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## ADB CEWG Webinar Session 7

# ADB's Roadmap for Circular Economy Zero Waste Cities in the People's Republic of China

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10 November 2022, Thursday 1400 - 1500H GMT +8

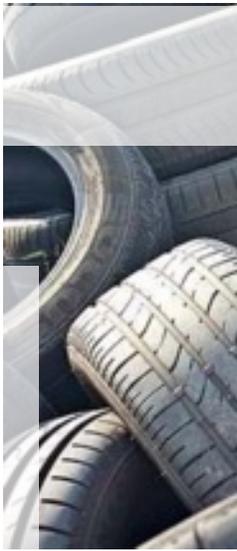
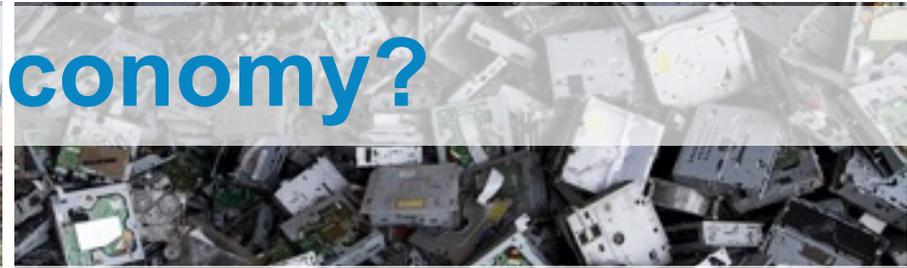
via Zoom



# Why Circular Economy?

## Effectively address increasing waste generation, environmental and ocean pollution

- Global consumption of materials such as biomass, fossil fuels, metals and minerals is expected to double in the next forty years, while annual waste generation is projected to increase by 70% by 2050.
- 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)

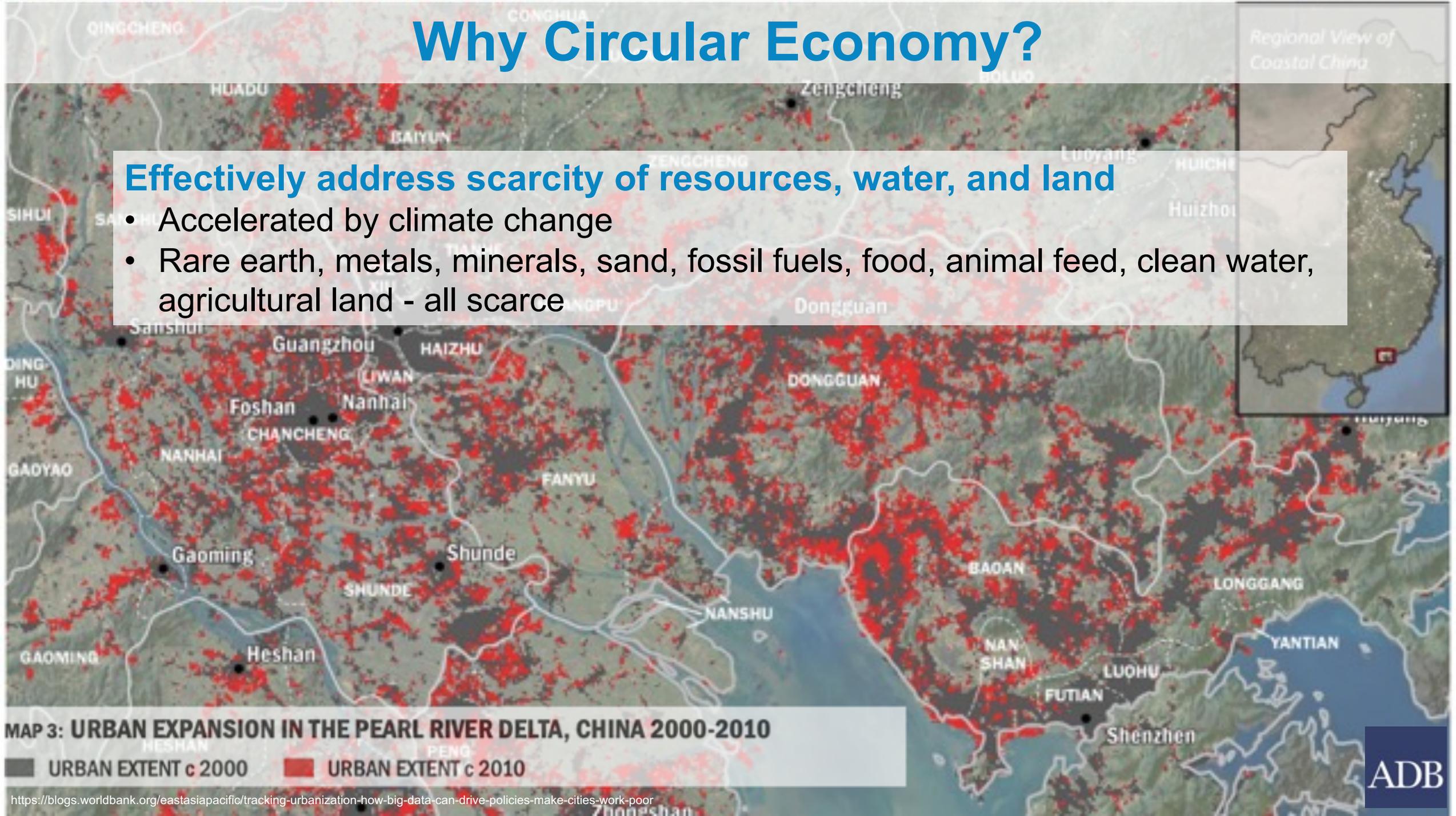


# Why Circular Economy?

Regional View of Coastal China

## 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



# Why Circular Economy?

## Capture wasted economic resource

*Take-Make-Waste* linear economic model wastes 80% of \$ 3.2 trillion of global consumer goods each year.

“The circular economy...offers an alternative that can yield up to \$4.5 trillion in economic benefits to 2030”.(World Economic Forum, 2014)

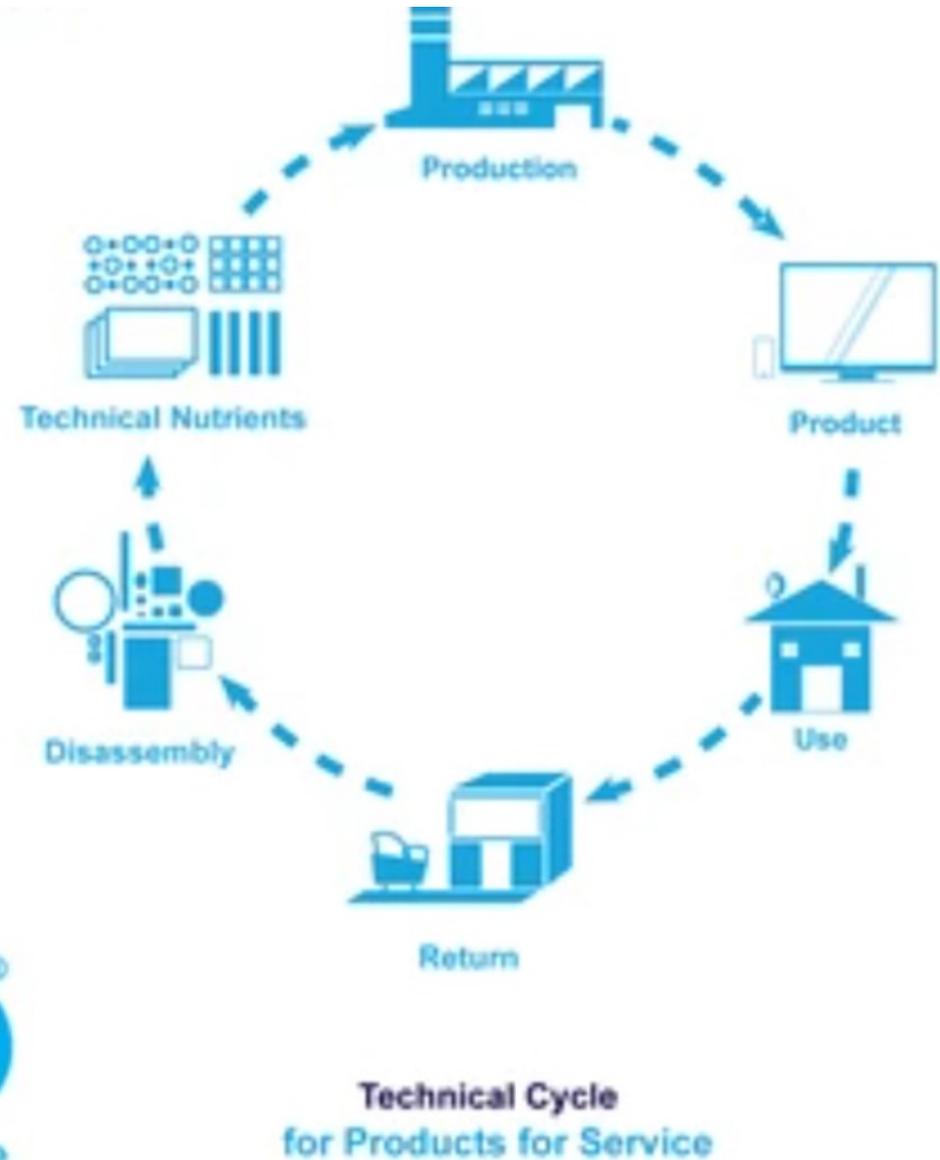
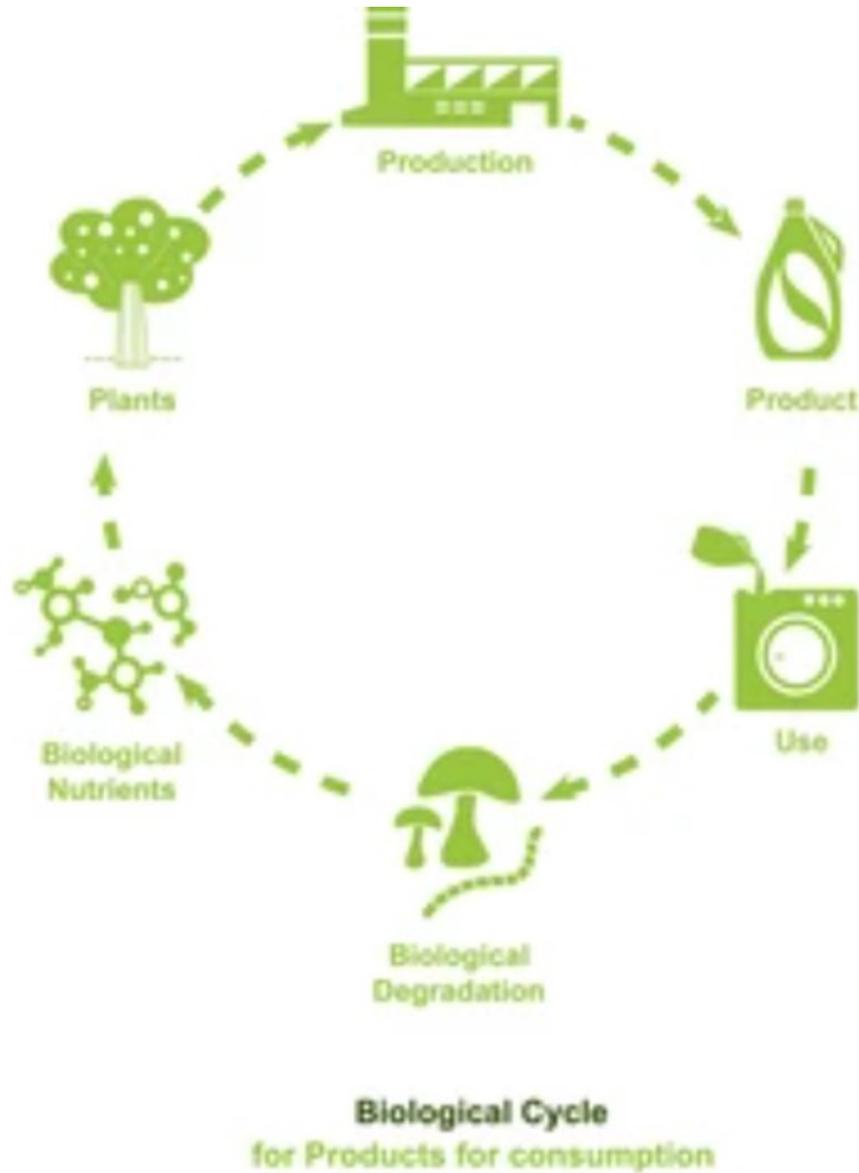
# Why Circular Economy?

## **Decoupling natural resource use from urban and economic growth**

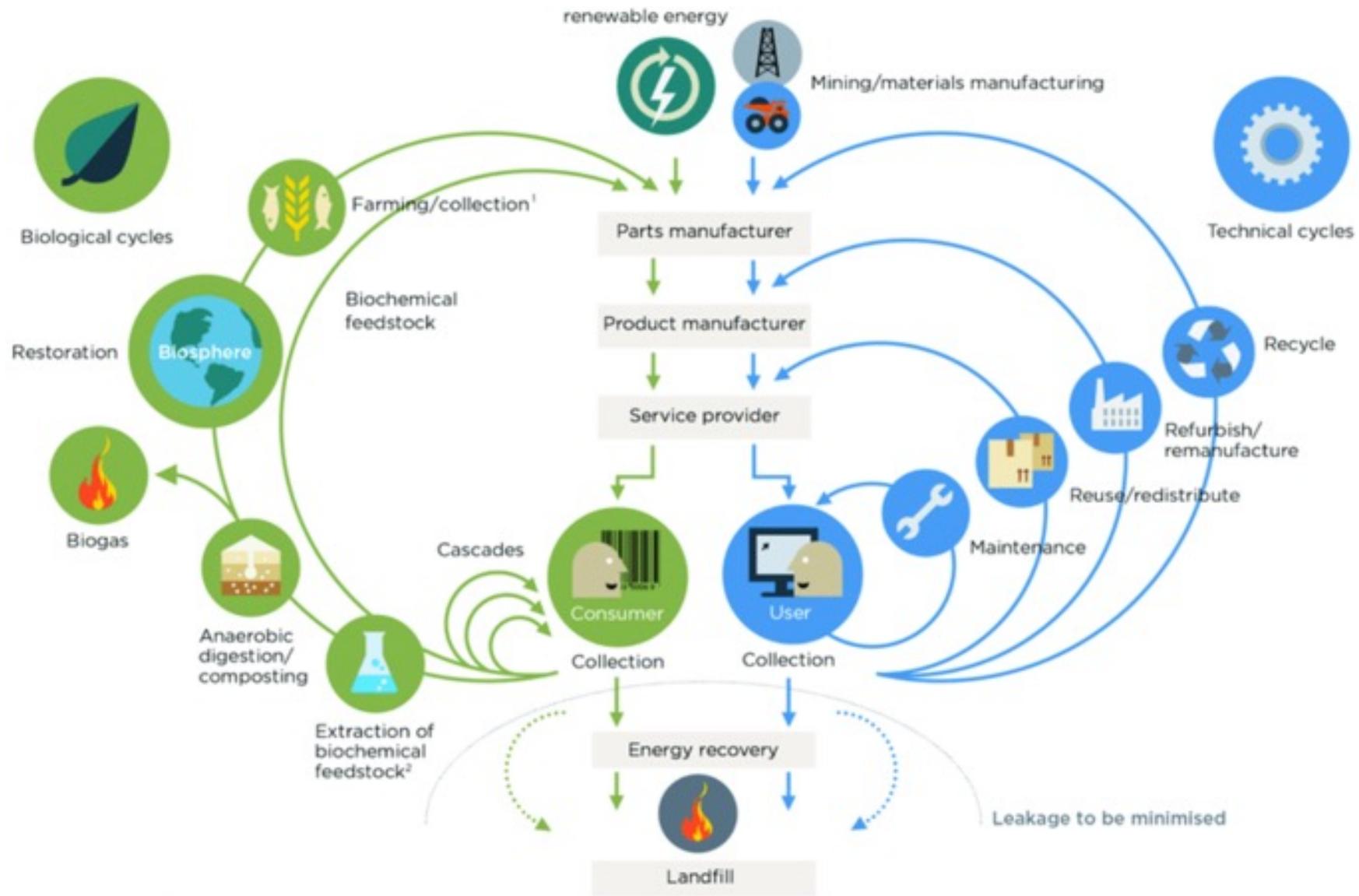
Core challenge to sustainable development is current link between increasing natural resources consumption along urbanization (bigger cities = more waste) and increased well-being.

UNEP concept of resource- and impact decoupling

# What is Circular Economy?



# How to Conceptualize Circular Economy Actions?



<sup>1</sup> Hunting and fishing

<sup>2</sup> Can take both post-harvest and post-consumer waste as an input

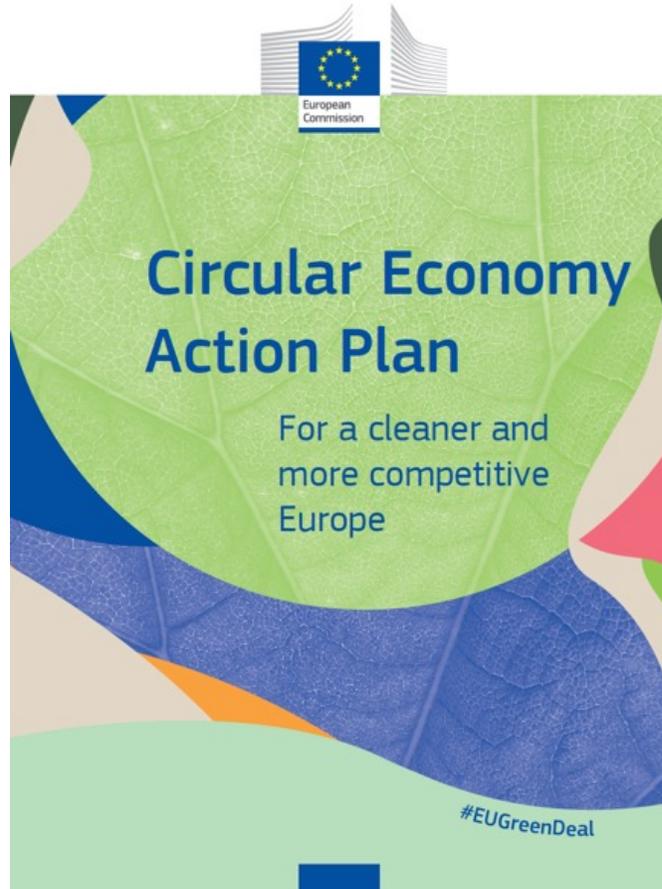
SOURCE: Ellen MacArthur Foundation -

Adapted from the Cradle to Cradle Design Protocol by Braungart & McDonough



# Example for Action: European Union

The European Union accelerates transition towards regenerative growth model that gives back to the planet more than it takes, advance towards keeping resource consumption within planetary boundaries, and reduce consumption footprint and double circular material use rate by 2030.



- A Sustainable Product Policy Framework
- Key Product Value Chains
- Less Waste, More Value
- Making Circular Economy Work for People, Regions and Cities
- Crosscutting Actions
- Leading Efforts at Global Level
- Monitoring Progress

# Circular Economy Policies in the PRC

**Circular Economy Promotion Law** of the People's Republic of China, enacted 1.1.2009  
(a comprehensive law, first focus on industrial synergies in circular economy industrial parks to address challenge of industrial waste)

**12th, 13th FYPs** included objectives of CE and pilot program for CE projects and pilot cities (from the 2013 CE action plan by State Council)

**Ministry of Ecology and Environment: Pilot Zero Waste Cities Program (2019)**

**14th FYP: “Fully implement 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**
- **"reverse recycling" model of production enterprises**
- **extended producer responsibility system**
- **reduction, standardization and recycling of express packaging**
- **waste materials recycling and sorting system of urban waste**
- **resource recycling system that integrates online and offline and has a controllable flow**

(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)

# Solid Waste Management Improvement in the PRC



# Previous and Current ADB Operations in Circular Economy

**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 urge for travel

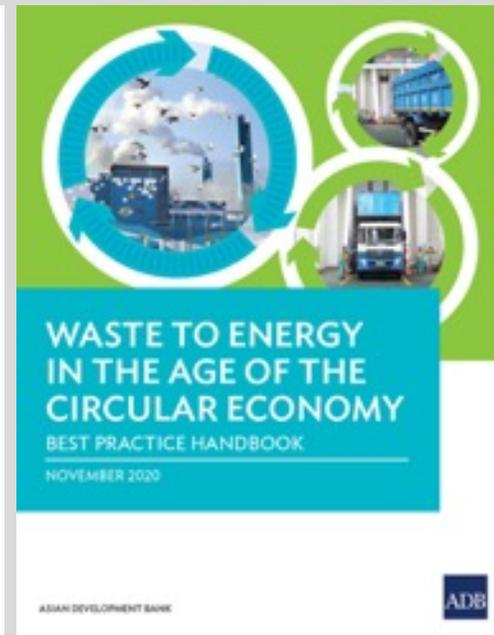
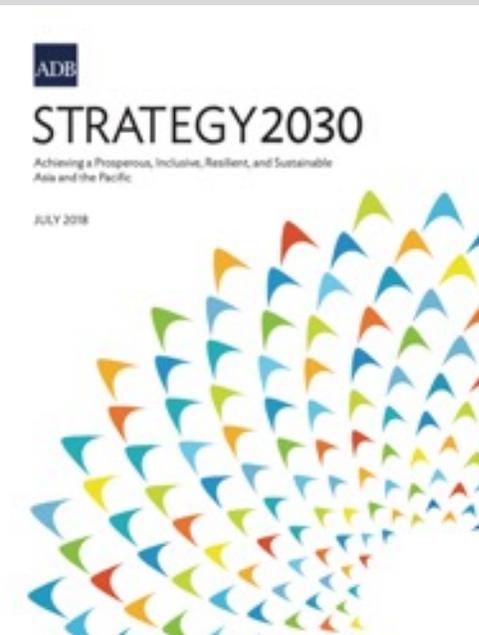
**Sponge city projects:** local rainwater recovery and reuse (in addition to river works above)

**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**

# Selected CE Related ADB Strategies and Papers



<https://www.adb.org/documents/strategy-2030-prosperous-inclusive-resilient-sustainable-asia-pacific>  
循环经济符合亚行的2030战略，所有业务重点，特别是业务重点3, 4, 5, 6  
循环经济也支持亚行的清洁和可持续海洋倡议

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

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

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

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

<https://www.adb.org/sites/default/files/institutional-document/659991/waste-energy-age-circular-economy-compendium.pdf>

# Concept: Circularize Four Linear Activity Areas

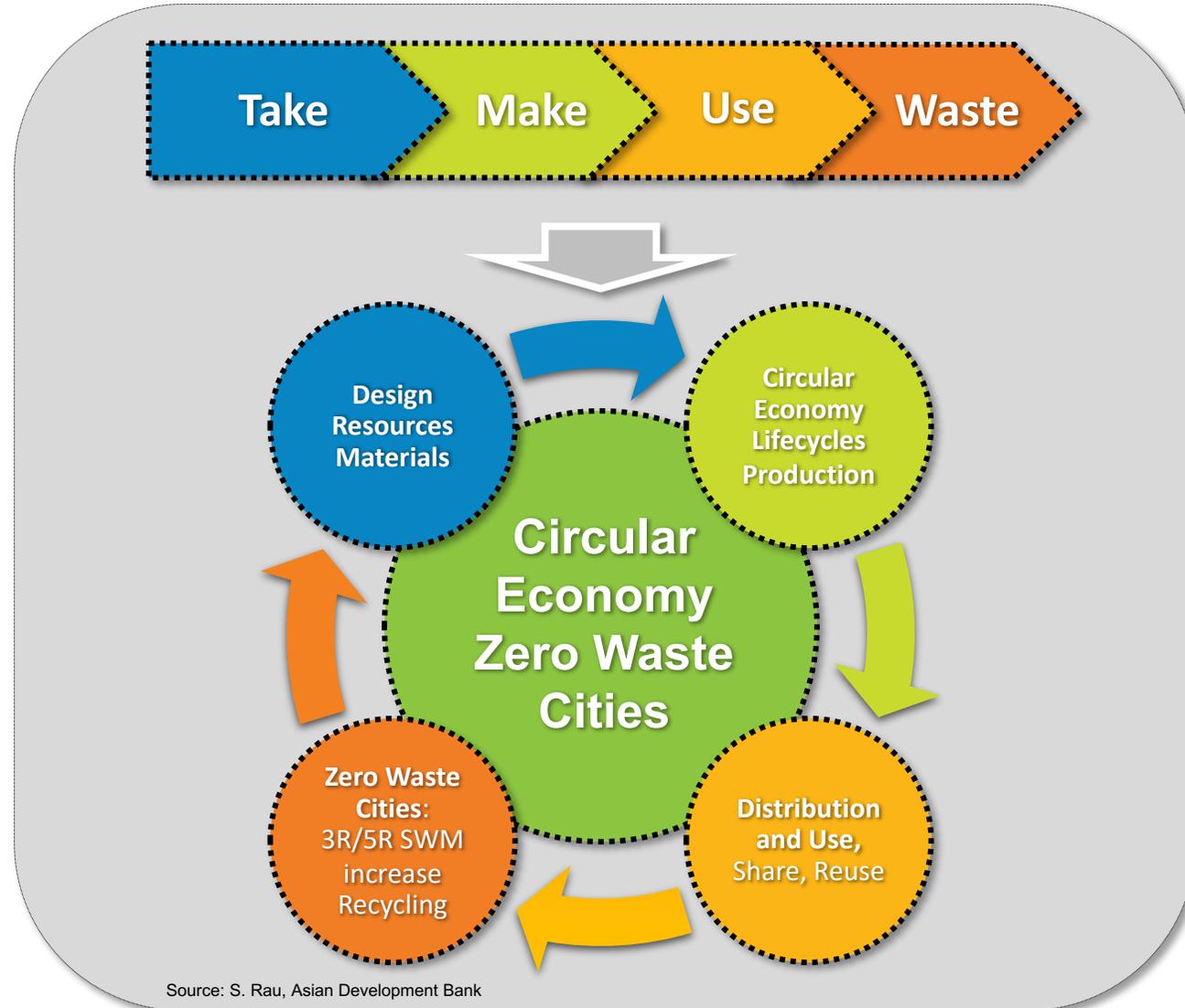
For the PRC we have prepared a roadmap for circular economy as one of five frameworks to guide implementation of the country partnership strategy 2020-2025 and we have a related TA under implementation.

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.



# Integrate Top-Down and Grass-Roots Approach

## Circular Economy Zero Waste Cities (CEZWC)

Institutions, Policies, Standards, Governance, Taxes, Incentives, Disincentives, Education and Capacity Development, R&D, IT Platform, Engage Private Sector, Develop business models, Promote Behavior Change in Community

### Design, Resources and Materials Input

Lifecycle design of products and processes

Component reuse from disassembly

Materials from renewable sources and from urban mining and recycling

Input from sustainable extraction as still needed

Source: S. Rau, Asian Development Bank

### Circular Economy Lifecycles Production

Bio-economy agriculture

Circular urban planning, infrastructure, buildings

Circular industrial parks with industrial synergies 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

Business Models

### Zero Waste Cities

Improved household waste management 3R/5R

Increased recycling rates and local materials reuse

Construction and demolition waste management

Kitchen/organic waste management

Medical waste management

# Circular Economy Zero Waste Cities (CEZWC)

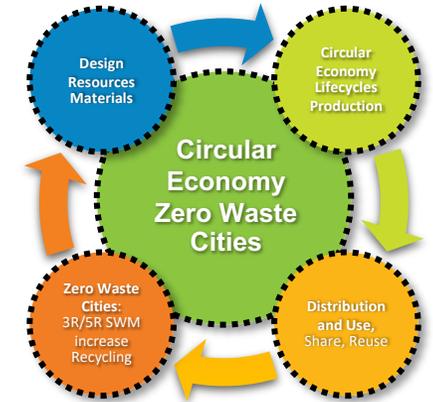
**Avenue 1: ADB Roadmap and TA promote Circular Economy Zero Waste Cities – initiate policies and pilots**

**Avenue 2: Institutions, Policies, Standards, Governance, Taxes, Incentives, Disincentives**

**Avenue 3: Education and Capacity Development, R&D, IT Platform**

**Avenue 4: Engage Private Sector, Develop business model**

**Avenue 5: Promote Behavior Change in Community**



# Circular Economy Zero Waste Cities (CEZWC)

## Avenue 1: ADB Roadmap and TA promote Circular Economy Zero Waste Cities – initiate policies and pilots

Avenue 1, Step 1: Develop ADB CE Roadmap with NDRC and MOF and define objectives, knowledge activities and lending pipeline

Avenue 1, Step 2: Implement TA on Circular Economy Zero Waste Cities in the PRC and initiate policies and pilots

### **ADB Technical Assistance Circular Economy Zero Waste Cities in the PRC, approved in 2020**

The TA will conceptually and programmatically link into biological and technical cycles current linear upstream, midstream, and downstream processes.

- (i) **Green circular industrial production plan of Qinghai Province advanced** - targeting upstream heavy industrial production with raw material processing.
- (ii) **Zero municipal waste action plan for Guangdong Province developed** - targeting downstream waste management, increase recycling and resource recovery in highly developed urban centers with state-of-the-art light industry manufacturing and services, and less-developed towns displaying differentiated levels and patterns of consumption and waste generation.
- (iii) **Green circular e-commerce packaging and logistics pilot program for the People's Republic of China developed.** pilot cities of different sizes and development levels will be working together with industry partners to circularize midstream e-commerce packaging and logistics
- (iv) **Capacity and institutions to implement green circular economy in the People's Republic of China enhanced** - above three outputs will be linked and lessons drawn for policies, technical guidance, and business models aiming at green circular economy zero waste cities.

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# Circular Economy Zero Waste Cities (CEZWC)

**Avenue 2: Institutions, Policies, Standards, Governance,  
Taxes, Incentives, Disincentives**

**Avenue 2, Step 1: Engage national, provincial and local governments**

**Avenue 2, Step 2: Support development of policies, standards, and market-based instruments like incentives and disincentives**

**Avenue 3: Education and Capacity Development, R&D, IT Platform**

**Avenue 3, Step 1: Engage national, provincial and local governments**

# **Circular Economy Zero Waste Cities (CEZWC)**

**Avenue 4: Engage Private Sector, Develop business model**

**Avenue 4, Step 1: Engage national, provincial and local governments**

**Avenue 5: Promote Behavior Change in Community**

**Avenue 5, Step 1: Engage communities and people and raise awareness and showcase and promote positive behavior**

# Top-Stream: Design, Resources, Materials Input

**Avenue 1: Promote Lifecycle design of products and processes product longevity, “disassemblability”, repairability**

**Avenue 2: Component reuse from disassembly**

**Avenue 3: Materials input from renewable sources and from urban mining and recycling**

**Avenue 4: Material input from sustainable extraction as still needed**



# Ave. 3, Past: TA Policy on Circular Economy Qinghai

## **ADB Technical Assistance approved in 2011**

The provincial economy is heavily dependent on mineral and natural resource exploitation to produce iron and steel, oil and natural gas, and nonferrous and rare earth metals. These damaged natural environment, causing soil and vegetation degradation, desertification, increased salinization, and decline in available underground and surface water. Qinghai promotes circular economic as strategy to mitigate environment degradation and fundamentally transform economic development.

Three outputs:

- (i) comprehensive review of Chaidamu Circular Economy Pilot Zone conducted and strategy and action plan developed;
- (ii) monitoring and evaluation system for circular economy development in Qinghai Province established; and
- (iii) policy recommendations on promoting circular economic development in Qinghai Province proposed.

## **Policy recommendations included:**

- (i) optimizing industrial policies and organization, promoting synergetic development of industrial parks, prioritizing SMEs, and accelerating development of a new industrial system;
- (ii) optimizing economic policies, including finance, investment policies, pricing policies, government procurement policies, and waste reuse policies;
- (iii) optimizing talent policies, empowering human capital and allocation, talent development and promotion, institutionalizing talent clustering;
- (iv) optimizing science and technology policies and innovation capacity especially in priority fields, reinforcing commercialization of science and technology outcomes, innovation platforms, and opening and exchange; and
- (v) optimizing social policies, including developing multiple incentives, promoting sharing economy, encouraging green consumption, promoting green buildings, advocating green travelling, developing a recycling system, and establishing circular economy communities.

# Upstream: Circular Economy Lifecycles Production

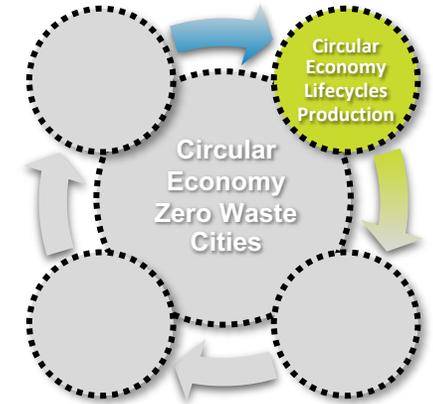
Avenue 1: Bio-economy agriculture

Avenue 2: Circular urban planning (brownfield redevelopment), infrastructure, buildings (adaptive reuse, disassembly)

Avenue 3: Circular industrial parks with industrial synergies and lifecycles production

Avenue 4: Circular economy in energy

Avenue 5: Circular economy in transport, vehicles



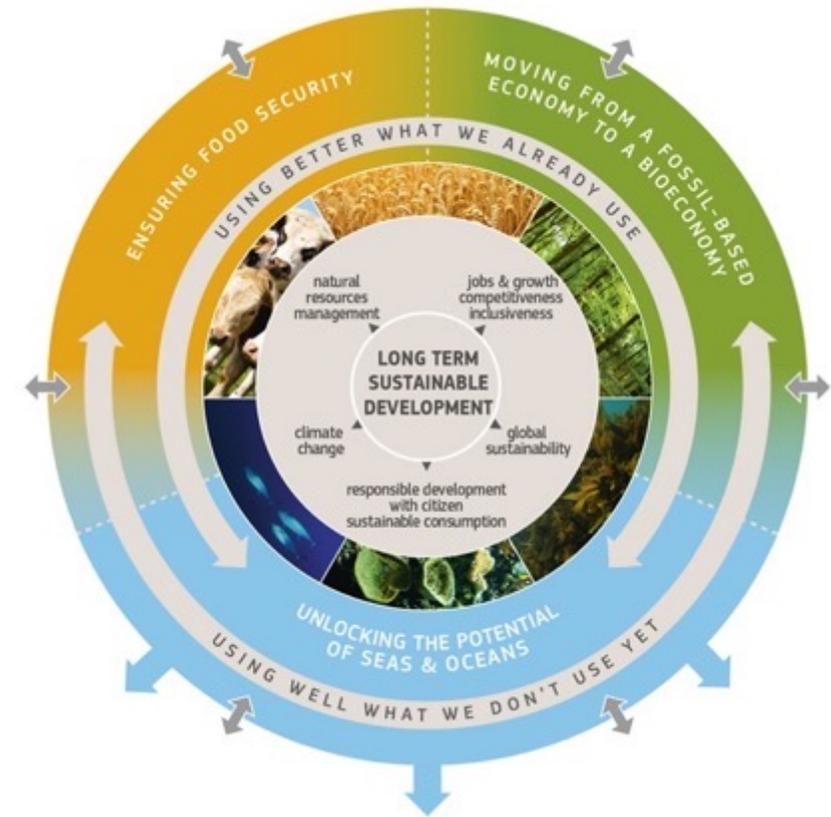
# Ave. 1, Step 1: Circular Bio-Economy for Rural Vitalization

## **Circular bioeconomy in primary industry**

agriculture, forestry and fisheries as key rural vitalization initiative aiming at: food security, climate resilience, environmental sustainability and rural prosperity.

**Production of renewable biological resources and use as value-added products and conversion of waste stream back into the value chain**, such as food, feed, bio-based products, and bioenergy; organic waste composting registration and licensing of firms, brands, and products.

**TA: Agriculture Green Production and Waste Management** is scaling up comprehensive use of rural biological resources.



Source: EU (2018) Updated Bioeconomy Strategy

## Ave. 2, Step 1: Anhui Hefei Rehabilitation of Former Landfill Site



**Anhui Hefei Urban  
Environment Improvement  
Project (ADB loan  
completed)**

Landfill remediation and  
closure along a river: before  
and after...



## Ave. 2, Step 2: Heilongjiang Green Urban Economic Revitalization



- ADB loan catalyzes **economic transformation to a non-coal economic future** of four coal-based cities in East Heilongjiang and urban transformation from dirty coal-mining cities to livable, green and clean cities.
- **Mining remediation** strategies and pilots cleaning up and make available for reuse
- of environment that is polluted from more than 60 years of coal-mining and industries.

## Ave. 2, Step 3: Treated Wastewater Reuse: ADB TA and Loan

### **Urban Wastewater Reuse and Sludge Utilization Policy Study (TA 7083-PRC)**

The TA focused on the development of:

- policy recommendations related to planning procedures and regulations, technology applications, and institutional capacity for promoting wastewater reuse; and
- a national policy framework for the promotion of beneficial sludge utilization.

The policy study has played a catalytic role in promoting policy innovation to regulate and promote beneficial sludge utilization and wastewater reuse. Consistent with the recommendations of the policy study, MOHURD and the National Development and Reform Commission have published the National Technical Guideline for Urban Sewage Sludge Treatment and Disposal (Trial) in March 2011.

This TA also enabled private sector engagement.

### **Beijing Enterprises Water Group Limited and BEWG Environmental Group Company Limited Wastewater Treatment and Reuse Project**

ADB Private Sector Operations loan. A-loan \$120 million and B-loan \$288 million.

Loans supported acquisition and operation of wastewater treatment plants, which treated 760 million tons of wastewater to grade 1A standard annually and reused 40 million tons, helping to reduce water pollution and increase water use efficiency. Project also helped improve energy efficiency in wastewater treatment and reuse. In 2015, BEWG conducted 96 technological transformation projects, which saved in total 12.69 million kilowatt-hours of electricity and about 6% in chemicals used for treatment.

ADB enabled BEWG secure a large credit facility on its own and become more independent from its parent, enhancing market confidence in BEWG's capacity.

# Ave. 2, Step 1: Nanjing Qinhuai River Environment Improvement



ADB loan project improves urban environment, public health, quality of life of residents and businesses and management of surface water resources in Nanjing.



# Mid-Stream Distribution and Use, Share, Reuse

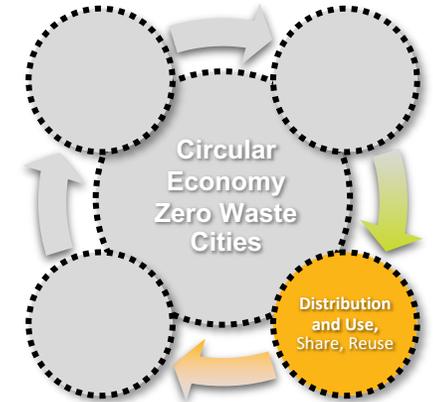
Avenue 1: Reusable packaging and circular logistics

Avenue 2: EPR (extended producer responsibility), repair, reuse, replacement

Avenue 3: Sharing economy pilots and mainstreaming

Avenue 4: Products as service pilots

Avenue 5: Business Models to ensure private investments in CE



# Ave 2, Step 1: midstream (upstream – downstream): Plastic



## RETA: Promoting Action on Plastic Pollution from Source to Sea in Asia and the Pacific

### Activities:

- Government led national and city action plans
- National Financing Roadmaps and task forces
- Policy and regulatory reforms to stimulate circular economy and promote 3R
- Plastic pollution reduction investments and pilot demonstrations (e.g. Integrated SWM, behavior change, support for local circular business models and women's economic empowerment)
- Studies on investment needs; technology solutions; circular economy and green jobs potential; sustainable and innovative financing solutions
- Circular business hub and test facility in Indonesia
- Knowledge-sharing workshops, regional cooperation, cross-country site visits, city twinning.

**Status:** TA Cluster and Subproject 1 approved, Subproject 2 proposed for 2021

**Amount:** \$13 million total (\$8 million Indonesia project)

**Duration:** December 2019 – June 2023

**Participating countries:** Indonesia, Myanmar, Philippines, Thailand, Viet Nam, with regional knowledge sharing

**Key partners:** Governments of Japan and Korea; Global Environment Facility; Global Plastics Action Partnership; WWF, ADB sub-regional cooperation programs



# Down-Stream Zero Waste Cities: 3R/5R SWM increase

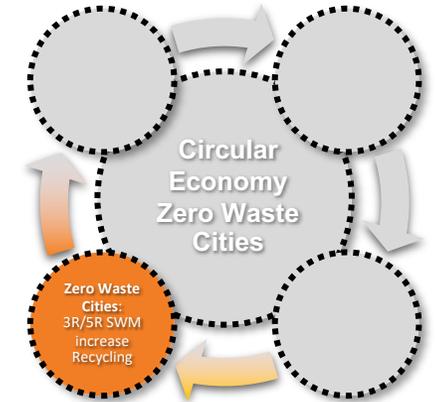
Avenue 1: Improved household waste management 3R/5R

Avenue 2: Increased recycling rates and local materials reuse

Avenue 3: Construction and demolition waste management

Avenue 4: Kitchen/organic waste management

Avenue 5: Medical waste management

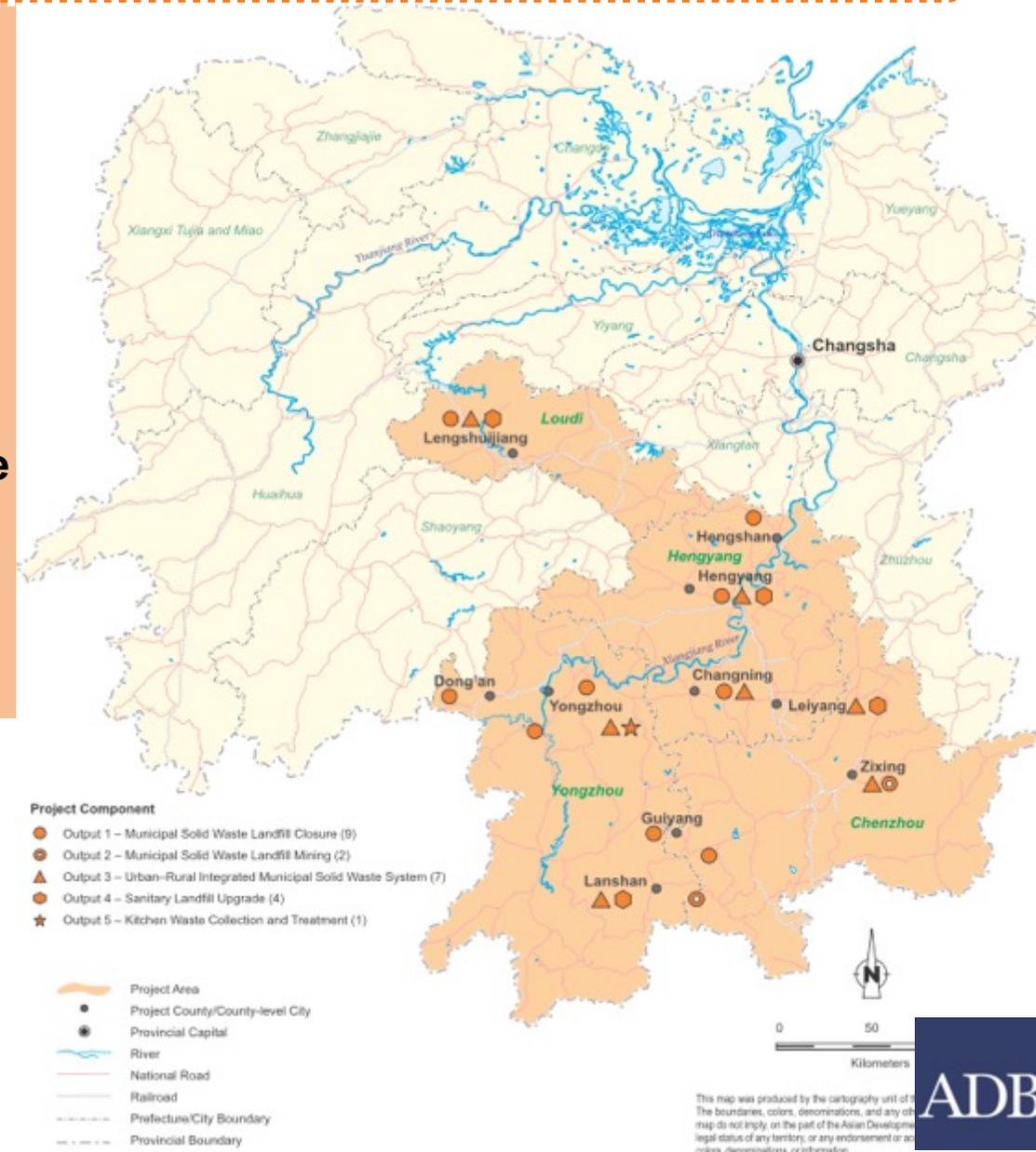


# Ave. 1, Steps 1/2: Manage Solid Waste, Land, Urban Mining: Hunan

## Hunan Xiangjiang River Watershed Existing Solid Waste Comprehensive Treatment ADB Loan Project

ADB loan project improves environment in Xiangjiang River watershed in Hunan and reduces pollutants discharge to Xiangjiang River and directly benefit 6.9 million people and more indirectly.

- **Substandard municipal solid waste landfills closed, and/or mined and remediated.**
- **New urban–rural integrated municipal solid waste management systems established.**
- **Sanitary landfill facilities upgraded.**
- **New kitchen waste treatment and management system established.**



## Ave. 1, Step 3: Scaled Waste to Energy

**1. ADB Private Sector Operations loan to China Everbright Environmental Energy Limited** Loan of \$200 million for PRC with six investments in Waste to Energy plants plus \$100 million for Viet Nam.

**2. ADB Private Sector Operations loan to SUS Environment** to invest in Waste to Energy plants in eco-industrial parks in 2nd and 3rd tier cities.

Use of advanced technologies including advanced flue gas emission control systems meeting EU emissions standards. This project supports the construction and operation of a portfolio of SUS Environment's WtE plants. The proceeds of ADB loan of \$100million will be channeled into portfolio of subprojects as project equity which is not available from the local commercial banks.



# 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 and education, support R&D**

## **Community engagement and consumer behavior change**

proactively promoted by government and private sector

# 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**

*Thank you for your  
Interest and support*

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