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Driving Sustainability: Ethanol Blending in India's Fuel system

SANKHYA (संख्या)

"There cannot be a good plan for economic progress without adequate data and there cannot be adequate data without a good plan for collecting them…"

P.C Mahalanobis, Member, First Planning Commission of India & Scientist

BIOETHANOL AS A SOLUTION TO CLIMATE CRISIS

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Climate change issues have increased significantly due to greenhouse gas emissions. Further, the top 7 emitters (China, USA, India, EU, Indonesia, Russia, Brazil) accounted for about 50% of emissions in 2020 as per the UNEP Emission Gap Report 2022.

The world's heavy reliance on fossil fuels and non-renewable energy sources necessitates a shift to alternative sustainable practices to control GHG emissions.

Bio-fuels have emerged as a promising alternative low-emission fuel offering benefits such as reduced carbon footprint, cost-effectiveness and decreased dependence on fossil fuels. They come in various forms, including Biojet, Bioethanol and Bio-diesel.

Several prominent global initiatives have emerged to drive the promotion of their usage and production. Global Biofuel Alliance, Global Bioenergy Partnership, Bio-Future Platform Initiative, Clean Skies Tomorrow Initiative, Assistance, Capacity-building & Training for Sustainable Aviation Fuels Programme are a few such initiatives.

Ethanol blending is a noteworthy process within the biofuels domain which involves mixing ethanol with conventional motor fuel, leading to a reduction in crude oil consumption.

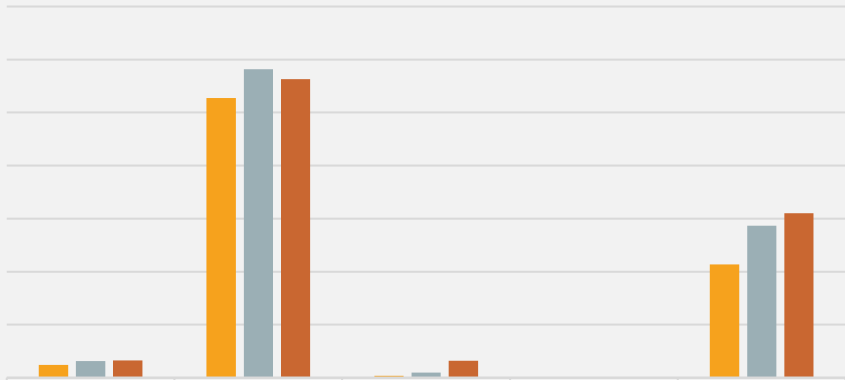
CATEGORIES OF ETHANOL AS BIOFUELS

1G-Production from feedstock like cereals, sugarcane, etc. → **2G-Production from surplus biomass, agriculture waste, etc.** → **3G-Prodution from algae, no use of food crops.**

Net Zero Coalition

- Net zero means cutting greenhouse gas emissions to as close to zero as possible.
- Net Zero Coalition by the UN sets a Net Zero Emission (NZE) Target to cut down on greenhouse emissions to zero by 2050.
- Several countries have recognized the vital role of biofuels and the use of ethanol blending in achieving the net-zero target and have taken proactive steps to promote their production.

Production of Ethanol in countries with the highest GHG Emissions



	China	USA	India	Indonesia	Brazil
2011	2,443	52,725	365	10	21,400
2016	3,148	58,190	993	10	28,694
2021	3,298	56,297	3,220	85	30,999

Source: International Energy Agency Report 2021

Note: The above chart does not include data on Russia due to the unavailability of data due to ongoing conflicts.

OVERVIEW OF ETHANOL BLENDING IN INDIA

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The government of India has been proactive in promoting the use of biofuels particularly ethanol blending to address the environmental concerns, reduce import dependency and boost the agriculture sector.

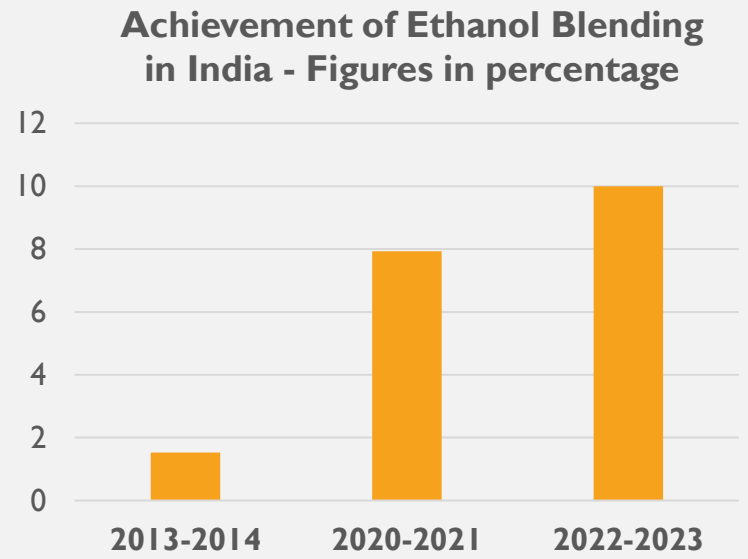
In 2003, the government launched the Ethanol Blending Petrol Programme (EBP) in a few states and union territories to increase the blending of ethanol with petrol to lower emissions and enhance energy security. It was later extended to the entire nation in 2019.

To further support biofuel production, the GOI introduced the National Policy on Biofuels in 2009, setting a target of 20% blending of biofuels.

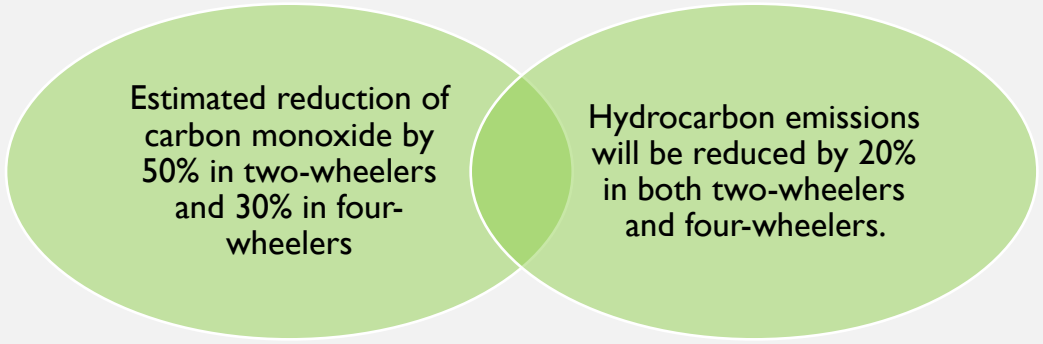
The government also expanded the scope of raw materials for ethanol production and reduced the GST on ethanol from 18% to 5%.

Further, in pursuit of its commitment to a greener future, India shifted its target to achieve E20 (20% ethanol blending) from 2030 to 2025. It is estimated that ethanol blending would reach 12% in 2022-23, 15% in 2023-24 and 20% in 2024-25.

In 2023, the GOI took a significant step by implementing 20% ethanol blending at select petrol pumps in 11 states and Union Territories.



Benefits of achieving E-20 by 2025



CHALLENGES FOR ETHANOL BLENDING PROGRAM IN INDIA

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Ethanol Capacity Requirement by Year and Raw Material in (Crs. Lts)		
Years	**Grains** (Maize & Rice, etc.)	**Molasses** (thick-dark brown juice obtained from raw sugar during the refining process)
2022-2023	350	625
2023-2024	450	725
2024-2025	700	730

Source: Ethanol Blending in India 2020-2025

As mentioned by the NITI Aayog, India would require a total distillation capacity of 15 billion litres (1500 crore litres) to achieve the E20 target. However, as per data released by the Government of India, current India's distillation capacity is 947.9 crore litres.

Currently, land availability for raw materials for the production of ethanol is insufficient. For the full implementation of E20 goals, the country would require 30,000 additional sq. km to come under the cultivation of raw materials for producing ethanol.

As per capacity augmentation, maize production should supply 466 Cr. Lt of ethanol for E20. However, due to the low demand for maize, farmers are not getting appropriate prices for production. Further, the market price for maize is below the minimum support price, which discourages its production.

In Global Hunger Index 2022, India is ranked at 107 out of 121 countries. There are concerns that the use of rice, maize, and sugarcane could potentially create competition for food resources and may go against the country's nutritional security initiative that aims to diversify crops.

POLICY CONSIDERATIONS AND SUGGESTIONS

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Diversify crop pattern

Encourage farmers to diversify their crop patterns by incentivising the cultivation of crops suitable for ethanol production and reducing the dependency on sugarcane as an independent source. Implement plans for the production of crops like maize. Technical assistance, research support and awareness program for farmers must be provided to adopt sustainable farming practices and maximise ethanol from different sources of ethanol production.

Mandate and Incentivize Separation of Organic Waste

Implement 2G Ethanol Production in the country by focusing on policies mandating the separation of organic waste at source, promoting waste segregation and facilitating the collection of organic waste for ethanol production. Further incentives, tax breaks, and subsidies may be provided to industries, municipalities, and waste management companies involved in producing and supplying organic waste for ethanol conversion.

Introduction of Flex Fuel Engine Technology

Promote the adoption of flex-fuel engine technology in vehicles, enabling them to run on various blends of gasoline and ethanol, including higher ethanol concentrations. The government should collaborate with automotive manufacturers to develop and introduce flex-fuel vehicles in the Indian market, facilitating a smooth transition to higher ethanol blends.

Mandate minimum blending

Introduce a mandate of a minimum ethanol blending percentage in gasoline, such as 5% or 10%, with a clear timeline for gradual increments in order to achieve the E20 target by 2025. Further, the government should establish mechanisms to monitor and enforce compliance with blending targets, ensuring oil marketing companies procure and blend the required ethanol quantities.

Monitoring Financial incentive

To avoid exacerbating hunger and food security issues in India, it is crucial for the government to set essential requirements and carefully monitor the implementation of financial incentives for ethanol production. By prioritizing non-food biomass feedstocks, promoting sustainable agricultural practices, and monitoring the impact on the food supply chain, India can achieve its renewable energy targets while ensuring food security for its population.

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** Sankhya means numbers and is also a school of rationalist Indian philosophy. According to Sankhya philosophy reliable knowledge comes from only three pramanas (proofs)- pratyakṣa ('perception'), anumāṇa ('inference') and śabda (āptavacana, meaning, 'word/testimony of reliable sources').*