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CIRCULAR ECONOMY, ECONOMIC DIVERSIFICATION AND AID FOR TRADE

Circularity and Sustainability in Operations and Policy:

Circular Economy Zero Waste Cities in the People's Republic of China

Stefan Rau, ADB

Why Circular Economy?

Effectively address increasing waste generation, environmental and ocean pollution

- 2016 – 2050: 2.01 – 3.4 billion tons of Municipal Solid Waste globally
- East Asia and Pacific highest contribution among world's regions generating 468 million tons or 23% (2016) (World Bank Group)

Effectively address scarcity of resources, water, and land

- Accelerated by climate change
- Rare earth, metals, minerals, sand, fossil fuels, food, animal feed, clean water, agricultural land - all scarce

Capture wasted economic resource

Take-Make-Waste linear economic model wastes 80% of $ 3.2 trillion of global consumer goods each year. (World Economic Forum, 2014)

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Previous and Current ADB Operations in CE

Clean and Sustainable Ocean Initiative and Plastic Pollution Reduction
Circular economy industrial parks supporting industrial symbiosis
Circular agriculture and bio-economy
Solid Waste Management: improvements **with 3R/5R principles and increased segregation, and recycling rates and decreased landfilling and optimized waste-to-energy** inclusive of collection, management and treatment with characterization and segregation, mining of old dumpsites, kitchen-waste management pilot, construction and demolition waste management. Also waste-to-energy investment support to private sector.
Water supply and Wastewater management: water efficiency improvements inclusive of non-revenue-water reduction, treated wastewater reuse, sludge treatment and use in many urban and rural projects
River pollution reduction, river rehabilitation and flood risk management: water quality improvement increases higher level of water usability and retaining value of otherwise damaged areas, infrastructure and assets, and river greenways increases land value and enables local recreation and reduces the urge for travel
Sponge city projects: local rainwater recovery and reuse (in addition to river works above)
Mining and land remediation and wetland rehabilitation: follows principle of bringing back land to higher value uses as brownfield redevelopment
Sustainable urban mobility, public transport, non-motorized transport, road safety and road maintenance
Energy efficiency, local energy cycles and renewable energy generation

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Circularize Four Linear Activity Areas

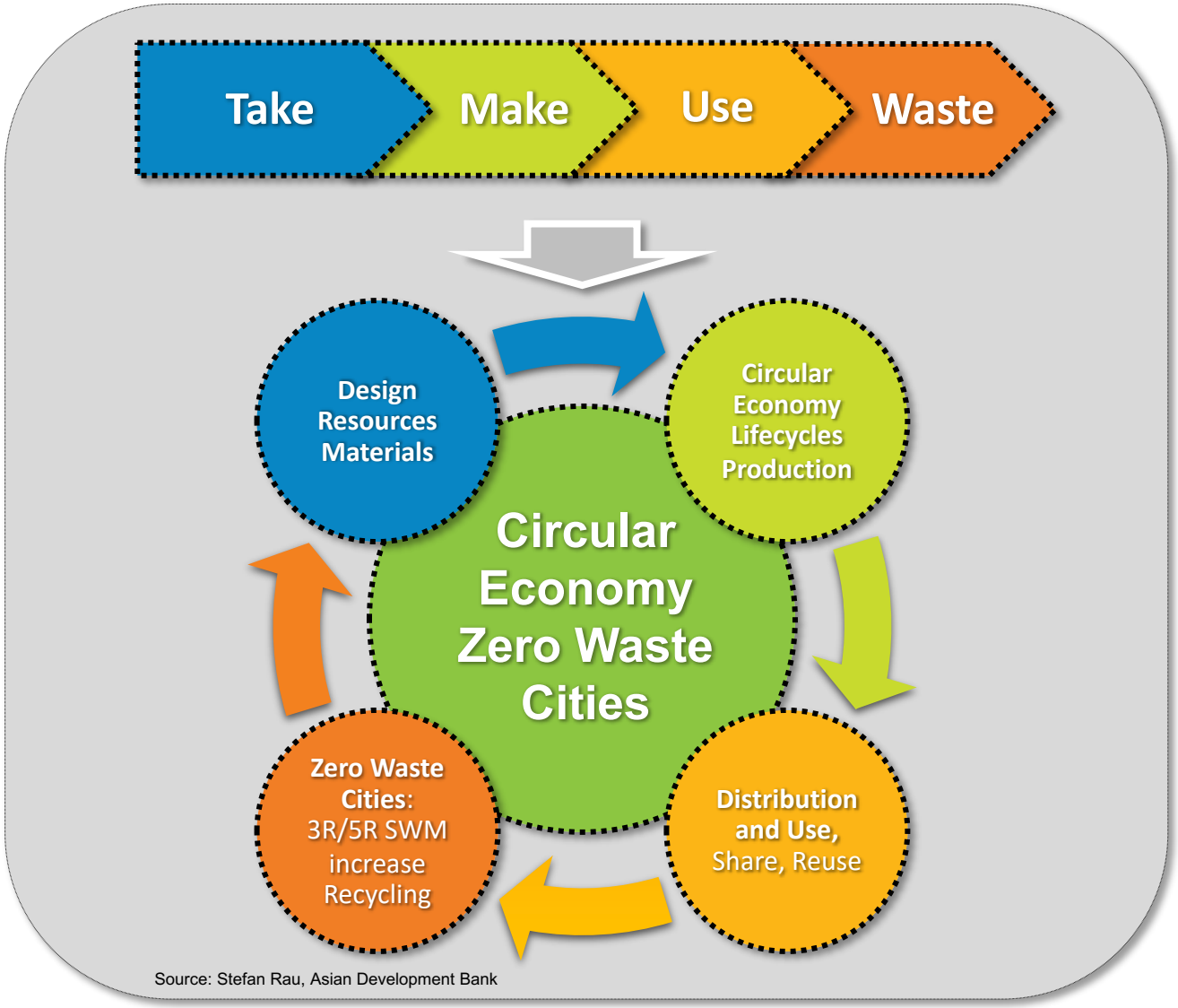
In the PRC we are preparing a roadmap for circular economy as one of five frameworks to guide implementation of the recently approved country partnership strategy and we have a TA under implementation.

We conceptualize this through four areas of activity we support as transformation from the linear take-make-use-waste model into a circular system.

Arrows in this simplified diagram should go both ways.

We are building on the original work by, among others, Michael Braungart with biological and technical cycles and the cradle-to-cradle concept and on international best practice cases from Asia, Europe, Oceania and US.

And we build on the fundamental work by UNEP, UNIDO, OECD, European Union (i.e. CE Action Plan) Ellen MacArthur Foundation, and the PRC government, and others.



Source: Stefan Rau, Asian Development Bank

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Integrate Top-Down and Grass-Roots Approach

Circular Economy Zero Waste Cities

Institutions, Policies, Standards, Governance, Taxes, Incentives, Disincentives, Education and Capacity Development, R&D, IT Platform, Engage Private Sector and Community, promote Behavior Change

Design, Resources, and Materials

Lifecycle design of products and processes

Input from sustainable extraction if needed

Materials from renewable sources and from urban mining and recycling

Disassembly and component reuse

Source: Stefan Rau, Asian Development Bank

Circular Economy Lifecycles Production

Bio-economy agriculture

Circular economy in urban planning, infrastructure, buildings

Circular industrial parks and lifecycles production

Circular economy in energy

Circular economy in transport, vehicles

Distribution and Use, Share, Reuse

Reusable packaging and circular logistics

EPR (extended producer responsibility), repair, reuse, replacement

Sharing economy pilots and mainstreaming

Products as service pilots

Zero Waste Cities

Improved household waste management 3R/5R

Increased recycling rates

Construction and demolition waste management

Kitchen/organic waste management

Medical waste management

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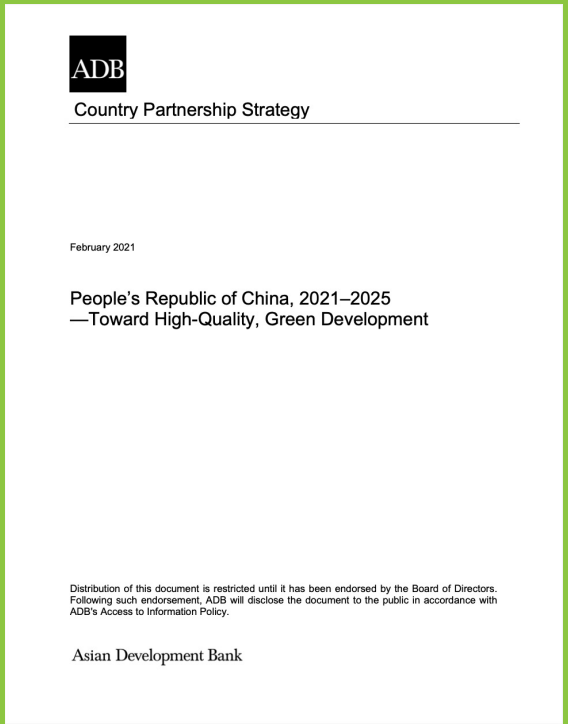
System Enablers and Local Pilots with Private Sector

Circular Economy Zero Waste Cities

The overarching objective of Circular economy zero waste cities will be to pilot comprehensive local activities in specific areas and industries and link value and material chains. Simultaneously we aim at enabling the transformation on a systemic and institutional level though policies etc.



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Country Partnership Strategy

February 2021

People's Republic of China, 2021–2025
—Toward High-Quality, Green Development

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https://www.adb.org/sites/default/files/institutional-document/684081/prc-cps-2021-2025.pdf

ADB-PRC partnership support Circular Economy through:

- Circular Economy Zero Waste Cities Pilot Program to develop local pilots through government, public-private and public-community partnerships.
- Systemic and institutional transformation and Circular Economy enabling environment on national, provincial and local levels.
- Sharing knowledge and lessons from pilots and promote mainstreaming of policies and successful instruments.
- Include circular economy aspects in projects currently under preparation to explore and contribute with solutions for replication.
- CE is aligned with the ADB-PRC country partnership strategy 2021-2025.

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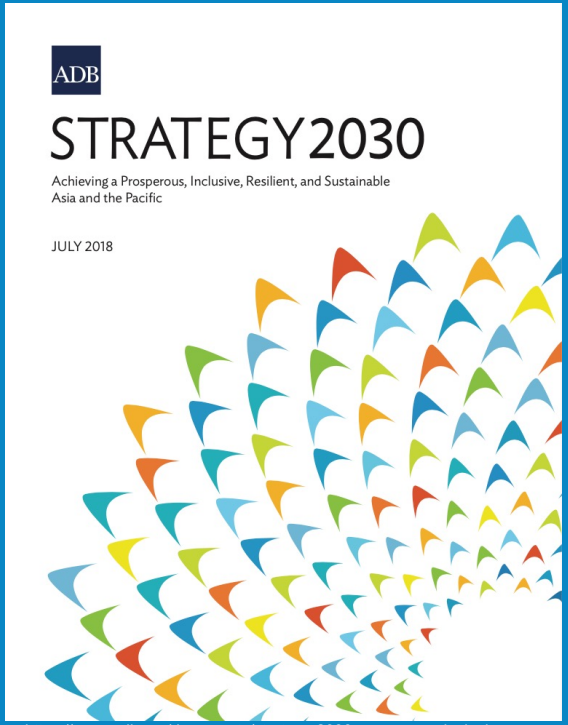
“Top-stream” Design and Resource Input

PRC Key Policies Promoting Circular Economy and Zero Waste Cities

The first area of activity we support is the top-stream Design and resources input to ensure a systemic transformation towards lifecycle considerations and use of renewable materials and recycled materials, and circular end-of-life practices more downstream. It is about longevity, lifecyle cradle-to-cradle product and production process design, optimizing use of renewable materials, and recycled materials and reused



https://www.adb.org/documents/strategy-2030-prosperous-inclusive-resilient-sustainable-asia-pacific
CE aligns with ADB’s S2030, all OPs and especially OPs 3, 4, 5, 6
CE also aligns with ADB’s Clean and Sustainable Ocean Initiative

- Industrial synergies in circular economy industrial parks was the first area of activity implementing the very comprehensive *Circular Economy Promotion Law of the People’s Republic of China*, that was effective since 2009.
- 12th, 13th Five-Year Plans included objectives of CE and pilot program for CE projects and pilot cities (from the 2013 CE action plan by State Council)
- National Action Plan for Circular Economy Development adopted in 2017
- Ministry of Ecology and Environment: Pilot Zero Waste Cities Program (2019)
- 14th Five-Year Plan: “Fully implement the concept of circular economy and build a multi-level resource efficient recycling system.”
  - Circular industrial parks and circular production chains
  - standardize remanufacturing
  - circular agriculture and organic agriculture
  - waste materials recycling and sorting system of urban waste
  - "reverse recycling" model of production enterprises
  - resource recycling system that integrates online and offline and has a controllable flow
  - extended producer responsibility system.
  - reduction, standardization and recycling of express packaging

(PRC’s 14FYP, CHAPTER 11: Promote green development and promote harmonious coexistence between man and nature; Chapter 39: Accelerating the Green Transformation of Development Mode; Section 2: Build a resource recycling system

“Upstream” Manufacturing Circular Processes

Circular Economy Lifecycles Production (“Cradle-to-Cradle”)

The second area of activity we support is the Circular economy lifecycles production and processes with industrial synergies, where waste and byproducts from one industrial process are used as resources for other processes and/or industries. There have been many examples around the world that can be studied for lessons and replication.

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KEY POINTS

- Urbanization and industrialization, along with improved well-being, still cause a disproportionate increase of resource and land use, generating more waste and carbon emissions.
- Urban mining recovers discarded materials and brings components and scarce resources back into the value cycle. This is important and should be mainstreamed. New transformative models are urgently needed to reduce resources and land consumption and promote low-carbon lifestyles.
- The People's Republic of China aims at a green circular economy that would recover discarded products and materials and eventually move toward full life cycles in product designs, considering resource extraction, processing, production, packaging, logistics, sales, use, share, reuse, recycle, etc. of everything in our material world and internalizing currently externalized environmental and social costs.

Options for Urban Mining and Integration with a Potential Green Circular Economy in the People's Republic of China

Stefan Rau[1]
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East Asia Department
Asian Development Bank

Rapid urbanization, industrialization, and economic growth in the People's Republic of China (PRC), coupled with increased disposable incomes over the last 40 years, have contributed to massive consumption of land and extracted natural resources. Structures were built on new urban land and resources were processed into consumable products, and many of which were used and eventually disposed or abandoned. Solid waste management practices remain focused on managing waste volumes effectively and efficiently following national regulations, while trying to minimize environmental impacts. The 3R principle of reduce–reuse–recycle is widely accepted; however, actual practice is lagging behind its potential. Most solid waste that is collected is either discarded in landfill sites or processed in municipal solid waste incineration plants. As natural resources and land are becoming increasingly scarce, urban waste and other by-products from urban metabolisms, as well as abandoned land and structures, are being discovered for adaptive reuse, or as valuable resources for other products and processes. Recovering these resources is called urban mining and, for land, brownfield redevelopment.

This ADB brief provides background information and cases on urban mining in a broader context, and offers possible avenues for the PRC to become a leader in comprehensive solid waste and resources management, which eventually becomes part of a green circular economy that should virtually generate no more waste.

[1] The author acknowledges Juliana Chia who provided research and discussion during an internship at the Asian Development Bank. Arun Ramamurthy and Su Chin Teoh contributed with research and conceptual discussion. Luca di Mario provided inputs as peer reviewer. Akiko Hagiwara and Sophia Castillo-Plaza contributed with review and editing.

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https://www.adb.org/publications/urban-mining-green-circular-economy-prc

- **Decoupling Natural Resource Use from Urban and Economic Growth**
- Core challenge to sustainable development is current link between increasing natural resources consumption along urbanization and increased well-being. UNEP concept of ***resource-*** and ***impact*** decoupling.
- **Land, buildings and infrastructure circular economy**
- **Brownfield redevelopment** has still much potential of remediating and reusing former mining and industrial sites, made safe and secure for new urban functions.
- **Circular buildings and infrastructure: Adaptive reuse of buildings.** Buildings should be adapted to new uses to serve new functions if original uses are obsolete in that place. Full **lifecycle buildings** with full components, elements and material reuse would be setting new standards for design and construction industry.

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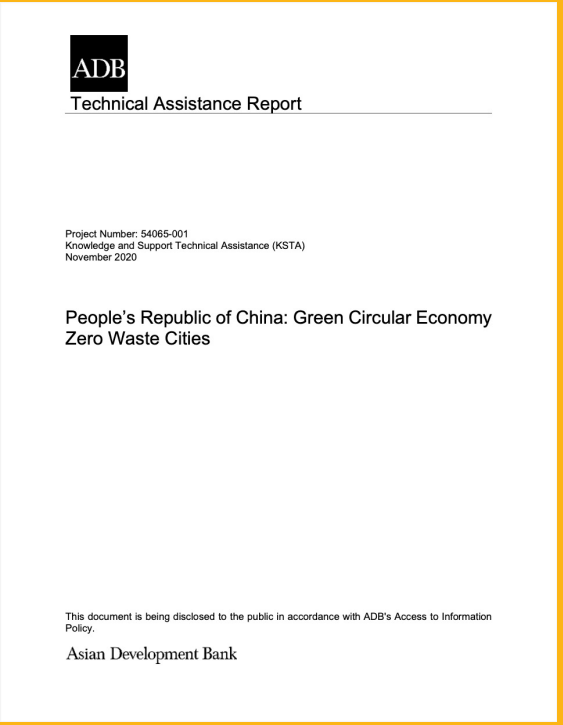
“Midstream” Packaging, Logistics and Use/Share

Distribution and Use, Share, Reuse

The third area of activity we support is the Distribution and use, share, reuse, EPR, repair, reuse and replacement, also explore and promote the sharing economy with the right kinds of conclusion from both negative and positive experiences i.e. from bicycle sharing and others.



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Technical Assistance Report

Project Number: 54065-001
Knowledge and Support Technical Assistance (KSTA)
November 2020

People’s Republic of China: Green Circular Economy
Zero Waste Cities

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https://www.adb.org/projects/documents/prc-54065-001-tar

- The TA will **link into biological and technical cycles** three areas of current linear upstream, midstream, and downstream processes.
- **Upstream**: Circularize heavy industrial production and raw material processing and integrate with Municipal Solid Waste Management and Recycling.
- **Midstream**: Circularize e-commerce packaging and logistics, a key link in CE. Pilot cities will partner with relevant industry players on business models and practices.
- **Downstream**: Improved solid waste management with increased recycling in highly developed cities with modern light industry manufacturing and services, and in less-developed rural towns piloting CE for differentiated levels and patterns of consumption and waste generation.

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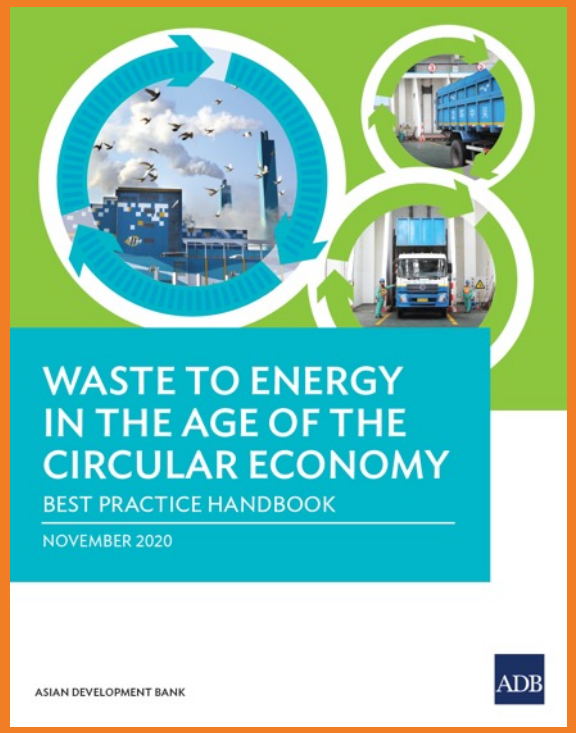
“Downstream“ Improve SWM: Increase Recycling

Zero Waste Cities – Improved Solid Waste Management – Increased Recycling

The fourth area of activity we support is the Zero Waste Cities with profoundly improved state of the art solid waste management significantly improving reuse and recycling rates. A special consideration is needed for PRC and other developing countries where waste composition includes large amounts of kitchen and other organic wastes compared to urban waste in high-income countries.



https://www.adb.org/publications/waste-to-energy-age-circular-economy-handbook

- **Bring more cities towards current best practice MSW management** in Asian countries: 67% recycled, reused, or upcycled; 25% waste to energy; 8% landfill of inert materials.
- Creation of **sorted, homogeneous streams** of waste at source is best practice.
- Generates **opportunities for distributed recycling** and upcycling activities.
- **Digitization of waste collection and trading of sorted materials** allows community participation and opportunity for marginalized people in the value chain.
- **Zero waste cities** aim at recycling and upcycling of more of the 33% waste that is disposed for final treatment (i.e. WtE and/or landfill) in current best practice cases.

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Support Institutional Strengthening

Institutionalization of cross-sector coordination and cooperation
(i.e. working group established among concerned national ministries and related local agencies, think tanks and academia)

Simultaneous multilevel engagement
(national, provincial and municipal pilots)

Policies, standards, governance
(taxes, market-based instruments with incentives, disincentives, education, technical training, capacity development, R&D, IT Platform, monitoring, and enforcement)

Private sector engagement, business models and pilots, capacity development amd education, support R&D

Community engagement and consumer behavior change
proactively promoted by government and private sector

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Monitoring of Results and Achievements

Institutions strengthened, policies and governance improved as result of lessons learned from the pilot program and policy dialogue, digital platform installed

Circular Economy Zero Waste Cities Program and Pilots implemented and lessons for a number of key challenges captured from successes and failures

Waste management improved with 3R/5R principles and increased segregation, and recycling rates and decreased landfilling and optimized waste-to-energy in a number of cities

Private sector engaged resulting in a number of improved product designs with increased durability, reusability, upgradability, reparability, with increased recycled content, more products from remanufacturing eliminated hazardous chemicals, and increased energy and resource and land efficiency, reduced single-use introduced ban on the destruction of unsold durable goods

Improved digitalization, EPR, product-as-a-service, sharing economy in a number of pilots tested

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Thank you for your interest

CIRCULARITY AND SUSTAINABILITY IN OPERATIONS AND POLICY:

CIRCULAR ECONOMY ZERO WASTE CITIES IN THE PEOPLE'S REPUBLIC OF CHINA

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