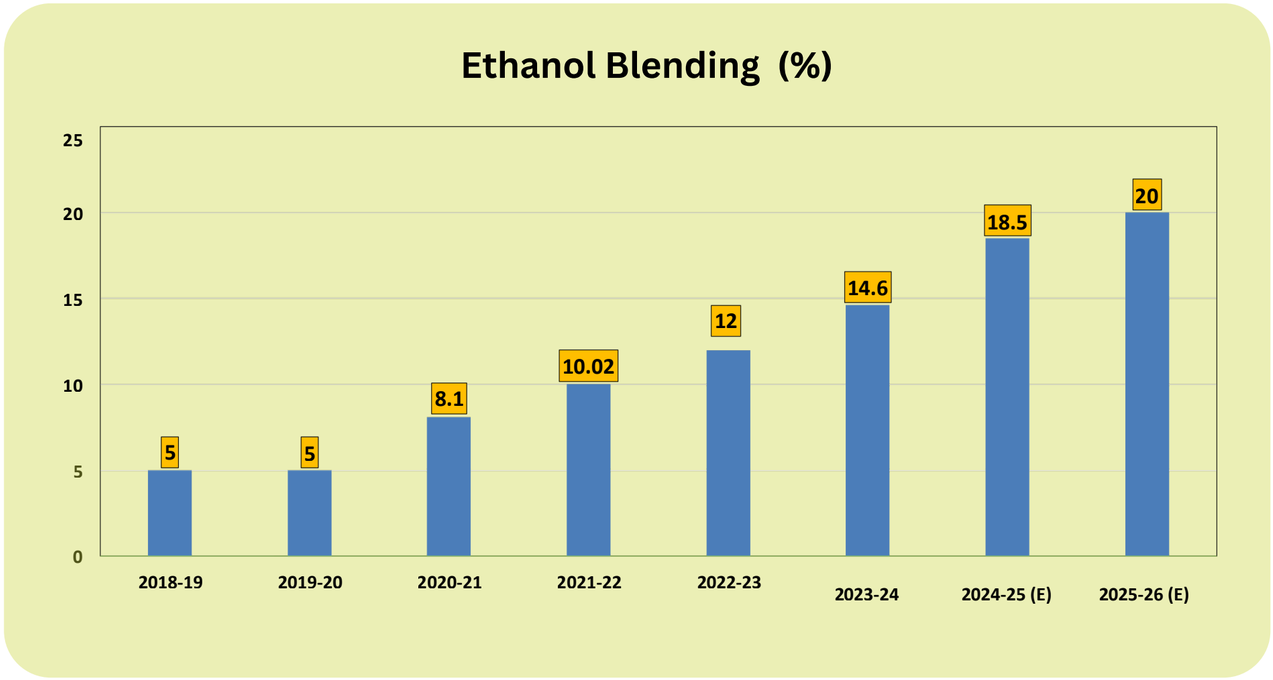
India’s Ethanol Success Story (2014-Ongoing)

1.36 Lakh Cr INR forex saved by substituting **23.2 MMT** of crude oil

1.18 Lakh Cr INR
to farmers by Ethanol Blending Programme

70 Mn + tCo2eq emission saved i.e.
5-6% annual emission reduction towards NDCs





The government is creating an ecosystem to introduce FFV-compatible vehicles with over 19 FFV variants launched at the 2025 Bharat Mobility Expo.

Competitive Advantage of Indian Biofuel Industry

Aggregation of Biomass at Point

Reliable and organised system of aggregation of biomass across the sugarcane value chain at the sugar biorefinery

Supportive Govn. Policies

Govt. of India has been incentivizing the production of biofuels, bio-ethanol, bio-CBG, bio-hydrogen and SAF through various support mechanisms

Coordinated Industry Government Actions

Coordinated Government-Industry partnership as demonstrated under EBP has created an enabling ecosystem for production for advance biofuels

Global Leader for Energy Transition

Given our feedstock potential, India is poised to become a **net Exporter of Biofuels and related technology**

1. https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1992767

Japan's Strive Towards Net Zero Decarbonisation and JCM

(Decided on February 18, 2025)

Japan's NDC (Provisional Translation)

Japan aims to reduce its greenhouse gas emissions **by 60 percent and 73% respectively from its fiscal year 2013 level in fiscal year 2035 and fiscal year 2040**, in line with the global 1.5°C target and as an ambitious goal on a linear pathway to achieving net zero by 2050.

- Govt. of Japan has set one of the most ambitious biofuel blending targets of this decade - 10% bioethanol and SAF by 2030, rising upto 20% by 2040.

- Thorugh Joint Carbon Crediting Mechanism (JCM), GoJ is aiming ito track and enhance its contribution to global emission reductions through the deployment of decarbonization technologies and projects in the Global South. *The JCM aims to deliver cumulative international emission reductions of* ***~100 million tCO_2 by 2030 and ~200 million tCO_2 by 2040 through strong public–private partnerships.***

Indo-Japanese Roundtable on Bioenergy (12th March)

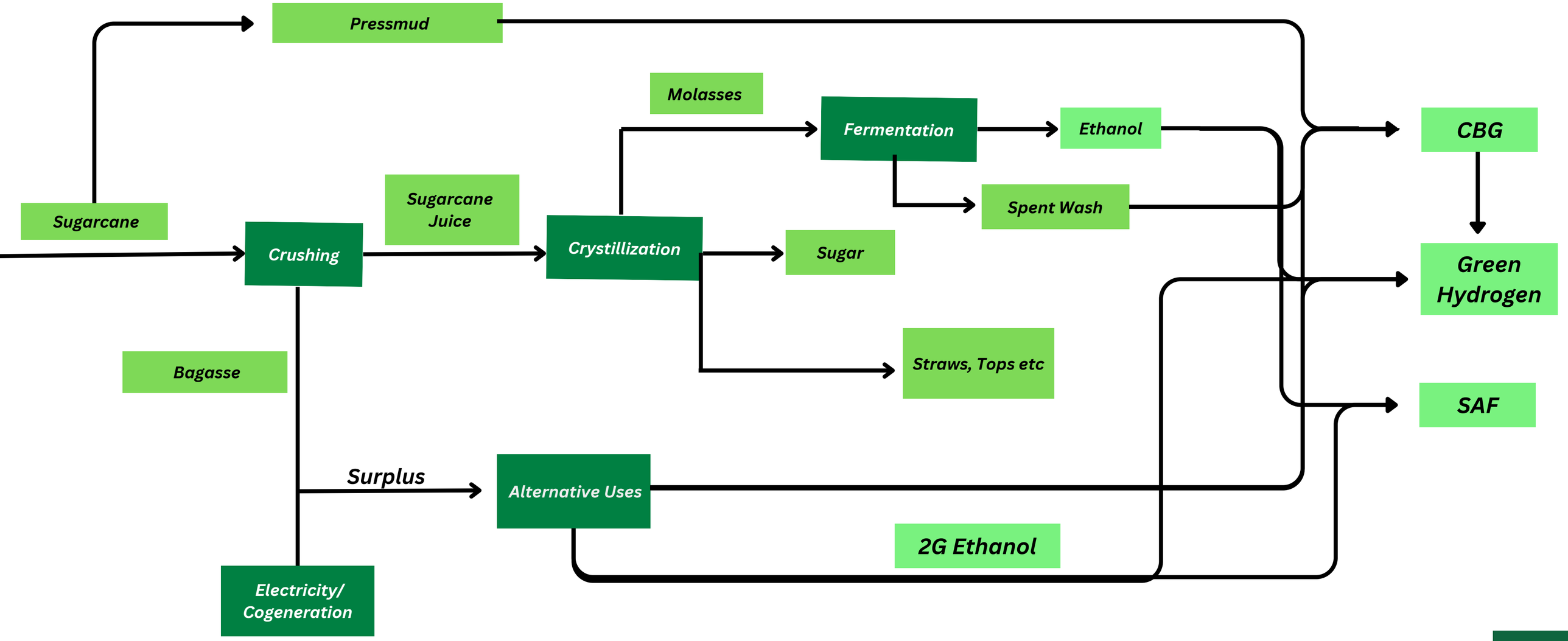
Hosted by ISMA in collaboration with Embassy of Japan, India

Feasibility Study Conducted in India under JCM

India

- JCM Feasibility Study on the Introduction of Distributed Power Generation Systems Utilizing Methane Gas Derived from Cow Dung in India (Fine Eco Solution Co., Ltd.)
- JCM Feasibility Study on Large-scale Introduction of Waste to Steam in Petrochemical Industry and Regional Transportation System of Urban Waste in India (EX Research Institute Ltd.)
- JCM Feasibility Study on Introduction of "Second-Generation Bioethanol Production Technology" in India(NIPPON STEEL ENGINEERING CO., LTD.)
- JCM Feasibility Study on Compressed Bio Gas Technology in India(Mitsubishi Corporation India Pvt. Ltd.)

Sugarcane Value Chain



CBG Potential in Sugar Biorefineries

PARAMETER	PRESSMUD	SPENT WASH	BAGASSE
SOURCING	Byproduct of the sugarcane juice clarification process	Byproduct of ethanol distillery operation	Fibrous byproduct of sugarcane processing
CHARACTERISTICS	Rich in organic matter and essential nutrients such as nitrogen, phosphorus, and potassium, making it ideal for anaerobic digestion.	Contains residual sugars and organic matter (High BOD & COD content)	High lignin and organic content
CURRENT USECASE	Used as a viable feedstock for CBG production or soil manure	In most cases it is incinerated while with adequate regulatory approval, viable for CBG production	Major use in captive consumption
CBG PRODUCTION POTENTIAL (LAKH TPA)	4.9	4.1	15 (From surplus bagasse availability)

Note: *While the overall potential for CBG production in the sugarcane value chain is over 2.5 Million Tonnes Annually through surplus feedstock, the near term achievable potential stands at 1 Million Tonnes per annum.*

The Indian government is driving significant initiatives to boost CBG production:

SATAT Scheme:

- *5,000 CBG plants by 2030*
- *15 MMT of CBG production*
- *Up to ₹4 crore per plant*
- *50 MMT of Fermented Organic Manure*
- *Off-take guarantees from OMCs*

- *Several other Govn. schemes/programs are being operated to increase CBG Production and its ancillary equipments/ecosystem (Gobardhan, CGD-CBG Pipeline Development, MDA for FOLM) etc.*

- *ISMA is collaborating with ministries, OMCs, financiers, and carbon credit stakeholders across the CBG value chain to enable this potential utilisation, conducting roundtables, knowledge sharing session and high level stakeholder consultations,*

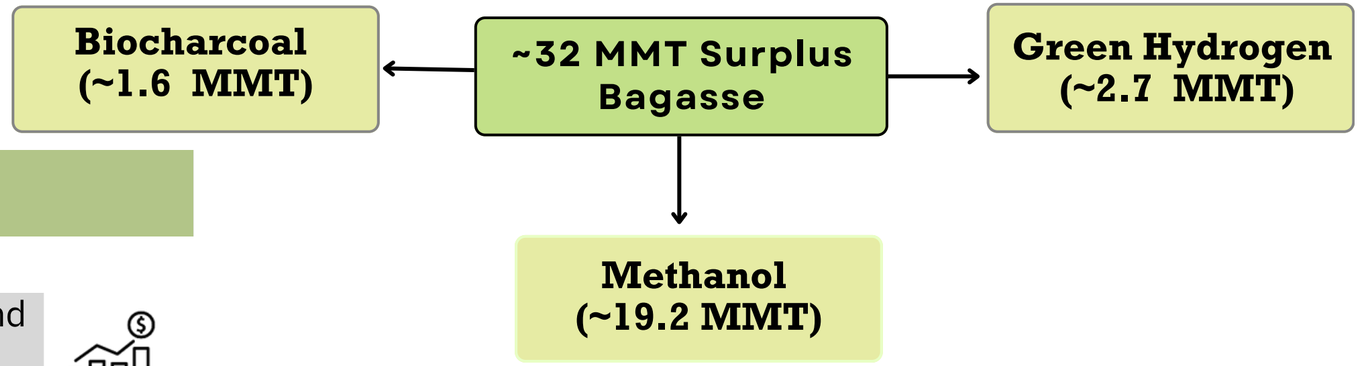
Mission Bio for National Green Hydrogen Mission

1. **The Govt. of India has undertaken ambitious Green Hydrogen production targets to produce 5 MMT by 2030**

2. **Under NGHM, the allocated budget of Rs 19,744 crore for setting up and scaling Commercial Industry Pilot site**

3. ISMA-IISc pilot study to produce Bio-based Green Hydrogen from Bagasse briquettes achieved 99.97% purity in green hydrogen production

4. ***The sugar industry has the potential to produce 2.6 MMT of Green Hydrogen through biomass, meeting over 50% of India's NGHM target.***



Why Sugarmills?

Abundance of biomass, electricity, water and CO2

Perfect Hub for the support and vision of Bio-based Green Hydrogen

1. https://theprint.in/environment/with-projects-to-produce-7-5-mmt-green-hydrogen-announced-india-100-confident-of-meeting-2030-goal/2252482/
2. https://mnre.gov.in/national-green-hydrogen-mission/

2G Ethanol Production Potential in Sugar Industry

Current Production: < 3% of global bioethanol production

GOI amended **PM-JIVAN Yojana**, with **bolt-on** initiatives to boost ethanol production in the country, extending it for five years, with an implementation timeline until 2028-29.

₹1969.50 crore allocated to establish 12 commercial and 10 demonstration advanced biofuel projects.

Financial Incentives: Up to 20% of project cost or ₹5 crore per 10 lakh litres of annual capacity, capped at ₹150 crore per project.

Voluminous production will enable it to become a base load energy source in surface mobility & aviation (SAF)

Sugarcane (~ 380-400 MMT)

- MMTY: Million Metric Tons per year
- All the figures are on annualized basis

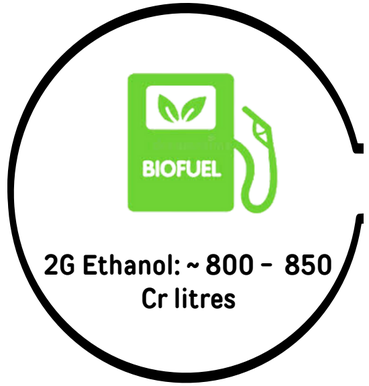
Sugar: ~ 30 MMT

Bagasse Availability: ~ 120 MMT

Molasses : ~ 19 MMT

Pressmud: ~ 16 MMT

Sugar: ~30 MMT



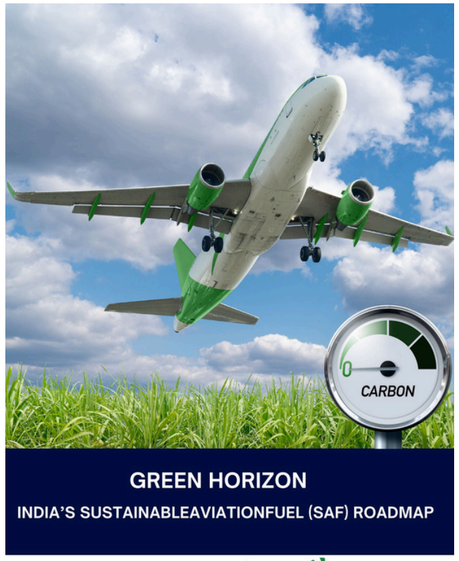
2G Ethanol: ~ 800 - 850 Cr litres

Bioethanol: ~ 800 Cr lit

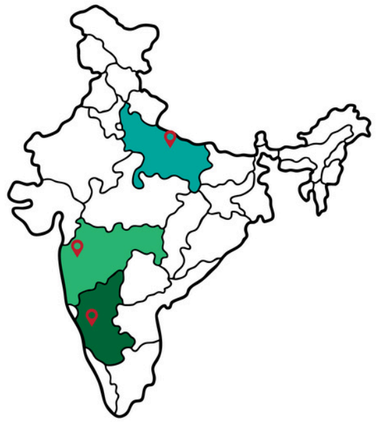
Biomanure: ~ 16 MMT

1. https://www.sciencedirect.com/science/article/abs/pii/S0960852420309020
2. https://mopng.gov.in/files/article/articlefiles/PM-Jivan-Amendment.pdf

Sustainable Aviation Fuel: An Opportunity



Deloitte. | isma



- *Key International Aviation hubs Delhi, Mumbai, and Bangalore.*
- *Around 80% of the country's sugarcane production is concentrated in Uttar Pradesh, Maharashtra, and Karnataka*

There is natural synergy which is waiting to be utilised.

Sugarcane is a Natural Solution

The question is whether or not India will be able to produce SAF, but what can we do beyond that?

1 A recent Deloitte report projects that India could produce 1,600–1,900 crore litres of SAF by 2040, with the sugar industry alone contributing 400 crore litres — positioning the country as a global SAF hub.

2 Realising this potential will require additional infrastructure investments of ₹17,500–18,500 crore in the sugar sector by 2030.

So lets create a Bio-Bharat Together!!

Thank You

Please reach out for any questions:
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isma
Indian Sugar & Bio-Energy Manufacturers Association