

A Roadmap for India's Circular Economy for Plastics

The need for action

The Government of India's commitment to address the plastic waste challenges and consequential human health and ecological impact concerns has been a key motivation for the development of a **National Circular Economy Roadmap for Reducing Plastic Waste in India to help drive the transformation of the plastic waste economy in India into a circular economy.**

In 2016, India acknowledged the scale and complexity of the plastic waste problem and its interconnectedness with global ocean plastic pollution and global warning concerns. This pollution has troubled Indian governments and citizens for over three decades, with multiple strategies and campaigns launched over this time. The introduction of the Plastic Waste Management Rules in 2016 led to a raft of measures directed at municipal, industry, residential and commercial actors.

India generates nearly 26,000 tonnes of plastics waste each day, more than any economy except the USA and European Union. Only 8% of this plastic gets recycled, 29% is mismanaged, and the rest incinerated or dumped, finding its way into water bodies and the food chain for humans, marine and terrestrial life.

India seeks to go further, towards a circular economy for plastics. A circular economy would use as little virgin plastic as possible, while retaining the value of materials within the economy as long as possible. It would substitute virgin plastics with alternative materials, extend the use of plastic materials, collect waste and end-of-life plastic, and recycle it for its next use. This would **promote good health and sustainable living in line with strategic action for the LiFE – Lifestyles for Environment** intervention of the Government of India as introduced at COP26 on the 1 November 2021. Finally, the Roadmap can support the Government of India and industry associations in responding to the requirements of the United Nations Global Plastics Treaty that is expected to be in force by 2024.

The Roadmap solution

To that end, major Indian and Australian research organisations have collaborated to develop the *National Circular Economy Roadmap for Reducing Plastic Waste in India*, as part of the Australia-India Comprehensive Strategic Partnership.

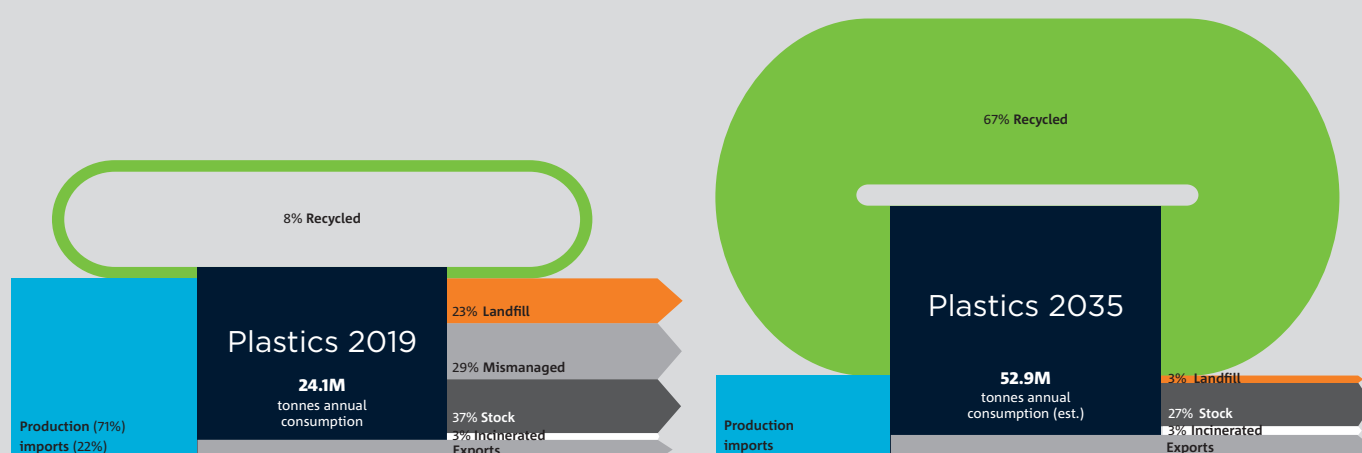
The Roadmap is a culmination of three years of collaborative research and engagements with stakeholders representing researchers, industry, Government and community in India.

This Roadmap offers a comprehensive view of the entire plastics value chain and systemic recommendations towards a circular economy for plastics.

The Roadmap traces the current successes and urgent needs for India's plastics industry and sets out a path for it to lead India's circular economy, addressing environmental issues and fostering a positive economic revolution. It offers:

- Clear recommendations for the transition to a circular flow of materials.
- A living framework and roadmap of actions in the short, medium and long term.
- Clear roles for the symbiotic linking of policy, industry, technology, community and social action.
- Practical guidance for government, municipal and community action, in the formal and informal economy and for public, household, private and non-profit actors.

Increasing plastic circularity in India over the next decade – an ambitious goal



Supportive infrastructure

Build a digital backbone of data, linking material flow information from virgin plastics manufacture through to re-use, secondary processing, and disposal. Create physical hubs for local industrial clusters where manufacturing, materials collection and re-processing feed each other. Build R&D ecosystems that capitalise on these clusters for innovation and research.

2025	2030	2035
<ul style="list-style-type: none"> A national modernisation fund for recycling infrastructure in place, co-funded by government and the private sector. 	<ul style="list-style-type: none"> Digital platforms in place for data collection and reporting, waste exchange platforms and marketplaces. 	<ul style="list-style-type: none"> Industrial clusters established to drive collaboration and innovation in product design.

Effective recycling

Radically improve India's recycling capability, with government-finance-research-industry collaboration. Build sorting facilities with artificial intelligence capabilities, with advanced mechanical and chemical processing infrastructure. Push for reverse logistics and state-of-the-art recycling technology to sit alongside industry and commerce in a distributed model, with smaller-scale community-based solutions.

2025	2030	2035
<ul style="list-style-type: none"> Government and corporates have recycling and sorting infrastructure in place. A National Expo of Technologies is held to promote the Make in India Campaign. 	<ul style="list-style-type: none"> Recycling capacity grows to 18.8 Mt on the back of new technologies and consumer forums. A zero landfill target for certain plastic types is set. A healthy pipeline and regular funding for recycling/upcycling technologies in place. Digitalisation of the flow chain of polymers is mandatory. 	<ul style="list-style-type: none"> Recycling capacity grows to 35.2 Mt. Secondary plastics are now valued for industrial applications. Digital product certification and traceability from cradle to grave in place.

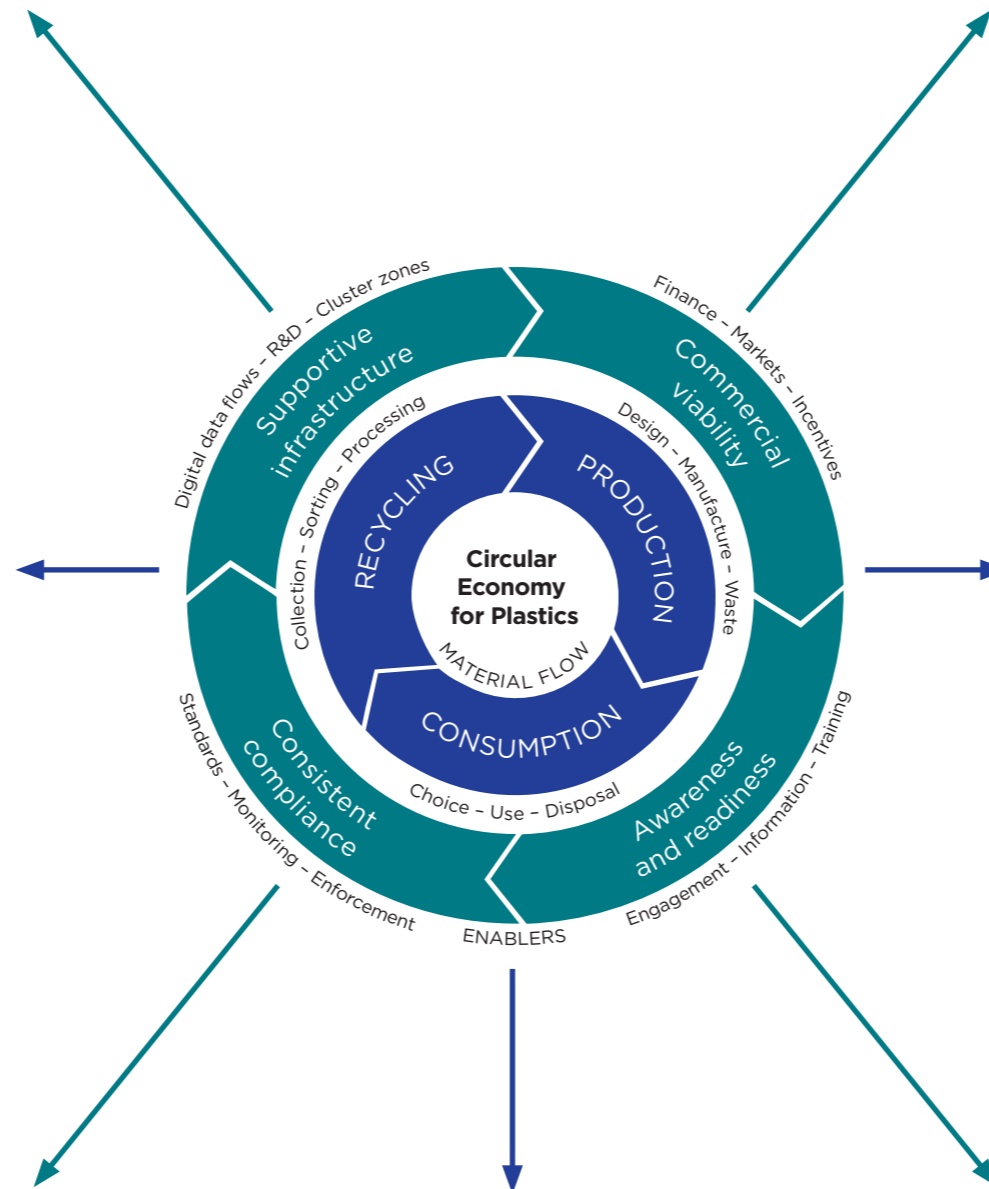
Consistent compliance

State governments set and monitor targets on plastics reduction, re-use and recycling under a national framework and standards. After enough time to licence and educate participants in the circular economy, incentive-based enforcement can be pursued to ensure targets are met, and that sustainable companies are not placed at an unfair disadvantage.

2025	2030	2035
<ul style="list-style-type: none"> A circular economy transition body is established. Targets are in place for virgin plastic use, segregation at source, and recycling. Data tracking mechanisms are in use across producers, recyclers and municipalities. 	<ul style="list-style-type: none"> Incentives in place to replace virgin with secondary plastics in production. EPR extended to all complex material streams and at all stages of the lifecycle. 	<ul style="list-style-type: none"> National standards are in place for end-of-life plastic, secondary use, digital capability and testing. Non-compliance is sanctioned with penal provisions. Regulations in place on product design, production, procurement, consumption and disposal. Ecological and human health externalities are integrated in risk, financial and pricing analysis for all products.

The seven elements of India's circular economy for plastics

Policies support every element in the circular economy for plastics



Commercial viability

Direct manageable capital from government and CSR funds towards start-ups and firms at next-stage commercialisation. Use incentives to preference circular economy businesses. Develop markets for high quality secondary material, with government agencies and sustainable corporations seizing the opportunity to 'buy recycled'.

2025	2030	2035
<ul style="list-style-type: none"> A compendium of commercially proven technological solutions is available. Waste exchange platforms and marketplaces are highly active. Public-private-community partnerships for innovation are active. 	<ul style="list-style-type: none"> New credit facilities for circular business models are available. Fiscal and tax incentives and public procurement policies for circular businesses are in place. Standards, certification and verification for recycled plastics and secondary products are established. Credit products and peer-to-peer lending for the informal waste sector are available. 	<ul style="list-style-type: none"> An effective, technology-based waste management system is in place.

Collaborative production / design for circularity

Reduce virgin materials and design for circularity throughout the value chain. Design to minimise material, avoid low-value, multi-material composites and hard-to-abate plastics. Substitute virgin plastics with recycled and alternative materials. Manufacture efficiently, capturing all waste streams for re-use or recycling. Avoid unnecessary plastic packaging.

2025	2030	2035
<ul style="list-style-type: none"> A Plastics Innovation Hub is established. Automated sorting techniques are piloted. Deadlines are set to replace certain polymers with sustainable alternatives. Standards for plastic recycling to support food and health safety are set. 	<ul style="list-style-type: none"> Supply and demand for plastic alternatives has been scaled up. The Plastics Innovation Hub's successes is reviewed. Public procurement strategies are implemented. 	<ul style="list-style-type: none"> All states have established a Plastics Innovation Hub, with proven technologies, education resources, skills training and business support to transition to a circular economy.

Awareness and readiness

Establish a 'zero-waste' culture at industry, in offices, and at home. Use educational institutions to raise awareness and build readiness. Tighten waste management policies in industry, administrative and commercial establishments. Promote national principles into India's multiplicity of communities and languages, with a focus on simple tools that are available on phones and devices, digital information portals, and multi-layered training.

2025	2030	2035
<ul style="list-style-type: none"> Online platforms to educate, communicate and promote circular businesses are established. Real-time data on plastics material supply chains is available. 	<ul style="list-style-type: none"> Municipal and state monitoring, evaluation and learning mechanisms to link community, industry and government initiatives are in place. Circular economy dialogues are active in response. 	<ul style="list-style-type: none"> There is evidence of a culture shift in business and community. Established plans for the next phase of transition are in place.

Sustainable consumption

Choose products with minimal plastics, that are recyclable and made with recycled content. Reject single-use, low value and unnecessary packaging plastics. Reduce and reuse wherever possible, before recycling. Segregate waste streams after use and dispose responsibly. Work with the informal sector for efficient collection of waste materials. Support the sharing and second-hand market economies. All actions in line with the LiFE initiative.

2025	2030	2035
<ul style="list-style-type: none"> Information and training portals, running with clear outreach targets are established. New waste systems are in place in urban centres with collection rates up to 40%. 	<ul style="list-style-type: none"> Every house, business and office is using segregated waste disposal. Competitive products with 50% recycled content are available. 	<ul style="list-style-type: none"> Single-use plastics and low-value packaging is phased out, with consumers choosing affordable and sustainable alternatives.

Benefits of the Roadmap

A circular economy for plastics offers comprehensive cross-border opportunities and benefits that are social, environmental and economic.

By 2035, landfill would be reduced by 30%, as single-use plastics are phased out completely, recycling rates increase to 67%, and over 80% of waste streams are digitally tracked and managed.

This diversion would lead to a cleaner environment, 20-50% less greenhouse emissions, improved air quality, and reduced microplastics in the food chain.

Integrating the informal sector into the formal economy by recognising their role, enabling access to government services, and supporting their business ventures.

Supporting a cultural shift from 'use and throw' to one in which future generations value resources and care for the environment, even as they develop their economy.

Creating new secondary markets for used plastics in construction and manufacturing, and new primary markets for alternative, eco-friendly products.

Accelerating India's progress on commitments towards the Sustainable Development Goals and under the forthcoming Global Plastics Treaty.

Offering an example for other national and regional economies to support transformative change at the global scale.

These benefits are within India's reach if all parties in the plastics value chain, with support from government, share a clear, new framework for action.

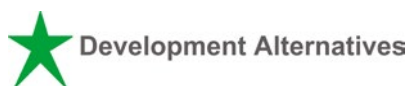
Agents for a circular economy

The Roadmap has identified a number of key stakeholders who can take ownership of the Roadmap to drive India towards a circular economy for plastics.

- **NITI Aayog** can co-ordinate with various ministries to streamline policy development and implementation.
- **Plastic and plastic product manufacturers** can collaborate with government as part of their Environmental-Social-Governance (ESG) strategy and leadership.
- The **Ministry of Environment, Forest and Climate Change** and the **Central Pollution Control Board** can prepare and promote manuals and codes to revolutionise plastic waste management.
- **Atmanirbhar Bharat** (Self-Reliant India), **Smart Cities and Swachh Bharat Abhiyaan** (Clean India), and the **Ministry of Housing and Urban Affairs** can implement these policies and codes, as the ministries with primary responsibility for their objectives.
- The **Central Pollution Control Board** promotes targets, while the State Boards along with the environment departments of state governments and local authorities proactively engage with producers, distributors, users, etc for better compliance.
- The **Bureau of Indian Standards** under the **Ministry of Consumer Affairs, Food and Public Distribution** can promote the innovations in technology and in circular business models that address the gaps and barriers to the circular economy.

In addition to these key stakeholders, anyone who is interested in promoting and addressing the plastic waste problem in India and globally can use the Roadmap and initiate a change process to encourage the transition to a circular economy for plastics.

For more information please visit - Reducing Plastic Waste in India ([csiro.au](https://research.csiro.au/rpwi/)) <https://research.csiro.au/rpwi/>



The India – Australia Industry and Research Collaboration for Reducing Plastic Waste is a three-year collaboration with partners in both India – the Council of Scientific and Industrial Research (CSIR), Development Alternatives and The Energy and Resources Institute (TERI) – and Australia – the University of New South Wales (UNSW), the University of Technology Sydney (UTS) and CSIRO. Through key activities, this collaboration works closely with industry, government and community stakeholders to evaluate the economic and policy implications of transitioning to a circular economy for plastics.