

**CIRCULAR ECONOMY IN INDIA:
RETHINKING GROWTH FOR
LONG-TERM PROSPERITY**

SUMMARY OF FINDINGS



ELLEN MACARTHUR
FOUNDATION

Executive summary

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In a context characterised by unprecedented economic dynamism and a rapidly growing population, India stands at the threshold of profound choices about the path to future development. If it continues, the country's economic growth trend, which averaged 7.4% a year in the last decade, will lead it to become the fourth largest economy in the world in about two decades.¹ This positive prospect does not, however, come without challenges as the nation still faces significant questions about rapid urbanisation, resource scarcity, and high levels of poverty.

In an interconnected world predicated largely on a linear economic model, the upcoming Indian powerhouse could embark on an industrialisation path comparable – albeit faster – to that of mature markets, with the associated negative externalities it entails. But this scenario is not inevitable. With its young population and emerging manufacturing sector, the country is at a crossroads and can today make systemic choices that would put it on a trajectory towards positive, regenerative, and value-creating development.

Business leaders and governments around the world are increasingly looking beyond the linear 'take, make, dispose' model of growth, with a view to operate a strategic move towards an approach fit for the long term. Past research by the Ellen MacArthur Foundation and others has demonstrated the potential of the circular economy – one that is restorative and regenerative by design and makes effective use of materials and energy in a digitally-enabled model of development.

This report shows that a circular economy path to development could bring India annual benefits of ₹40 lakh crore (US\$ 624 billion) in 2050 compared with the current development path – a benefit equivalent to 30% of India's current GDP. This conclusion rests on high-level economic analysis of three focus areas key to the Indian economy and society: cities and construction, food and agriculture, and mobility and vehicle manufacturing. The research shows that realising these benefits fully would require applying circular economy principles in combination with harnessing the unfolding digital and technological transformation, all tailored to the Indian context.

In addition to creating direct economic benefits for businesses and households, following a circular economy development path would reduce negative externalities. For example, greenhouse gas emissions would be 44% lower in 2050 compared to the current development path, and other externalities like congestion and pollution would fall significantly, providing health and economic benefits to Indian citizens.

Achieving these benefits would require Indian businesses to lead the way in the transition phase, with policymakers simultaneously setting the direction and creating the right enabling conditions. Other organisations, such as universities, non-profits, and international organisations can play important supporting roles, including facilitating and participating in local collaborative initiatives.

By embarking on a circular economy transformation – launching new circular economy initiatives and reinforcing existing efforts – India could leverage its expected high levels of growth and development to build a more resource-effective system, creating value for businesses, the environment, and the Indian population.

In support of the report

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“India has the opportunity to save money, make money and do good by adopting the principles of the circular economy. It has the opportunity to leapfrog other economies and establish a leadership position. This ‘must read’ report provides a framework and practical recommendations for three vital sectors of the economy namely agriculture, construction and transportation.”

MR RANGASWAMI, FOUNDER, CORPORATE ECO FORUM

“Traditionally, the Indian economy has been one where reusing, re-purposing and recycling has been second nature. In a world that is increasingly running out of natural resources, this thinking is an asset that must be leveraged by businesses, policymakers and citizens in an organised manner and expanded to include other elements to make the economy truly circular. Many companies in the Tata group already implement some of the principles of a circular economy and we would continue to explore opportunities to expand this; it makes business sense and furthers our mission of improving the quality of lives of communities we serve globally.”

SHANKAR VENKATESWARAN, CHIEF - TATA SUSTAINABILITY GROUP

“Increasing circularity is paramount to unlock efficiencies in a world which needs urgent investment opportunities in sectors which deliver environmental, economic and social gains. Lessons from this work in India can serve as an important example for other developing countries seeking to implement policies to meet the SDGs and the commitments in the Paris Agreement.”

AMBASSADOR GUILLERMO VALLES, DIRECTOR FOR INTERNATIONAL TRADE IN GOODS, SERVICES AND COMMODITIES, UNCTAD

“This ground-breaking report shows how India can significantly benefit from a circular economy - creating jobs and cutting pollution. Construction, mobility and agriculture in India can be re-purposed to offer more-for-less by designing out waste, digitising production and consumption and optimizing the use of economy wide assets. India can leapfrog the ‘take-make-waste’ traditions of industrialized countries, and offer its consumers a new path to prosperity. This opportunity needs smart policy and business champions. With these ingredients India can rise to new heights.”

DAN HAMZA-GOODACRE, CLIMATEWORKS

“Beyond design practice and economic models, the circular economy will also affect the nature of collaboration - well beyond existing practices. We need new procurement - making commitments between all parties based on mutual gains. This will be a big disruption to existing practices from finance to contractual arrangements. It will upset our own sector, a big challenge but an opportunity to re-shape how we work.”

CAROL LEMMENS, DIRECTOR, GLOBAL MANAGEMENT CONSULTING BUSINESS LEADER, ARUP

“India is committed to the goals set out in the SDGs. It ratified the Paris Agreement on 2 October 2016, coinciding with the birth anniversary of Mahatma Gandhi. India is earnestly working towards finding ways to improve the standard of living of its citizens, compatible with its resources. Increasing circularity in the Indian economy, by better utilisation of materials, energy and innovative ideas ranging from India’s traditional knowledge to latest technologies will be very important to realise India’s sustainability goals over the next decades. Sectors such as mobility, agriculture and construction will play a crucial role in the future growth of India. The suggestions contained in the report are, therefore, noteworthy and timely.”

H.E. MR AJIT KUMAR, AMBASSADOR AND PERMANENT REPRESENTATIVE OF INDIA TO THE UNITED NATIONS OFFICE AND OTHER INTERNATIONAL ORGANIZATIONS IN GENEVA

“The arguments for choosing more sustainable strategies for national development – giving attention not just to their economic but also to their social and environmental outcomes – apply to all countries, advanced or emerging, rich and poor. The ones, such as India, trying to catch up in the race to create better lives for their citizens, however, face resource constraints – natural, physical, financial and human – that make those choices doubly difficult, yet just as imperative. The concept of circular economy, a metaphor that neatly resonates with Mahatma Gandhi’s ardent lifelong quest for efficiency in production, sufficiency in consumption and what he could well have called “conservancy” of resources and ‘deficiency’ in wastes, captures well the desirable characteristics of the future we will all have to live in – and how to get there. It is only to be hoped that governments, businesses and civil society in India will come together and draw upon these traditional and yet highly modern values in creating a vibrant, prosperous and fulfilling future for the nation. The insights of this Report will probably be of considerable value to other economies as well.”

ASHOK KHOSLA, CHAIRMAN, DEVELOPMENT ALTERNATIVES, CO-CHAIR, INTERNATIONAL RESOURCE PANEL (2007-2016)

“In the 70s, when I grew up in India, we practiced circular economy principles without even knowing it: we wasted no resources and reused everything. With rapid modernisation of its economy, however, India is losing touch with its frugal roots. This report convincingly shows how India can rekindle its frugal consciousness and implement circular value networks that would set new global benchmarks for efficiency and sustainability.”

NAVI RADJOU, COAUTHOR OF FRUGAL INNOVATION: HOW TO DO BETTER WITH LESS AND FELLOW, JUDGE BUSINESS SCHOOL, UNIVERSITY OF CAMBRIDGE

“The world’s growing and the increasingly affluent population has caused an overuse of resources, higher price levels and increasing market volatility. In this scenario I believe that the circular economy model could be a game changer. We at Mahindra group are conscious of this and are innovating to create production models that reduce our reliance on virgin raw materials through reduce, reuse, recycle and upcycle. We recognise that the future of a circular economy for a transitioning economy like India involves incorporating the informal sector in discussions and assigning them a recognisable place in the value chain. I am happy to see that circularity has already started to make inroads into our linear economy, with innovative products from waste being introduced in the markets. At Mahindra we also work closely with our supply chain as positive influencers and are happy to be part of this story. ‘Circular economy in India’ by the Ellen MacArthur Foundation is an attempt to understand the needs of these very markets and could serve as an eye opener to the possibilities for circular economy in our country.”

ANIRBAN GHOSH, CHIEF SUSTAINABILITY OFFICER, MAHINDRA GROUP

“India’s growing manufacturing ambition is going to bring global issues of excessive waste with it. Hence considering discarded materials/products as legitimate raw materials with circular economy approach is the only way forward.”

SHUBHI SACHAN, PUNĀH PROJECT INITIATOR AND LEAD, GODREJ & BOYCE

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Knowledge partnership between UNCTAD and the Ellen MacArthur Foundation

In view of common interests in identifying areas where positive environmental gains can be achieved through economic activity in services, goods and trade, UNCTAD engaged in a knowledge partnership with the Ellen MacArthur Foundation to assist in the preparation of this report. UNCTAD hopes that this initial project in an emerging market serves as the first of many, since many developing countries face severe issues due to poor utilisation of abundant material and energy stocks, which if properly mobilised could serve as stepping stones for the attainment of SDGs 2, 7, 9, 11, and 12 in 2030.

Disclaimer

This report has been produced by a team from the Ellen MacArthur Foundation, which takes full responsibility for the report's content and conclusions. UNCTAD served as a knowledge partner for the project. While the members of the steering committee and advisory panel, and the experts consulted acknowledged on the following pages have provided significant input to the development of the report, their participation does not necessarily imply endorsement of the report's contents or conclusions.

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Summary of findings

While the business benefits of a circular economy globally are well understood² and the opportunities for high-income countries (especially in Europe) have been studied,³ limited proof points are available for countries with high economic growth and rapid societal changes (e.g. expanding population, urbanisation, and growing middle class).⁴ Taking these factors into account, this report looks specifically at circular economy opportunities in India, providing a starting point for exploring the benefits of a circular economy for emerging economies.*

Recent initiatives by businesses, government bodies, and non-profits in India are aligned with the principles of a circular economy. Several aspects of circularity are deeply ingrained in habits, as exemplified by high rates of utilisation and repair of vehicles and the distributed recovery and recycling of materials post-use. Often handled informally, these activities provide the only source of livelihood for some of the poorest sections of the Indian population.

However, because these activities tend to happen at the end of the value chains, with little upstream effort to enable effective recovery, they have sub-optimal economic and environmental impact and present health risks for the people involved. As the Indian economy and middle class continue to grow, these practices will become less attractive, unless a more systematic approach is taken to modernise them and move them up the value ladder. Moreover, as India becomes increasingly connected to the global market and its predominantly linear supply chains, economies of scale may pull the country towards the same one-way model of growth that mature markets embraced, further reducing the impact of current circular practices and potentially creating a linear lock-in.

An ambitious long-term vision of a circular economy, built on the current strengths of the Indian market and engaging business, policy, and education in its realisation, could, on the contrary, provide the basis for a regenerative development path towards long-term prosperity.

This report identified circular economy opportunities in three focus areas: cities and construction, food and agriculture, and mobility and vehicle manufacturing. Household expenditure in these three areas taken together (housing, food, and mobility) accounts for more than two-thirds of average household spend in India, both in urban and rural areas.⁵ They cover the two largest industrial sectors in terms of employment (agriculture and construction) and growth expectations (construction and vehicle manufacturing).

The insights of the report rest on both research and analytical modelling. In addition to extensive desk research, the research included interviews with some 40 local and international experts and several workshops and meetings in India, bringing together more than 80 expert participants from business, government, universities, non-profits, and other organisations. Detailed analysis was carried out comparing costs and externalities between the current scenario and a circular economy scenario in the three focus areas in 2030 and 2050 (see *About the analysis*). The work resulted in insights on the benefits a circular economy could have for India and recommendations on how to capture these benefits.

ABOUT THE ANALYSIS

The analysis takes into account expected population growth, urbanisation trends, and demand for increased quantity and quality of housing, food, and mobility. The current development path takes into account expected technological development and optimisation trends, while the circular development path uses a system-based approach leveraging circular economy opportunities.

For India as a country with a growing economy and population, the analysis compared costs and externalities in the two development scenarios, rather than comparing future values with today. Costs compared are cash-out costs and do not include opportunity costs or monetisation of externalities. All costs are in 2015 Indian rupees.

* Some information on insights from this report that could inform investigation of circular economy opportunities in other emerging economies can be found in Appendix B.

The case for a circular economy in India

The research and analysis established seven key insights that make the case for the application of circular economy principles in India.



A circular economy development path in India could create 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. 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.

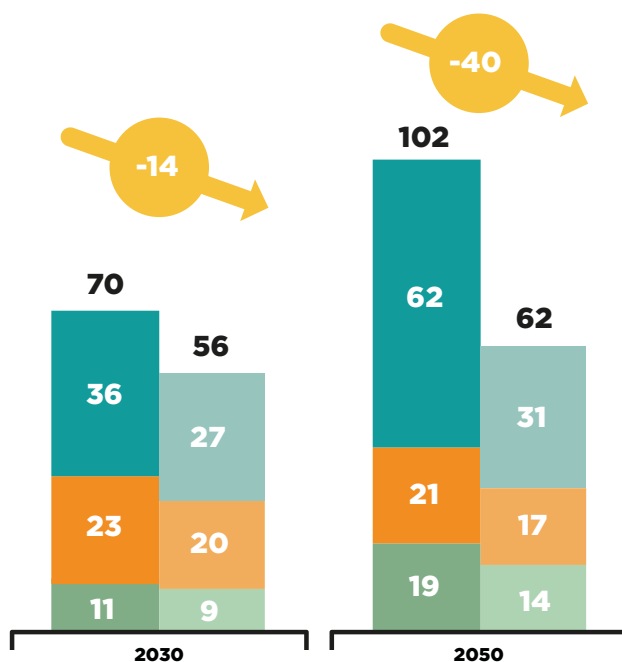


By adopting circular economy approaches, businesses could achieve material cost savings and increase their profits. The key drivers of value creation include better product design, innovative business models, and reverse logistics.

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

FIGURE 1: COMPARISON OF CASH-OUT COSTS IN POTENTIAL DEVELOPMENT PATHS

TOTAL CASH-OUT COSTS IN THREE FOCUS AREAS (₹ LAKH CRORE)



	CURRENT SCENARIO	CIRCULAR SCENARIO
MOBILITY AND VEHICLE MANUFACTURING		
FOOD AND AGRICULTURE		
CITIES AND CONSTRUCTION		



can create value by increasing utility (in terms of total kilometres 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.

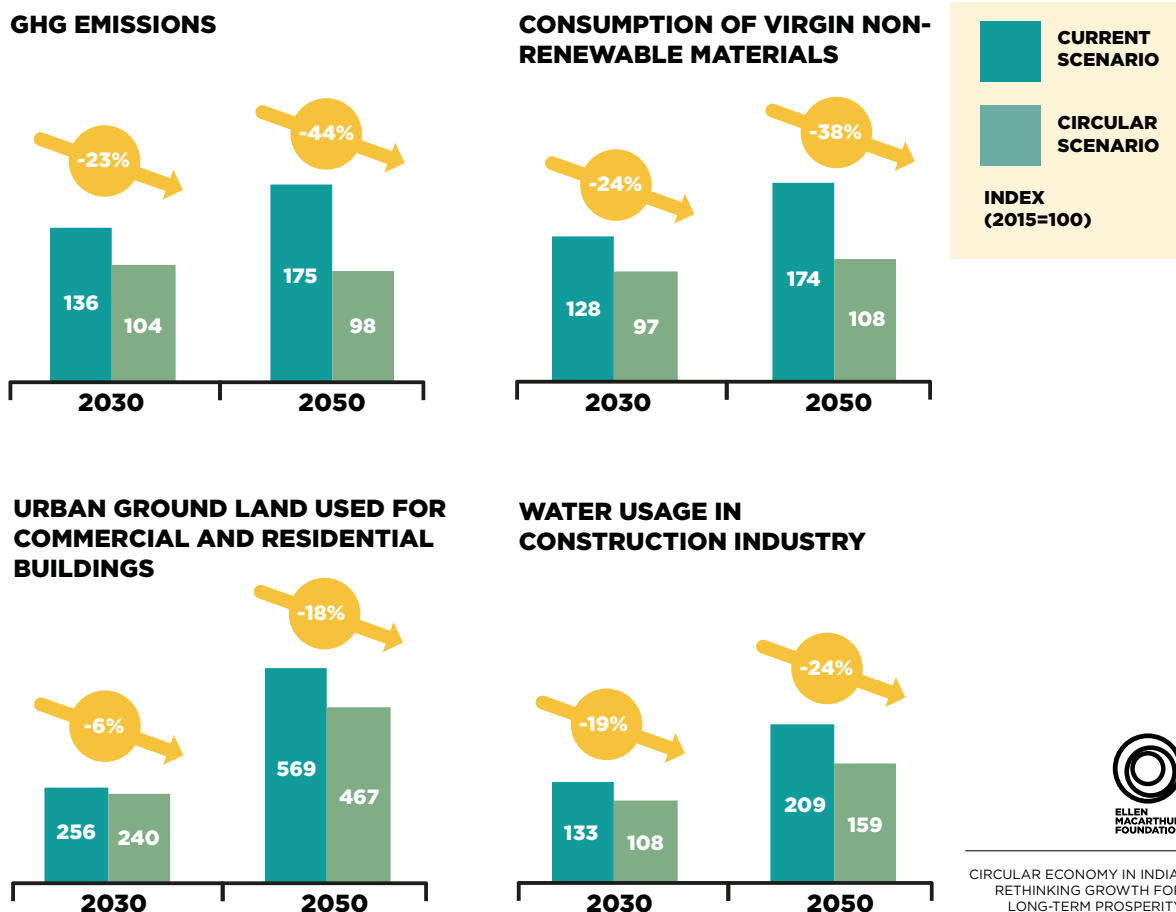
Indian businesses in industries beyond those analysed for this report could also realise profit opportunities. For example, an earlier analysis by the Ellen MacArthur Foundation, based on detailed product-level modelling, found a global value creation potential of up to US\$ 700 billion a year for fast-moving consumer good companies at today's consumption levels.⁶ The expected growth of the Indian middle class suggests that this implies significant opportunity for Indian businesses in industries with rising local consumption, such as textiles and electronic equipment. Both established businesses and new entrepreneurial initiatives could capture these profit opportunities.

3

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 (see p. 57 for details). Other negative externalities, such as those resulting from the linear use of virgin materials and water, and the consumption of synthetic fertilisers, would also decrease.

In the three focus areas analysed, virgin material consumption would be 24% lower in 2030 and 38% lower in 2050 compared with the current development path. Water usage in the construction industry would be 19% lower in 2030 and 24% lower in 2050, while synthetic fertiliser and pesticide use would be 45% lower in 2030 and 71% lower in 2050 compared to the current development path (see Figure 2).

FIGURE 2: COMPARISON OF POTENTIAL DEVELOPMENT PATHS



4

A circular economy could deliver benefits for the Indian population, such as cheaper products and services and reduced congestion and pollution.

In all three focus areas studied, the analysis showed that the cost of providing the expected services for each citizen would be considerably lower on the circular development path than on the current path. While businesses will capture part of this value, most of it would boost disposable income. The lower costs could also help India implement such initiatives as Pradhan Mantri Awas Yojana (Housing for All) and the National Food Security Mission.

The analysis also suggested beneficial impact on congestion, pollution, and health. For example, following the circular development path would reduce vehicle kilometres travelled on roads by 38% in 2050, compared with the current path, and reduce congestion and time spent in traffic. The circular scenario would also include more zero-emission vehicles reducing pollution and their associated negative effects on health and costs. Reduced use of pesticides (76% lower in 2050 compared with the current path) is likely to improve the health of farmers.

Detailed modelling of systemic externalities, which exceeds the scope of this analysis, would be necessary to estimate more precisely the broader systemic impact of applying circular economy principles in India.

5

Leveraging digital technology to enable the circular economy could reinforce India's position as a hub for technology and innovation.

The interplay between circular economy and digital technology creates fertile ground for value creation and given its renowned IT sector, India is particularly well positioned to leverage these opportunities. All three focus areas studied could leverage digital technology and the increasing ease of connectivity.

For example, in the food system, digitised supply chains and platforms for sharing assets (thus maximising their utilisation rate) and knowledge (best practices) among small farmers can create significant benefits. In the mobility sector, digital devices can provide seamless door-to-door transport planning, combining diverse modes of transport, and providing direct access to mobility when it is needed. In cities, digitally enabled sharing solutions are already being deployed to increase the utilisation of floor space in buildings.

Pairing circular economy principles with digital intelligent assets (internet of things) generates many additional value creation opportunities,⁷ which both established businesses and emerging entrepreneurs could capture. Current government initiatives, like Digital India, could support these opportunities by embracing circular economy principles.

6

By actively leveraging and reinforcing circular economy opportunities now, India could move directly to a more effective system and avoid getting locked into linear models and infrastructure.

As the systems that provide housing, food, and mobility require development in a growing economy like India's, the country could realise significant value by developing them in a circular, rather than a linear, way.

For example, only about 2% of the Indian population currently owns a car, but the demand for mobility is increasing. Designing and building a mobility system that enables safe, convenient, and comfortable travel without car ownership could meet people's mobility needs with lower cost and fewer negative externalities than in the current development scenario. In other areas, such as cities and the construction industry, satisfying the demand for development with highly efficient infrastructure and buildings – or virtualising the needs altogether, which in turn has a beneficial impact of the mobility system – could reduce consumption of resources and energy for many years.



High-growth markets like India can achieve competitive advantage over mature economies by moving to a circular economy.

As explained above, applying circular economy principles to new activities from the start would firmly set the direction of travel and favour early success. In contrast, because of existing linear lock-in, mature economies would need to transform large parts of their systems to reach the same level of circularity. This advantageous starting

point could provide India and other high-growth markets with a competitive advantage over those economies.

For example, 70% of the buildings expected to stand in India by 2030 are not yet built,⁸ compared with 25% in the UK.⁹ If both economies applied circular economy principles to all new construction until that year, India's buildings would have higher embedded circularity. India could leverage this competitive advantage by developing circular construction skills and innovation to export to other countries. Similarly, the total costs (relative to the size of the economy) of shifting to a highly circular system would be much lower for India.

Circular economy opportunities for India

Cities and construction: liveable cities with buildings and infrastructure that meet the future needs of India's expanding population

India is urbanising at an unprecedented rate, against a backdrop of resource constraints. An estimated 700-900 million square metres of new commercial and residential space a year – the equivalent of what exists in Chicago today – needs to be built to cope with the increasing demand.¹⁰

Circular economy principles can contribute to this construction activity in ways that create economic value and decouple development from the use of virgin, non-renewable resources. Renewable and recycled materials and modular construction methods can minimise waste and reduce construction costs. Buildings can be designed to be adaptable to changing needs and contribute to the regenerative urban ecosystem during their use phase (energy generation, connection to nutrient cycling systems, etc.).

As India invests in long-term infrastructure to improve citizens' quality of life, for example through the Smart Cities Mission, it could incorporate circular economy principles into the design of the infrastructure needed to provide water, sanitation, and waste services at scale, creating effective urban nutrient and material cycles. More systemic planning of city spaces, integrated with circular mobility solutions, can contribute to higher air quality, lower congestion, and reduced urban sprawl. Flexible use of buildings and urban spaces, enabled by digital applications, can increase utilisations

rates, getting more value out of the same assets. Higher efficiency and lower overall building and infrastructure costs could also help meet the housing needs of the urban poor without compromising safety and quality.

Food and agriculture: a regenerative, restorative agricultural system that combines modern technology with traditional practices to meet India's growing food demand

Employing half of the country's working population,¹¹ the agricultural sector remains essential to the Indian economy and vital to the nation's food security. An agricultural system geared towards closing nutrient loops could give the sector a framework for retaining natural capital, boosting economic and ecological resilience, and delivering a stable supply of fresh, healthy, and diverse food to India's growing population.

Leveraging the current small-farm structure, India could create large-scale networks of farmers, interconnected and symbiotic in their practices and committed to regenerative approaches. Combining local knowledge and traditional methods (like working with a large variety of species) with modern technology (like precision farming, and digitally enabled asset- and knowledge-sharing systems) could increase yield while significantly decreasing requirements for resources such as water, synthetic fertilisers, and pesticides.

Reducing food waste across the supply chain could make the Indian food system even more effective. This would require optimising production and digitising food supply chains to match supply and demand more easily. Urban and peri-urban farming can bring food production closer to consumption, reducing food waste and transportation requirements. Composting and anaerobically digesting food waste with no other valuable use and post-consumption nutrients (those contained in human excreta) allows restoration of nutrients to the soil and production of energy.

Mobility and vehicle manufacturing: a convenient, multimodal transport system enabled by digital technology, for resource-optimised and efficient mobility

Demand for personal mobility in India is expected to double or even triple by 2030.^{12,13} Car sales are booming, and the country is expected to become the third largest market in the world by 2030, after China and the U.S.¹⁴

Circular economy principles can contribute to a mobility system that would meet the growing needs of the Indian population, especially in cities, while limiting negative externalities, such as GHG emissions, congestion, and pollution.

A multimodal, door-to-door, on-demand mobility system, embracing vehicle-sharing trends and leveraging digital innovation, could provide efficient and effective transportation with high vehicle usage and occupancy rates. Mass transit as the backbone combined with other forms of transport – including vehicle as a service – for convenient last-mile connectivity can create convenient door-to-door journeys. Technological innovation can help plan these journeys and make travelling safer and faster.

Taking reparability, remanufacturing, and recycling into account in vehicle design and creating the appropriate reverse cycle infrastructure can reduce the need for virgin, non-renewable resources and energy. Building vehicles that rely on zero-emission propulsion technology could reduce negative externalities like GHG emissions, pollution, and dependence on imported fossil fuels. As car ownership is currently low, adoption could be rapid as ownership expands.

Capturing the benefits

Capturing the circular economy benefits identified in this report would require action by various stakeholders. Analysis of the opportunities and associated challenges in the three focus areas led to the formulation of recommendations for businesses, policymakers, and other organisations. More details and examples on the recommendations can be found in Chapter 3 – Capturing the benefits.

Indian businesses are well placed to lead the way in the transition. Businesses stand to realise substantial profit from the circular economy opportunities outlined in this report. Five recommendations could guide companies seeking to capture this value.

- **Build circular economy knowledge and capacity.** Taking maximum advantage of circular models requires decision-makers throughout the organisation to understand the benefits and take them into account in business decisions. To put circular economy principles into practice, current and prospective employees need training on circular product design, new business models, and reverse logistics.
- **Innovate to create new products and business models and demonstrate their success.** Being at the forefront of implementing circular economy principles and digital technology can create competitive advantage and critical industry momentum. Businesses can foster innovation to address challenges, such as transition costs, more rapidly by collaborating with research institutions and by making information open source. Both established businesses and start-ups can profit from the innovation opportunities, providing an attractive outlet for entrepreneurship in India. Successful pilot projects can demonstrate the value of circular economy models internally and externally.

- **Integrate circular economy principles into strategy and processes.** To have the right incentives for value creation in place, circular economy aspects should be taken into account when designing an organisation's governance structure and decision-making processes. In particular, this would mean including incentives for medium- and long-term value creation opportunities – as well as for cross-functional collaboration – in company strategy.
- **Collaborate with other businesses, policymakers, and the informal economy.** Participation in pre-competitive collaboration in cross-industry and cross-value-chain networks can enable businesses to drive change that they cannot create on their own. Opportunities include leveraging industry cooperative networks and collaborating on specific issues that require systemic problem-solving, such as complex reverse logistics. Tapping activities of the informal economy (e.g. existing repair and recycling activities for vehicles), in cooperation with the public sector or other organisations, allows for additional value creation.
- **Invest in circular economy opportunities.** While sizing and prioritising the value of investment related to the circular economy opportunities outlined in this report requires detailed analysis, the circular economy offers attractive opportunities for both businesses and financial institutions. Companies could moreover scale back investments in linear business models to avoid risks of exposure to greater market volatility and stranded assets.

Governments can set direction for the transition and create the right enabling conditions. Five recommendations could guide policymakers at national, state, and local/city levels in supporting the transition in the medium- and long-term.

- **Set direction and show commitment.** Clear policies and communication can encourage private and public investment in relevant research and business development. While scattered existing provisions and regulations include some circular economy principles, advancing the transition requires a coherent focus and systematic approach, including integration of circular economy ideas into existing government initiatives. Policies could, for example, provide targets and strategies. Clear and binding policies, laid out in a roadmap, would provide the visibility needed to coordinate infrastructure development and investment planning.
- **Create enabling regulatory frameworks and remove policy barriers.** Some current policies, typically focused on individual areas rather than taking a systemic view, cause unintended barriers to adopting circular business models. Detailed analysis of regulations in each sector – conducted with businesses and other relevant stakeholders – could identify these barriers and provide a basis for recommending policy changes that support circular economy opportunities.
- **Create platforms for multi-stakeholder collaboration.** Collaboration among stakeholders to address key issues is critical to achieve systemic change. For example, inroads to addressing India's solid waste management challenge could be made by connecting all kinds of actors along the value chain, including producers, municipalities, the informal sector, waste management companies, and research institutions.
- **Support circular models through public procurement and infrastructure.** Using a circular procurement approach, public organisations could acquire goods and services in a way that achieves value for money throughout a product's use, while minimising material losses and adverse environmental impacts. Public procurement recommendations that support promising, scalable circular business models, from both emerging and established innovators, could help kick-start those models to stimulate their wider adoption in the market. Focusing infrastructure investments on infrastructure such as integrated post-use collection systems and sorting and reprocessing facilities could support circular economy activity and investment by the private sector.
- **Embed circular economy principles into education.** Bringing circular economy principles into education, from school through to professional development, can equip learners with the right systems thinking skills and mindsets to become active shapers of a circular economy. Increased access to information, for example through open-access courses, helps bridge knowledge gaps, reduce scepticism, and increase awareness of the value of circular models.

Various organisations, including universities, non-profits, and international bodies, can play important supporting roles in the transition to a circular economy. They might, for example, conduct research and pilot projects to create a knowledge base and establish proof points, represent the interests of groups like the informal sector, or facilitate collaborative initiatives among businesses, the public sector, and other stakeholders.

In the short term, further stakeholder engagement and research is needed. The above recommendations typically involve many stakeholders and require solid evidence of the benefits of circular economy opportunities in India. A good place to start could be engaging those stakeholders and conducting additional research, built on the findings of this report. Such initiatives would be most successful if led from within India.

