

INDIA'S BIOECONOMY VISION & MISSION: SCIENCE & TECHNOLOGY

NEWS: India Targets \$300 Billion Bioeconomy by 2030

WHAT'S IN THE NEWS?

India aims to achieve a \$300 billion bioeconomy by 2030 through policies promoting biomanufacturing, innovation, and sustainability. Initiatives like BioE3 and the National Biopharma Mission are key to transforming India into a global biotech hub.

India's Bioeconomy Vision and Mission:

Context: The Union Minister for Science & Technology emphasized the importance of public participation and awareness in India's biotechnology initiatives, reaffirming the national target of achieving a \$300 billion bioeconomy by 2030.

What is Bioeconomy?

- The bioeconomy refers to the sustainable use of renewable biological resources to produce food, energy, healthcare solutions, and industrial goods.
- It leverages advanced tools such as gene editing, bioprinting, and biotechnology.
- Integrated with digital and circular economy principles, it promotes climate resilience, sustainability, and inclusive economic growth.

India's Global Position in Bioeconomy

- India is among the Top 12 global biotechnology destinations.
- 3rd largest biotech destination in Asia-Pacific.
- Bioeconomy contribution to GDP: 4.25% (2024).
- Growth from \$10 billion (2014) to \$165.7 billion (2024).
- CAGR: 17.9% over the last 4 years.
- Target: \$300 billion by 2030.

Biotechnology Sectors in India

- **Biopharmaceuticals:** Vaccines, biosimilars, diagnostics, therapeutics.
- **Bioagriculture:** Genome-edited crops, transgenics, sustainable practices.
- **BioIT:** Integration of IT in biotech research and services.
- **Bioservices:** Contract research, clinical trials, regulatory support.

Government Initiatives and Policies

1. BioE3 Policy (2024):

- Aims for biotechnology-driven economy aligned with climate goals.
- Focus on:
 - Biomanufacturing & Bio-AI hubs
 - Establishment of biofoundries
 - Circular economy-based regenerative models
 - Workforce expansion and skilling
 - Integration with LiFE and Net Zero objectives

2. National Biopharma Mission:

- Led by DBT, implemented by BIRAC.
- Budget: \$250 million (50% co-funded by World Bank).
- Aims:
 - Develop indigenous biopharma ecosystem
 - 101 projects, over 150 partner institutions, 30 MSMEs

3. BIRAC Initiatives:

- Biotechnology Industry Research Assistance Council (est. 2012).
- 95 bio-incubation centres across India.
- Supports startups with funding, mentorship, and infrastructure.

Key Sectoral Achievements

Pharmaceuticals:

- India: 3rd largest by volume, 14th by value globally.
- Supplies 65% of global vaccines.
- Produces 1 in every 3 tablets consumed globally.
- Developing indigenous HPV vaccine for cervical cancer.

Bioagriculture:

- **Chickpea Variety 'Saatvik (NC-9)'**: Drought-tolerant, high-yield.
- **Genome-Edited Rice**: DEP1-edited MTU-1010 for higher productivity.

- **SNP Arrays:** IndRA (rice), IndCA (chickpea) for DNA fingerprinting.
- **Amaranth Breeding:** Anti-obesity varieties via 64K SNP chip.
- **Kisan-Kavach Suit:** Anti-pesticide protection for farmers.

Biotech-KISAN Programme:

- Scientist-farmer collaboration.
- Hub-and-spoke model operational in 115 Aspirational Districts.

Bioenergy:

- Biomass-based clean fuel production.
- Ethanol blending target: 20% by 2025 (15% achieved in 2024).
- Impact:
 - Saved 173 lakh MT crude oil
 - Rs. 99,014 crore in forex saved
 - 519 lakh MT CO2 emission reduction

Challenges to Bioeconomy Growth

- Infrastructure deficits (especially in rural/digital domains).
- Shortage of skilled biotech professionals.
- Regulatory and IP-related bottlenecks.
- Funding constraints for early-stage startups.

Way Forward

- Scale up bio-manufacturing capabilities with global partnerships.
- Boost R&D in frontier technologies (CRISPR, synthetic biology).
- Expand bio-clusters and incubation hubs across regions.
- Integrate bioeconomy with green energy, AI, and health infrastructure.
- Ensure public awareness and equitable access to biotech solutions.

Conclusion: India's bioeconomy is at a transformative juncture, driven by strong public policy, dynamic entrepreneurship, and global collaboration. Through continued focus on innovation, inclusivity, and sustainability, India can lead the global shift towards a bio-based, green, and resilient future.

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