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INDIA'S TRYST WITH A CIRCULAR ECONOMY

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Contents

India's Tryst with a Circular Economy[1]

"Nothing is more powerful than an idea whose time has come."

Victor Hugo

1. Introduction

1.1 Within roughly half a century, from 1970 to 2015, India witnessed a six-fold increase in its annual material consumption, from 1.18 billion tonnes to a staggering 7 billion tonnes. This figure is slated to double to 14.2 billion tonnes if not more by 2030 as India becomes the most populous country and its per capita consumption surges.

1.2 And this material consumption is shouldered by a breakneck speed of resource extraction. It has been quantified that India's resource extraction is 1,580 tonnes/acre, which is 251% higher than the world average of 450 tonnes/acre.

1.2 If we juxtapose this figure with the fact that the percentage of goods recycled in India is a paltry 20 per cent, we not only see an acute sub optimal utilization of scarce resources but also a tremendous possibility of reversing this trend and embarking on a sustainable model of economic development. As a matter of fact, in Europe alone, the quantum of goods recycled is as high as 70 per cent!

1.3 Its also pertinent to note that India is also the third highest emitter of greenhouse gases, and accounts for 9.2% of total world emissions[2]. And as India tries to fit in the missing piece of manufacturing in its pursuit of becoming a leading economic power, the intensity of consumption of raw materials is only going to increase exponentially.[3] To keep manufacturing green and competitive it is perhaps pertinent to find ways and means to increase the recycling capacity from the lowly 20 per cent presently. Therefore, it is not misplaced to assert that the journey from the current linear economic model to a circular economic model is filled with ecological and economic benefits.

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[2] https://www.orfonline.org/expert-speak/india-rebuilds-economy-time-make-circular-sustainable/

[3] https://www.orfonline.org/expert-speak/india-rebuilds-economy-time-make-circular-sustainable/

1.4 According to the World Economic Forum, this proportion needs to almost double to shrink the global carbon footprint and address other critical environmental challenges. [4]According to the Ellen McArthur foundation, transitioning to a circular economy will result in US$ 624 billion in economic benefits, and reduce carbon emission by 44% (compared to current development path) in 2050 alone.

2. Embarking on a Path of Green Growth

2.1 The vision of green growth has been a cornerstone of India's policy initiatives as has also reflected in the budget document for 2023-24. This is clearly evident from the impetus on green growth in the budget speech of the finance minister. One of the most important aspects of this green growth vision has been the focus on energy transition. The commitment on part of the government to achieve this is reflected in the budgetary allocations being made for this purpose. The budget allocates Rs 35000 crores for energy transition which is a significant step in the direction of achieving the goal of green growth. However, there are critical issues which need to be paid attention to in order to understand the challenges ahead and how this budgetary allocation can be best utilized to address these challenges.

2.2 One of the key elements of this energy transition is the expansion of the vision of a circular economy which would not only facilitate the achievement of our green goals but will also help us reuse and recycle materials for our consumption. A circular economy is central to efficient energy transitions. The context of this working paper is to locate the standing of India as a circular economy and understand the challenges at hand. In order to establish that, it is important to define the very meaning of the circular economy and what its elements are.

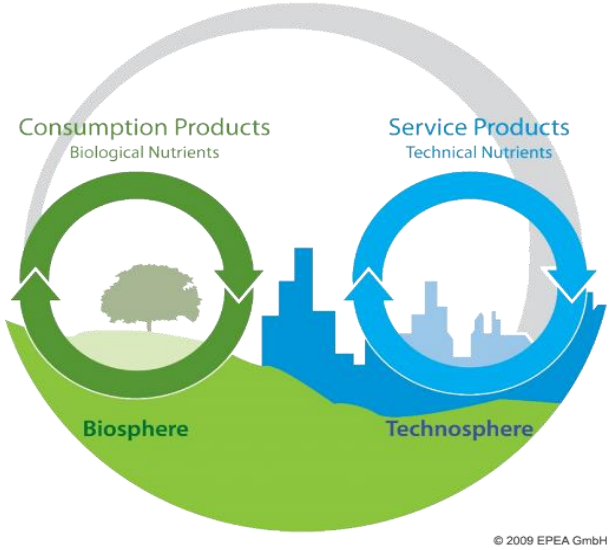
3. Circular Economy

3.1 Circular economy is essentially an economic system where means of production are organized around reusing and recycling the inputs so that they can be used to reduce our environmental emissions and at the same time facilitate a sustainable and environment friendly mode of production.

3.2 The central idea here is to achieve a *circularity* of inputs. The idea of Circular economy comes from several schools of thoughts which have been refined over a period of time. German chemist Michael Braungart and American architect Bill McDonough, developed the Cradle to Cradle concept

[4] https://ellenmacarthurfoundation.org/circular-economy-in-india

and certification process. This design philosophy considers all materials involved in industrial and commercial processes to be nutrients, of which there are two main categories: technical and biological. The Cradle to Cradle framework focuses on design for effectiveness in terms of producing products with positive impact.[5]



Source:https://ellenmacarthurfoundation.org/schools-of-thought-that-inspired-the-circular-economy

3.3 The key principles of this approach are[6],

(i) Cradle to Cradle design takes inspiration from natural systems, where there is no concept of waste: everything is a resource for something else. Biological nutrients should be safely returned to the soil, while technical nutrients should be used again and again at high quality.

(ii) The second principle is to use clean and renewable energy. The argument goes that natural systems thrive on current solar income and human systems could too. Renewable energy is clean (at the point of use), low-cost to operate, creates no emissions in use, and utilises abundant resources.

(iii) Finally, celebrate diversity: diversity builds resilience in natural systems, and can do so in human systems, too. Equally, no two places are the same: a diverse approach is often necessary to overcome the challenges and meet the opportunities offered by different geographies.

3.4 Other schools of thoughts which have further refined the concept of Circular economy are Biomimicry, Industrial Ecology, Regenerative Design, Blue Economy etc.

[5] https://ellenmacarthurfoundation.org/schools-of-thought-that-inspired-the-circular-economy
[6] ibid

4. What is the Size of the Circular Economy?

4.1 The Circularity Report 2023 estimates that only 7.2% of the global economy is circular and this number is only getting worse with time[7]. Despite all the efforts to address the goals of sustainable development, the global production ecosystem has failed to inculcate elements of a circular economy.

4.2 A root cause of this, is the increase in consumption and resource extraction to fulfill the enhanced aggregate demand. While it is important to understand that enhanced private consumption is critical for enhancing the quality of life of billions of people, especially in developing economies, it is also important to ensure that this does not happen at the cost of our environmental goals. And the evidence at hand suggests exactly this.

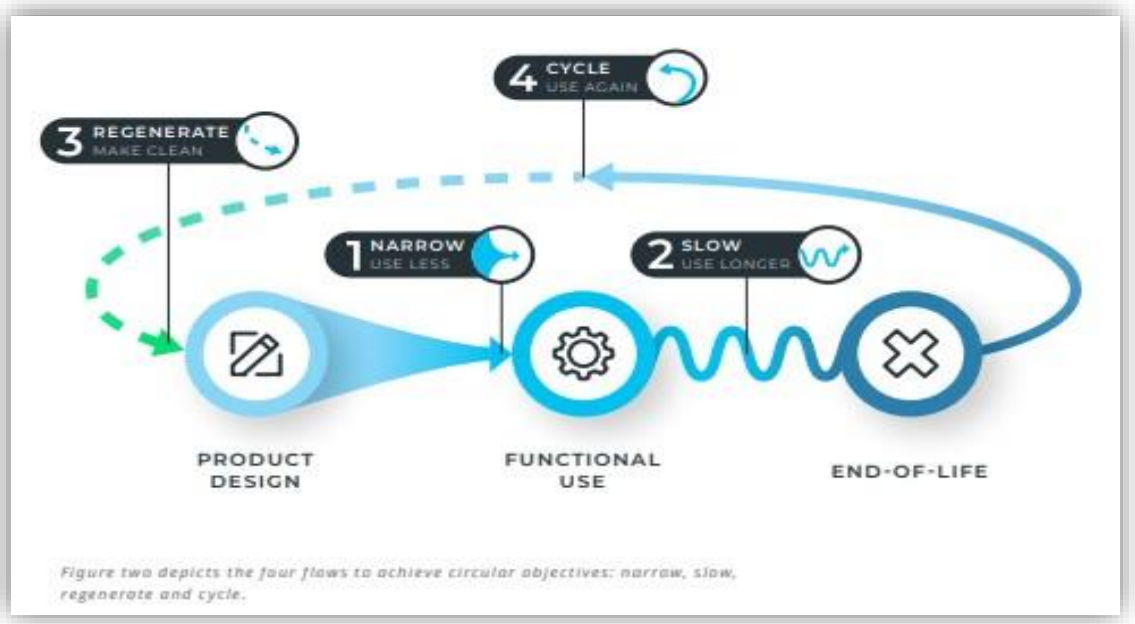
4.3 The circularity report notes that resource extraction and utilization over the last six years have surpassed the total of the same over the entire 20th century.[8] Not only that, the global shift in means of production has increasingly become uncircular over the last few years. While the global size of the circular economy stood at 9.1% in 2018, it dropped to 8.6% in 2020 and currently stands at 7.2%.

4.4 Not only does the circularity report show that there has been a decline in the size of the circular economy, but it also argues that the shift to a larger circular economy is the answer to our environmental goals. The report argues that a circular economy can reduce up to 30% of total material used in order to fulfill our needs which will go a long way in addressing our climate change issues. This vision of a circular economy has three key components: reduce, regenerate, and redistribute. While the idea of reduce revolves around shifting from an end goal of efficiency to sufficiency, regenerate caters to a shift from extraction to regeneration of the components of the production chain. Redistribution is essentially putting in the necessary mechanisms in place which can address the inequality of resource access and shift the imbalance in global resource use in developed economies in comparison to their developing counterparts.

4.5 Much of the discourse around sustainable development and reducing carbon footprints to achieve our environmental goals has revolved around the Intergovernmental Panel on Climate Change's (IPCC) target of keeping global temperature increase to 1.5 degree celsius. This target which was a part of the Paris Agreement agreed at the Conference of Parties (COP 21) has

[7] The circularity gap report, 2023
[8] The circularity gap report, 2023

been the cornerstone around which our efforts for sustainable development have been organized. The Paris Agreement also notes that in order to achieve these goals, greenhouse gas emissions have to peak by 2025 and decline by 43% before 2030.



Source: The Circularity Report, 2023

4.6 Current evidence suggests that these targets are not going to be met and the limit of 1.5 degree celsius for global warming is going to be breached. The Economist in a recent report argues that the necessary mechanisms which would drive the push towards achieving this target are not in place.[9] Similar apprehensions have been pointed out by the lead negotiator of last year's COP27 in Egypt.[10] One of the critical aspects of this failure is the inability to achieve our goals of enhancing the circularity in the global economy. There is a direct correlation between a reduction in the size of the circular economy globally and the increase in global warming. There is evidence which shows that a bulk of greenhouse gas emissions, as a matter of fact, as much as 70% of these are tied to material handling and use. If there is one critical shift that needs to be achieved in order to achieve our climate goals, it is to facilitate the necessary institutional mechanisms required to shift towards a circular economy.

4.7 In light of this global evidence, it is important to understand where India stands as a circular economy.

[9]https://www.economist.com/interactive/briefing/2022/11/05/the-world-is-going-to-miss-the-totemic-1-5c-climate-target

[10]https://www.euractiv.com/section/climate-environment/news/1-5c-target-not-achievable-under-current-conditions-says-cop27-host/

5. Is India Predominantly Linear?

5.1 India's current economic model is largely linear, where resources are extracted, processed, and transformed into products that are sold to consumers. After use, these products are disposed of, leading to a significant amount of waste generation.

5.2 According to the Central Pollution Control Board (CPCB), India generates over 62 million tonnes of waste every year. About 43 million tonnes (70%) are collected, of which about 12 million tonnes are treated, and 31 million tonnes are dumped in landfill sites. This is expected to increase to 165 million tonnes by 2030. The majority of this waste is disposed of in landfills or dumped in open spaces, leading to environmental degradation and health hazards.

5.3 As per the SPCBs/PCCs, there are 4437 ULBs, 3043 Towns & cities and 968 Class I & II Towns & Cities in the country. In 2016, India added 31 million tonnes of waste to the legacy waste in its dumpsites. As per the Central Pollution Control Board (CPCB's) Annual Report 2018–19 on solid waste management, despite four years of the Swachh Bharat Mission (SBM) in 2019, India dumped 23.35 million tonnes of waste in existing 3159 dumpsites.

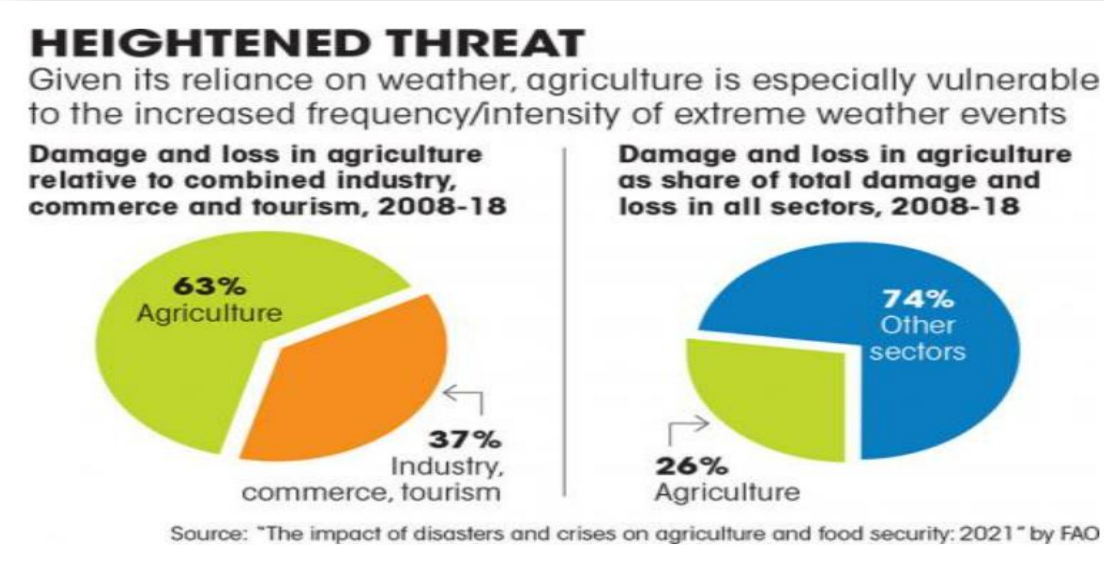
6. Effects of Climate Change

6.1 India is highly vulnerable to the impacts of climate change. We are already experiencing the adverse effects of climate change, such as more frequent and severe droughts, floods, heat waves, and extreme weather events. More frequent and severe heat waves have led to increased mortality and morbidity.

6.2 In 2015, a heatwave in India caused over 2,000 deaths. Climate change has resulted in changing rainfall patterns, leading to more frequent and severe droughts in some regions of India. This has led to water scarcity, which affects both human and animal populations. In August 2018, the people of Kerala saw one of the worst floods since the great floods of 1924. The state received 96% excess rainfall than predicted, setting off massive floods in most regions. Agriculture, housing, fisheries, animal husbandry and other businesses, and the natural flora and fauna of the state, faced huge losses. The State Land Revenue Department reported around 330 landslides, and the projected economic loss crossed INR 31,000 crore. More than 100 people were reported dead due to the landslides. The landslides also

resulted in crop loss, with more than 300 acres of coffee and tea plantations in the state affected.

6.3 Agriculture accounts for 15% of India's GDP and 43% of employment and is the most vulnerable to climate change. Frequent heat waves, extreme rainfalls, water scarcity and soil degradation directly impact the agriculture output and incomes in India. Decreased output, in turn, results in weaker rural income and consequently, lower demand. Heatwaves also reduce labor productivity. Cereal production is particularly vulnerable. The IPCC has estimated a 10-30% decline in rice production and a 25- 70% fall in maize production in India with a 1-4-degree rise in temperature in the 21st century.



6.4 India has a long coastline of around 7517 kms and rising sea levels due to climate change pose a significant threat to coastal communities. Cyclones and storm surges can cause widespread damage to infrastructure and homes.

7. India's Transition to a Circular Economy

7.1 As the Indian economy and middle class continue to grow in its current linear supply-chain model, it could lose the opportunity to attain a regenerative development path toward long-term prosperity. However, the circular economy model could provide a strong framework for development and a basis for setting principles to guide business innovation, policy, and education. Applying these principles would help India build on its current circular economy practices and scale them across sectors and value chains, using existing building blocks to embark on a circular development path and capture its benefits.

7.2 Circular economy principles can contribute to a system that would meet the growing needs of the Indian population, especially in cities. It could help limit negative externalities, such as greenhouse gas emissions, congestion, and pollution. Three key elements are central to this transition.

8. Preservation of Natural Capital

8.1 India is an agrarian economy. The agrarian sector relies heavily on fresh water. Though India has significant groundwater resources, it has been facing pressing challenges. India sees droughts that affect 330 million people, waterborne diseases that affect 37.7 million people and water contamination by sewage and agricultural runoff. Overall, 76 million people in India do not have access to safe water. With the economic and population growth, the demand for water is expected to outstrip supply by 2020. All these adversities are likely to be exacerbated by climate change.

8.2 Agriculture provides 64% of total employment in rural areas and contributes 17.4% of GDP. Soil degradation is a significant problem, with total annual costs estimated at more than ₹35,000 crores (US$ 5.4 billion). It is estimated that 147 million hectares, or 55% of the land used for biomass production, is degraded. While some degradation is natural, the major causes are human-induced and include deforestation, overgrazing, and urban sprawl. A decline in soil quality results in lower crop productivity, prompting farmers to make greater use of fertilizers, and in so doing reduce their profits.

8.3 India has rich biodiversity. India is home to 7-8% of all recorded species, with over 45,000 species of plants and 81,000 species of animals. Two of India's most biodiverse spots are threatened hot spots. These are the Eastern Himalayas and the Western Ghats. 10% of India's wild flora and fauna are on the list of threatened species. India is also the second largest fish-producing country after China. Fishing provides employment to 14.5 million people. Increasing demand has created pressure on Indian fish stocks. Today 61% of the country's marine fish stocks are overexploited, and remaining stocks are fully exploited, leaving little or no room for expansion.

8.4 Threatened stock and depleting freshwater resources, soil degradation, loss of biodiversity, depletion of fish stocks and degradation of marine ecosystems necessitates the importance of preserving and enhancing natural capital. Practicing a circular economy could enhance natural capital by encouraging nutrient flow within the system and creating conditions for

regeneration. The use of technology and renewable processes could control finite stocks and balance resource flows.

> *"A circular economy development path in India could create an annual value of ₹14 lakh crore (US$ 218 billion) in 2030 and ₹40 lakh crore (US$ 624 billion) in 2050 compared with the current development scenario. This conclusion emerges from comparison of costs in the three focus areas (agriculture, mobility, and construction). The analysis indicates that costs to provide the same level of utility would be significantly lower in the circular development scenario. Cost savings amount to 11% of current Indian GDP in 2030 and 30% in 2050."*[11]

9. Circulating Biological and Technical Components

9.1 India's material consumption per capita has been increasing slowly, compared to other emerging economies like China, and remains low by international standards. In 2009 India consumed 7% of all materials used in the world, while housing about 14% of the world's population. However, India's material productivity (defined as GDP per used ton of material) is relatively low, despite improvements over the last decade, and is expected to remain behind that of high-income countries by 2030. As a result, if India maintains the economic development pace of the past few decades, it stands to more than triple its demand for resources by 2030.

9.2 Loss of nutrients leads to soil degradation. Deterioration of soil is a significant trend in India. India loses 0.8 million tons of Nitrogen, 1.8 million tons of phosphorus, 26.3 million tons of potassium annually. This led to increased dependency on fertilizers by the farmers. A sharp increase has been witnessed between 2002 and 2011. The usage levels are still extremely high.

9.3 India produces almost 50 million tons of municipal solid waste every year. It is estimated that this would increase to 150 million tons by 2025. In addition, due to unavoidable value losses, waste treatment is responsible for 124 million tons of GHG emissions a year (6.7% of total Indian GHG emissions). Furthermore, large amounts of unprocessed waste end up in open-air dumpsites, usually near urban areas, posing major threats to human health and local environments.

[11] https://ellenmacarthurfoundation.org/circular-economy-in-india

9.4 High material consumption, loss of nutrients and waste of products and materials are growing problems. These problems encompass an opportunity for the Indian industry to design solutions for refurbishing, remanufacturing, and recycling to keep products, components, and materials circulating and contributing to the economy. Optimizing the reuse of products to extend their lifecycle is an important aspect. Sharing models increases product utilization. Circular systems also maximize the value of biological materials and seek to address several resource challenges.

"By adopting circular economy approaches, businesses could achieve material cost savings and increase their profits. The key drivers of value creation include better product design, innovative business models, and reverse logistics. For example, shifting from selling cars to providing vehicles as a service can create new revenue streams for the automotive industry and capture the value of more intensive use of each car. Innovative vehicle design to make maintenance easier and boost fuel efficiency can create value by increasing utility (in terms of total kilometers driven) and decreasing running costs. In the built environment, construction companies can innovate by applying design methods for modular buildings. Retrieving materials left over after construction and demolition work and keeping them in cycles could capture their value and ultimately reduce overall construction costs."

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10. Reducing Negative Externalities

10.1 Indian cities see significant noise pollution. Major Indian cities like Mumbai, Hyderabad and Delhi exceed the government noise limits. The major contributors to the noise pollution are industry, transport, and construction. High noise pollution levels have been linked with various health issues like cardiovascular diseases.

10.2 India faces air pollution hazards. It affects the inhabitants with adverse health effects. Air pollution causes respiratory and cardiovascular diseases. According to the World Health Organization (WHO), outdoor air pollution caused an estimated 620,000 deaths in India in 2012, the highest in the world after China. Major contributors to air pollution are biomass burning, emissions from vehicles, and industry. Levels of pollutants in air have been found to be significantly higher than the air quality standards in most urban cities. Per capita carbon emissions in India are significantly lower than the

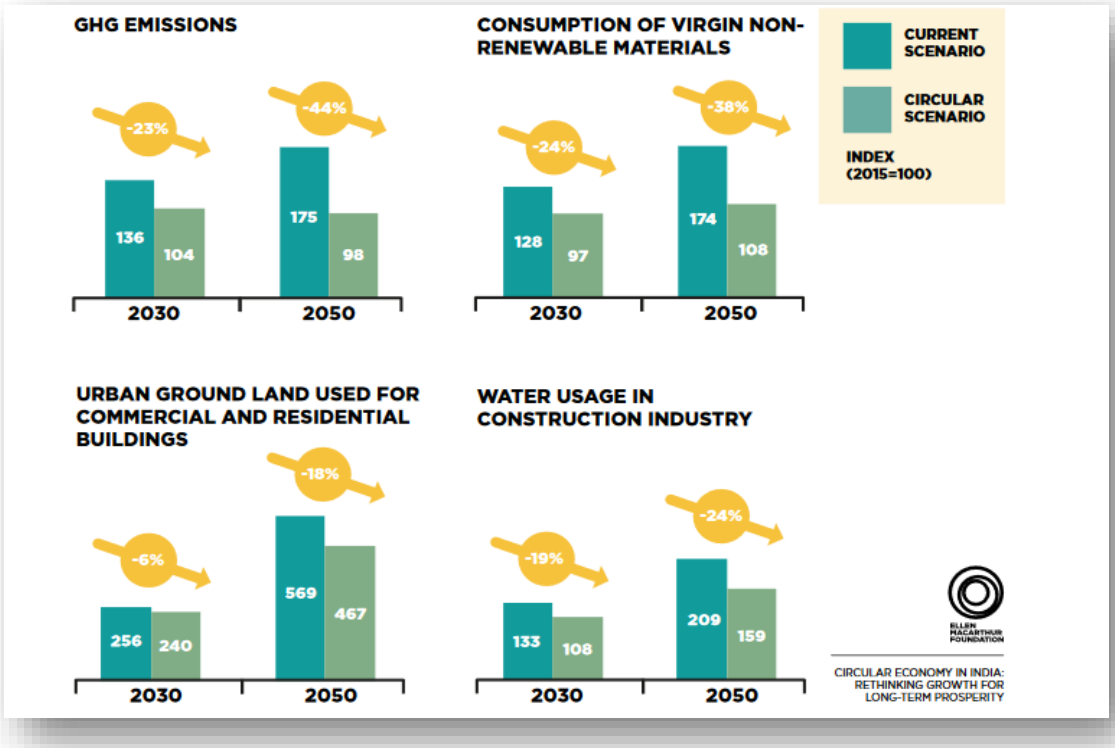
global average,49 and while expected to rise, are likely to remain lower over the next 20 years.

10.3 However, if we look at the CO2 emissions in absolute terms, it has tripled between 1990 and 2014 in India. This is the third highest in the world. India has committed to reduce the Greenhouse emission intensity of its GDP by between 33 and 35% by 2030 (considering 2005 as base year).

10.4 Economic activities are associated with negative externalities like land degradation, air, water, and noise pollution, the release of toxic substances, and greenhouse gas emissions. They not only disturb the ecological balance by disrupting the natural cycles, it impacts the flora and fauna including humans.

10.5 A circular economy development path could significantly mitigate negative environmental externalities. For example, greenhouse gas (GHG) emissions could be 23% lower in 2030 and 44% lower in 2050 compared with the current development scenario, helping India deliver on its targets promised in the recently ratified Paris agreement. This comparison is derived from the accumulated emissions in the three focus areas. Other negative externalities, such as those resulting from the linear use of virgin materials and water, and the consumption of synthetic fertilizers, would also decrease.

Comparison of Potential Development Paths



11. Steps Taken Towards Creating a Circular Economy

11.1 India's policy framework to promote the circular economy is based on a multi-pronged approach that includes regulatory measures, financial incentives, awareness campaigns, and capacity building. In this section, some of the key policies and initiatives implemented by the Indian government to promote the circular economy are being explored.

(i) National Resource Efficiency Policy (NREP):

One of the most important policies to achieve the goal of a circular economy is the National **Resource Efficiency Policy (NREP).** The NREP was launched in 2019 with the objective of promoting sustainable production and consumption patterns, enhancing resource efficiency, and reducing the environmental impact of economic activities. The policy includes measures to encourage the adoption of circular business models, such as product-as-a-service, leasing, and sharing, and promotes the use of recycled materials. In addition to the NREP, the framework of **Extended Producer Responsibility (EPR)** is another element of the policies designed to facilitate the creation of a circular economy. EPR is a regulatory framework that makes manufacturers and producers responsible for the post-consumer waste generated by their products. The EPR framework encourages producers to adopt sustainable product design practices, increase the use of recycled materials, and support waste management and recycling initiatives.

(ii) Swachh Bharat Mission (SBM)

This is another critical policy intervention when it comes to aspects of waste segregation and recycling. The Swachh Bharat Mission was launched in 2014 with the objective of promoting cleanliness, hygiene, and waste management. The mission includes initiatives to promote waste segregation, recycling, and composting, and aims to make India a "zero-waste" country. A reduction in waste generation is central to the goal of a circular economy.

(iii) Atal Innovation Mission

Another policy intervention which stands out in terms of its rationale for a circular economy is the Atal Innovation Mission. The Atal Innovation Mission was launched in 2016 to promote innovation and entrepreneurship in India. The mission includes initiatives to support

the development of circular business models and encourage the adoption of sustainable technologies.

(iv) Financial Incentives

In addition to these policy initiatives, a number of interventions have been made which revolve around financial incentives for the efficient utilization of resources. In line with these, the Indian government has implemented various financial incentives to encourage the adoption of circular business models and promote sustainable consumption patterns. These incentives include tax benefits, subsidies, and low-interest loans to the recycling industry.

11.2 India's policy framework to promote the circular economy also includes a range of measures to encourage the adoption of circular business models, promote resource efficiency, and reduce waste generation. These policies and initiatives are critical to achieving India's sustainable development goals and ensuring a more sustainable and prosperous future for the country. However, India still faces several challenges in transitioning towards a circular economy.

11.3 One of the biggest challenges is the lack of adequate infrastructure for waste management and recycling. India needs to invest in waste processing and recycling facilities and improve waste collection and segregation systems to enable the efficient and effective processing of waste. Another challenge is the lack of awareness and understanding of circular economy concepts among businesses and consumers. The government needs to create awareness campaigns and education programs to promote the adoption of circular economy practices and encourage consumers to adopt sustainable consumption patterns.

11.4 India's transition towards a circular economy will require a concerted effort from all sectors and stakeholders. The government needs to create a supportive policy environment and invest in infrastructure and research and development to enable the transition towards a circular economy. Businesses need to adopt circular business models and incorporate sustainable practices into their production processes. Consumers need to adopt sustainable consumption patterns and support the development of sustainable products and services. By working together, India can transition towards a circular economy and create a sustainable and resilient future.

12. Challenges in Achieving the Vision of a Circular Economy

12.1 There are several challenges that limit India's transition towards a circular economy. India needs to focus on creating awareness and education programs, improving infrastructure for waste management and recycling, providing incentives for circular economy practices, and promoting research and development in the field of circular economy. It will also require a multi-stakeholder approach and collaboration between government agencies, businesses, NGOs, and consumers to address these barriers and accelerate the transition towards a circular economy.

12.2 One of the critical challenges here has been a **lack of awareness and understanding of the circular economy** among policymakers in the country. The circular economy requires a shift in the traditional linear economic model, which can be challenging to achieve without the right policies and regulations in place. For example, policies to incentivize repair and reuse, or regulations that mandate the use of recycled materials in certain products, can help drive the adoption of circular practices. However, such policies require a deep understanding of circular economy principles and their potential benefits. There is an immediate need to reorient the vantage of the policymakers which can incorporate the vision of a circular economy.

12.3 Another challenge is the l**ack of awareness and understanding among businesses and consumers.** Many companies in India are still focused on the traditional linear economic model, which prioritizes short-term profits over long-term sustainability. Introduction of EPR policy has brought the recycling industry to forefront, but the focus needs to be shifted to minimizing the waste through other value propositions by businesses. Similarly, many consumers in India are not aware of the environmental impact of their consumption patterns, and hence they do not demand products that are designed for circularity. Businesses and consumers need to be educated about the benefits of the circular economy and how to implement circular practices.

12.4 In addition to the issues in policy making and with respect to the businesses and the customers, another key issue is the **inefficiency in the waste management sector.** India has a vast informal sector involved in waste collection and disposal, and many of them are not aware of circular economy principles. As a result, many waste collectors and recyclers resort to the most straightforward and often polluting methods of waste disposal, such as burning or dumping in landfills. Circular economy principles need to be integrated into the waste management sector, and waste collectors and

recyclers need to be educated about circular practices and how they can contribute to the circular economy.

12.5 Another critical challenge when it comes to achieving the vision of a circular economy is the **lack of differentiation between circularity and recycling**. The policies around waste management in India broadly focus on end-of-life waste management. Very few focus on reducing the waste and maintaining the value proposition of material and components through close and narrow loop systems. Businesses, policymakers and overarching strategies need to consider reuse, repair, refurbish and remanufacture models in their approach along with recycling. The absence of this is a major hurdle in the creation of a circular economy.

12.6 There is an **absence of a multi-stakeholder level understanding of the circular economy** in the country. A circular economy requires a collective effort from all stakeholders to create systemic change in the way we design, produce, consume, and dispose of goods and services. The absence of a multi-stakeholder approach can limit knowledge sharing and exchange of best practices. Without collaboration, businesses and government agencies may not have the resources to invest in circular infrastructure, technologies, and research and development. Lack of collaboration at policy level may result in conflicting policies and regulations, which can undermine circular practices and impede the transition towards a circular economy. On the other hand, missing the link with consumers and NGOs can limit consumer engagement in circular practices.

12.7 **Inefficient waste collection and segregation** poses another huge challenge in creating a circular economy. India generates a vast amount of waste every day, and a large proportion of it is not adequately collected or segregated, leading to environmental and health hazards. Inefficient waste collection and segregation practices make it difficult to identify and recover recyclable materials, leading to a limited supply of materials for the circular economy. The waste is often burned or dumped in open areas, leading to air and water pollution and contributing to climate change. The disposal costs for municipalities and waste management companies is high which can discourage investment in waste management infrastructure and hinder the adoption of circular practices. This requires significant public and private sector investment in waste collection vehicles, sorting facilities, and waste management technology.

12.8 **Limited availability of recycled materials** also creates barriers towards the vision of a circular economy. In the absence of sufficient recycled

materials, businesses in India are forced to rely on virgin materials, which can be costly and environmentally damaging. It also makes it difficult to track the origin and quality of materials in the supply chain, leading to uncertainty and inefficiencies and businesses may turn to unsustainable sources of materials, such as deforestation or mining, to meet their needs.

12.9 **Downcycling** is another key problem which poses a challenge to the vision of a circular economy. Downcycling refers to the process of recycling materials into products of lower value and quality compared to the original material. While downcycling does help in reducing the amount of waste generated, it also leads to a reduction in the quality and value of the recycled material, making it less desirable for reuse. The plastic recycling industry in India is still in its nascent stages, and downcycling is a common practice due to the lack of proper infrastructure and technology for recycling high-quality plastic products. Additionally, the high level of contamination in waste also makes it difficult to recycle materials into high-value products.

12.10 It is also important to note that a transition to a circular economy must allow incentives for businesses to make changes in their production processes. In a circular economy, businesses need to redesign their products, services, and business models to use resources more efficiently, reduce waste, and minimize environmental impact. However, this transition can be costly and time-consuming, and businesses need incentives to make the shift. Without incentives, businesses may prioritize short-term profits over long-term sustainability goals, which can hinder the adoption of circular practices. Incentives would promote innovation and investment in research and development in this area. There is a genuine **lack of incentives for businesses** to incorporate these changes to transition towards a circular economy.

12.11 **Limited research and development focus** on the transition towards a circular economy is another critical bottleneck. A circular economy requires a fundamental shift in the way we design, produce, consume, and dispose of goods and services. This shift requires innovation and new approaches to address the challenges of resource depletion, waste, and environmental degradation. However, the lack of research and development in this field can limit the knowledge and expertise needed to develop circular business models, technologies, and products. Without research and development, businesses may not have the resources to develop and implement innovative circular solutions.

12.12 These are some of the critical challenges which need to be addressed in order to facilitate the transition towards a circular economy. Without addressing these challenges, an overhaul of the material inputs used in production processes and how consumption based on reuse and recycle can be incentivized, will be difficult to achieve.

13. Policy Recommendations to Achieve the Transition Towards Circular Economy

13.1 Transitioning towards a circular economy requires a systematic and integrated approach involving various sectors and stakeholders. Some of the major policy interventions that India needs to make in order to facilitate this transition are discussed below.

13.2 There is an immediate need to come up with a **national level vision document of a circular economy.** A comprehensive circular economy policy at the national level will be a critical driver for India's mission on circular economy.

13.3 Such a policy can provide a framework for the transition to a circular economy by establishing clear goals, strategies, and initiatives that promote circular practices across different sectors. These goals can serve as a guide for businesses, government agencies, and other stakeholders to align their efforts towards circular transition. A circular economy policy can establish a regulatory framework that promotes circular practices and provides incentives for businesses and consumers to adopt circular solutions. This can include policies for extended producer responsibility, green procurement, and circular product design. It can promote closed-loop systems and resource efficiency, circular supply chains, circular financing, and circular innovation. The policy can build awareness and education among consumers, businesses, and government agencies about the benefits of circular practices and the environmental impact of linear consumption.

13.4 Another policy recommendation which needs to be incorporated is the creation of a **circular economy stakeholder platform.** A stakeholder Platform can be an enabler of the circular economy mission by bringing together stakeholders from different sectors to share knowledge, exchange ideas, and collaborate on circular economy initiatives. The platform can help promote dialogue and partnerships between government agencies, businesses, NGOs, and consumers, and help accelerate the transition towards a more sustainable and circular economy. This platform can be an enabler of a circular economy in a number of ways. The platform can serve as a hub for

knowledge sharing, best practices, and case studies related to circular economy initiatives. This can help stakeholders learn from each other, and identify opportunities for collaboration and innovation. It can facilitate **networking and collaboration** between stakeholders from different sectors, including government, industry, academia, and civil society. This can help build partnerships and coalitions that can drive circular economy initiatives forward. The platform can also help inform **policy development** by providing a platform for stakeholders to share their views and ideas on circular economy policies and regulations. This can help ensure that policy decisions are informed by the needs and perspectives of a diverse range of stakeholders. One of the other key goals of this platform can be to incentivize **capacity building.** The platform can help build the capacity of stakeholders to implement circular economy initiatives by providing access to training, resources, and technical assistance. This can help ensure that stakeholders have the skills and knowledge they need to implement circular economy solutions effectively. The platform can also be central in **advocating for the adoption of circular economy** practices and raise awareness of the benefits of a circular economy. This can help generate public support and create demand for circular economy products and services.

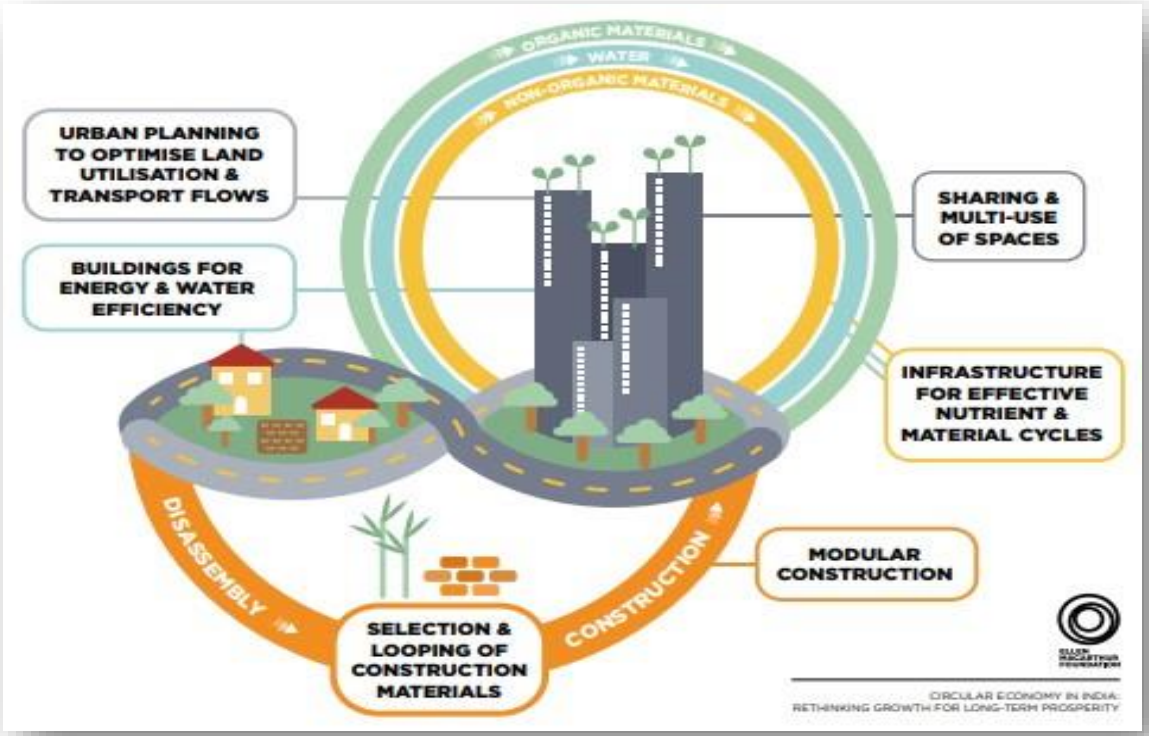
13.5 The vision of a circular economy must also align with the goals of a monitoring and evaluation ecosystem which can keep track of its progress. Hence a critical policy recommendation here will be to **establish a monitoring and evaluation system** to track the advances made towards achieving the vision of a circular economy. A monitoring and evaluation system can help measure progress towards circular economy goals and targets. By tracking key performance indicators such as waste reduction, resource efficiency, and recycling rates, stakeholders can assess the effectiveness of circular economy policies and initiatives, and identify areas for improvement. It can also help stakeholders identify barriers and opportunities for circular economy initiatives. By analyzing data on waste generation, resource use, and recycling, stakeholders can identify areas where circular economy practices can be implemented more effectively, and address obstacles to circular economy adoption. Another key aspect of this monitoring and evaluation system can be to facilitate an **engagement between stakeholders in circular economy initiatives.** By sharing data and progress reports with stakeholders, and involving them in the monitoring and evaluation process, stakeholders can stay informed and engaged in the circular economy mission, and contribute to its success. A monitoring and evaluation system can also help **demonstrate the impact of circular**

economy initiatives. By tracking the environmental, economic, and social benefits of circular economy practices, stakeholders can communicate the value of circular economy to policymakers, businesses, and consumers, and build momentum for circular economy adoption. In addition to its demonstrating impact, a monitoring and evaluation system can also enable adaptive management of circular economy initiatives. By using data and feedback from the monitoring and evaluation system, stakeholders can adjust and refine circular economy policies and initiatives to ensure they are achieving their intended outcomes.

13.6 In addition to creating these institutional mechanisms to fasten the pace of the transition towards a circular economy, there is also a need to radically change the way waste disposal and waste management is being organized in the country. **Reducing waste generation and managing waste more efficiently** is fundamental in helping India meet its Mission Circular Economy. Waste reduction and efficient waste management are two key pillars of the circular economy. Waste reduction helps conserve natural resources by reducing the need for raw materials and energy consumption. Efficient waste management can create economic opportunities by promoting recycling, composting, and other forms of waste recovery. This can create jobs and generate revenue, while also reducing the cost of waste disposal. It can reduce environmental pollution by minimizing the amount of waste that ends up in landfills and other disposal sites. This can help mitigate greenhouse gas emissions and other environmental impacts associated with waste disposal. Efficient waste management can improve public health by reducing the risk of disease and other health hazards associated with waste accumulation and disposal along with creating opportunities for circular business models that promote closed-loop systems and resource efficiency.

13.7 Another key policy intervention which needs to be envisaged is the **incentivization of the utilization of reused, repaired, and recycled products.** The reuse, repair, and recycling of products can play a significant role in helping India achieve its Mission Circular Economy. 3 Rs are at the core of the circular economy model. They can help conserve natural resources by reducing the need for raw materials and energy consumption. It creates economic opportunities by promoting circular business models that generate revenue, reduce the cost of production, and create jobs. Reused and repaired products can provide consumers with affordable and high-quality alternatives to new products. This can also create opportunities for community-based businesses that provide repair and reuse services through circular supply chains.

13.8 There is an immediate need of implementing the principles of circular economy in the construction industry in the country. **Policy interventions to reduce construction waste and use recycled materials in construction need to be prioritized.** Construction waste causes a lot of environmental issues as a result of the particulate matter (PM) which gets released in the atmosphere and bringing the construction industry under a circular economy framework will help alleviate these issues.



Source: ellenmacarthurfoundation.org

13.9 In order to achieve the goal of creating a circular economy it is paramount that **policy interventions are designed which encourage businesses to adopt circular business models.** Product-as-a-service, leasing, and sharing are emerging business models that are gaining popularity due to their potential to reduce waste, increase resource efficiency, and promote sustainable consumption patterns. These models are based on the principles of the circular economy, which is a regenerative economic system that aims to keep products, components, and materials in use for as long as possible. By keeping products in use for longer periods, businesses can reduce the need for raw material extraction, manufacturing, and disposal, leading to a more sustainable and efficient use of resources. This reduces the environmental impact of resource extraction, manufacturing, and waste disposal. This can help businesses meet their sustainability goals and enhance their reputation as environmentally responsible organizations.

13.10 Circular economy also requires a transition in terms of the technical aspects of material reuse and recycling. **Investing in innovation and technology to develop new circular solutions** can help develop new materials that are more sustainable and environmentally friendly. These materials can be designed for reuse, repair, or recycling, and can help reduce the use of non-renewable resources. Innovation and technology can help develop circular design strategies that consider the entire lifecycle of a product, from production to disposal. Investing in advanced recycling technologies can help improve the efficiency and effectiveness of recycling processes, increasing the quality and quantity of recycled materials, and reducing the amount of waste that ends up in landfills and other disposal sites.

13.11 Digital technologies such as artificial intelligence, blockchain, and the Internet of Things can help create new opportunities for circular business models, such as product-as-a-service and sharing platforms. Investing in circular economy research can help generate new knowledge and insights that can inform policy, business strategies, and innovation. This can help accelerate the transition towards a more sustainable and circular economy.

14. Conclusion

14.1 The concept of a circular economy has gained immense popularity in recent times, as it provides a sustainable solution to the current linear economic model. In a circular economy, resources are kept in use for as long as possible, waste is minimized, and products are designed to be reused or recycled at the end of their life. The transition to a circular economy is expected to provide numerous benefits to India, ranging from environmental conservation to economic growth and job creation.

14.2 One of the primary advantages of a circular economy is the reduction in waste generation. India is currently grappling with a severe waste management problem, with landfills overflowing and waste burning leading to air pollution. A circular economy aims to minimize waste generation by prioritizing the use of renewable resources, encouraging recycling and reusing products and materials, and ensuring the efficient use of resources. By reducing waste generation, a circular economy can mitigate the environmental impact of waste disposal and reduce the strain on India's already overburdened waste management infrastructure.

14.3 Moreover, a circular economy can contribute to economic growth and job creation. India has a vast informal sector, which could benefit

significantly from a circular economy's emphasis on repairing and refurbishing products. The circular economy could create new job opportunities for the repair and refurbishment of goods, recycling and recovery of materials, and waste management. Additionally, the circular economy's emphasis on localizing production and using locally sourced materials could create new opportunities for small and medium-sized enterprises (SMEs), which are critical to India's economic growth.

14.4 Furthermore, a circular economy could contribute to India's efforts to combat climate change. By promoting the use of renewable energy sources, reducing greenhouse gas emissions, and minimizing waste generation, the circular economy aligns with India's commitments to the Paris Agreement. The circular economy's focus on energy efficiency and resource optimization could also contribute to reducing India's dependence on imported resources and the associated greenhouse gas emissions from transportation.

14.5 Lastly, a circular economy could improve resource security and resilience in India. India is heavily dependent on imported resources such as oil, coal, and minerals. The circular economy's emphasis on localizing production and using locally sourced materials could improve India's resource security and resilience, reducing its vulnerability to global price fluctuations and supply chain disruptions.

14.6 In conclusion, the transition to a circular economy can bring significant benefits to India, ranging from environmental conservation to economic growth and job creation. The circular economy's emphasis on reducing waste generation, promoting local production and resource optimization, and reducing greenhouse gas emissions aligns with India's commitments to sustainable development and climate change mitigation. Therefore, India must take proactive steps to accelerate the transition to a circular economy, including investing in infrastructure, encouraging innovation and technology development, and building public awareness and support for a circular economy.