



PHD CHAMBER
OF COMMERCE AND INDUSTRY
VOICE OF INDUSTRY AND TRADE

KEY TAKEAWAYS



4TH INTERNATIONAL CLIMATE SUMMIT

19th July, 2024 at Hotel Taj Palace, New Delhi

DENTED CORN-ETHANOL

Energy Security, Food Security
and Decarbonization



ABOUT THE SUMMIT

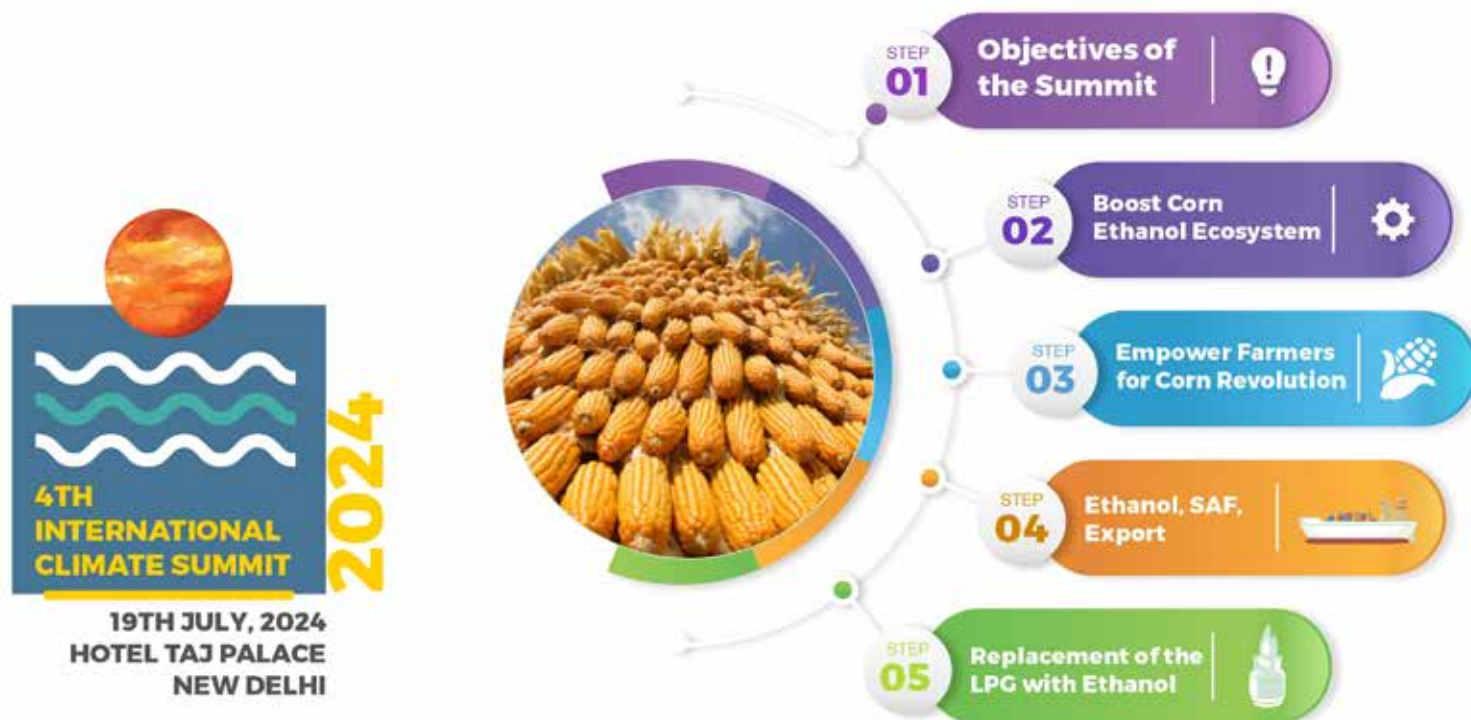
Bioethanol has emerged as a promising alternative to gasoline and LPG. It is renewable, clean, and cost-effective, presenting an important pathway for energy security and decarbonization. Doping ethanol with petrol supplies extra oxygen for complete combustion, reducing carbon monoxide levels in auto emissions and interfaces. Ethanol has an octane rating of 115, burning cleanly in automobile engines with fewer particulate emissions. 2G-ethanol will play an important role in replacing gasoline and will provide energy security to our country. Additionally, replacing LPG with ethanol for cooking will be a revolution in itself. Using LPG for cooking poses risks due to single fuel dependency. Ethanol offers additional advantage over the logistics of using heavy LPG cylinders, with a reduction in the substantive costs associated with maintaining complex infrastructure for LPG. In view of this, bioethanol emerges as a competing renewable fuel.

In nearly a decade, India's ethanol blending initiative has yielded impressive results. This has resulted in significant savings in foreign exchange amounting to Rs. 78,118 crores, alongside a substantial reduction in CO2 emissions totaling 426 lakh MT. Moreover, these efforts have successfully substituted 142 lakh MT of crude oil during the same period, contributing to energy security and sustainability. Equally noteworthy is the substantial support provided to farmers. Biofuel demand is set to expand to 38 billion liters over 2023-2028, a nearly 30% increase from the last five-year period. In fact, total biofuel demand rises by 23% to 200 billion liters by 2028, with renewable diesel and ethanol accounting for two-thirds of this growth and biodiesel and biojet fuel making up the remainder.

Needed Corn Ethanol to Make India Self-Reliant in Ethanol

Among emerging economies, Brazil, Indonesia, India, and Malaysia are forecasted to drive over 60% of global biofuel demand and production growth during the specified period. Robust biofuel policies will lead to escalating demand for transport fuel, ethanol for cooking, and the introduction of Sustainable Aviation Fuel. The government needs to accord the topmost priority supporting the 'Corn Revolution' in the country on war footing for the production of 2G ethanol. PSUs and other oil sector companies should set up mega 2G refineries (1250 KLPD to 1500 KLPD) on a priority basis.

The government needs to support Indian farmers with lucrative incentives to bring about a Corn Revolution in the country. Importing dented corn should be duty-free to create an ecosystem for 2G ethanol production for a period of five years till India becomes self-sufficient in local production of dented corn.



KEY TAKEAWAYS

4TH INTERNATIONAL CLIMATE SUMMIT 2024

YELLOW DENTED CORN ETHANOL FOUNDATION FOR ENERGY SECURITY, FOOD SECURITY AND SUSTAINABLE RURAL DEVELOPMENT

Introduction

PHD Chamber of Commerce and Industry organized the fourth edition of its very successful series, the International Climate Summit 2024 on 19th July 2024 at The Taj Palace, New Delhi. This year the theme of the Summit was 'Dented Corn-Ethanol: Energy Security, Food Energy and Decarbonization'.

The International Climate Summit 2024 served as a crucial platform for fostering dialogue and collaboration aimed at leveraging dented corn ethanol to boost India's energy security, rural employment, contribute to environmental sustainability and promote green energy and sustainable practices in alignment with national and global objectives. The summit was attended by over 500 delegates including Central and State Govt. officials, policy makers, scientists, researchers and titan of industries.



The Inaugural Session was addressed by Shri Nitin Jairam Gadkari, Hon'ble Minister of Road, Transport & Highways, Government of India and Dr. Sadesh Sookraj, Global Decarbonization

Advisor, IFC Washington (Part of World Bank). The Valedictory Session was addressed by Shri Jagdeep Dhankar, Hon'ble Vice President of India.



The Inaugural Session, Plenary Session and Valedictory Session was followed by three knowledge-based technical sessions. The first technical session was ‘Ethanol Production – 1G and 1.5G Technologies’. The second technical session was ‘Corn Revolution – Transform Rural India’. The third technical session was ‘Decarbonization and Carbon Trading’.

Background

India is the world’s third-largest energy-consuming country, although its per capita energy consumption is only one-third of the world’s average. As India has set an ambitious target of becoming energy independent by 2047 and achieving net zero by 2070, the Government of India is committed to setting up 50% of cumulative power generation from non-fossil fuel-based energy resources by 2030.

India stands at the cusp of a transformative journey towards energy security, sustainable development, and economic prosperity. The development of a robust Corn to Ethanol ecosystem is a pivotal strategy in this journey,

aligning with global efforts to mitigate climate change and foster sustainable growth. The development of a Corn to Ethanol ecosystem in India presents a unique opportunity to drive sustainable development, enhance energy security, and foster economic growth. By leveraging its agricultural strengths and embracing innovative technologies, India can position itself as a global leader in the ethanol sector. This vision requires concerted efforts from government, industry, and academia to create a sustainable and prosperous future for the nation.

India’s corn production yield is around 3.5 tons/hectare compared to approximately 16–20 tons/hectare in the USA and 10–12 tons/hectare in Brazil/Argentina. There is significant potential to double the crop yield from the same amount of land by using better seeds. Several states lead in sweet corn production. Karnataka, Andhra Pradesh, Rajasthan, Maharashtra, Madhya Pradesh, and Uttar Pradesh play a crucial role as leading sweet corn producers, accounting for a significant portion of the country’s total corn output.

These states benefit from favourable agro-climatic conditions, irrigation facilities and skilled farmers. India’s corn production has shown a trend of growth over the past few years, reflecting improvements in agricultural practices and favourable weather conditions: In 2021: Corn production in India was approximately 31.65 million tons. This increased to around 32.42 million tons in 2022 and further significantly to 35.91 million tons in 2023.

However, despite this growth, India has been continuously importing corn to meet its needs. The data from the past three years, 2021 to 2023, illustrates this trend: In 2021, approximately 4.2 million metric tons, costing ₹15,500 crores (USD \$2.1 billion); In 2022, approximately 3.9 million metric tons, costing ₹13,800 crores (USD \$1.7 billion); In 2023, approximately 4.5 million metric tons, costing ₹16,000 crores (USD \$1.9 billion).

Yellow Dented Corn is the most produced crop globally with 1.1 billion tons, followed by wheat at 760.9 million tons and rice at 756.7 million tons.

Corn growth across the world:

Sr. No.	Country	Percentage (%)
1.	United States of America	31.06%
2.	China	23.42%
3.	Brazil	09.07%
4.	European Union	05.99%
5.	Argentina	04.49%
6.	Ukraine	03.22%
7.	India	02.60%
8.	Mexico	02.25%
9.	South Africa	01.46%
10.	Others	16.45%

Globally 1.2 billion tons corn is produced annually and more can be produced without expanding land use.

Yellow sweet corn is edible. Dented Corn is non-edible and it is primarily used for fuel rather than food. It is used for ethanol production due to its higher percentage of starch content compared to sweet corn. This higher starch content results in a much greater ethanol yield, producing 2.8 gallons per bushel versus 1 gallon per bushel from normal corn. In the USA, 95% of bioethanol is produced from yellow dented corn for domestic consumption and export markets.

Dented Corn ethanol could offer a comprehensive solution to our country by addressing:

Energy Security- 100% replacement of gasoline in flex-fuel engines,

feedstock for Aviation Turbine Fuel, and replacement of LPG.

Economic Efficiency - Mature technologies that offer lower-cost fuels;

Industrial Application - Feedstock for specialty chemicals, and petrochemicals such as ethylene, ethylene oxide derivatives, thermoplastics, mono-ethylene glycol, and many more;

Climate Change Mitigation - Ethanol contributes 79% reduction in Greenhouse Gas emissions compared to fossil fuels.

Ethanol is being produced in India from cane sugar molasses, sugarcane juice, broken rice, non-edible grains, etc. However, producing ethanol from edible grains and sugar can lead to food shortages. Due to the shortage of feed for ethanol production, India has

been importing significant quantities of ethanol to meet its needs: In 2021, approximately 4,70,000 metric tons, costing ₹2,270 crores (USD: \$307 million); In 2022, approximately 6,20,000 metric tons, costing ₹3,120 crores (USD: \$398 million); in 2023, approximately 7,50,000 metric tons, costing ₹4,500 crores (USD: \$545 million).

This seismic shift can significantly enhance India's energy security by promoting bioethanol as a cooking fuel in every household. Transitioning from Liquefied Petroleum Gas (LPG) to ethanol for cooking not only offers a sustainable solution, but also stimulates rural economies. Leveraging the existing LPG distribution network can facilitate this transition, making ethanol accessible and affordable for households across the country at a rapid pace.

Ethanol, a versatile and sustainable biofuel, holds immense potential as feedstock for production of chemicals. In the chemical industry, ethanol can be used to produce ethylene, which is essential for manufacturing various polymers and chemicals. These applications highlight ethanol's versatility and its potential to significantly reduce the chemical industry's reliance on fossil fuels, driving a more sustainable and eco-friendly industrial future.

The production and use of "Dented Corn Ethanol" can reduce greenhouse gas (GHG) emissions by an average of 79.1% compared to fossil fuels. Bioethanol contributes to mitigating climate change by providing a carbon-neutral or even carbon-negative energy source. The carbon dioxide released during combustion is offset by the carbon dioxide absorbed during biomass growth, resulting in a closed cycle, or effectively recycling carbon dioxide. Additionally, ethanol production can utilize agricultural residues and waste materials along with corn, promoting a circular economy. Developing a robust Corn-to-Ethanol ecosystem is pivotal in this journey, aligning with global efforts to mitigate climate change and foster sustainable growth. Incorporating waste materials into ethanol production not only enhances sustainability but also adds economic value to agricultural by-products that would otherwise be discarded.

Increased demand for ethanol can stimulate dented corn production, providing farmers with additional revenue streams and promoting rural development. This can help reduce

rural-urban migration and support sustainable agricultural practices. Farmers can adopt sustainable agricultural practices to earn valuable carbon credits, which not only provide an additional revenue stream, enhancing their financial stability but also incentivize environmentally friendly farming methods.

Food Security - The use of yellow dented corn for ethanol production also yields valuable by-products such as proteins and corn oil. This not only supports food security but also offers the highest profit per acre to farmers, significantly improving their socio-economic conditions.

There is an urgent need to initiate a 'Yellow Dented Corn Revolution' in India on war footing.

A comparative analysis with the United States, a global leader in corn-to-ethanol production, underscores the importance of robust government support and incentives in realizing this potential. The United States has become a leading producer of corn-based ethanol due to extensive federal support, including the Renewable Fuel Standard (RFS) that mandates renewable fuel use in transportation, Flexible Fuel Vehicle Incentives and Ethanol Infrastructure Grants. Enforced laws requiring ethanol blending, tax credits, grants, and loan guarantees have spurred investment in ethanol production, reducing financial risks for investors.

The production of bioethanol in the United States over the past three years has been: -

2021: 15.016 billion gallons; **2022:** 15.361 billion gallons; **2023:** 15.620 billion gallons.

The US corn-to-ethanol industry has created numerous jobs and provided farmers with a stable market, boosting rural economic development. It has also diversified the energy supply, reducing reliance on imported oil and enhancing energy security.

Recommendations:

To fully unlock the potential of corn ethanol and realize its socio-economic and environmental benefits, concerted efforts are required across multiple fronts. The following policy recommendations are proposed:

Ethanol

Establish a Consistent Policy: India should implement a long-term policy aimed at achieving 100% ethanol-run vehicles by 2030.

Ensure Dispenser Availability: Ensure that dispensers for blended petrol and 100% ethanol are available at all petrol pumps nationwide.

Set Up Mega Bio-refineries: The government should mandate all PSUs and oil sector companies set up mega biorefineries with capacities, ranging from 1000 KLPD to 1500 KLPD on war footing.

Yellow Dented Corn

Declare a National Mission: 'Dented Corn Revolution' should be declared as national mission to be able to achieve targets by 2030.

Duty Free Imports: Allow duty-free import of dented corn for ethanol production until 2030, similarly, on the lines of crude oil. During this period, India should become self-sufficient in dented corn production through 'Dented Corn Revolution'.

Develop a detailed plan: Indian Agriculture Research Institute and other Maize R&D centres should propose a detailed plan for India to lead the 'Dented Corn Revolution' by 2030, working closely with US agencies, experienced in Dented Corn Production and with Indian farmers.

Research & Development

Announce a significant financial incentive for CSIR and other R&D institutions to develop 1G, 1.5G, 2G, and 3G technologies for utilizing all cellulosic materials for ethanol production, similar to the support provided for Green Hydrogen.

Financial Incentives

- The Government should provide financial incentives and subsidies to promote 2G ethanol production, including tax breaks, grants for infrastructure development, and price support mechanisms for 2G ethanol producers.
- Incentivising mega-biorefineries and ensuring duty-free import of dented corn will be instrumental in catalysing the 2G ethanol revolution. Moreover, empowering Indian farmers through lucrative incentives and technological support is paramount, fostering a conducive ecosystem for sustainable 2G ethanol production.

Carbon Credit:

The Government can execute a faster predictable mechanism, so that farmers and ethanol producers could avail credit.

Carbon credit should be included for production of ethanol from bio-route.

'Yellow Dented Corn Ethanol' embodies the three Fs: Food, Feed, and Fuel. It represents a technologically mature and economically competitive pathway for India's decarbonization and sustainable development. This initiative is a gold mine for both energy and food security and will be a game changer for the nation, ushering in the 'Yellow Dented Corn Revolution' for India. India could become not only self-reliant but export hub for locally produced ethanol, sustainable aviation fuel and ethanol-based chemicals. Ethanol could rapidly bring economic prosperity to the farmers. Crude oil cannot be grown but corn can be. So country is definitely less dependent on imports and other countries. Corn growing farmers can form cooperatives to increase the land size for enabling mechanized and advanced farming techniques leading to higher yield.

No bunker would save humanity if climate change not tackled: VP

PNS ■ NEW DELHI

Climate change is a bomb ticking by the second and no bunker would save humanity if collective efforts are not taken to find a solution to this existential problem, Vice President Jagdeep Dhankhar said on Friday.

Addressing the valedictory session of the 4th International Climate Summit organised by the PHD Chamber of Commerce and Industry here, Dhankhar said fighting the climate crisis should be everyone's foremost priority.

"Climate change is a bomb ticking by the second. We are running out of options. It is no longer a problem waiting to happen," the vice president said.

He warned that if not tackled, climate change would be non-discriminatory, affecting everyone without exception. "You cannot have a safe place. You cannot have a bunker to save yourselves," he said.



India has embarked on an ambitious journey. It has set a target to achieve 50 per cent of its installed electricity capacity from non-fossil fuel-based energy sources by 2030 and net zero emissions by 2070, he said.

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The vice president, however, added that the issue of climate change cannot be solved by any single nation alone. "We don't have another planet. This is the only planet where more than 8 billion

make us alive to the situation the gravity, the extremity of a This should be our foremost priority," he said.

Pointing out that climate change disproportionately affects marginalized and vulnerable communities, Dhankhar said, "Climate justice must be our North Star."

The vice president called for action beyond conferences. "It should get into big narratives. Everyone must use social platforms and everyone must indicate what contribution he or she is making," he concluded.

THE ECHO OF INDIA

No bunker would save humanity if climate change not tackled: Vice Prez Dhankhar

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single nation alone. "We don't have another planet. This is the only planet where more than 8 billion people can live. This should make us alive to the situation, the gravity, the extremity of all. This should be our foremost priority," he said. Pointing out that climate change disproportionately affects marginalized and vulnerable communities, Dhankhar said, "Climate justice must be our North Star." The vice president called for action beyond conferences. "It should get into big narratives. Everyone must use social platforms and everyone must indicate what contribution he or she is making," he concluded. (PTT)

Punjab Express

No bunker would save humanity if climate change not tackled: Vice President Dhankhar

NEW DELHI, JULY 19



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The Statesman

Dented corn ethanol, a pathway for India's decarbonisation

STATESMAN NEWS SERVICE
NEW DELHI, 19 JULY

Highlighting the importance of bio ethanol derived from dented corn, JP Gupta, chair, Environment Committee, PHD Chamber of Commerce and Industry on Friday said it represents a technologically mature and economically competitive pathway for India's de-carbonization and sustainable development.

Dr Gupta said that the dented corn ethanol embodies "Food, Feed, and Fuel," and added that the beauty of the same is that no other source provides the dual use.

He further said that it will not only provide a good source of energy, but will also help change the financial condition of the farmer, as more demand will increase more income.

Dr Gupta in his address at the 4th International Climate



Summit organised in New Delhi by the PHD chambers of commerce and industry, further pointing out the use of corn ethanol mentioned that it has the potential of replacing 100 per cent use of gasoline in the flexi engines, can be used as aviation turbine fuel, and also be a replacement for LPG etc.

Dr Gupta further said that the dented corn is particularly advantageous for ethanol production due to its high starch content of 70-75 per cent, compared to the 20-30 per cent in normal corn, and because

of this, as a result it produces greater ethanol yield, which is 2.8 gallons per bushel versus 1 gallon per bushel from normal corn, he claimed.

One more advantage of dented corn is that the same is the most produced crop globally, he added.

Dr Gupta also said that it makes for a good raw in the production of special chemicals and thermoplastics, also providing an answer to climate change, with its contribution in up to 80 per cent reduction in greenhouse gas emissions, as compared to the fossil fuels.

He said that the PHD chambers has been in the forefront in charting the pathway for the decarbonization of India through green hydrogen, and has hosted three international climate summits and authoring three knowledge books on green hydrogen.

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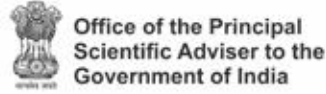
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PHDCCI, acting as the “Voice of Industry & Trade” reaching out to more than 1,50,000 large, medium and small industries, has forged ahead leveraging its legacy with the industry knowledge across multiple sectors to take Indian Economy to the next level.

At the global level, we have been working with the Embassies and High Commissions in India and overseas to bring in the International Best Practices and Business Opportunities.”

PHD CHAMBER OF COMMERCE AND INDUSTRY

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