



Research Unit
Press Information Bureau
Government of India

Policy to Practice

Harnessing Biotechnology for a Greener Tomorrow

(Ministry of Science and Technology)

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Introduction

Biotechnology is emerging as a transformative force in addressing global challenges related to environmental sustainability and energy conservation. By leveraging cutting-edge innovations in biomanufacturing, bioresources, and bioenergy, India is actively advancing its commitment to green growth and a sustainable future. The Department of Biotechnology (DBT) has been at the forefront of driving policy reforms and research initiatives aimed at fostering a bio-based economy that aligns with the nation's environmental and economic goals.

Policy Reforms Driving Biotech Advancements

Recognizing the potential of biotechnology to revolutionize key sectors, the Government of India has introduced several landmark policy reforms:

BioE3 (Biotechnology for Economy, Environment, and Employment) Policy

Approved on **August 24, 2024**, this policy aims to accelerate innovation-driven research and entrepreneurship in high-performance biomanufacturing.

BioE3

Biotechnology for Economy,
Environment & Employment



VISION

To set Bharat at the forefront of a future that is more sustainable and responsive to global challenges by accelerating and harnessing biomanufacturing solutions that encompass diverse bioeconomic activities while safeguarding environmental and climate impacts.

GOAL

To fast-track innovation-to-technology sustainably by weaving together fragmented activities under the umbrella of biomanufacturing and incentivize concrete options to build a sustainable future.

OBJECTIVE

To set forth a framework that ensures the adoption of cutting-edge advanced technologies, and to align innovative research aimed at revolutionising biomanufacturing processes for enhanced efficiency, sustainability, and quality while also accelerating the development and production of bio-based high-value products.

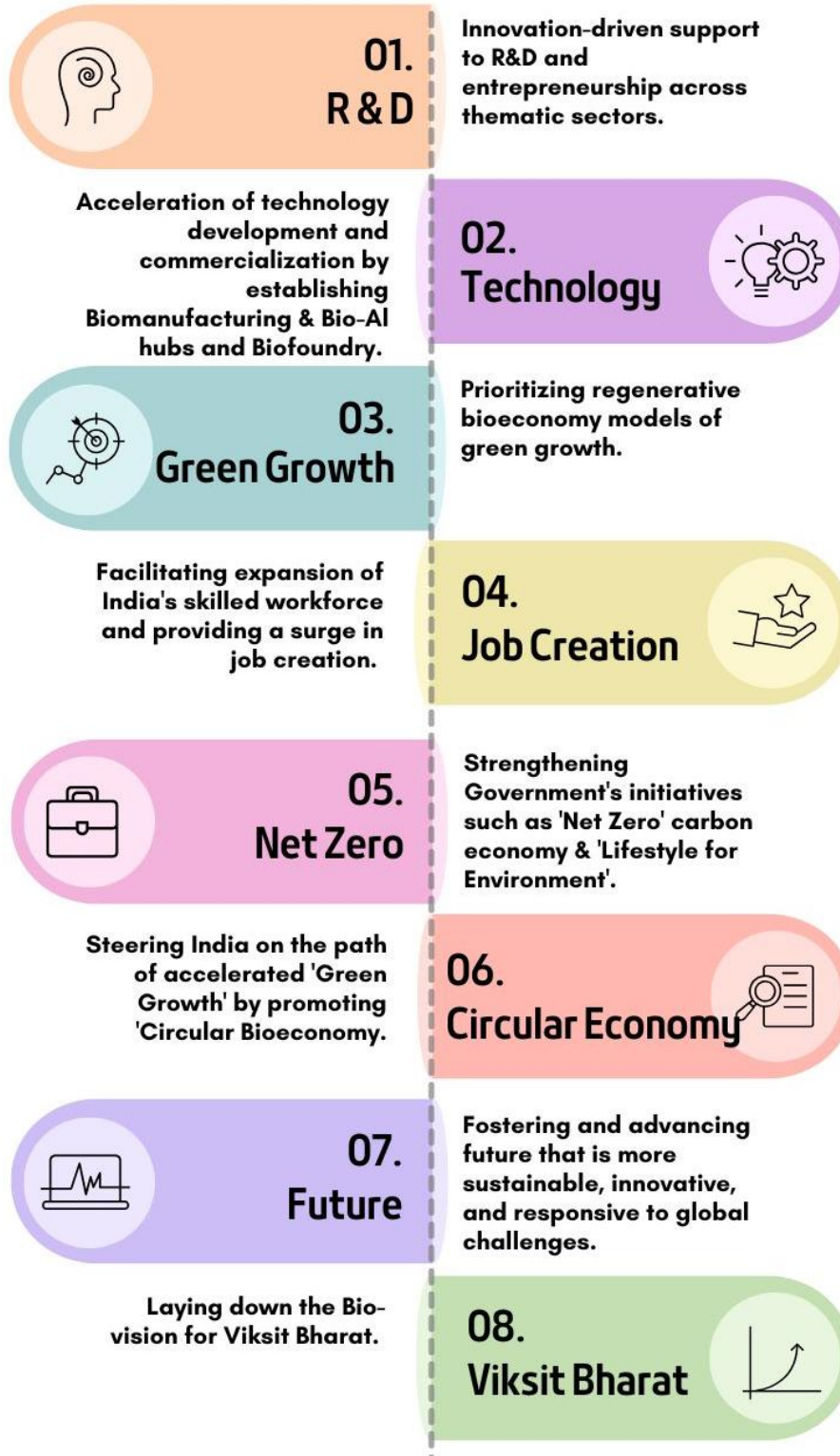
Benefits of BioE3¹

- ✚ Positioning India as a Global Biomanufacturing Hub.
- ✚ Steer India on the path of accelerated Green Growth.
- ✚ To fast-track innovation to technology sustainably.
- ✚ Drive employment and intensify entrepreneurial momentum.
- ✚ Achieve bioeconomy targets and national economic goals for 2047.
- ✚ Create a Bio-Vision for Bharat.²

¹ <https://dbtindia.gov.in/sites/default/files/BioE3%20Policy%20Brochure.pdf>

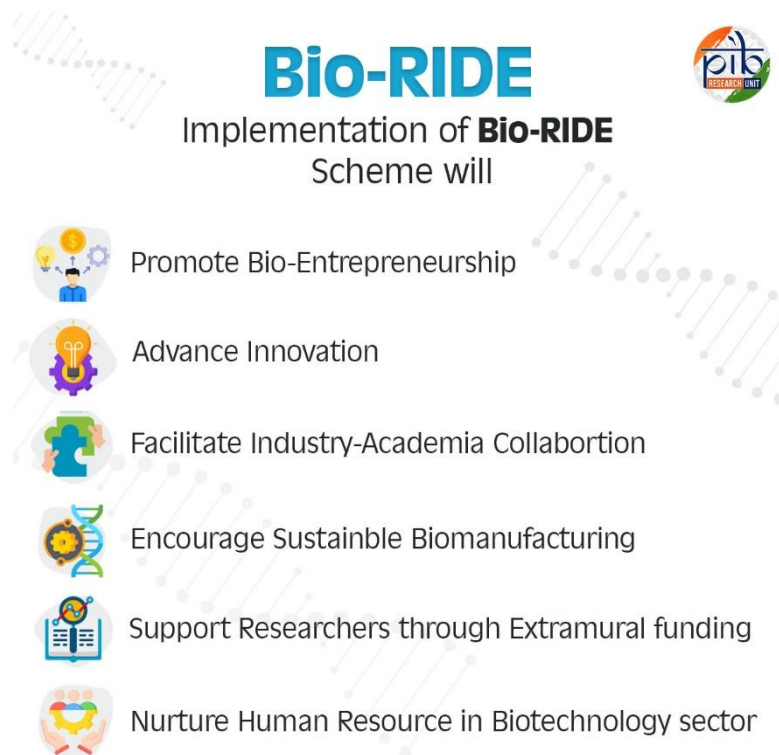
² To read more about Bio E3 [click here](#)

Salient Features



Biotechnology Research Innovation and Entrepreneurship Development (Bio-RIDE)

This scheme consolidates previous DBT initiatives into a single framework, with a budget allocation of **Rs 1,500 crore**. Bio-RIDE aims to accelerate research, enhance product development, and bridge the gap between academic research and industrial applications. The scheme is part of the Government of India's mission to harness the potential of bio-innovation to tackle national and global challenges such as healthcare, agriculture, environmental sustainability, and clean energy.



4

India's First Biomanufacturing Institute (BRIC-NABI)

The establishment of the BRIC-National Agri-Food Bio-Manufacturing Institute (BRIC-NABI) marks a significant milestone in India's agricultural biotechnology landscape. This newly established entity aims to streamline the journey from research to commercialization, facilitating pilot-scale production and delivering innovative Agri-tech solutions to the market.

⁴<https://x.com/JPNadda/status/1836391805740552641/photo/1>

VISION

Food and nutritional security for all through agri-food biotechnology research and innovation.

MISSION

To be a centre of excellence and provide leadership in agri-food biotechnology research.

GOAL

Improving nutritional quality and availability of affordable agri-food and food products through innovations.

5

i3c BRIC RCB PhD Program

Launched in 2024, this PhD initiative aims to build a highly skilled workforce with a problem-solving approach to address societal needs. The programme will foster greater academic and research interaction among the institutions of the DBT BRIC (iBRICs), RCB and ICGEB, and will increase the professional networking opportunities for the Ph.D. scholars. With its first call opened in June 2024, a total of 58 students have been enrolled in its very first batch.

Benefits of joining i3c BRIC-RCB Ph.D. Programme



An Advanced Coursework Curriculum empowering futuristic research



An Enriching Immersion Programme that imparts experiential learning



Merit based Ph.D. admission choices in any one of the BRIC institutions/RCB/ICGEB



Hands-on training on High-End Technology Platforms



Interdisciplinary Collaborations fostering a dynamic exchange of ideas and expertise

6

Emerging Frontiers in Biotechnology (EFB) Program

⁵ Annual Report 2022-23 <https://nabi.res.in/cms?slug=annual-reports>

⁶ https://dbtindia.gov.in/sites/default/files/i3c-flyer-apr-1%20%282%29_1.pdf

The Emerging Frontiers in Biotechnology (EFB) program of DBT is designed to promote innovative and high-risk research in emerging areas of biotechnology. It aims to address cutting-edge scientific challenges and create new knowledge and technologies that could have significant societal and economic impacts. 157 innovative projects have been supported so far across 73 institutions nationwide, spanning 21 states.

Key Achievements in Bioenergy and Environmental Conservation

India's commitment to bio-innovation is yielding tangible results in bioenergy, bioresources, and environmental restoration:

Mangrove Biore Restoration

DBT-led initiatives have successfully demonstrated biore restoration techniques across 65 hectares of degraded mangrove ecosystems in the Indian Sundarbans. Out of 31 selected sites, 16 have shown significant restoration progress, aiding in coastal ecosystem conservation.



Plant Tissue Culture for Sustainable Agriculture

The National Certification System for Tissue Culture Raised Plants (NCS-TCP) is a quality management system that certifies disease-free plants for growers to improve crop productivity. NCS-TCP's relentless effort in certifying disease-free plants is transforming agriculture. With over 1 billion plants certified, it's a testament to a healthier, more resilient future for farming.





Biomass Processing Innovations

Novel enzymes, including an engineered beta-glucosidase with improved glucose and pH tolerance, have been developed for efficient and cost-effective biomass conversion. These advancements are pivotal for scaling up bioenergy production.

Advancements in Bioethanol Production

The International Centre for Genetic Engineering and Biotechnology (ICGEB) has identified and further developed a robust yeast strain, *S. cerevisiae* NGY10, enhancing ethanol production efficiency. This strain demonstrates 97% efficiency at 30°C, outperforming commercial strains, thus bolstering India's biofuel sector.



Conservation of Living Root Bridges in Meghalaya



The ecology and genetics of the living root bridges of Meghalaya have been characterized in terms of the biology, genetic diversity and population structure of the trees and pollinators within the mutualism between the rubber tree (living root bridge component) and its pollinating fig wasps. This knowledge has been used to design long-term conservation strategies for this iconic relationship between trees, wasps and humans.

Conclusion

The integration of biotechnology into environmental and energy conservation efforts is paving the way for a sustainable future. Through progressive policy reforms, strategic investments, and groundbreaking research, India is strengthening its bioeconomy while addressing critical environmental challenges. As biotechnology continues to evolve, it holds immense potential to drive economic growth, foster ecological balance, and ensure energy security for future generations.

References

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Bio E3 brochure: <https://dbtindia.gov.in/publications>

Annual Report 2022-23 <https://nabi.res.in/cms?slug=annual-reports>

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