

Building Block for

# Circular Cities

Dr. Shyamli Singh Prof. Vinod K. Sharma

**GNAMAMI  
GANGE**



**Handbook for Urban Local Bodies Officers**

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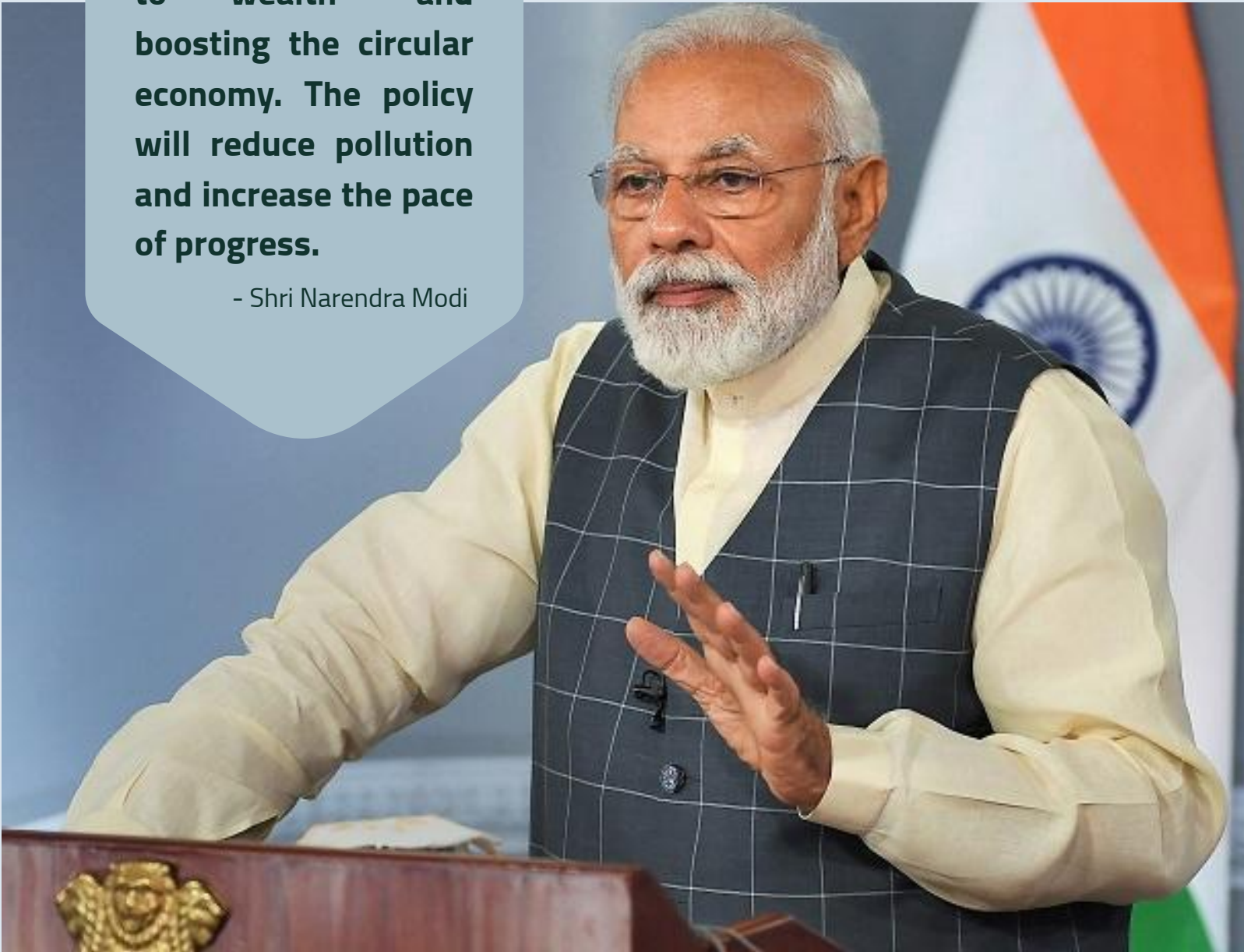
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**The new automobile scrapping policy is in line with our emphasis on “waste to wealth” and boosting the circular economy. The policy will reduce pollution and increase the pace of progress.**

- Shri Narendra Modi



## FOREWORD



The 74th Constitutional Amendment marks a landmark moment in India's realm of urban local self governance, creating urban local bodies (ULBs) constitutional entities with the authority to provide better governance and more effective delivery of civic services to communities.

It is therefore important for the states to devolve greater responsibility, power, and resources to the ULBs through the devolution of finances and officials envisioned in the Twelfth Schedule to the Constitution. Indian Institute of Public Administration, New Delhi has developed a complete training program under the project "Blended Capacity Building Programme for Stakeholders of River Ganga under Namami Gange ". The modules have been developed in a clear and easy-to-understand manner for the Urban Local Bodies Officers.

Though mostly based on missions of Namami Gange and state governing municipal administration, it lends itself to customization to meet the special needs of other states and river bodies. The modules cover a wide range of topics, including perspectives of ULBs, their constitution, and organisational structure, as well as comprehensive lessons on ULB working.

Amidst unparalleled economic growth and a rapidly increasing population, India is faced with a series of difficult decisions regarding its future. With a 7.4 percent average annual growth rate during the previous decade, the country will become the world's fourth largest economy in approximately two decades. As a result of growing urbanisation and resource scarcity, as well as high poverty levels, this hopeful outlook is not without its obstacles.

This module on Circular Cities talks about gaps, needs and framework on introducing perspectives for urban local body officers. Further to bring a change in the city development dynamics for sustainable and economical efficiency. I am hopeful that this training module will significantly help to improve the skills of regulatory authorities across the country.

A handwritten signature in black ink, appearing to be 'S.N. Tripathi'.

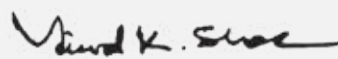
S.N. Tripathi IAS (R)  
Director General, IIPA

## PREFACE

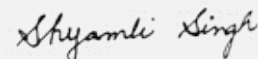
Due to the linked nature of our world and the linear economic model that underpins it, India, which is poised to become a global powerhouse, might begin on an industrialization path akin to mature economies, with all the attendant negative externalities. It's important to note, however, that this is not a foregone conclusion. To take advantage of the country's young population and rapidly growing industrialization sector it may make structural decisions now that will set it on a path to good, value-creating growth.

India could utilise its anticipated substantial growth and advancement to build a more resource-efficient system, generating value for businesses, the environment, and the Indian population, by embarking on a circular economy transformation – launching new circular economy initiatives and reinforcing existing efforts.

The National Mission for Clean Ganga has made tremendous progress by launching a number of programmes and regulatory frameworks to assist state governments with integrated management. The project Blended Capacity Building for the stakeholders of river Ganga under Namami Gange Indian Institute of Public Administration, New Delhi has designed modules as a strategic step toward enhancing the ability of urban managers in cities. We are pleased to observe that the progress made in this direction has been chronicled as a step-by-step guide structure in these volumes. Team IIPA is confident that the module toolkit will motivate communities to reimagine their urban areas as part of the city's integrated vision and urban planning process. We look forward to collaborating with state governments and concerned citizens to protect these natural resources.



Prof. Vinod K Sharma



Dr. Shyamli Singh

Faculty, IIPA



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# Background

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Circular City provides solutions to the most pressing issues of the twenty-first century. A one-of-a-kind concept that integrates nature and technology in the most effective way to promote well-being. It is intended to aid human evolution while also conserving Earth's biodiversity.

The concept of the Circular City brings to reality the simplicity of living close to nature while having easy access to knowledge and modern technology. Circular is associated with economy, resource management, governance, and aesthetic design.

This module seeks to identify a list of city assets and products that would widen the circularity notion beyond the economics to cover other areas of Urban Local Bodies based management, thus the term "circular" cities.



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# Target Audience

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- District collectors, Magistrates, Sub-National officials, Development Departments and Public services who address development and planning activities
- Officials of Urban local bodies, Panchayati Raj Institutions and Smart Cities Officials who implement the program
- Academia, Universities Research Institutions that can help documentation and assess related scenario
- Citizen group and civil ocietsy as a whole

# Urbanisation and India

By 2050, 60% of India's population will live in urban areas – up from about 30% today

**\$2.94**  
Trillion

World's 5th largest economy (nominal GDP) (IMF, 2019)

**3<sup>RD</sup>**  
Rank

World Ranking in Startup Ecosystem (Economic Survey, 2018-19)

**1.35**  
Billion in 2019

World's 2nd largest Population (IMF, 2019)

**5**

Billion

Mobile phone users (TRA, 2018)

**81%**

Workers in informal Economy

(IOL, 2018)

**27,668**

Number of registered Start-ups

(StartupIndia Website, 2020)

**566**

Million

Internet users in India (2018)

**21**

Million

of the world's 30 most polluted cities are in India (World Air Quality Report, 2019)

**More Than 4400**

Trillion

(Census 2011)

**53**

Cities with Million+ Population

(Census 2011)

**590**

Million

will be living in India's cities by 2030 (MGI- India's Urban Awakening Report, 2010)

**5**

Most Climate Changes Vulnerable Country in the World

(Climate Risk Index, 2019)

A circular economy development path in India could create annual value US\$ 218 billion in 2030



# Circular Economy India

1

\$1700 bn

Substitute  
wasted resource

2

\$ 600 bn

Monetise  
Wasted  
Capacity

CIRCULAR  
ECONOMY  
2030

3

\$ 1300 bn

Recover  
embedded  
wasted values

4

\$ 900 bn

Lengthen  
wasted  
lifecycles



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# Why Circular Cities

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By 2050, cities will house two-thirds of the world's population. Our cities, on the other hand, are dealing with the consequences of our current take-make-waste economy. Cities consume more than 75% of natural resources, produce more than 50% of global garbage, and emit 60-80% of greenhouse gases under this 'linear system.' A circular economy allows us to rethink how we manufacture and utilise the goods we need, and it allows us to experiment with new ways of assuring long-term success.

Circular development protects and improves city ecosystem services, which help to maintain natural cycles and promote the health of city dwellers. Ecologically regenerative actions are frequently implemented through the incorporation of green - blue connectivity into the urban fabric, urban ecosystem management (e.g., water management, ecology, farming, forestry), and bioremediation processes (e.g., phytoremediation of contaminated urban sites). Together with the Sustainable Development Goals external link icon and climate targets external link icon, the transition to a circular economy will help municipal leaders meet many of their other goals, such as improved housing, mobility, and economic development.

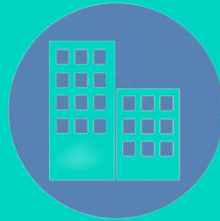




# KEY CHALLENGES

**400%**

increase in water demand by manufacturing sector by 2050  
(from 2000 baseline)



CITIES & INDUSTRIES

**55%**

increase in global water demand by 2050, mostly in cities

**70%**

of all freshwater withdrawals were by agricultural sector



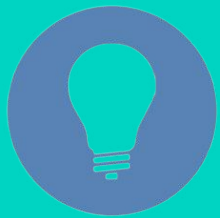
FOOD

**60%**

increase in food production will be needed by 2050 to keep up with growing population

**15%**

of freshwater withdrawals globally are for the production of electricity



WATER & ENERGY

**5-30%**

of total operating cost of water and wastewater utilities are from energy use

**\$20** trillion

loss per year in ecosystem services due to pollution and change in land use



ECOSYSTEM

**\$125** trillion

economic value provided by ecosystem services to global economy in 2011

# CITIES ARE CHANGE CENTRES

City governments can help create vibrant, liveable, resilient communities that are designed to be regenerative. Their closeness to the everyday problems and demands of urban residents and companies, as well as their policy levers, give them this crucial position. A city's budget for solid waste management, structural waste (underused buildings), economic costs (congestion) and health expenses (air and noise pollution) are all managed by city governments. Cities face the problems of a take-make-waste linear economy, but they are also change agents. Cities can help alter larger systems. Cities have been more daring in driving transformation in recent years.

## URBAN POLICY LEVERS

Urban policy levers supporting circular economy enable:



**Waste and pollution to be designed out of products and urban systems**



**Materials to be kept in use and maintain their value**



**Natural systems in and around cities to regenerate**

The Sustainable Development Goals emphasise the need of responsible consumption and production, as well as a new approach to materials and value based on circular economy concepts. Sustainable Cities and Communities SDG 11 and Responsible Consumption and Production SDG 12 are inextricably connected.

The International Resource Panel has stated that the circular economy is critical to attaining SDG 12 Responsible Consumption and Production, and that success in this area will have good consequences for the rest of the SDGs and can assist to offset numerous trade-offs. Similarly, the circular economy is being accepted as a critical paradigm for achieving climate goals.

This study, which builds on Delivering the Circular Economy: A Toolkit for Policymakers and focuses especially on the city level, identifies 10 policy levers as critical to urban circular economy transitions.



# THROUGH A WATER LENS

## CIRCULAR ECONOMY PRINCIPLES

### Circular Economy Principles

### Application to Water Systems

1

DESIGN OUT WASTE AND POLLUTION

2

KEEP PRODUCTS AND MATERIALS IN USE

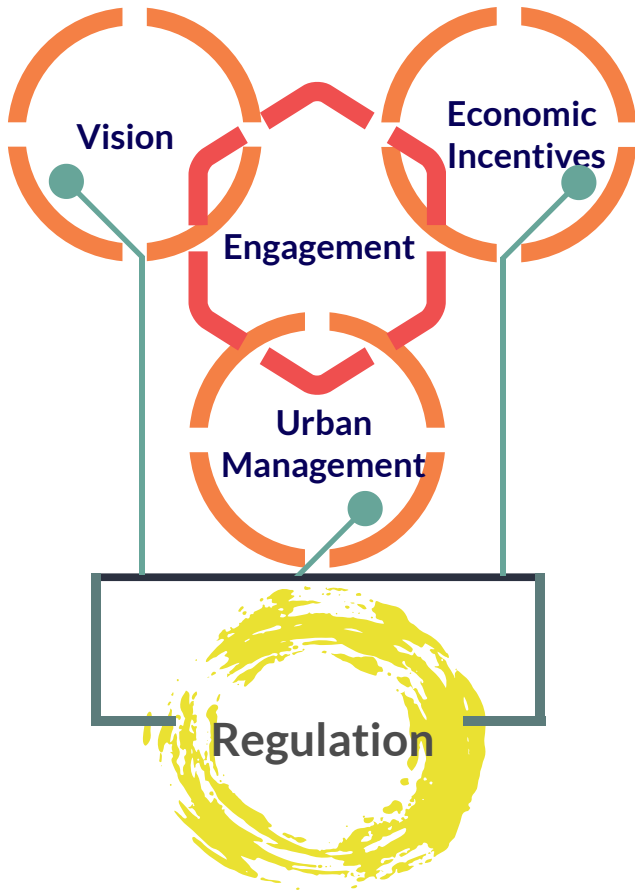
3

REGENERATE NATURAL SYSTEMS

- Optimise the use of energy, minerals, and chemicals in water systems
- Increase sub-basin water use relative to neighbouring sub-basins (e.g. use in agriculture or evaporative cooling)
- Use measures or solutions that do not require water

- Optimise water system resource yields (water, energy, minerals, and chemicals)
- Maximize energy and resource extraction from water systems
- Maximize value generated at water-system interfaces

- Reduce water consumption and non-consumption to improve environmental flows. (e.g. river restoration, pollution prevention, effluent quality)
- Minimize human engagement and use of natural water systems



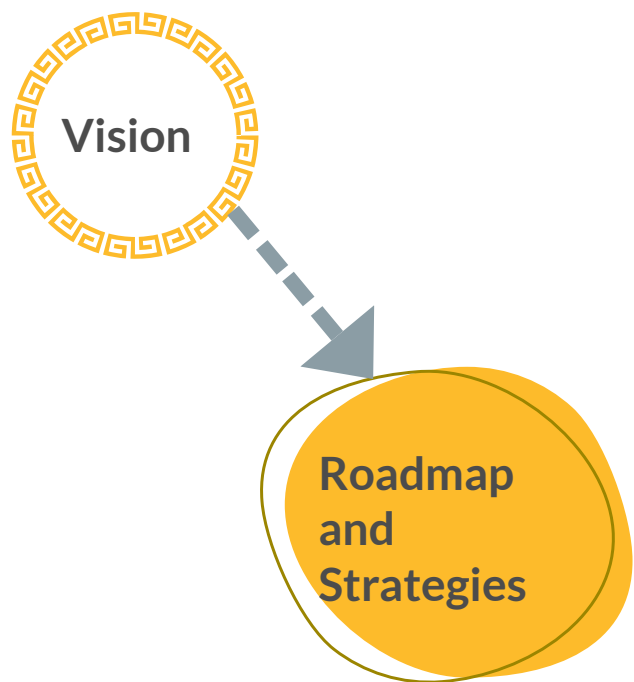
## Interlinkages Policy and Urban Officers

Five categories emerge to represent some of the interactions between the 10 policy levers, and their interlinkages are depicted in the figure. The five categories include:

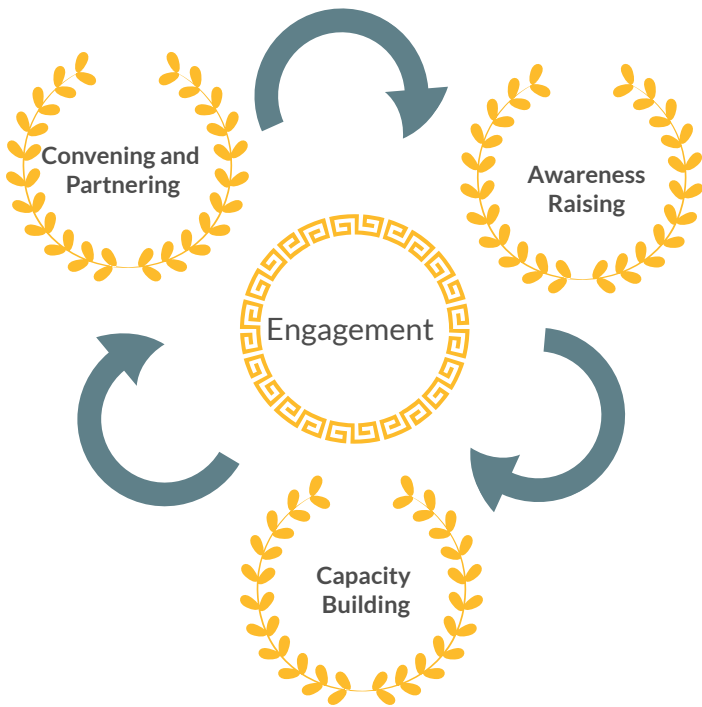
1. Vision
2. Engagement
3. Economic Incentives
4. Regulation
5. Urban Management

## Vision

Roadmaps and plans can give overall guidance. Circular economy city roadmaps and plans may define a direction for a city and guide the creation of other policy levers, such as urban planning standards or material and waste classifications and laws, by defining strategic goals. Involving urban stakeholders in the formulation of a plan can improve its efficacy and create a feeling of shared ownership.



# Engagement



Cities has an ability to include different segments of the community, bringing them together and catalysing action. Emergence in cities will create chances for a circular economy, and it will demand involvement and collaboration from all sectors. Convening and collaborating, Awareness raising, and Capacity development are the policies used to impact this area. A clear engagement policy lever is able to boost Stakeholder engagement—engaging and connecting with stakeholders in various ways —also serves to assist with the design and deployment of other policy levers, such as the development of a municipal roadmap for a circular economy. Collaborations and partnerships may be strengthened by the convening of stakeholders.

# Economy Incentives

When it comes to funding innovation and helping establish new markets, city governments can utilise fiscal measures like taxes, penalties, and charges whereas fiscal measures such as taxes, penalties, and charges can aid in encouraging or discouraging behaviours.

Such policy instruments are known as economic tools and are sometimes categorised into two distinct categories: financial support and fiscal measures. Individual cities have far-ranging degrees of control over this type of policy, which is why many are established in cooperation with higher levels of government.







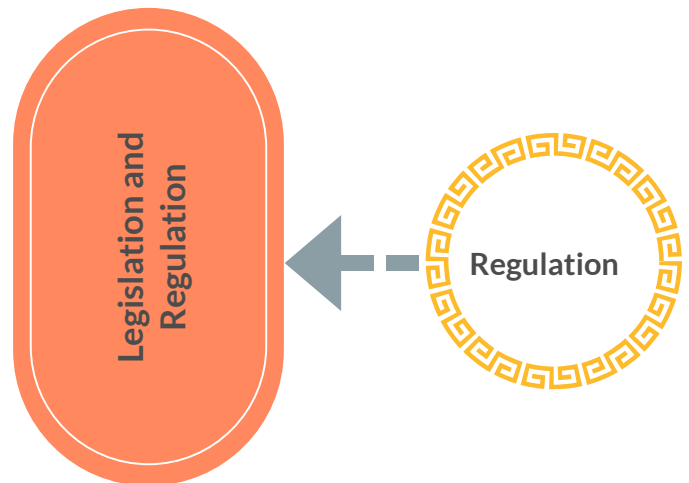
# Urban Management

The administration of city assets, and the purchase of public goods and services. Urban planning, asset management, and public procurement are the key levers in this area. All connect closely to the transition to a circular economy, which necessitates a shift in the design, usage, and movement of materials in a city.

A city's land-use planning also has an impact on how assets on that property may be managed, and public procurement regulations also affect asset management methods. Urban management levers are not self-contained, and like with other levers, are capable of being steered by circular economy plans and laws.

# Regulation

Legislation and regulation may have a huge impact on markets, affecting behaviour, and getting rid of obstacles that stand in the way of growth. Thus, it may help support and strengthen other policy levers such as laws that address the quantity and affordability of housing. Regional or national governments often promote legislation and regulation at the same time.



Increasingly, urban management policy levers and regulation policy have been thought of as powerful tools for achieving change. Even if one has little authority in certain sectors, a shift to a circular economy is not precluded. Urban issues have become increasingly complicated and interrelated, studies of the cities' climate activities found that "the manner in which cities implement their authorities is more significant than the magnitude of their capabilities.

# » THROUGH A WATER LENS

## LINEARITY OF CURRENT WATER SYSTEMS



### Fact

**This linear approach of human-managed water use, which is prevalent in a majority of basins today, is short-sighted and inherently unsustainable. This Take-Use-Discharge approach also goes against all three Circular Economy Principles.**

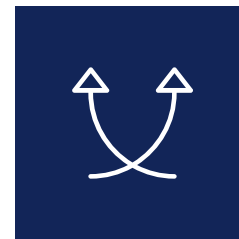
Water is sourced, or 'withdrawn', from streams, rivers, lakes, reservoirs, oceans, and groundwater aquifers as well as harvested directly as rainwater.



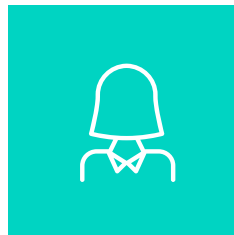
Water is 'used' by these four traditional categories: Agriculture, Municipality, Industries, Environment within in the water cycle.



This includes consumptive and non-consumptive uses. Non consumptive used water is 'returned' to the basin directly or via a municipal treatment facility



Outflows



Depending on location within the basin this returned water can then be further used downstream or lost to the basin in similar way as the consumptive uses.

To manage water systems for long-term sustainability, addressing the projected global and local demands for water, a circular approach is relevant, timely, and achievable and offers opportunity for commercial advantage.



# APPROACHES SUPPORTING CIRCULAR ECONOMY TRANSITION

Increasing numbers of institutions are appreciating the benefits of collaborative governance approaches, especially with relation to addressing systemic challenges. Results showed that a collaborative approach to governance yields twice as many actions compared to approaches that don't feature collaboration.

## Governance Approach

There are three distinct attributes of a culture that may aid collaborative governance.



**Innovation:** The existence of an open environment in which to experiment, iterate, and learn. Innovation in business models, design, and manufacturing are all essential in implementing a circular economy, and different models, design, and production all matter when it comes to getting and using resources. As these new behaviors are being enabled and incentivized, enabling, and helping surroundings can assist foster an innovative culture.

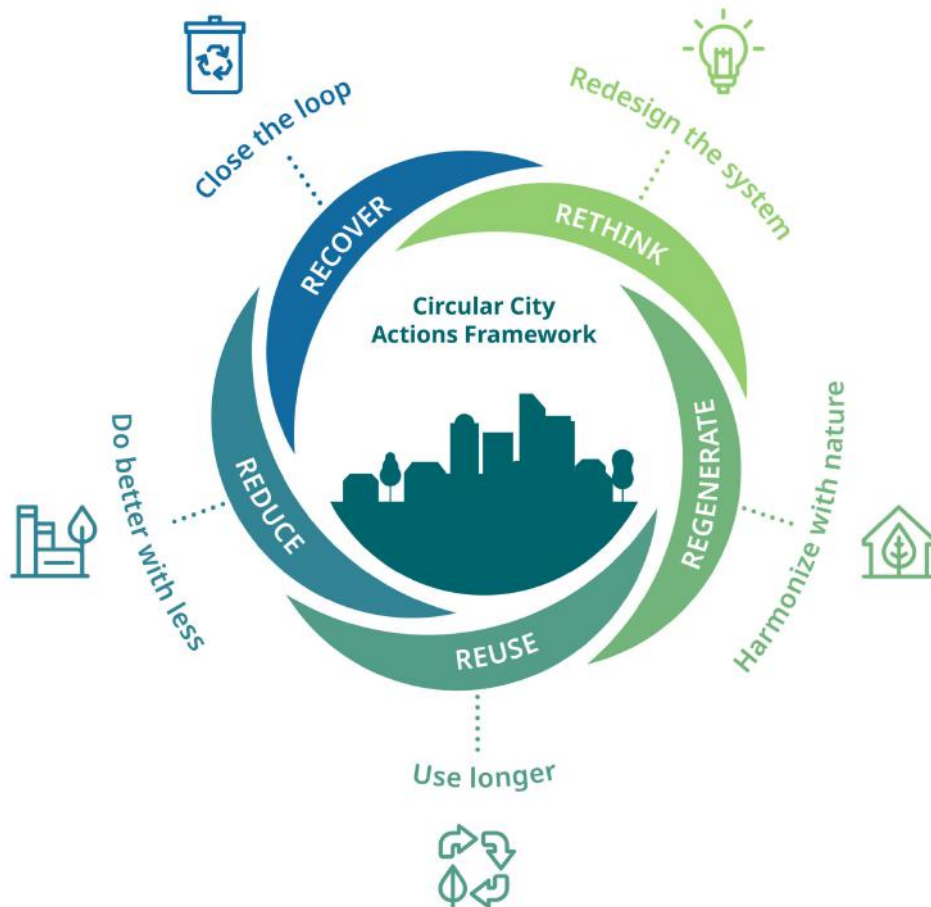
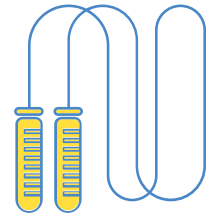


**Integration:** An environment where cross-topic silos are fostered and nurtured. With an emphasis on taking a systems-level approach, it is imperative to encourage the participation of a broad range of subjects, skills, and disciplines. This can add a new perspective and result in a multitude of innovative ideas that address various policy objectives. Integration across silos is fostered in an atmosphere that promotes strategic, system-focused, and transparent behaviour.



**Inclusion and participation:** To assist and create local solutions, a culture of inclusion and involvement is needed. People are the reason cities exist. All citizens' interests and needs are taken into consideration as well as their experiences when it comes to policy-making for cities. Engagement with citizens and addition of value to a city are both consequences of participation in municipal policy making. Inclusive and participatory work settings cultivate an inclusive and participatory work culture.

# Circular City Actions Framework



Source: <https://circularcities.wordpress.com/>

To start moving towards a more circular system, the Circular City Actions Framework proposes five complimentary options. The framework is action-oriented, showing the desired results of each method.

In addition to public service delivery, local and regional governments have a role in asset management, urban planning and regulation. They work best when applied in tandem to all production, consumption, and waste management activities impacted by the city or its people. They may be used in stakeholder meetings to show the local circular economy and highlight appropriate actions.

# Rethink

**Redesign the system:** Lay the groundwork for circular activities and the circular economy transition

1. Turku, Finland, has pledged to reduce lifetime emissions from food services through circular buying. To achieve this aim, the city's strategic procurement department established targets for reducing food waste and providing vegetarian meals. In addition, the department employs an emission monitoring technology to measure emissions associated with its food service contracts.

Support closed-loop systems and cross-sectoral synergies

3. The 1.5-Degree Life Campaign was launched by the three cities of Yokohama, Nagan, and Turku, Japan, and Turku, Finland. The initiative works with young groups to minimise emissions caused by consumerism. Youth are encouraged to create creative products based on their "1.5-degree lives" in order to persuade others to follow suit.

Eliminate linearity and incentivize circular practices

2. The Hammarby Sjöstad area in Stockholm, Sweden, was built on the concept of closed-loop metabolism, which incorporates synergies between water, energy, and transportation services. The district is heated using purified waste water, domestic waste combustion, and biofuel; after heat is recovered from waste water, it is utilised for cooling. The biogas generated is utilised to power local public transportation.

Incentivize the shift towards sustainable lifestyles

## Outcomes:

- Urban systems are highly adaptable and promote long-term sustainable development;
- Urban systems promote self-sufficiency;
- Residents are bonded to value chains; local community links and inclusiveness are facilitated;
- Productivity emissions are addressed; and
- All residents have equitable access to goods and services.

# Regenerate

**Harmonize with nature:** Encourage the development of infrastructure, manufacturing methods, and sourcing that will allow natural ecosystems to thrive.

1. In 2016, the drought in Brasilia, Brazil's capital city, reached crisis proportions. To guarantee that local water sources could continue to replenish naturally, a broad collection of stakeholders worked together to reforest springs in the northern urban watershed. These springs feed Lake Paranoá, a vital supply of water for the region.

Protect and restore local ecosystems

Promote solutions inspired and supported by nature

2. Bogor, Indonesia, processes organic waste using a method based on the life cycle of the black soldier insect. Fly larvae consume organic garbage, lowering the quantity that is landfilled. The procedure generates useful byproducts such as leftover residue that can be used as fertiliser and fly eggs and larvae that can be sold as animal feed.

3. The community of Makang'wa and adjacent communities in Chamwino, Tanzania, developed a solar-powered water supply project capable of providing clean water to over 7,000 families.

Prioritize renewable resources

## Outcomes:

- Services and products are produced from low-impact and recyclable materials;
- Purchasing and supply systems do not exceed natural ecosystem carrying capacity;
- Ecosystem recovery is facilitated and prioritised;
- Biodiversity is restored and protected, contributing to public health;
- Carbon sinks are optimised; and
- Urban structures are better prepared to adapt to climate change.

# Reduce

**Do better with less:** Design facilities, techniques, and products to reduce material and energy consumption, as well as waste creation, throughout production, use, and disposal.

1. Guelph, Canada, has long been regarded as a leader in water sustainability and conservation. To boost water efficiency even further, the city provided financial incentives for the construction of greywater reuse and rainfall harvesting equipment. By enabling households and businesses to utilise water that would otherwise enter sewage or storm water systems, these systems lessen demand on the water supply.

Design  
infrastructure  
resource efficiency

Support circular and  
resource-efficient  
business innovations

2. The Jaipur Integrated Texcraft Park Private Ltd., an eco-friendly textile manufacturing park with features for water recycling, rainfall harvesting, and energy efficiency, was built with the help of the Indian city of Jaipur. In addition, the textile park has made great measures to ensure the safety and health of textile employees.

3. Rosario, Argentina, partnered with non-governmental organisations to develop its extremely successful Urban Agriculture Program (UAP). The success of the programme was aided by the municipality's concerted efforts, which included the allocation of funds, the development of supporting regulations, and forward-thinking city planning. In addition to decreasing food insecurity, the initiative used regenerative agricultural techniques to rehabilitate polluted metropolitan areas.

Support local, low-  
impact circular  
economies

## Outcomes:

- Toxic/hazardous chemicals are removed;
- Overconsumption of products and resources is decreased;
- Total exploitation is reduced; total production input is reduced;
- Overall energy intake is decreased; total waste is decreased;
- Total GHG emissions are reduced; reliance on scarce resources is reduced;
- Pollution-related health effects are significantly lowered.

# Reuse

**Redesign the system:** Laying foundation for a smooth transition to circular economy.

1. The German city of Bonn launched the "Werde Cupster" project to promote the use of reusable drinking containers. The initiative's website offers companies with information (including instructions on accepting reusable containers during the COVID-19 epidemic) and links interested customers with participating businesses.

## Design and regulate for extended use

## Support circular and resource-efficient business innovations

2. The Hammarby Sjöstad area in Stockholm, Sweden, was built on the concept of closed-loop metabolism, which incorporates synergies between water, energy, and transportation services. The district is heated using purified waste water, domestic waste combustion, and biofuel; after heat is recovered from waste water, it is utilised for cooling. The biogas generated is utilised to power local public transportation.

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## Support local, low-impact circular economies

### Outcomes:

- Primary resource consumption is lowered;
- Products are recycled at their largest achievable value;
- Energy demand are reduced;
- Consumption-based emission levels are highlighted;
- Complete waste is lessened;
- Material and economic value is relegalized, contributing to the local economy;
- Local productivity is supported; and community connections are fostered.



# Recover

**Make waste history:** Optimize waste reduction at the conclusion of the usage phase and reintroduce it into manufacturing operations.

1. RAG's administration building in Essen, Germany, was designed and built with circular economy concepts in mind. All materials were documented on a material passport in order to facilitate separation and eventual reuse of building components. The building was also intended for easy deconstruction in the future.

Design and regulate  
for separation and  
recovery

Collect and sort  
waste to facilitate  
recovery

2. A measure enacted in 2017 by the Washington State legislature mandated that producers of solar panels purchased after July 2017 provide consumers an ecologically friendly and simple option to recycle the panels.

3. "Quelimane Limpa" in Quelimane, Mozambique, composts food market trash. Next, the garbage is transferred to a local composting facility, where it is converted into compost that is distributed to adjacent gardens.

Process waste,  
ensure re-entry into  
industry

## Outcomes:

- As a result, total extraction, materials input, input energy, and waste generation are decreased. Upskilling and job possibilities are enhanced.
- The local economy and innovation are boosted.



# THROUGH A WATER LENS

## THE SYSTEM PERSPECTIVE



### Fact

Water is a complex system, so to simplify the applicability of this model, it currently represents a single basin. The opportunity with Circular Economy for Water is to better align the human water cycle with the natural water cycle.

**'Butterfly' Diagram adapted to represent the Circular Water Economy**

**Avoid Use** – through rethinking products and services and eliminating ineffective actions.

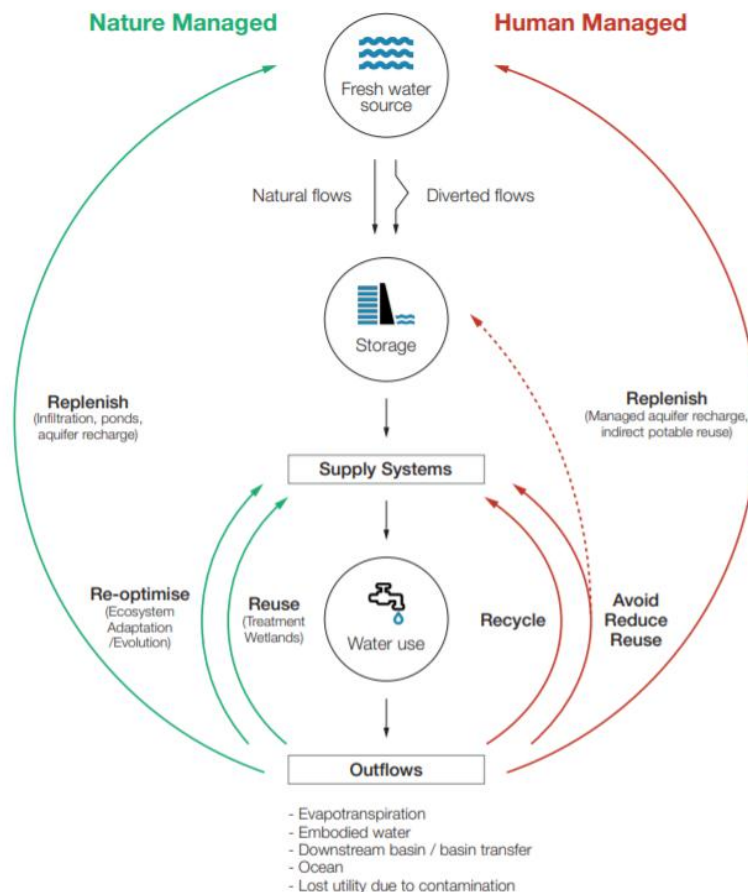
**Reduce Use** – driving continuous improvements through water use efficiency and better resource allocation and management.

**Reuse** – pursuing any and all opportunities to reuse water within an operation (closed loop) and for external applications within the surrounding vicinity or community.

**Recycle** – within internal operations and / or for external applications.

**Replenish** – efficiently and effectively returning water to the basin.

The function of water use in these loops can have multiple dimensions. Understanding these is fundamental to realizing the opportunity and enterprise potential of water and Circular Economy.



# THE OPPORTUNITY

## EVALUATION & ASSESSMENT

*Initiative / Tool / Framework*



### ReSOLVE

Related to 'Water as service / medium' dimensions of water



### Water Utility Pathways in Circular Economy

Perspective of Circular Economy from  
a water utility's perspective



### 6s and 7s Models

Provides holistic approach to Circular  
Economy assessments



### AWS Standard

Water resources, water quality



### Disclosure Initiatives for Cities and Water

Water footprint, sustainable  
water use



### Water Risk and Action Framework (WRAF)

Sharing of resources in participatory  
manner



# GOVERNMENT INITIATIVES

*Aatmanirbhar Bharat* is dependent on sustained growth. A development strategy that maximises the use of resources is urgently needed. India must develop towards a circular economy because to its rising population, fast urbanisation, climate change, and environmental degradation.

"Circular economics" is an economic strategy that eliminates waste and the ongoing use of resources. It emphasises the necessity for a holistic perspective of products and processes. To minimise resource reliance and increase competitiveness, our industrial systems must embrace methods based on the circular economy principles.

In addition to reducing congestion and pollution, India's circular economy might have a snowball impact on the economy. In order for us to become self-sufficient, we will need to optimise our resource efficiency, reduce the use of scarce resources, and create new business models and entrepreneurial enterprises.

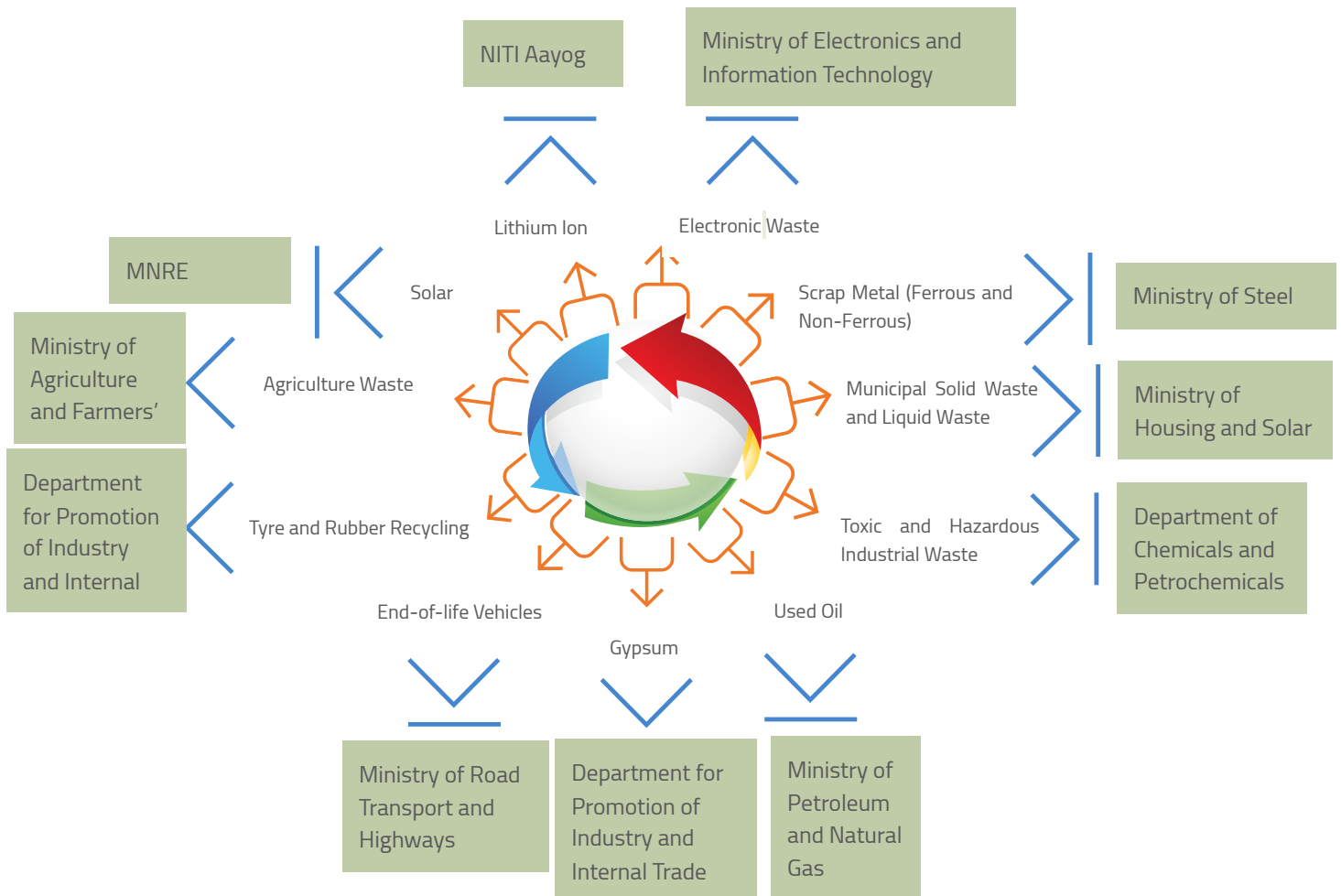
As part of its efforts to move the country towards a circular economy, the government has been developing legislation and encouraging initiatives. For example, the Plastic Waste Management Rules and E-Waste Management Rules have been published. The Metals Recycling Policy has also been published.



# ATAMNIRBHAR BHARAT

It has also been decided to create 11 committees, each with a specific emphasis area, which would be chaired by the respective line ministries and include officials from MoEFCC and NITI Aayog, domain experts, academics and industry leaders (Annexure 1). For each of their particular priority areas, the committees will create thorough action plans for transitioning from a linear to a circular economy. And they'll make sure that their results and suggestions are implemented effectively by implementing the appropriate modalities.

Among the emphasis areas are 11 end of life/recyclable material/waste goods or areas of developing issues that must be addressed in a comprehensive manner. The report is divided into three parts:



# SMART CITIES MISSION

By implementing 'smart solutions', the Mission's major aim is to promote cities that offer essential infrastructure, a clean and sustainable environment, and adequate quality of life for their inhabitants. By focusing on the social, economic, physical, and institutional foundations of the city, the Mission strives to spur economic growth and improve quality of life. Focus is on inclusive and sustainable development via the establishment of repeatable models that serve as beacons for other cities. A two-stage competition has picked 100 communities to become Smart Cities.

## Six fundamental principles on which the concept of Smart Cities



The Smart Cities Mission specifies several characteristics of a Smart City, such as diversified land use, reduced resource depletion and pollution, and digitalization, in order to promote overall well-being and reduce citizens' vulnerability. These are mirrored in measures that assess a city's circularity.

# AUTOMOBILE SRCAPPING POLICY

In addition to reducing pollution, the government's fleet modernisation programme aims to improve road and vehicle safety, fuel efficiency, and the availability of low-cost raw materials for the auto, steel, and electronics industries. Private automobiles will be deregistered after 20 years if declared unfit or if not renewed. Private automobiles will be eligible for enhanced re-registration after the 15th year.



Source: <https://www.businesstoday.in/latest/economy-politics/story/modi-govt-vehicle-scrappage-policy-all-you-need-to-know-291350-2021-03-20>

There was an urgent need to implement such a programme on a nationwide scale. The plan intends to reduce automobile air pollution by 25-30% and improve fuel efficiency. As older vehicles are phased off the road, the service and manufacturing sectors will benefit from increased demand for new vehicles.

# NAMAMI GANGE'S INITIATIVE

*The Namami Gange Knowledge Hub shall develop expertise in Circular Economy and disseminate it to all key stakeholders in any river basin.*

## 01

### Initiative 1

Water Resourcing  
and Valuation  
Toolkit

## 02

### Initiative 2

River Restoration &  
Conservation Manual &  
Guidelines

## 03

### Initiative 3

Ecosystem Services

## Who should engage

### RIVER BASIN ORGANISATIONS

- Jointly develop a circular economy policy framework and water balance-sheet

### URBAN LOCAL BODIES

- To develop and implement ecosystem services in a sustainable manner

### ENVIRONMENTAL IMPACT ORGANISATIONS

- To actively champion the implementation of circular economy framework

### IMPACT INVESTORS

- To channel capital into circular economy pilot and demonstration projects

## How to engage

### PILOT PROJECTS

- Participate in the circular economy pilot and demonstration projects

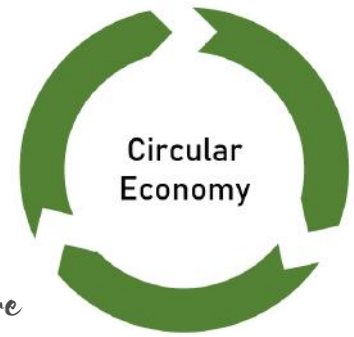
### CIRCULAR ECONOMY MASTERCLASSES

- Learn from the very best experts from around the world

### TECHNOLOGY SHOWCASES

- Participate in technology showcases



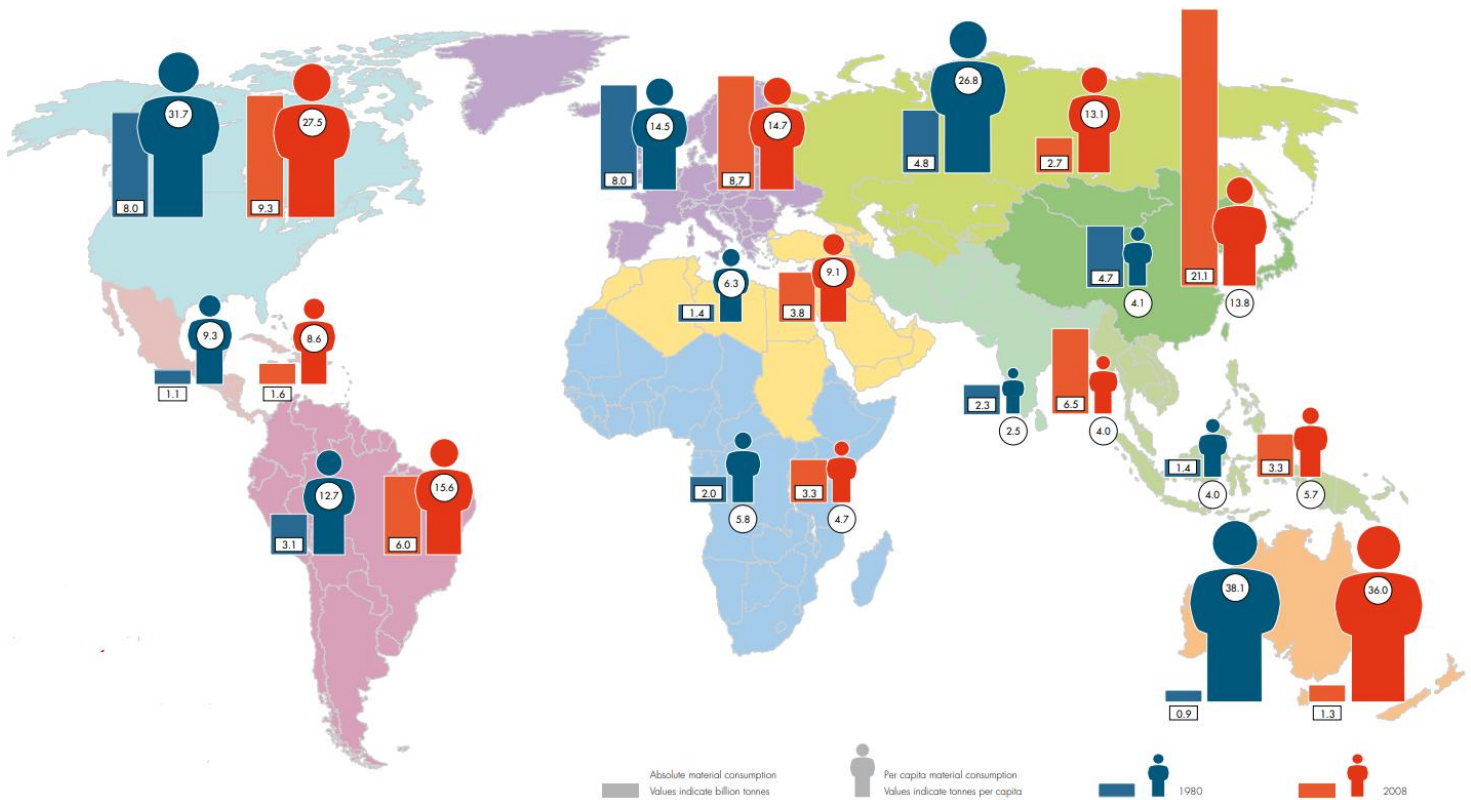


*Globally, the “big five” material consuming countries — China, the United States, India, Brazil and Russia — are responsible for 55% of total material requirement.*

# Green economies around the world

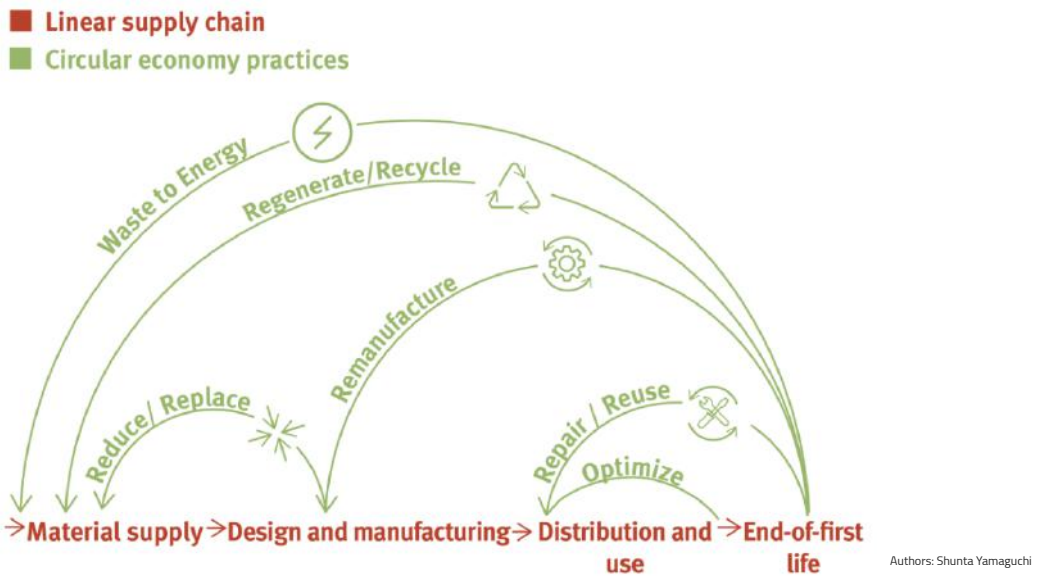
## Global trends of material use at a glance

In 2008, each human being consumed approximately 10 tonnes of materials, 1.6 tonnes more than in 1980. There is a factor 11 difference between the regions with the highest and lowest material use. At the same time, humans generate more and more economic income per unit of material used, yet material productivity did not even double – or Factor 2 – between 1980 – and 2008.



# International trade and circular economy – Policy alignment

Product based standards for a circular economy by OCED Trade and Environment



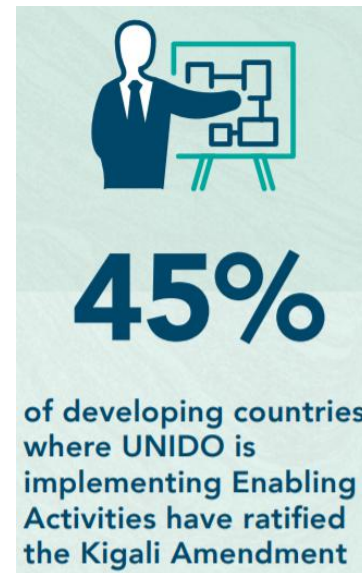
CE Policy	CE Standards	Value chain	Trade implications
Extended producer responsibility (EPR)	<ul style="list-style-type: none"> <li>material content</li> <li>recycled content</li> <li>hazardous content</li> <li>recyclability</li> <li>reparability</li> <li>sustainable production</li> </ul>	Upstream (for product design and production)	<ul style="list-style-type: none"> <li>Whether one country's circular economy policy or standard is undermined by another country's domestic policy choices.</li> <li>Whether a patchwork of different regulations and standards across different jurisdictions could become unnecessary barriers to market access and trade</li> <li>Aligning to or using available international standards (wherever possible)</li> </ul>
Eco-design			
Green public procurement			
Labelling			
Recycling	<ul style="list-style-type: none"> <li>material quality (for waste and scrap)</li> <li>(for secondary raw materials)</li> </ul>	Downstream (for waste and scrap) (for secondary raw materials) (for goods for refurbishment and remanufacturing, and second-hand goods)	
Refurbishment and remanufacturing	<ul style="list-style-type: none"> <li>product quality (for goods for refurbishment and remanufacturing, and second-hand goods)</li> </ul>		
second-hand goods			
Labelling			

Source: Author based on Yamaguchi (2018 ) and OECD (2021, forthcoming ).

# CLOSING THE LOOP

The Montreal Protocol Division ( MPD ) of UNIDO's Department of Environment aids developing nations and countries with economies in transition in phasing out ODS, reducing GHGs, and phasing in non-ozone depleting compounds. MPD's technical services, in collaboration with our bilateral-stakeholder partners, are focused on introducing innovative technologies, strengthening systems, and developing human capacities to ensure equitable and sustainable industrialization.

Working predominantly with the foam sector, the refrigeration and air conditioning (RAC) manufacturing sector and the RAC servicing sector, it has already implemented more than 1000 projects in 105 countries.



Transitions towards a circular economy, include the following:

- Phasing out controlled substances from products as early as the design phase and supporting industry in finding ways to redesign products to contain less harmful substances before these products are even manufactured;
- For example, refrigerant management programmes conserve value by reusing items and resources and ensuring that supply are circular;
- Helping government monitor ODS and GHG usage, improving regulatory frameworks and giving policy guidance on standardisation, labelling and certification schemes.

# All 'round the world: Embracing the circular economy

## **Efficient:** Circling the best

Since 2014, when UNIDO's Resource Efficient and Cleaner Production (RECP) pilot project was launched in the Republic of **Belarus**, more than 30 companies learned how they can cut production-related costs and at the same time reduce adverse environmental impacts. In one example, UNIDO helped a confectioner to use safe and sweetwater to make marmalade for chocolate fillings.



In **Serbia**, the National Cleaner Production Centre (NCPC) is a particularly strong player in implementing sustainable chemical solutions, including new business models such as Chemical Leasing.



[https://www.unido.org/sites/default/files/2017-07/Circular\\_Economy\\_UNIDO\\_0.pdf](https://www.unido.org/sites/default/files/2017-07/Circular_Economy_UNIDO_0.pdf)

## **Long-Lasting:** Keeping you 'round

Most industrialized countries have banned hydrochlorofluorocarbons (HCFCs), which are potent greenhouse gases that can deplete the ozone layer. Developing countries are now working to phase them out, too. In **Pakistan**, UNIDO took the lead on assisting industry with the phase-out in order to reduce the demand for HCFCs, ensuring better products, greater longevity and easier disposal. Overall, UNIDO has implemented plans to phase out HCFCs in 72 countries.



**The former Yugoslav Republic of Macedonia** faced significant hurdles when it came to managing polychlorinated biphenyls (PCBs). But with the help of a multi-pronged project with UNIDO, the country is now well on its way to eliminating the threat of these harmful pollutants, and new services include identifying contaminated transformers, treating them, and returning them to the production process.



## *Continuous: What goes around comes around*

In **Ethiopia**, UNIDO and other international organizations worked with the government to design an e-waste strategy. The new strategy promotes the sound management of e-waste, secure handling of non-recyclable materials, and the highest possible recovery rate for valuable materials. In addition, Ethiopia will host regional workshops and capacity building activities for countries in Eastern Africa, serving as a model for the region.



In **Guinea**, UNIDO trained more than 4,000 young people and women in solid waste management, including waste collection and sorting, sanitation and the integrated management of public spaces. The project offers a hopeful model for addressing West Africa's most pressing environmental, economic and social problems.



[https://www.unido.org/sites/default/files/2017-07/Circular\\_Economy\\_UNIDO\\_0.pdf](https://www.unido.org/sites/default/files/2017-07/Circular_Economy_UNIDO_0.pdf)

# INCLUSIVE, EFFICIENT, LONG-LASTING, CONTINUOUS

**Come full circle:** Forging ahead

*The circular economy encourages cross-border trade. Improvements in product qualities, such as longer product life, reusability, and serviceability, help to ensure that items may be utilised and sold on the global market. The circular economy opens up new opportunities for countries to develop by helping them overcome international trade barriers in this manner.*



**By creating standards for secondary raw resources that were previously deemed waste,**



**Today's nations are at a crossroads.** While unsustainable and linear patterns of consumption and production harm future generations, a restorative way to enhanced wealth is opening doors to the public on the other side of the equation.



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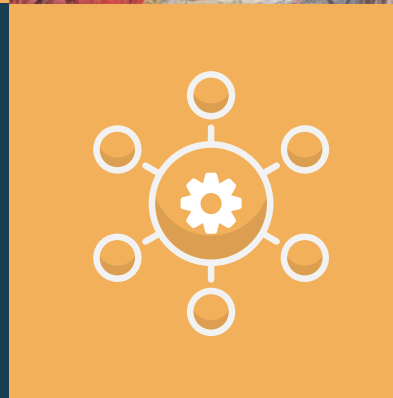
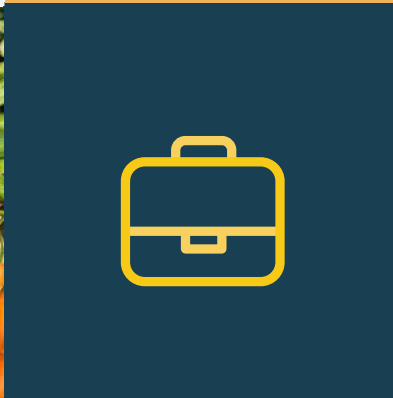
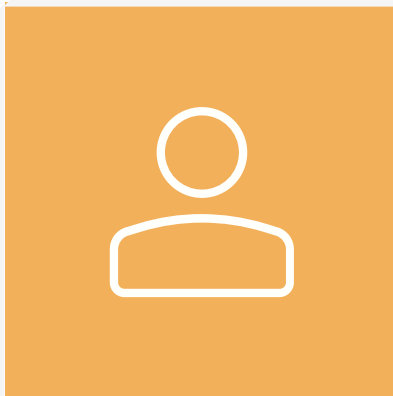
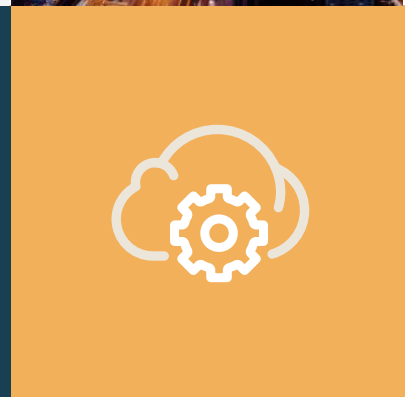
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" The Japanese concept of *mottainai* expresses that it is a shame for something to go to waste without having made use of its potential in full "  
— something that happens in regularity for a linear economy







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