India Achieves 20% Ethanol Blending in Petrol

For Prelims: Ethanol Blending Programme, Pradhan Mantri JI-VAN Yojan, Carbon monoxide (CO), Hydrocarbons, Flex-Fuel Vehicles

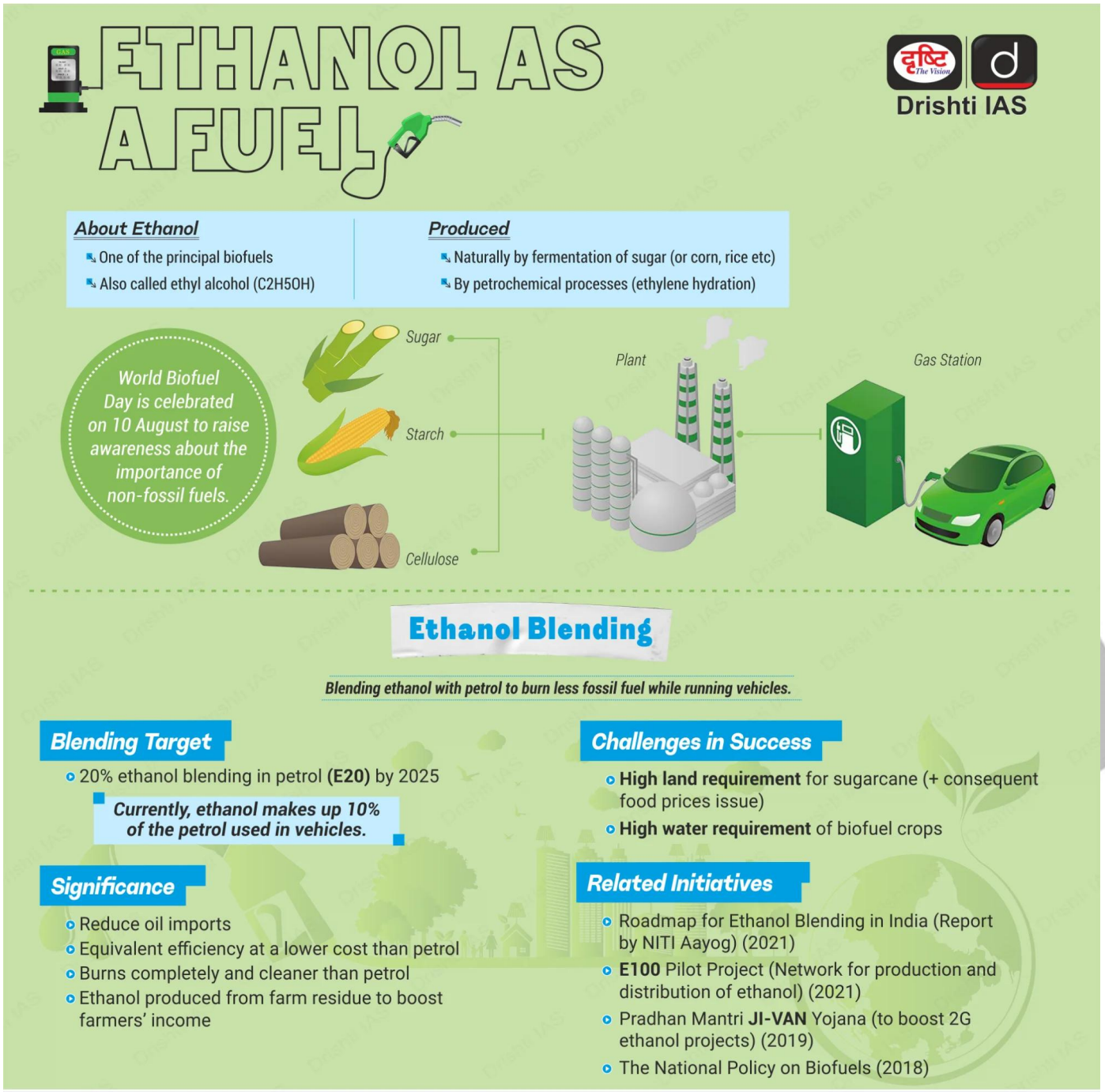
For Mains: Ethanol Blending and Energy Security, Socio-economic and Environmental Impact of Biofuel Promotion.

Source: DD

Why in News?

India has reached a significant milestone in clean energy by **achieving 20% ethanol blending in petrol in 2025 under the Ethanol Blending Programme (EBP).**

- This rapid progress underlines the country's commitment to energy security, rural income enhancement, and environmental sustainability.



What are the Key Factors Behind India's Ethanol Blending Success?

- **Policy and Regulatory Framework:** The **National Policy on Biofuels (2018, amended in 2022)** advanced the 20% ethanol blending target from 2030 to **2025-26**.
    - The policy promotes use of diverse feedstocks: **sugarcane, molasses, corn, damaged food grains, agricultural residues, and even waste biomass.**
        - Flexibility in feedstock choice ensures stable supply and minimizes competition with food security.
    - The **EBP Programme** was institutionalized with regular monitoring and updates.
    - **The National Biofuel Coordination Committee (NBCC)** oversees feedstock use based on surplus declarations.
    - The **Pradhan Mantri JI-VAN Yojana** encourages production of advanced biofuels from **agricultural and forestry residues**, industrial waste, and algae, expanding the biofuel ecosystem.
- **Infrastructure and Pricing Reforms:**

- **Ethanol Interest Subvention Schemes (EISS)**: Financial support (2018–2022) to set up molasses- and grain-based ethanol plants.
- **Long-Term Offtake Agreements (LTOAs)**: The LTOAs signed by Public Sector Oil Marketing Companies (OMCs) ensured steady demand, timely payments, and market stability for Dedicated Ethanol Plants (DEPs).
- **Administered Pricing Mechanism**: Assured pricing for ethanol under the EBP Programme, encouraging private participation.
- **GST Reduction**: Reduction of **Goods and Services Tax (GST)** on ethanol from **18% to 5%** helped **lower production costs and encouraged higher ethanol production** and blending.
- **Amendments to Industries (Development & Regulation) Act,1953**: Facilitated smooth **interstate and intrastate movement** of ethanol.

What are the Socio-Economic and Environmental Impacts of Ethanol Blending in India?

Socio-economic Impacts

- **Enhanced Farmer Income and Rural Prosperity:** Ethanol procurement till 2025 earned farmers Rs 1.18 lakh crore and distilleries Rs 1.96 lakh crore.
  - New agro-processing and distillery jobs boosted rural employment in states like Uttar Pradesh, Maharashtra, and Bihar.
- **Foreign Exchange Savings and Energy Independence:** India saved Rs 1.36 lakh crore in forex by cutting **crude oil imports.**
  - Ethanol Blending reduced India's oil import dependency, which is important for managing **trade deficits** and geopolitical risk.
- **Promotion of 'Make in India' and Self-Reliance:** Ethanol Blending strengthens domestic energy infrastructure and fosters the bio-economy, aligning with **Atmanirbhar Bharat** goals.
- **Price Stabilization and Crop Diversification:** Absorption of **surplus sugarcane and food grains** (e.g., broken rice, maize) stabilizes farm gate prices.
  - Facilitates crop diversification through incentives for non-food feedstocks like sweet sorghum, corn, and biomass.

Environmental Impacts

- **Reduced Greenhouse Gas (GHG) Emissions:** Approx. **700 lakh tonnes of CO_2 emissions avoided** (till 2025), aiding India to reach **Paris Agreement** targets.
  - Reduction in vehicular emissions of **carbon monoxide (CO)**, **hydrocarbons,** and particulate matter with E10–E20 blends.
- **Lower Air Pollution in Urban Areas:** Blended fuel burns more completely, reducing tailpipe pollutants, significant for **air-quality** challenged cities like Delhi and Kanpur.
- **Waste-to-Wealth Utilization:** Conversion of **damaged grains, molasses, crop residues**, and **agricultural waste** into ethanol reduces landfill burden and methane release, aligns with **circular economy** principles.

What are the Challenges in Deeper Ethanol Integration in India?

- **Feedstock Concerns and Food Security**: Ethanol from food crops (sugarcane, rice, maize) may pressure **food supplies,** and in 2024-25 **India became a net importer of maize** to meet ethanol demand.
- **Water Scarcity:** Ethanol production is **water-intensive,** grain-based units use 8–12 litres of water per litre of ethanol.
  - Sugarcane and molasses add to high water use, deforestation, and waste. Distilleries release **vinasse,** a toxic wastewater that can pollute rivers.
- **Climate Sensitivity**: Ethanol production depends heavily on climatic conditions affecting crop yields (e.g., droughts, unseasonal rains).
  - Intensive mono-cropping for ethanol production, driven by profitability, may reduce soil

fertility and alter land-use patterns, posing a threat to biodiversity.

- **Industrial Pollution Concerns:** Ethanol distilleries are classified as **"red category"** industries due to their high pollution risk.
    - They emit harmful chemicals like **acetaldehyde, formaldehyde, and acrolein, which can cause respiratory issues and cancer.**
    - In Andhra Pradesh, many units got environmental clearance without public hearings or proper assessments, and are often set up near residential areas.
- **Infrastructure and Logistics Gaps**: Ethanol infrastructure like pipelines, storage, and inter-state coordination needs upgrades.
    - Blending remains uneven across OMCs and states, with rural areas lacking facilities, raising safety and quality concerns.
    - Most existing vehicles in India are **E10-compatible,** E20 leads to marginal fuel efficiency loss unless engines are retuned.
        - Scaling beyond E20 will require industry-wide transition to **Flex-Fuel Vehicles (FFVs)** and fuel distribution upgrades.
- **Second and Third Generation Ethanol Technology**: Still underdeveloped in India, it needs large-scale investment and viability demonstration.

How could India Scale Beyond E20 While Ensuring Sustainability?

Strategy Area	Actionable Measures
Feedstock Diversification	▪ Support **algae-based ethanol (3G Ethanol)** under PM JI-VAN Yojana as a greener, waste-to-fuel option. ▪ Encourage drought-resilient, low-water crops like **sorghum** for sustainable biofuel production.
Technology Transition	▪ Mandate FFV production, offer **Production Linked Incentive (PLI) schemes** and lower GST benefits to automakers, and scale up **ETHANOL100** - compatible fuel stations.
Infrastructure Expansion	▪ Build pipelines, blending terminals, and green logistics to cut emissions under the **National Logistics Policy (NLP 2022).**
Environmental Integrity	▪ Mandate **effluent treatment, recycled water use,** reinstate public hearings for environmental clearances, and implement **carbon, water, and land-use audits** with **water budgeting** in ethanol-producing states.

Conclusion

India's early achievement of the E20 target marks a significant pivot toward renewable energy and rural prosperity. Going forward, strategic foresight and inclusive policy design will be crucial in **advancing ethanol blending beyond 20%, without compromising food security or environmental resilience.**

Drishti Mains Question:

India has achieved its E20 ethanol blending target. Discuss the factors behind this success and its implications for energy security and rural economy.

UPSC Civil Services Examination, Previous Year Questions (PYQ)

Prelims

Q. Given below are the names of four energy crops. Which one of them can be cultivated for ethanol? (2010)

(a) Jatropha

(b) Maize

(c) Pongamia

(d) Sunflower

Ans: (b)

Q. According to India's National Policy on Biofuels, which of the following can be used as raw materials for the production of biofuels? (2020)

1. Cassava
2. Damaged wheat grains
3. Groundnut seeds
4. Horse gram
5. Rotten potatoes
6. Sugar beet

Select the correct answer using the code given below:

(a) 1, 2, 5 and 6 only

(b) 1, 3, 4 and 6 only

(c) 2, 3, 4 and 5 only

(d) 1, 2, 3, 4, 5 and 6

Ans: (a)

Mains

Q. "Access to affordable, reliable, sustainable and modern energy is the sine qua non to achieve Sustainable Development Goals (SDGs)".Comment on the progress made in India in this regard. **(2018)**