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**Asian Development Bank
Knowledge Sharing
7 February 2024**

Notes:

In this publication, "\$" refers to United States dollars, unless otherwise stated.

ADB recognizes "Hongkong" and "Hong Kong" as Hong Kong, China; "Korea" as the Republic of Korea, and "Vietnam" as Viet Nam.

The Challenges of Applying Circular Economy Principles to Food Waste and Waste Electrical and Electronic Equipment in Hong Kong, China

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Former Deputy Director of Environmental Protection Department, HKSAR Government

Former President of International Association for Impact Assessment

Former Chairman of Environmental Division of Hong Kong Institution of Engineers

Co-founder of IESG Technologies Ltd

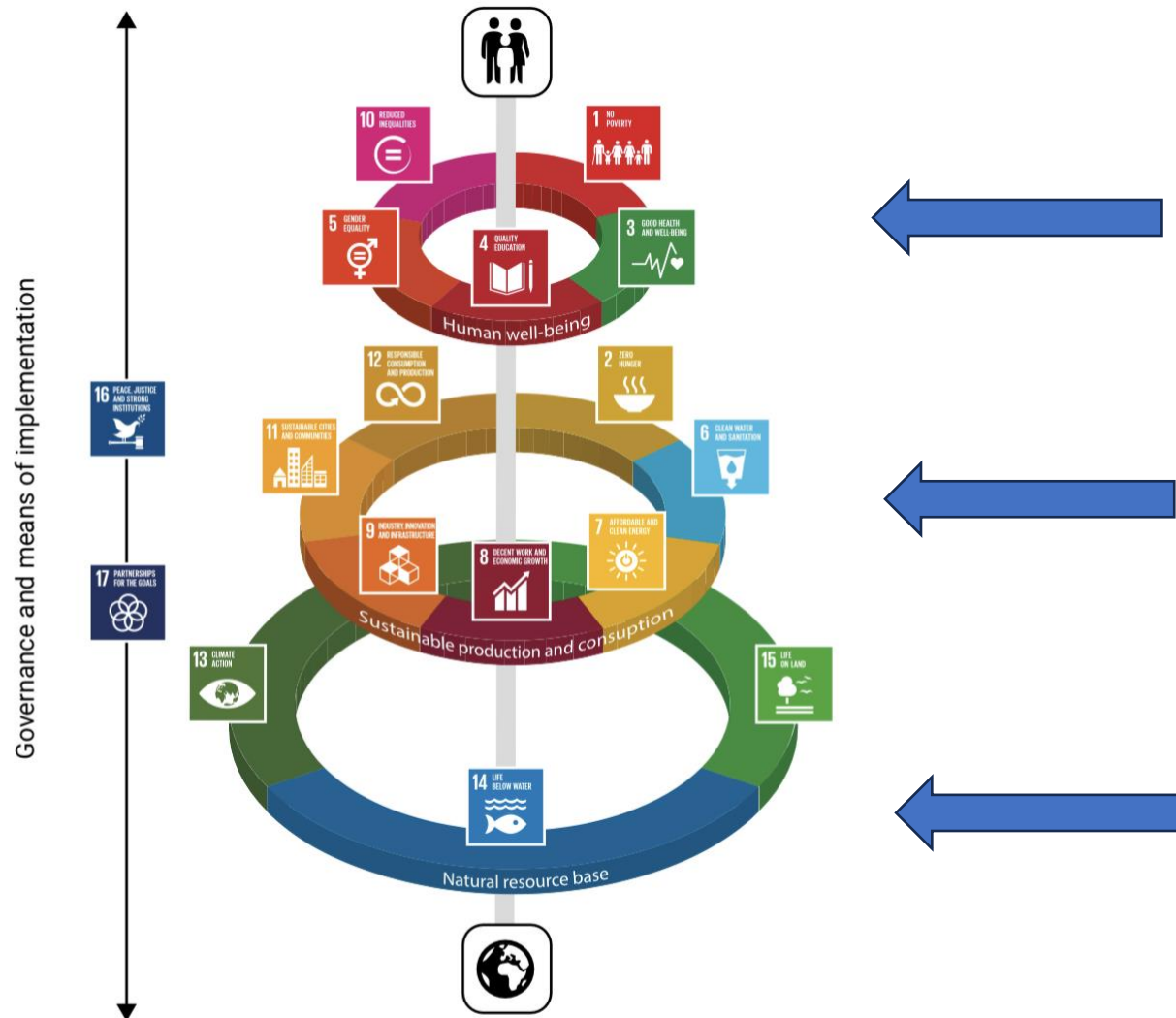
February 2024

Outline of the Talk

- the challenges and opportunities of circular economy in the Asian context
- the Hong Kong's practical experiences in applying circular economy principles to food waste and waste electrical and electronic equipment

Challenges and opportunities of circular economy in the Asian context

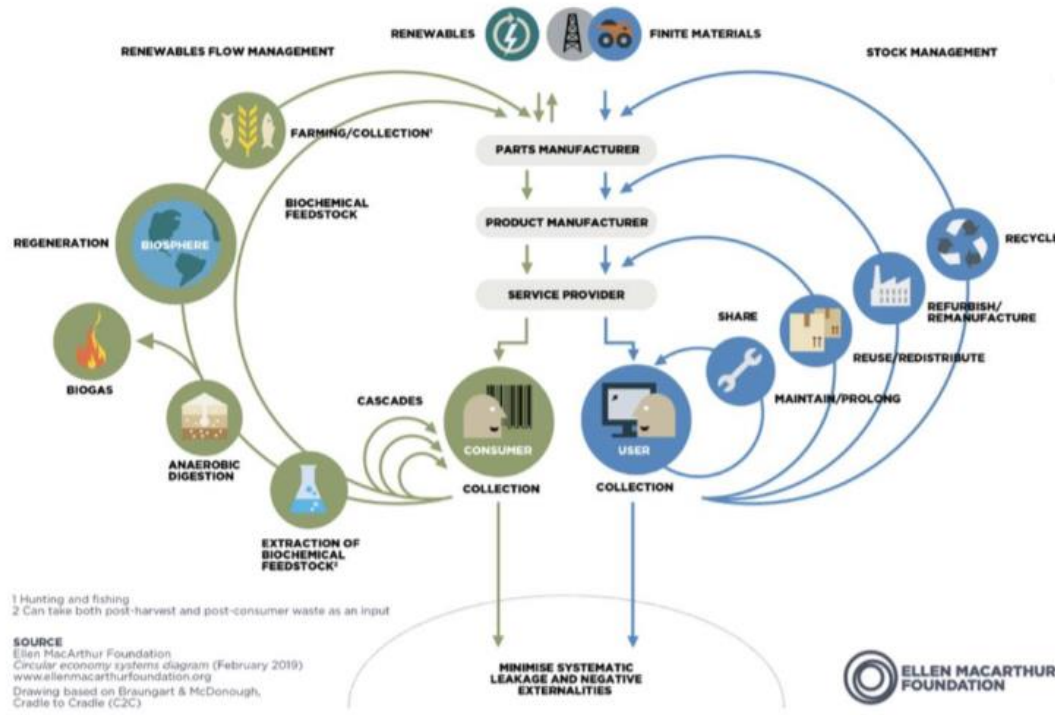
Intervention on Sustainable Waste Management and Circular Economy in the Context of UNSDGs



Responses on Sustainable Waste Management and Circular Economy

- ✓ Safeguarding public health through sustainable waste management policies and waste treatment practices
- ✓ Fundamental change in the economic development mode and production and consumption patterns to reduce material use, cut down waste quantity and enable circular use of resources
- ✓ Limit the use of natural resources and enable regeneration and restoration of natural resources to preserve the resource base sustainability

From a Linear Economy to Circular Economy



What is Circular Economy ?

- 1966: “cyclical system” of production in American Economist Kenneth F. Boulding’s book “The Economics of Coming Spaceship Earth”
- 1988: “circular economy” in a book “The Economics of Natural Resources
- **Ellen MacArthur Foundation:** A circular economy is one that is restorative and regenerative by design and aims to keep products, components and materials at their highest utility and value at all times, distinguishing between technological and biological cycles

Economics of Circularity

- 2013 Ellen MacArthur Foundation and McKinsey report “Towards the Circular Economy: net material cost savings of \$630 billion annually in EU by 2025
- 2015 Book “Waste to Wealth” by Accenture Strategy: \$4.5 trillion of additional economic output by 2030;
- 2015 WRAP and Green Alliance’s book “ Employment and Circular Economy: 200,000 new jobs in UK by 2030

Materials use increase



	2017	2060
Metals	9Gt	20Gt
Fossil fuels	15Gt	24Gt
Biomass	22Gt	37Gt
Non-metallic minerals	44Gt	86Gt

Evolving Concepts and Framework of Circular Economy and Sustainable Waste Management

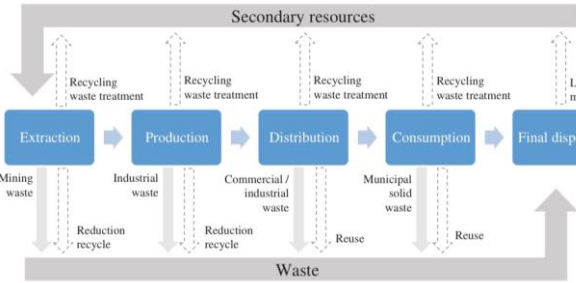
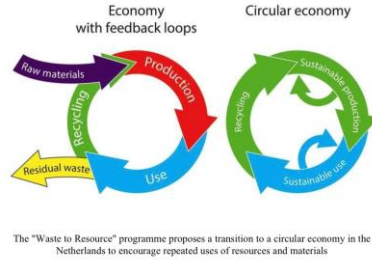
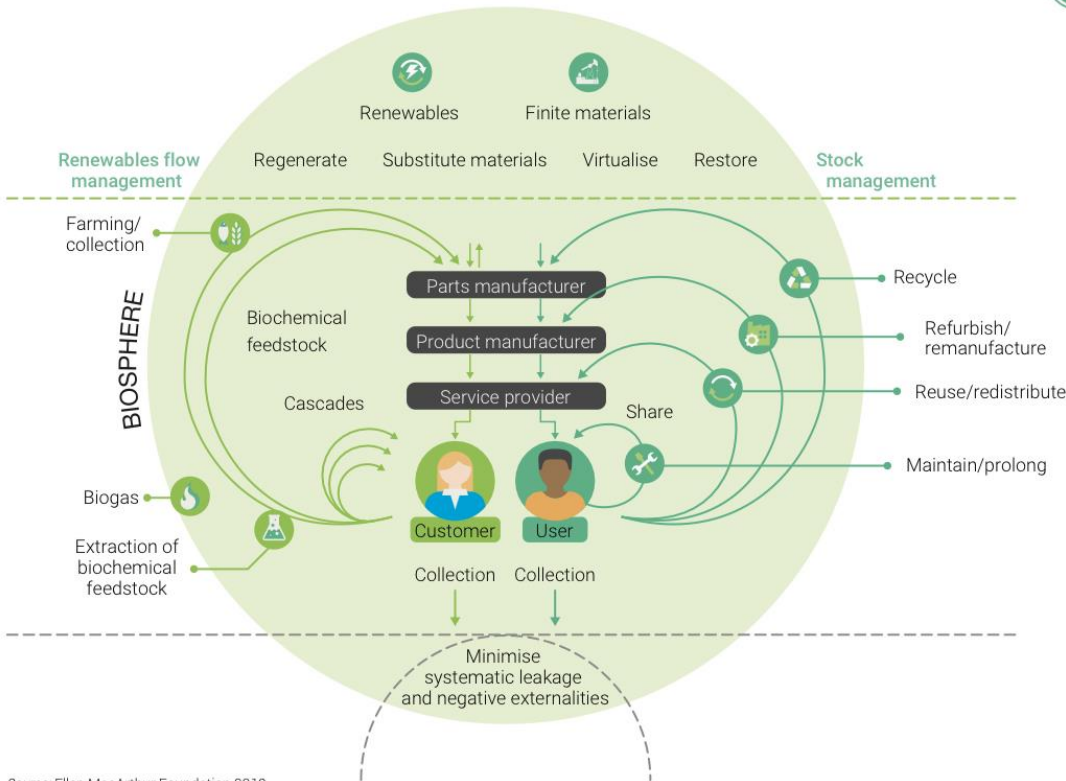


FIGURE 2.4 New paradigm: waste as secondary resources

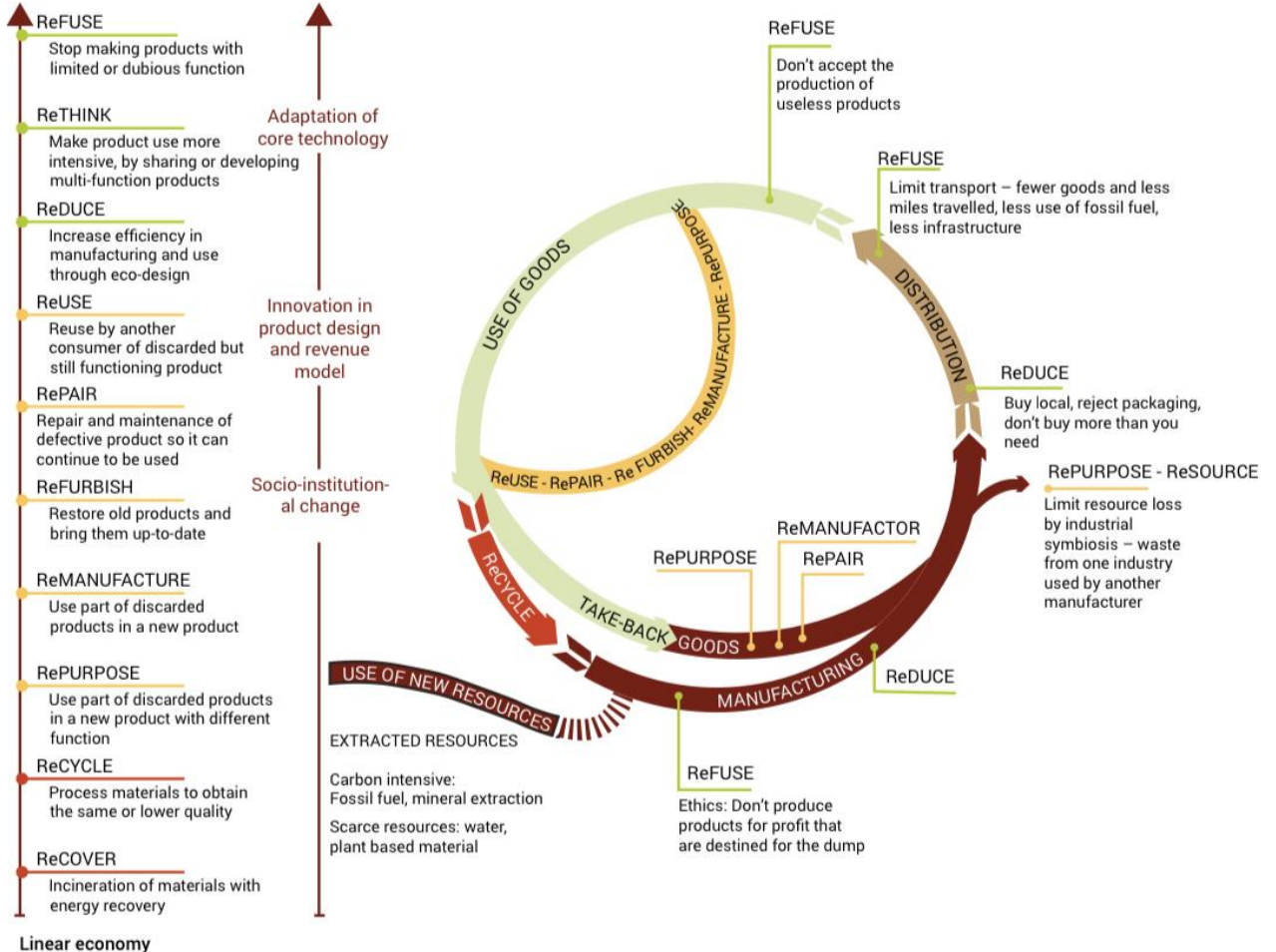


The "Waste to Resource" programme proposes a transition to a circular economy in the Netherlands to encourage repeated uses of resources and materials



Source: Ellen MacArthur Foundation 2019

Ultimate circularity Circular economy goes beyond recycling
Circular economy

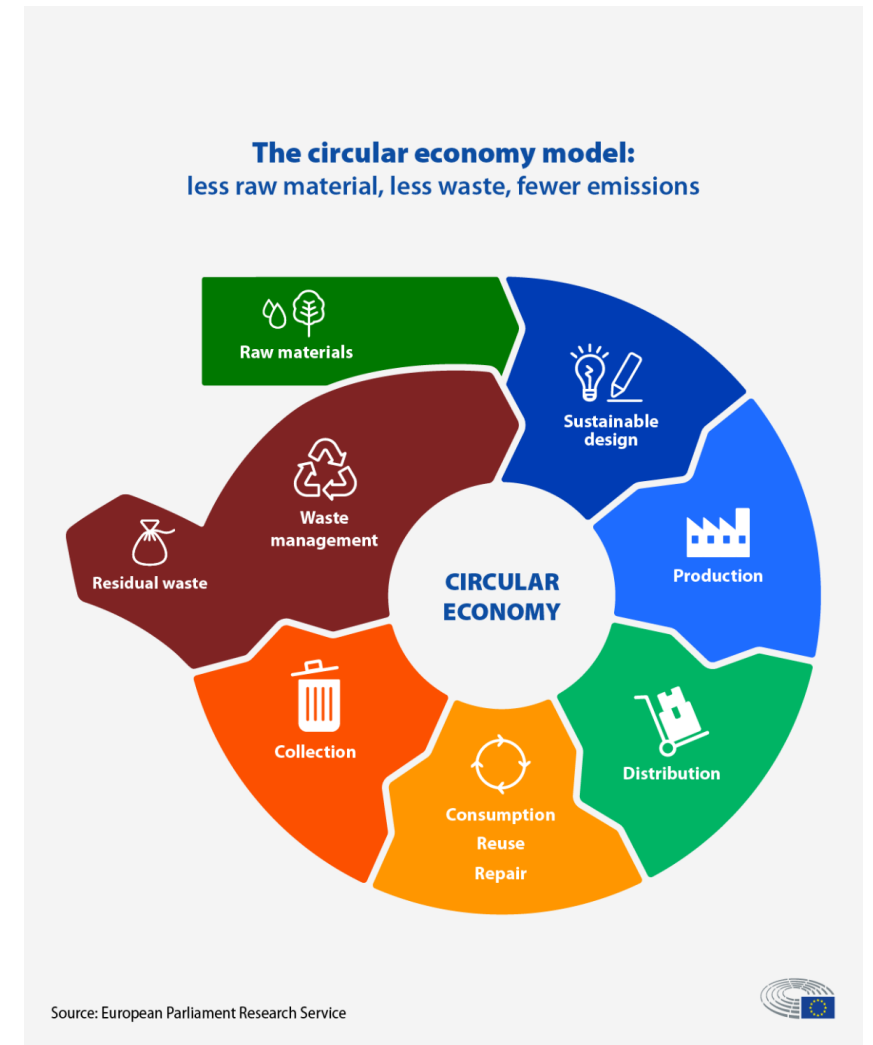


Source: Based on Stahel (2016) and Potting et al. (2017).

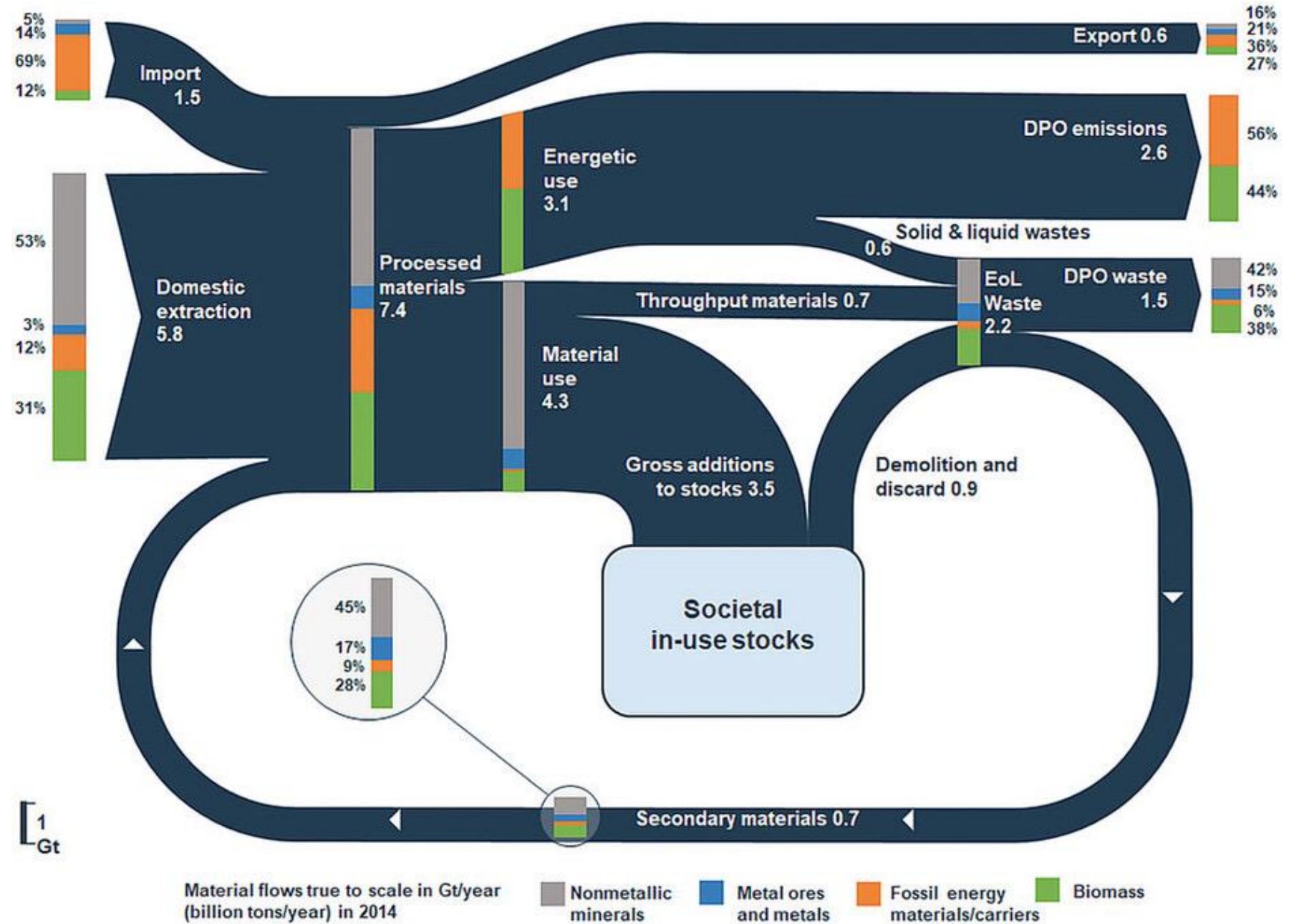
Circular Economy

EU's Definition

The circular economy is a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible. In this way, the **life cycle of products is extended.**

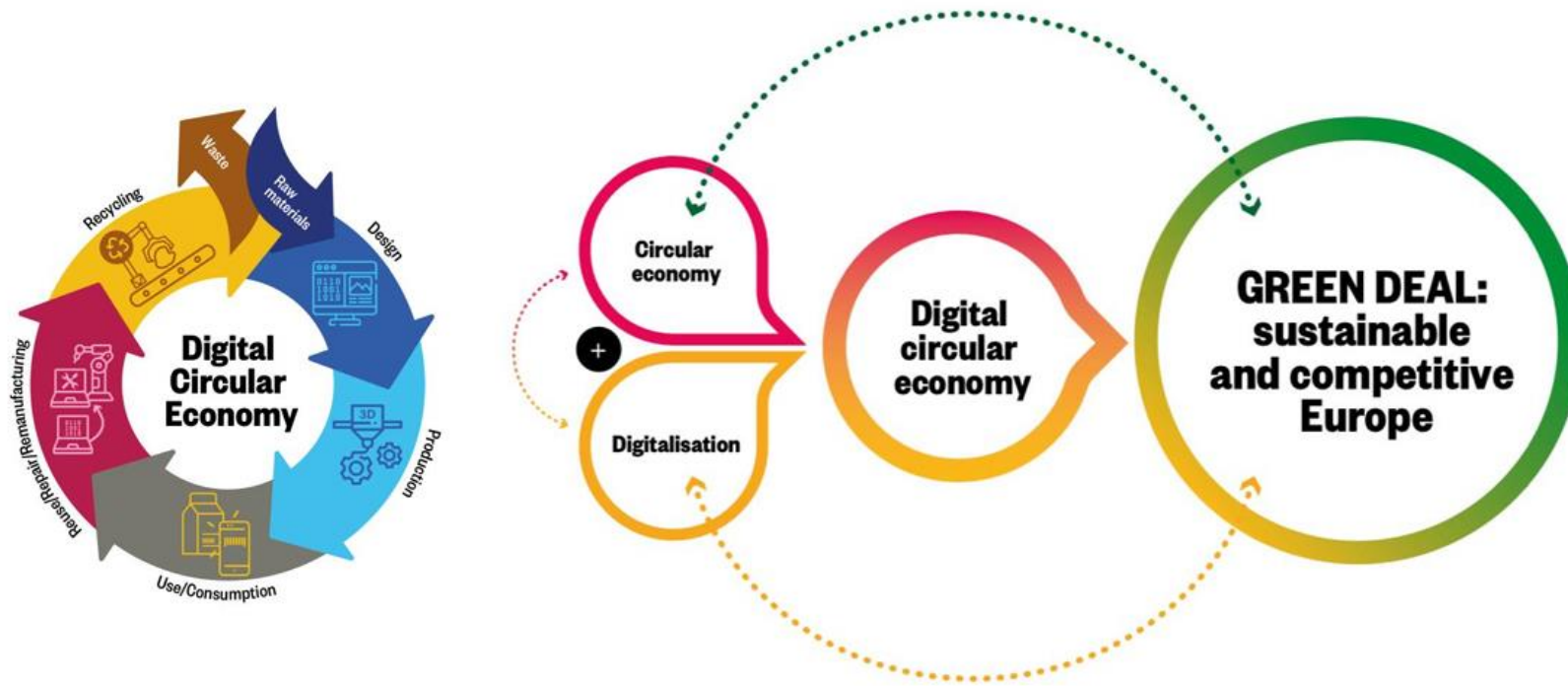


Material Flows in EU



Journal of Industrial Ecology / Volume 23,
 Issue 1 / p. 62-76 RESEARCH AND ANALYSIS
 Open Access Measuring Progress towards
 a Circular Economy: A Monitoring Framework
 for Economy-wide Material Loop Closing in the
 EU28
 andreas Mayer, Willi Haas, Dominik
 Wiedenhofer Fridolin Krausmann, Philip Nuss,
 Gian Andrea Blengini

Circular Economy, Material Management, Sustainable Waste Management, Global Value Chain and Digitalisation



EU Action Plan for Circular Economy: In a circular economy, the value of products and materials is maintained for as long as possible; waste and resources are kept within the economy when a product has reached the end of its life, to be used again and again to create further value.



Circular Economy (CE) and Digitalisation Technologies

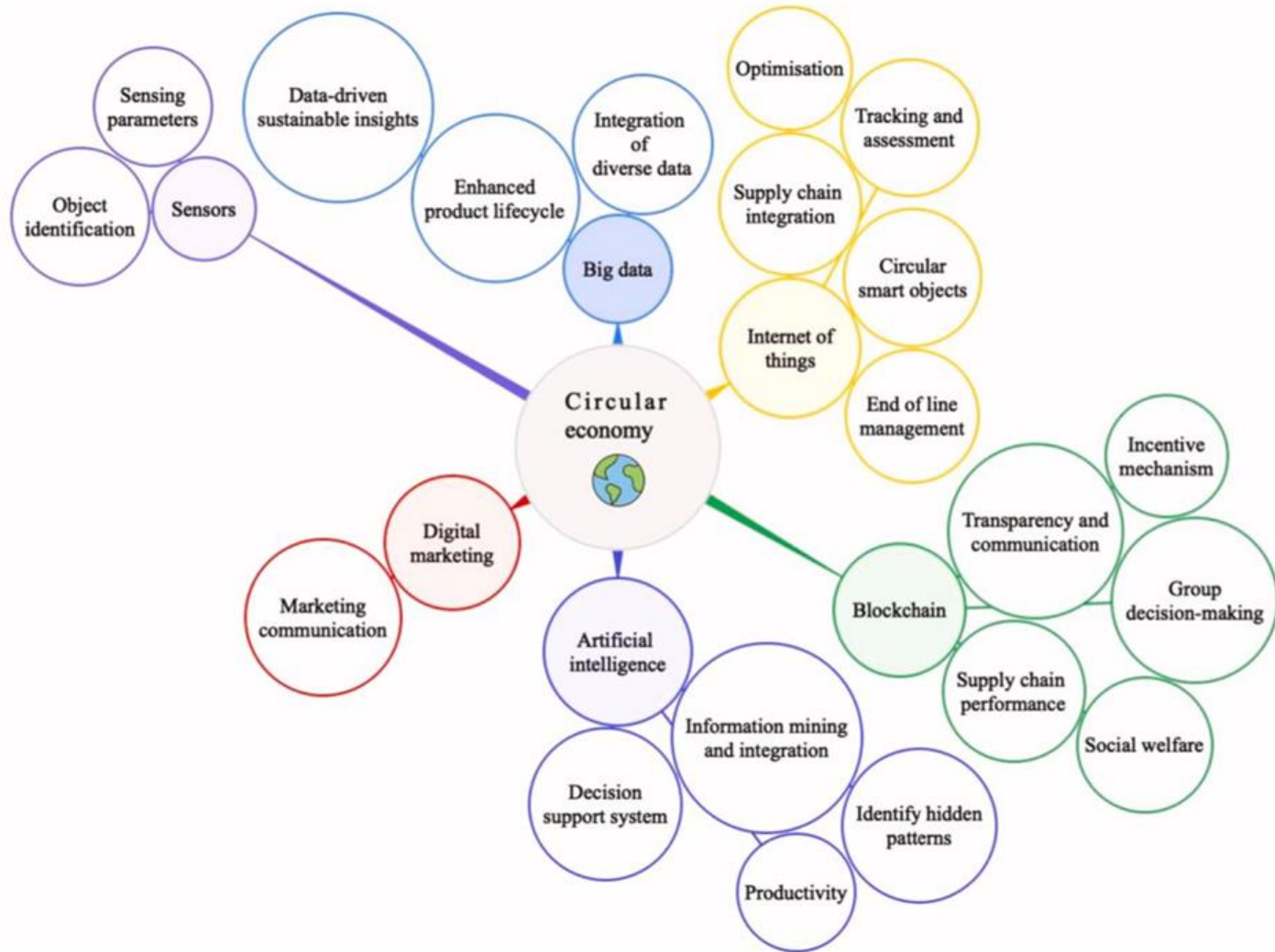


Fig. 7. Capabilities driven by digitalisation technologies to achieve CE.

Research Thematic Foci:

- Digitalisation Technologies and CE
- Barriers to and Enablers of Digitalisation-led CE
- Digitalisation-led Business Model Innovation
- Sector Specific Studies

Source: Chetna Chauhan and others, "Linking circular economy and digitalisation technologies...", Technology Forecasting and Social Change, 2022

Circular Economy as one of six sustainability transformations in Germany



FIGURE A: The Six Areas of Transformation of the German Sustainable Development Strategy and the five levers to support them

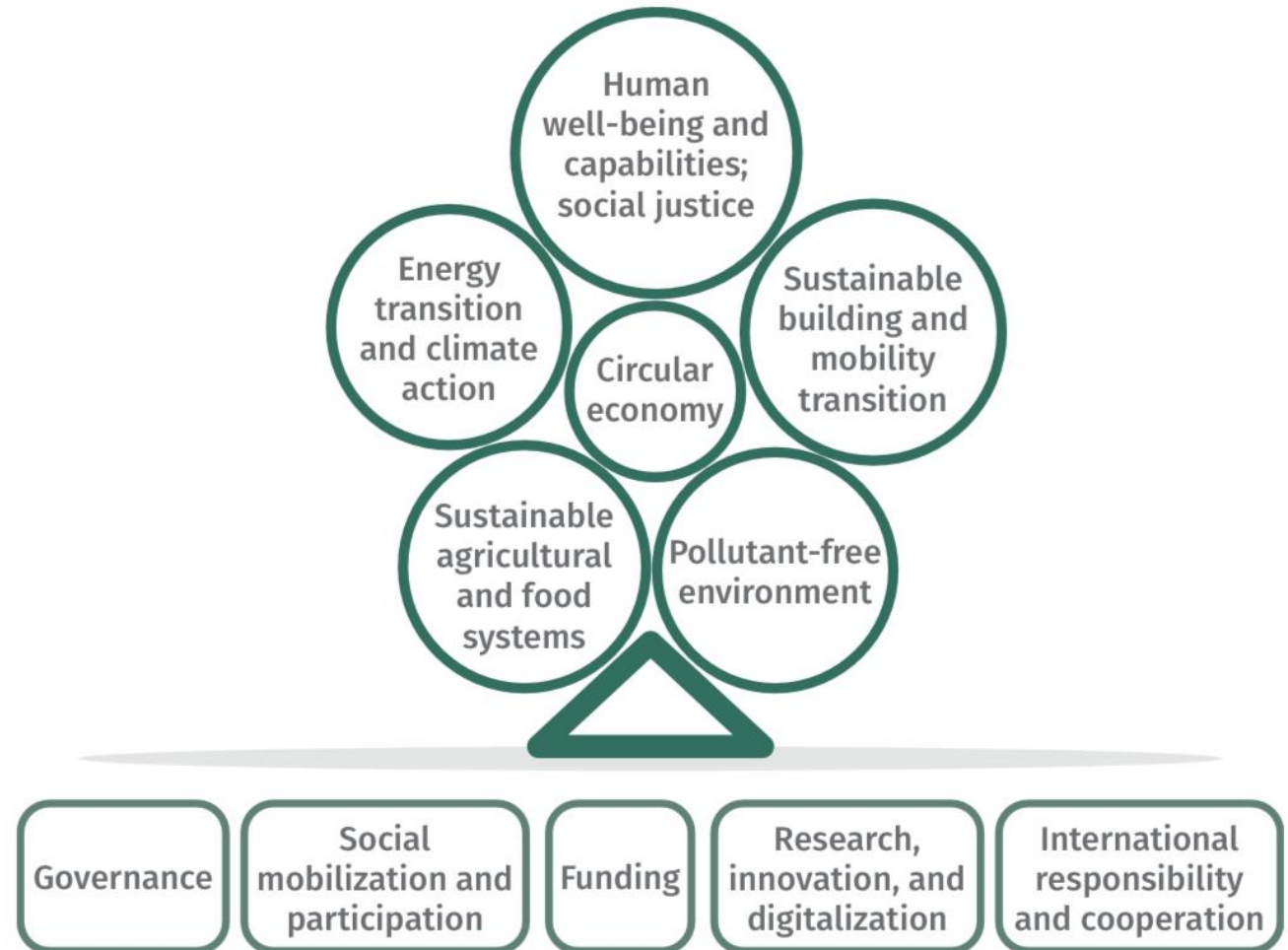
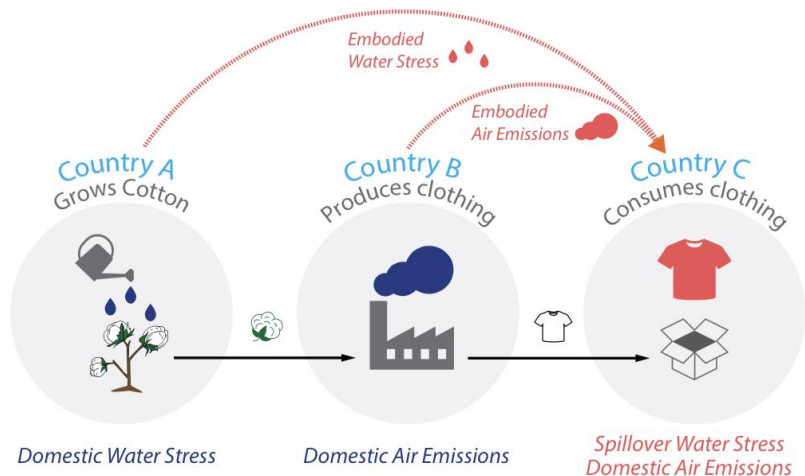
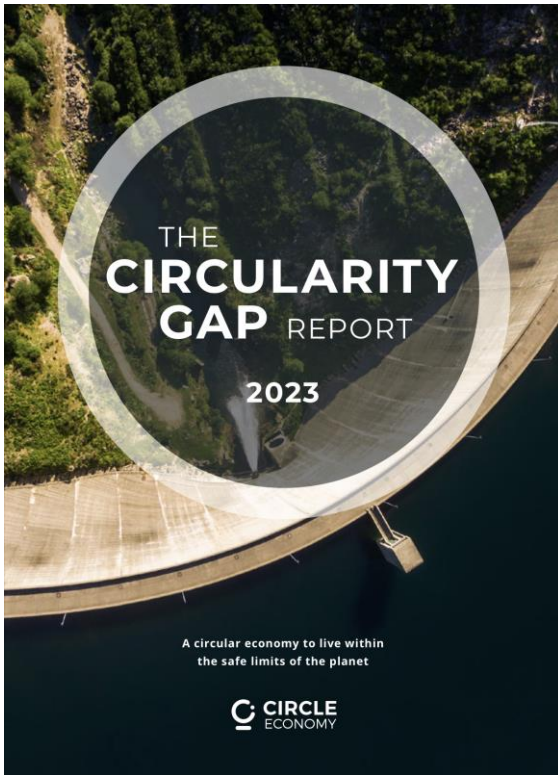


FIGURE 11: Visualization of environmental impacts embodied in supply chains



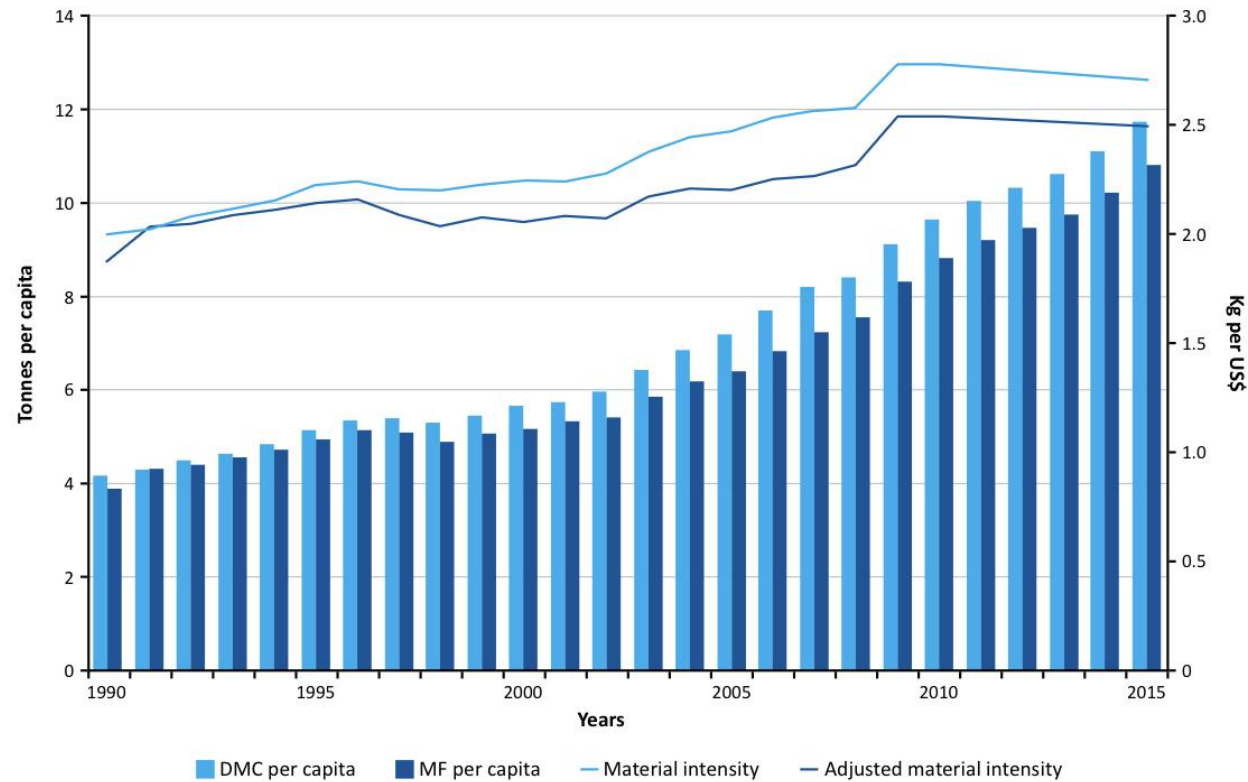
Declining Trends on Circularity and Urgent Global Call for More Sustainable Waste Management



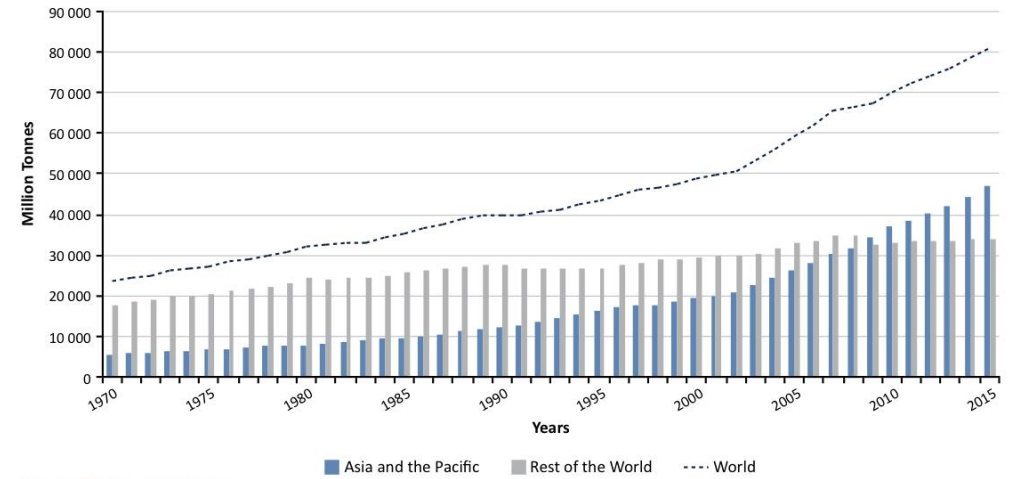
Global Waste Management Challenges

Material Consumption Trends in Asia Pacific

Figure 1.2.15: Asia and the Pacific, per person domestic material consumption (DMC), material footprint (MF) per person and material efficiency of the economy, tonnes per person and kilograms per USD, 1970–2015



Source: CSIRO 2015; UNEP 2015



Sources: CSIRO 2015; UNEP 2015

Key Messages

- ✓ Material consumption footprint per person continues to grow since 1990
- ✓ But the material efficiency of the economy has not caught up with the increase in material consumption
- ✓ There is an urgent need to change the material consumption culture and significantly enhance material efficiency of the economy

Circular Economy Challenges in the Asia Context

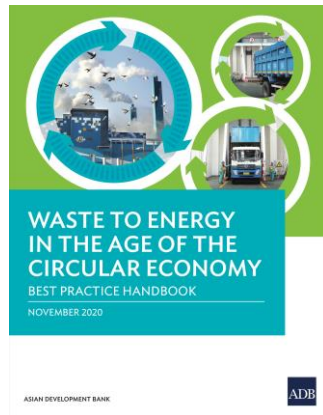
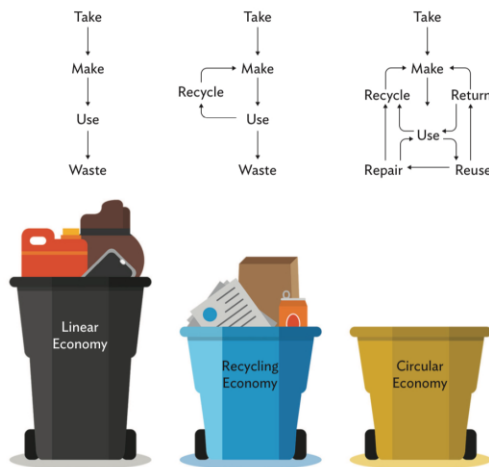
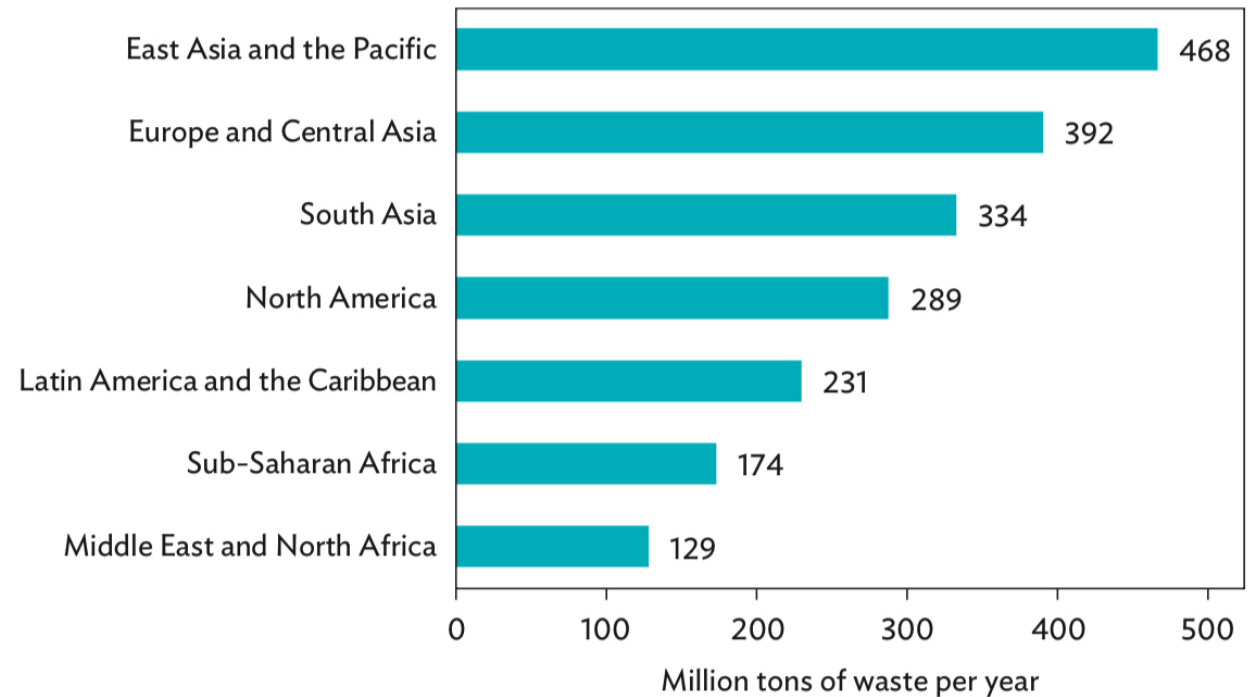


Figure 1: The Circular Economy Simplified



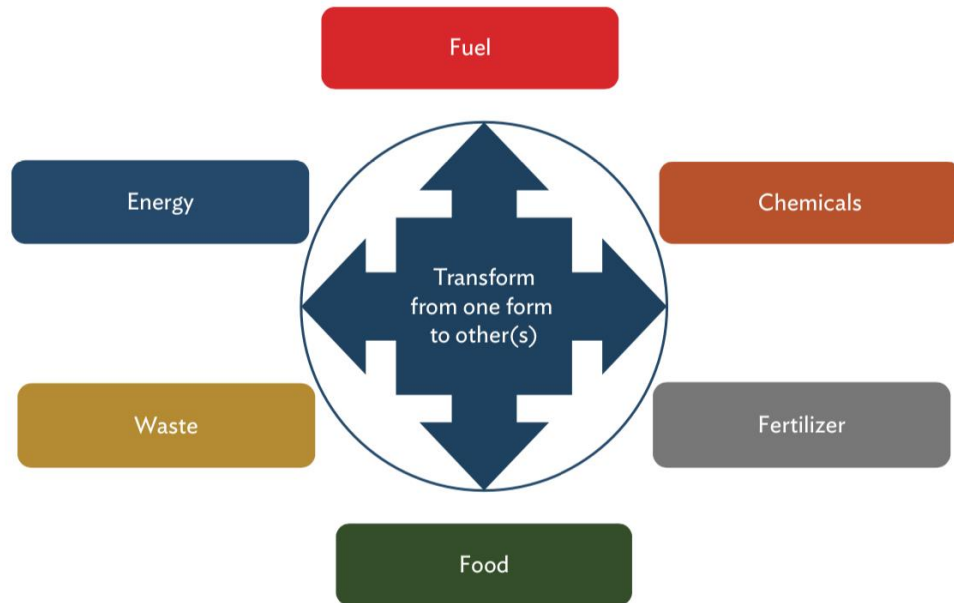
Source: Asian Development Bank internal training material.

Figure 3: Waste Generation by Region, 2016



Source: World Bank. 2018. What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.

Circular Economy Challenge: Technological Transformation As a Prerequisite for Material Transformation

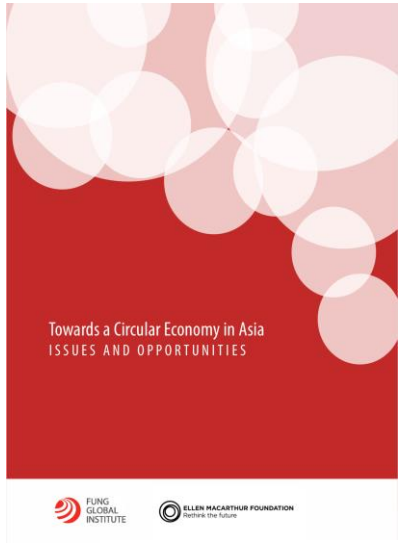


Waste	Food	Fertilizer	Fuels	Energy	Chemicals
Solid – Rice Husk, Food Scraps, EFB, Fiber, MSW, Offal, Spent Grain, Ash, Liquid – POME, Process Waste, Sewerage, Sludge, Gas – Waste Gases, Waste Heat, Emissions, Fly Ash, Radiant Heat	Crops – Corn, Cassava, Palm, Sweet Sorghum, Sugar, Wheat, Rice, Edible Oils, Fruits, Algae, Grasses, Trees etc. Livestock – Chicken, Beef, Cattle, Dairy, Duck, Sheep, Deer, Fish, Seafood etc.	NPK, Urea, Silica Phosphate, Soil Conditioners, Biochar, Ash	Solid – Briquettes, Pellets, Biochar Liquid – Bioethanol, Biodiesel, DME, FAME, LPG, LNG Gas – NG, CNG, BioCNG, Hydrogen, Syngas	Thermal, Electrical, Stored, Transportable, Distributed/ Microgrid, Centralized Grid, Emerging DC/ Nano	C5, C6, C7... Upward Bags, Plates, Cutlery, Biochemical Industry

BioCNG = compressed biomethane, CNG = compressed natural gas, DC = direct current, DME = dimethyl ether, EFB = empty fruit bunch, FAME = fatty acid methyl ester, LNG = liquefied natural gas, LPG = liquefied petroleum gas, MSW = municipal solid waste, NG = natural gas, NPK = nitrogen, phosphorous, potassium, POME = palm oil mill effluent.

Source: Asian Development Bank internal training material.

Key Challenges and Opportunities of Circular Economy in the Asian Context



A circular economy aims at eliminating waste and optimizes the repeated recovery and reuse of biological and technical materials, such as plastics and metals.

"We [BASF] map product value chains against sustainability criteria to pinpoint the "hot spots" where better chemistry can create more efficiency or sustainability. Transparency is key. Also important are incentives to drive smarter business decisions."

RACHEL FLEISHMAN

"Supply chains today are so fragmented across borders and companies, potentially making the task of changing mindsets more difficult. On the bright side, Asia's factories are an incredibly resourceful, adaptive and resilient lot – they had to be in order to survive the pace of change thus far. So if the commitment to circular economy thinking among brands and buyers is real, the supply chain stands a good chance of adapting successfully."

PAMELA MAR
Fung Group

Hong Kong's practical experiences in
applying circular economy principles to
food waste and waste electrical and
electronic equipment

Five Founding Principles of Circular Economy

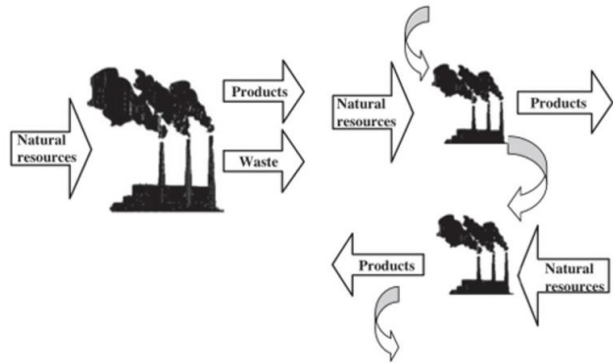


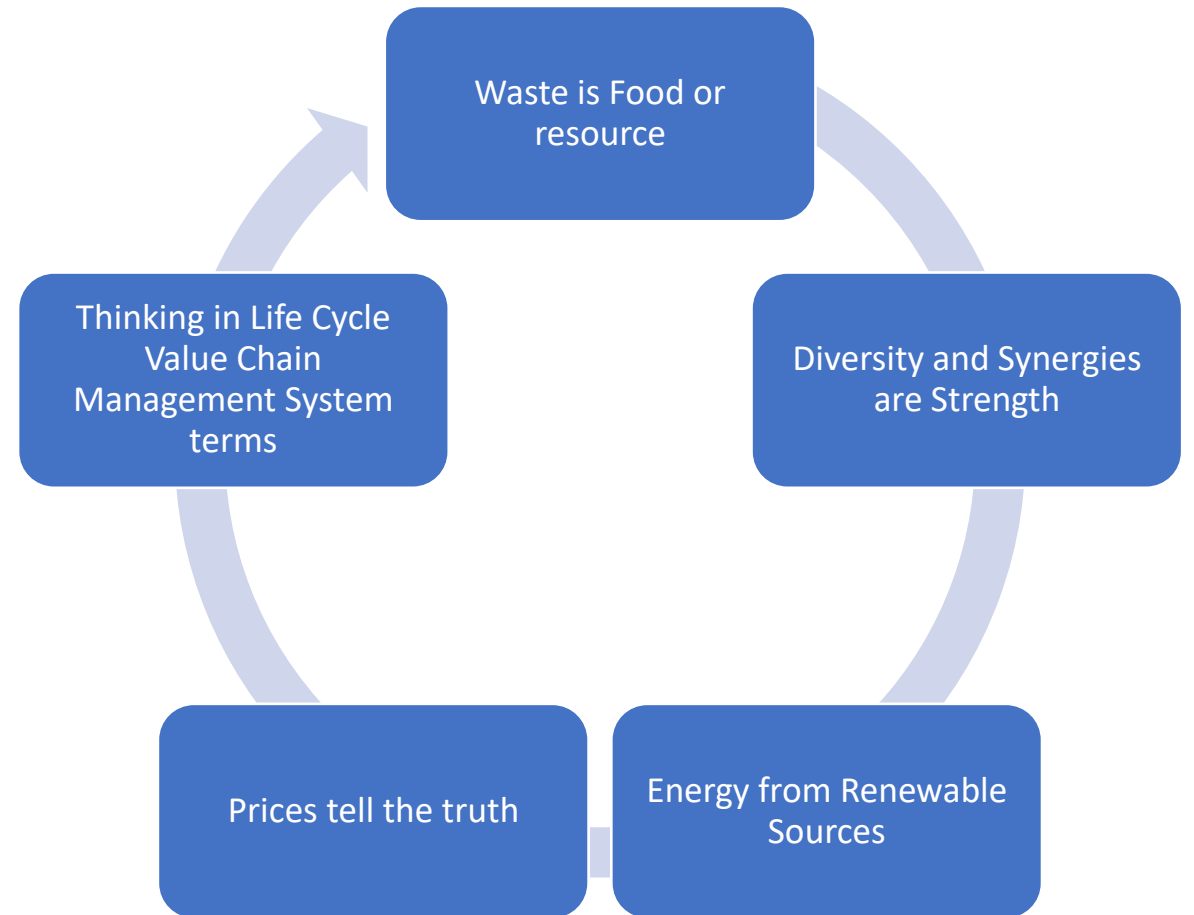
FIGURE 9.1 Fundamental configuration of a system with changing system boundary

BOX 9.2 CIRCULAR ECONOMY

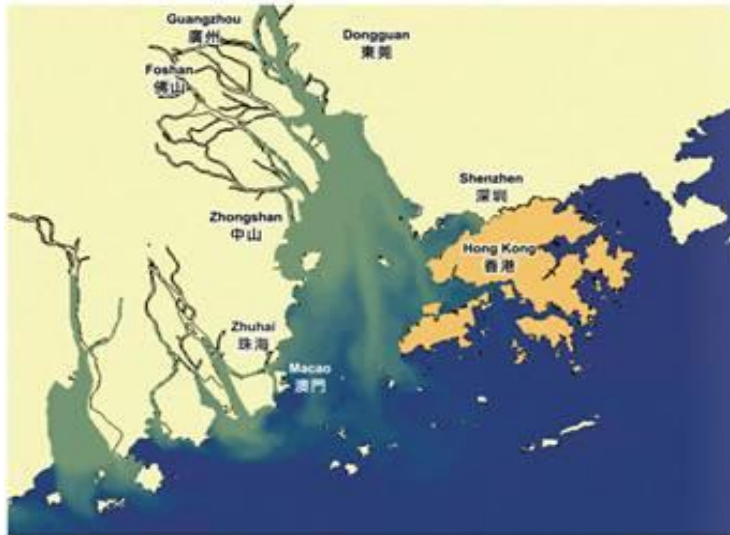
A circular economy relies on the following five founding principles (Ellen Macarthur Foundation, 2013).

- **Waste is food:** Waste should be eliminated. The biological parts (nutrients) and technical component parts of any product should be designed for disassembly and repurposing.
- **Diversity is strength:** Facing external impacts, diverse systems with many connections and scales are more resilient than those built just for self-efficiency.
- **Energy must come from renewable sources:** Any system should ultimately generate energy through renewable sources.
- **Prices must tell the truth:** The rational use of natural resources must reflect the real cost of the activity, including the environmental cost.
- **Thinking in terms of systems:** Understanding how things influence one another within a whole is key.

In short, circular economy is a generic term for an industrial economy that provides a coherent systems-level design framework to harness innovation and creativity. Ensuring that the whole is greater than the sum of the parts will enable a positive, restorative economy.



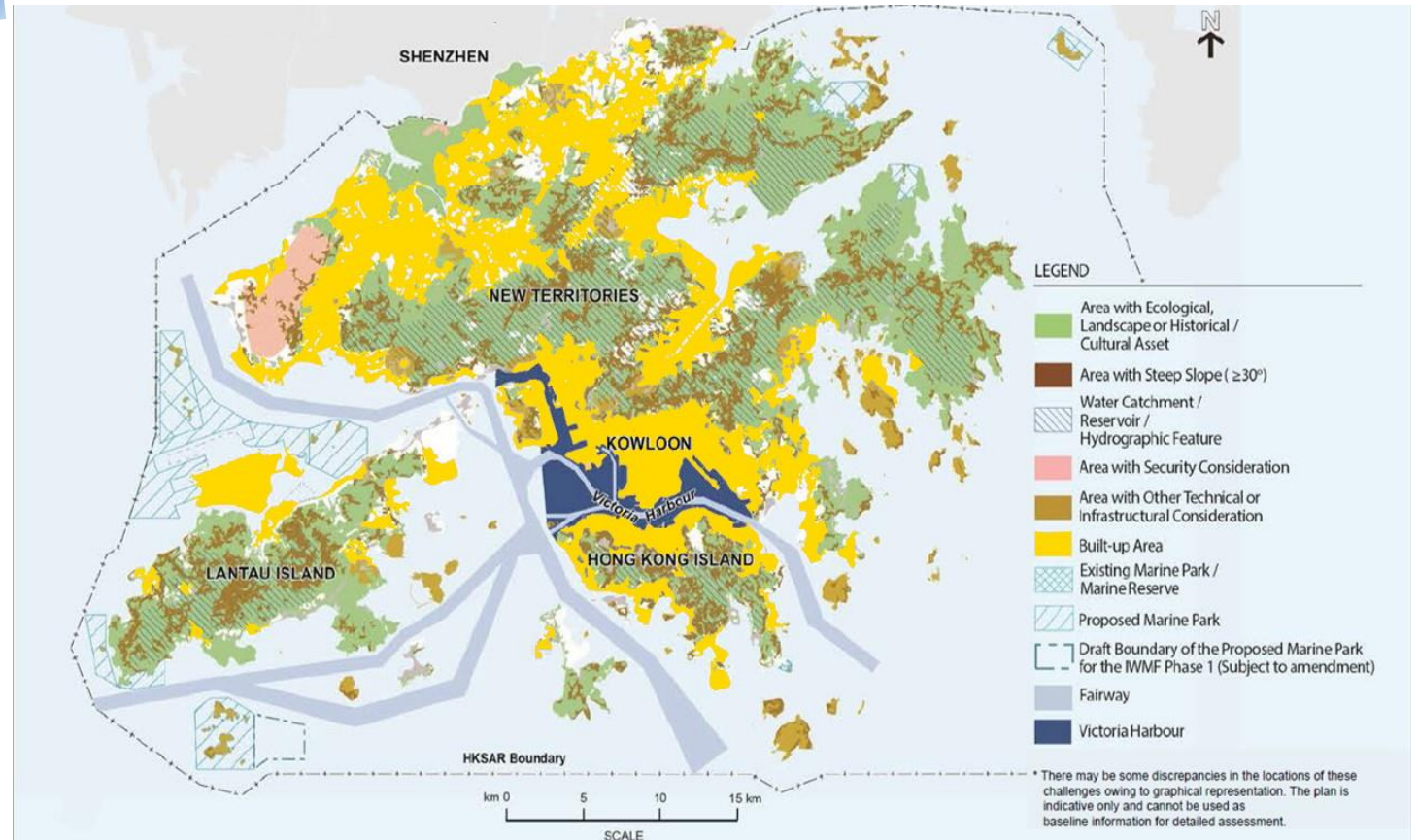
The Context for Hong Kong's Circular Economy



Hong Kong in Brief

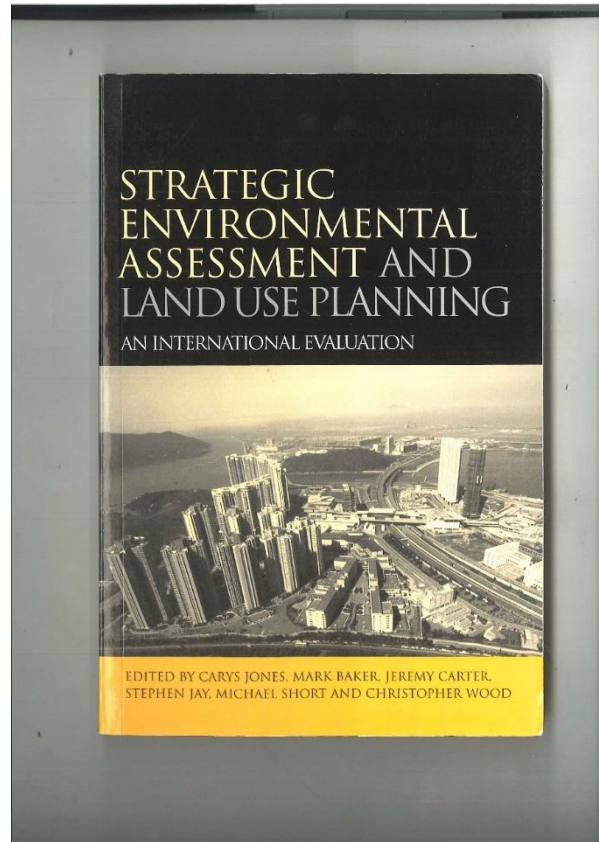
	Hong Kong	Greater PRD Region	San Francisco	New York	Tokyo
Land area (km ²)	1,106	42,824	17,955	21,480	13,500
Population (M)	7.32	63.75	7.15	20.09	37.8
People per km ²	6,618	1,489	398	935	2,800

- 1,106 sq km with only 24% built-up area
- Population from 3M in 1960 to 7.35M in 2022
- Residential developments are often close to pollution sources
- Interface issues with new developments next to ecologically sensitive areas



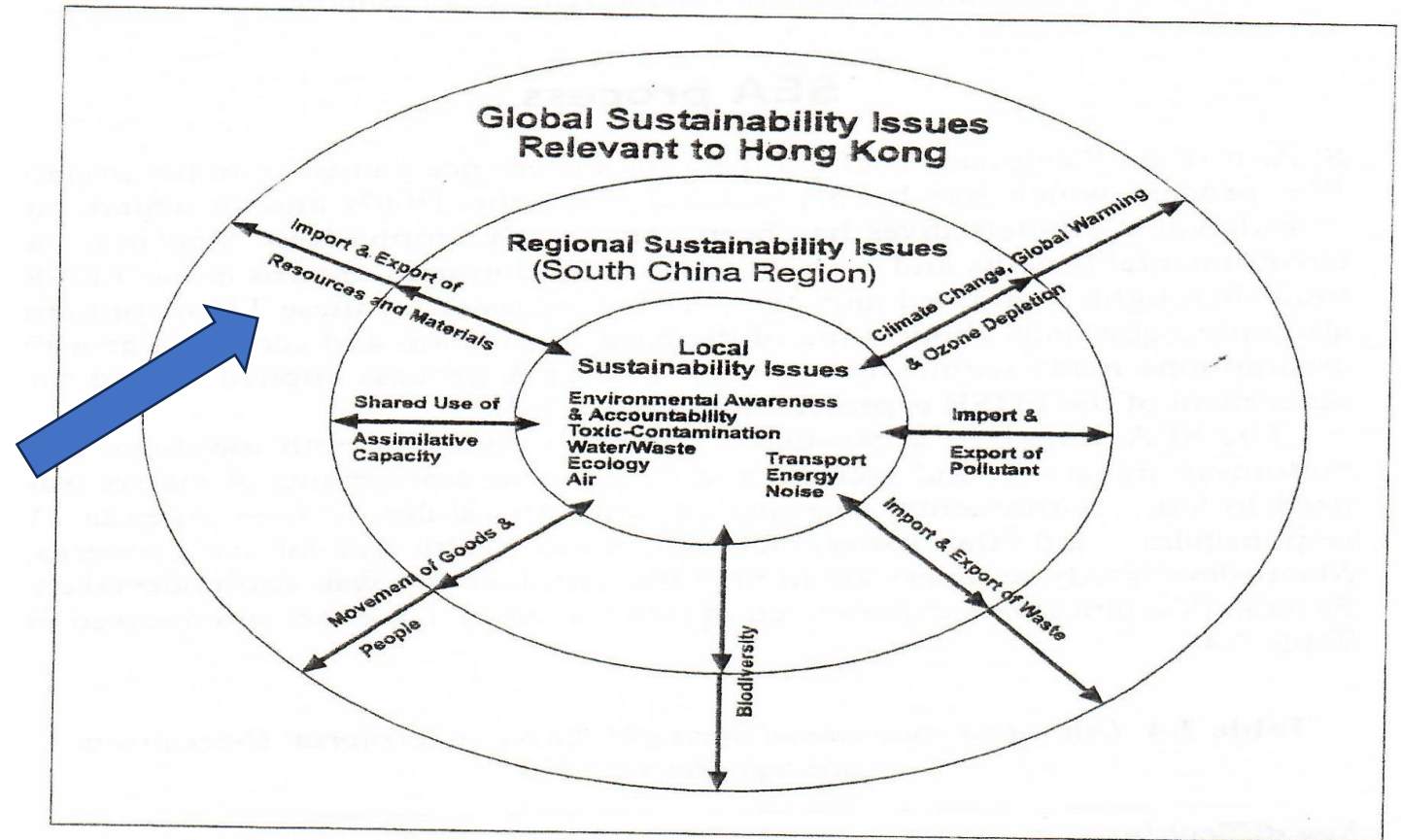
Source: HK2030+ Public Consultation Document, Planning Department, the Government of HKSAR, March 2017

The Global and Regional Context for Hong Kong Sustainability Challenges (including waste challenges in 1990s: Three Tiers of Environmental Sustainability Challenges



A Chapter on Hong Kong By Elvis Au & Kin Che Lam

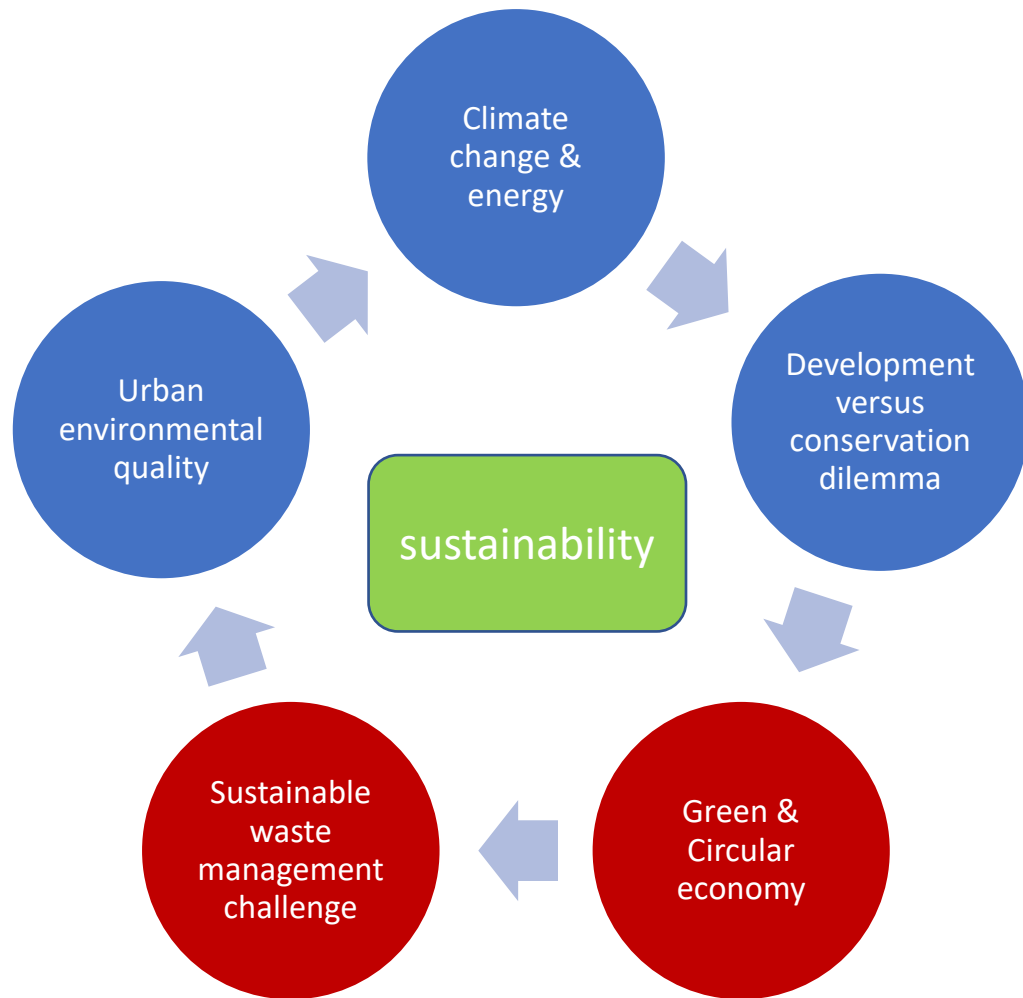
- Case study: Hong Kong Territorial Development Strategy Review, covering Natural Capital and Environmental Carrying Capacity and Tiered Sustainability Issues using Agenda 21 as the framework



Source: Ho and Au (1997)

Figure 7.3 Relevance of environmental sustainability issues to Hong Kong

Sustainable Waste Management and Circular Economy as Part of Five major sustainability challenges for metropolis like Hong Kong in 21st Century

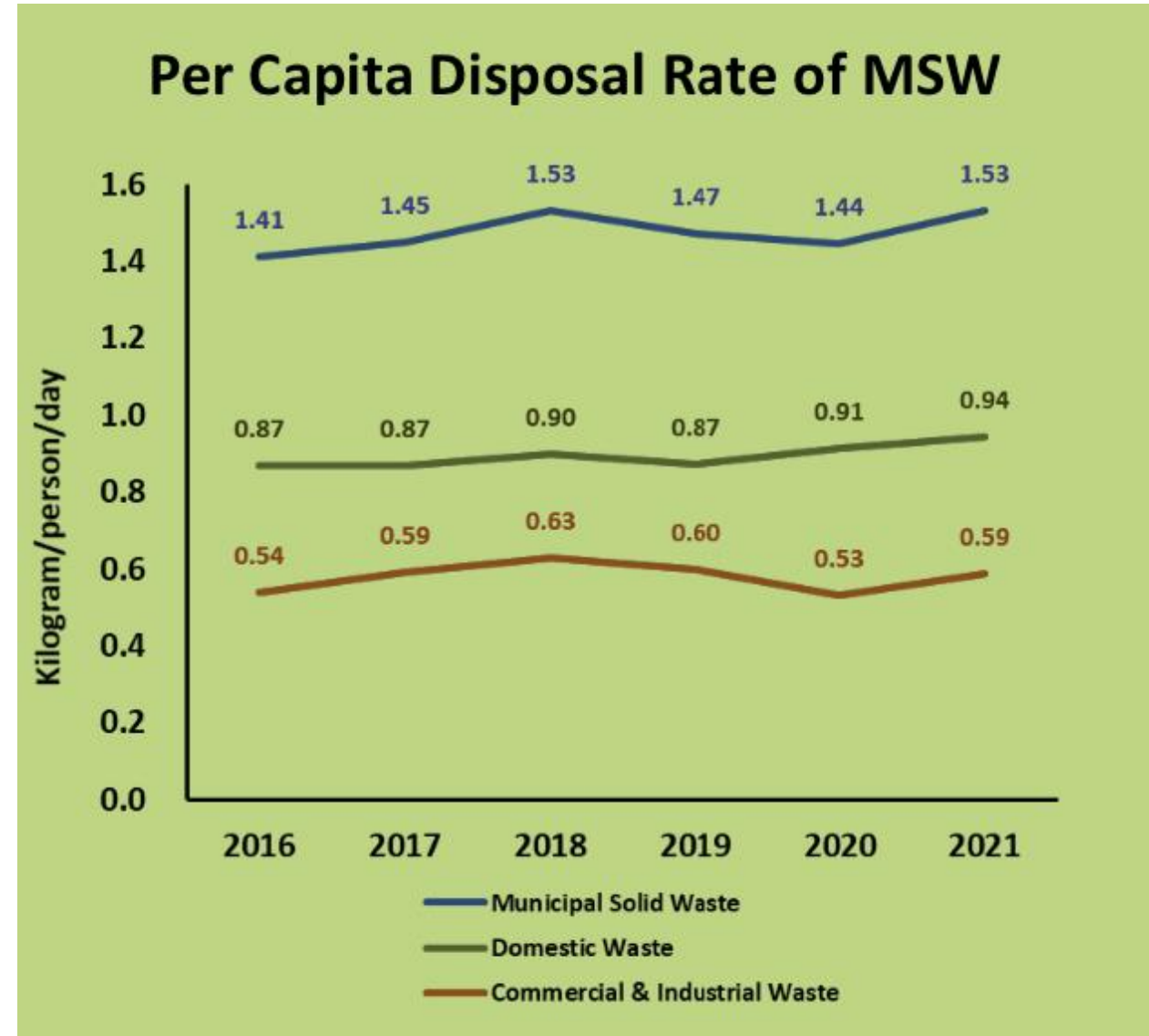


- Sustainable waste management and circular economy form an integral parts of the following SDGs:
 - ✓ SDG2: zero hunger (ie food wastage)
 - ✓ SDG3: good health and well-being
 - ✓ SDG8: decent work and economic growth
 - ✓ SDG11: sustainable cities and communities
 - ✓ SDG12: responsible consumption and production
 - ✓ SDG13: climate action
- Represent cross-cutting themes that are critical to the 3 Ps: people's wellbeing, Planet's survival and Prosperity of any cities survival of any cities

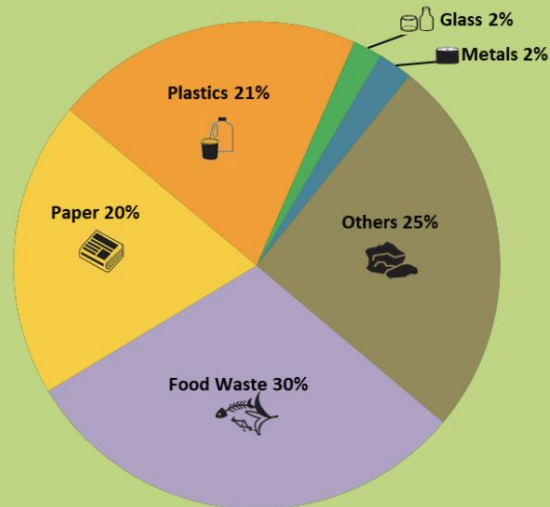


Waste Management Challenges in Hong Kong

Waste Statistics in 2021



Composition of MSW Disposed of at Landfills in 2021



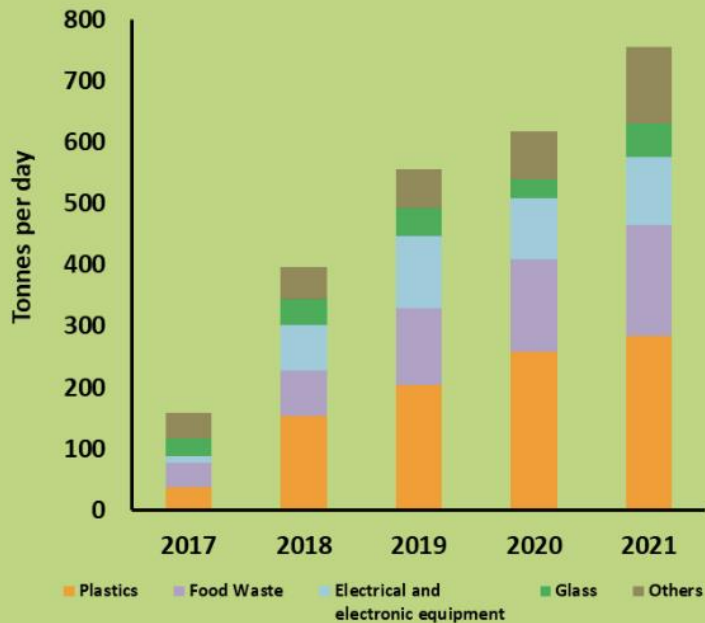
Total disposed quantity: 4.15 million tonnes

Note: Others include yard waste, textiles, wood, household hazardous wastes, bulky items and miscellaneous waste materials. Figures may not add up to 100% due to rounding.

Waste Management Challenges in Hong Kong

Waste Statistics on Recyclables in 2021

Total Quantities of Recyclable Materials Recovered from MSW Recycled Locally Rose by 22% as Compared to 2020



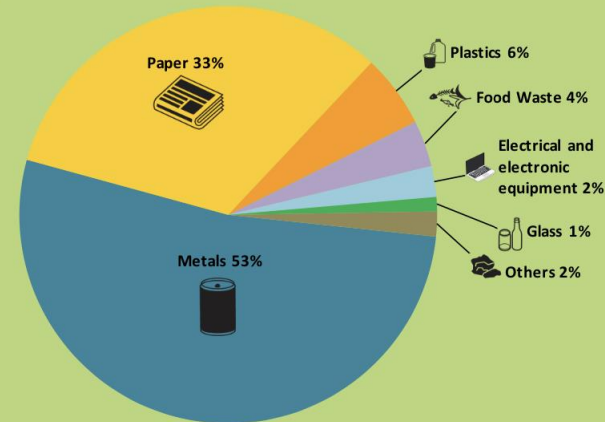
Municipal Solid Waste (MSW)

31% Recovered for Recycling

69% Disposed of at landfills



Recyclables Recovered from MSW in 2021



Total recovered quantity: 1.84 million tonnes

Notes: Recyclables recovered include recyclables delivered outside Hong Kong for recycling as well as recyclables recycled locally. Others include wood, rubber tyres, textiles and yard waste. Figures may not add up to 100% due to rounding.

Food Waste Recovered from MSW Increased by 21% as Compared to 2020

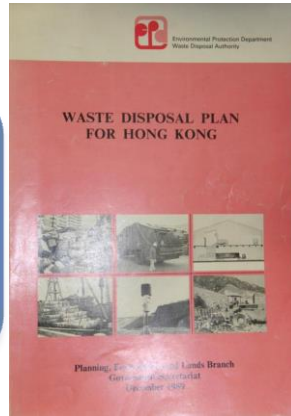


Impact of Hong Kong's Waste Policies

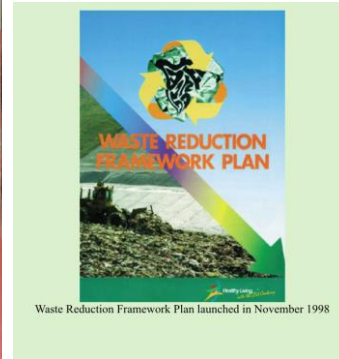
Waste Management Journey in Hong Kong (1989-2021)



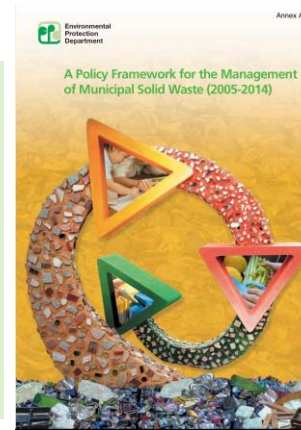
1989
White Paper:
A Time to Act



1989
Waste Disposal
Plan



1998: Waste
Reduction
Framework Plan



2005: Policy
Framework for MSW



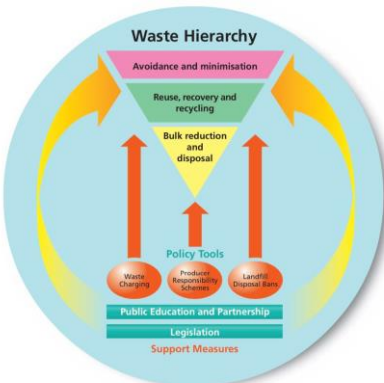
2013: Sustainable
Use of Resource



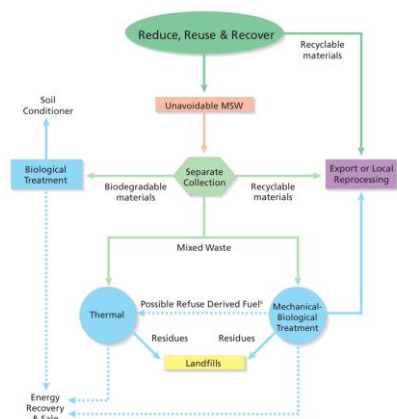
2013: Food Waste
Plan



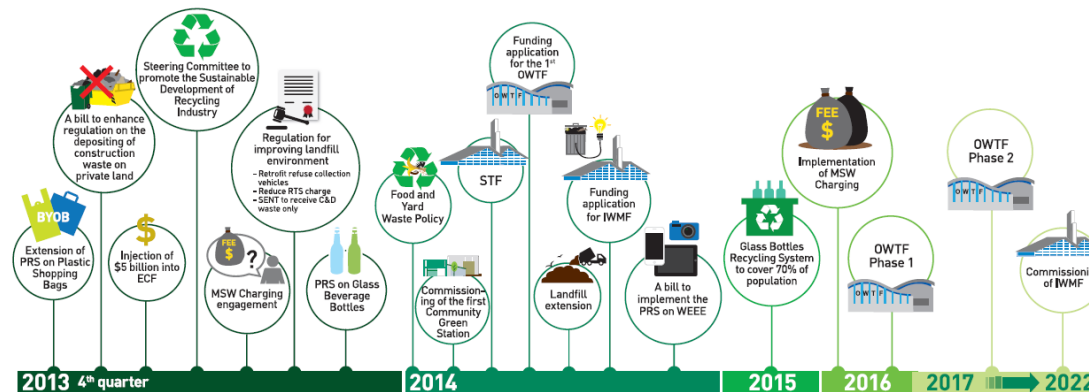
2021: Waste
Blueprint 2035



The right tools and measures for the right job



The Integrated Waste Management Facilities show the way



Synergy between Waste Blueprint 2035 and Climate Action Plan 2050

Carbon Neutrality and Circular Economy

WASTE BLUEPRINT for Hong Kong 2035
February 2023

New Vision
Waste Reduction, Resources Circulation, Zero Landfill

Retrospect and Prospect
Major Achievements (2013-2022):
Waste Reduction: 425% increase in Producer Responsibility Schemes (PRS) to promote 'zero responsibility'.

New Targets
1. Medium-term Target (By 2030):
By implementing charging for disposal of municipal solid waste (MSW), to gradually reduce the per capita MSW disposal rate by 40-45%, and increase the recovery rate to about 55%.

2. Long-term Target (By around 2035):
By developing adequate waste-to-energy facilities, to move away from the reliance on landfills in the long run.

Regular Reviews
Strategies and targets will be reviewed roughly every five years to keep abreast of the latest situation.

Major Areas of Action
Our new goal is to establish a circular economy, and achieve "Waste Reduction + Resources Circulation + Zero Landfill".

Waste Reduction
Implement MSW charging, Fully implement PRS on glass beverage containers, Regulate the use of disposable plastic tableware by states and explore the need of handling other single-use plastics.

Waste Separation
Strengthen the community recycling network, Expand food waste collection and recycling, Expand waste plastics collection and recycling.

Resources Circulation
Enhance waste-to-energy and food waste treatment capability, Facilitate the setting up of paper pulping facility, Develop a P+R to recycle yard waste, Develop construction waste sorting facility.

Industry Support
Enhance the operation of the Recycling Fund, Expand green procurement, Expand EcoPark, Support green employment.

Innovation and Cooperation
Set up Green Tech Fund, Explore adoption of innovative technologies to treat food waste more effectively, Promote application of innovative technologies to enhance efficiency of waste reduction and recycling, Exchange with other Greater Bay Area cities on development of "zero waste city".

Education and Publicity
Launch educational and promotional campaigns on waste reduction and recycling, Promote "plastic-free" culture to reduce the use of disposable plastic tableware, Create Green Outreach service to all districts, Collaborate with the trade in reducing the use of plastic packaging materials.

Synergy between sustainable waste management, circular economy and carbon management

Hong Kong's CLIMATE ACTION PLAN 2050
October 2021

Retrospect and Prospect
66% (Total electricity generation), 18% (Renewable energy), 90% (Waste and Energy)

Strategies • Opportunities
Steering and Coordination: The Steering Committee on Climate Change and Carbon Neutrality will lead the implementation of the Climate Action Plan.
Green Finance: Accelerate the development of green and sustainable finance, develop Hong Kong into a green financial hub in the region.
Green Economy: Facilitate the development of green industries, create investment and job opportunities.
Technology and Innovation: Promote R&D development and innovation, support the application of digitalization technologies and green R&D.
Capacity Building: Climate change-related courses are incorporated and integrated into the curriculum of tertiary institutions.
Public Engagement: Government will work together with various sectors to promote low-carbon lifestyle.

Net-zero Electricity Generation • Energy Saving and Green Buildings
Decarbonisation: Over the past decade, the Government has allocated over 80 billion-dollar investment, various carbon-reduction measures. The two-year campaign has also allocated about 8.7 billion to decarbonisation projects.
Energy Saving and Green Buildings: About 2.1 billion kWh of electricity was saved in 2022 as compared with 2015 (4.7%).
Electric Vehicles (EVs): In the first half of 2023, the total sales of new registered private cars EVs.

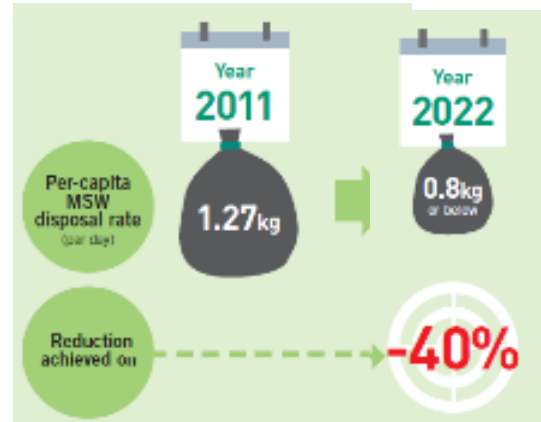
Green Transport
Clean Air Plan for Hong Kong 2028: Hong Kong Roadmap on Popularisation of Electric Vehicles.
Hydrogen Fuel Cell Vehicles: To cut nitrogen fuel cell and electric, buses and heavy vehicles.
Electric Private Cars: Cause the low registration of fuel-powered and hybrid private cars in 2025 or earlier.
New Electric Transport: Progressively adopt new energy buses.

Waste Reduction
Waste accounted for about 14% of total carbon emissions in 2018. Developing waste-to-energy facilities and promoting waste reduction and recycling will enable us to move away from reliance on landfills for municipal waste disposal.
Waste-to-energy: 2023, 2035
Municipal Solid Waste Charging: 2023, 2025
Regulation of Disposable Plastic Tableware: 2023, 2025
Waste-to-energy: 2023, 2035

Carbon Neutrality Roadmap
2020: 48.5 million tonnes
2025: 4.0 million tonnes
2035: 2.3 million tonnes
2050: Carbon neutrality

Challenges
Goal of Decarbonisation: Space Constraints, Technology Readiness, Extreme Weather, Demand for Talent, Policy Support for AI.

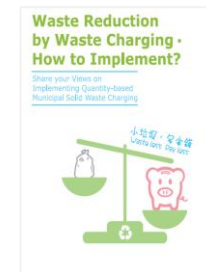
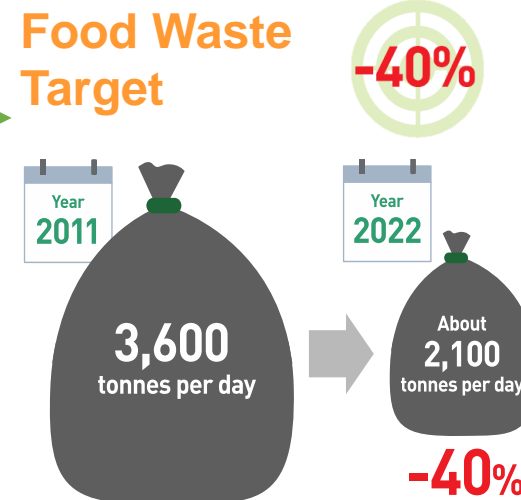
3 Key Directions for Sustainable Waste Management in Hong Kong in mid 2010s



Plastic Bag Levy Scheme



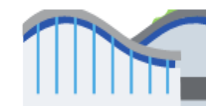
Foodwise HK Campaign



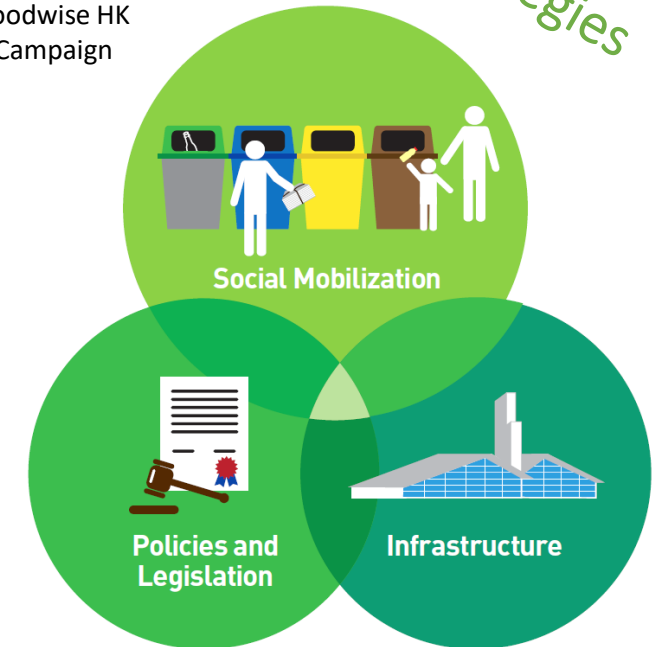
MSW Charging



PRS (Glass beverage bottles)



ORRCs
WEEETRF
IWMF Phase 1



Multi-prong Approaches for Waste Management in Hong Kong since 2012



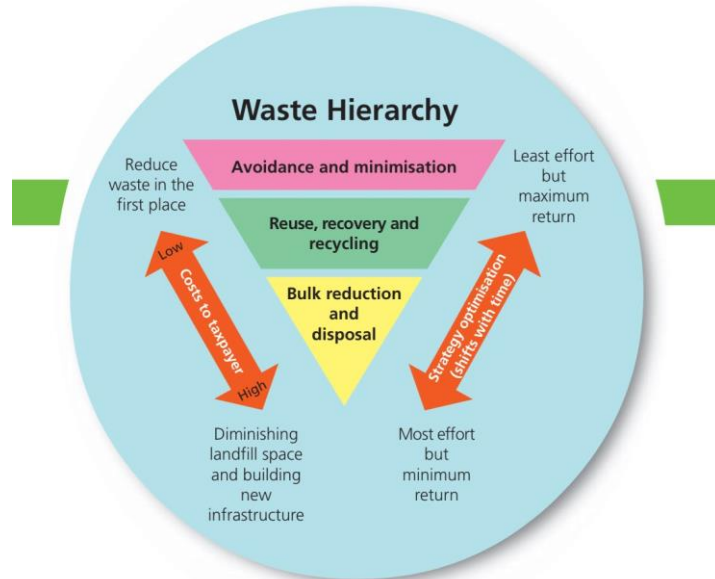
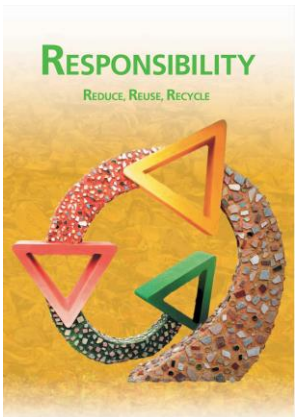
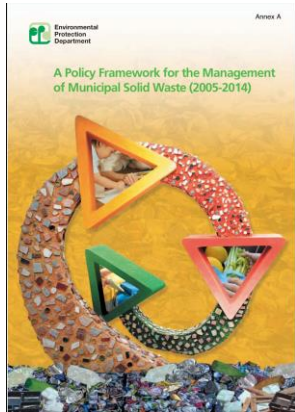
Strategy in tackling waste management:



Circular Economy for Food Waste

2005 Policy Framework for Municipal Solid Waste 2005-2014

First Attempt to Articulate the Concept of Circular Economy in Hong Kong



The Waste Hierarchy Model

”the government’s intention to promote local recycling and jumpstart a “circular economy””



Tomorrow’s “circular economy” as it emerges from today’s planners

SUPPORTING THE RECYCLING INDUSTRY - the “CIRCULAR ECONOMY”

94. The “circular economy” provides a sustainable solution to the waste problems. In a “circular economy”, as much as possible of the waste generated as a result of economic activities is returned to the consumption loop. Reuse, recovery and recycling, as integral elements in the waste hierarchy, encourage repeated uses of resources or materials.
95. **Waste recycling is a key element in our MSW strategy.** The Government’s intention is to promote the local recycling industry and jumpstart a “circular economy”. The Government has been formulating a comprehensive policy to support the recycling industry. This includes allocating suitable land resources, encouraging research and development, introducing environmental legislation and providing effective support measures. The Government will:
- improve the collection network through programmes on separation of waste at source;
 - adopt PRSs as a major measure to enhance the recovery of recyclable materials;
 - lease suitable STT sites exclusively to waste recyclers;
 - establish an EcoPark to provide long-term land for the environmental and recycling business;
 - adopt a green procurement policy to enhance market demand for recycled products;
 - continue to support and encourage research and development of new recycling technologies through the ECF, the Innovation and Technology Fund, and funds for small and medium enterprises; and
 - continue to organise educational programmes at the community level to increase the public awareness of waste recycling.

96. The EcoPark will act as a valuable resource for the development of advanced, value-added environmental industries. The Government has pledged to build a 20-hectare EcoPark in Tuen Mun Area 38 with a marine frontage of over 450 m. The EcoPark will provide long-term land for both the recycling and the environmental industries with a view to encouraging investment in advanced and cost-effective technologies. The Government will fund the construction cost of infrastructure so that an affordable rent can be offered to the waste recycling and environmental industries. Priority will be given to those industries which can help to achieve the Government’s MSW management objectives. Phase I of the EcoPark will be available for occupation by the end of 2006.

97. A green procurement policy facilitates the development of a “circular economy”. Recycling cannot be sustained without market outlets for recycled products. The Government is therefore taking the lead to adopt a green procurement policy and is regularly reviewing the specifications for bulk purchase items so as to incorporate environmentally friendly features where practicable. For example, the Government is taking the lead to encourage the use of recycled aggregate and geo-construction materials made of waste rubber tyres in its construction works. The Government will also encourage local corporations to give priority to green products when deciding on what to buy.

Waste Blueprint for Hong Kong 2035

Polluter Pays and Circular Economy Principles

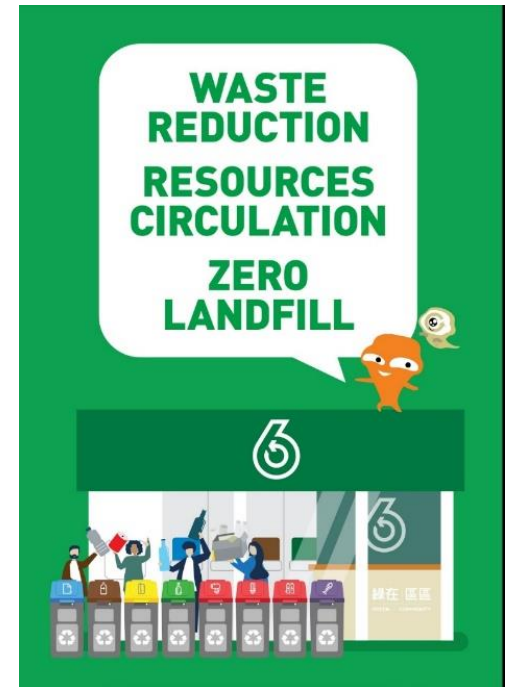
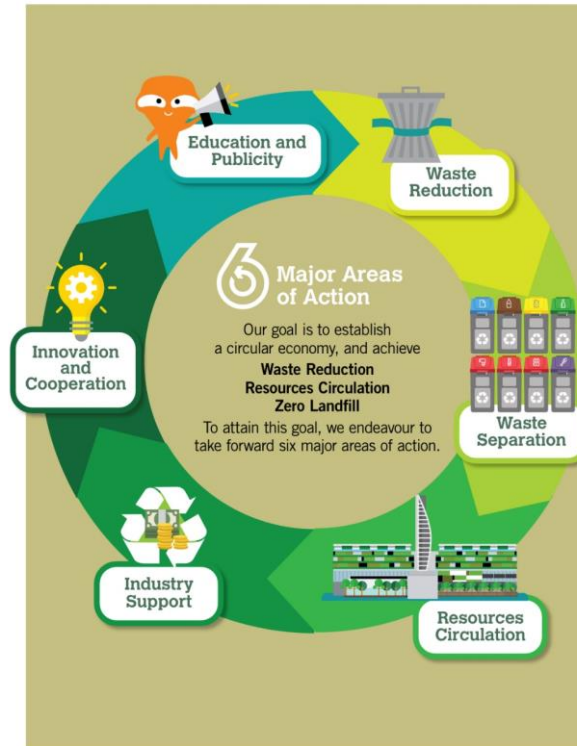


Resources Circulation, Paving Way for Circular Economy

Values of Waste

Hong Kong produces over 15 000 tonnes of MSW per day, consisting roughly 4 200 tonnes of waste paper, 2 500 tonnes of waste plastics and 3 500 tonnes of food waste. The value of pulp produced from waste paper can be up to HK\$2,400 per tonne. If half of the waste paper is transformed into pulp for export, the total value can be as high as HK\$1.8 billion per annum. For waste plastics transformed into recycled pellets or other raw materials, depending on the type and quality of materials, the value will range from HK\$1,200 to HK\$15,000 per tonne. If a quarter of the waste plastics are turned into recycled plastic materials of high quality, the total value can reach up to HK\$1 billion per year.

As for food waste, O•PARK1 is able to transform 200 tonnes of food waste per day into 14 million kilowatt hour of surplus electricity per year, which is sufficient to support the electricity need of about 3 000 households. If half of the food waste in Hong Kong is transformed into electricity, it can support the need of about 27 000 households. Transformation of food waste into other products using biotechnology can generate even higher returns.



Resource Recovery facilities for food waste and WEEE n Hong Kong

Strategies

Waste-to-energy infrastructure

O·PARK and food waste/sewage sludge co-digestion



O·PARK1 can handle **food waste** of **200 tonnes per day**

Food waste is turned into biogas to generate and supply electricity for **3,000 households**

Resources Circulation

We have built a number of large-scale waste management infrastructure to support the aforementioned waste separation work and facilitate the transformation of waste into resources.



O·FARM - the rooftop of O·PARK1 is used to grow spice and herbs with the compost produced from food waste



T·PARK



WEEE·PARK

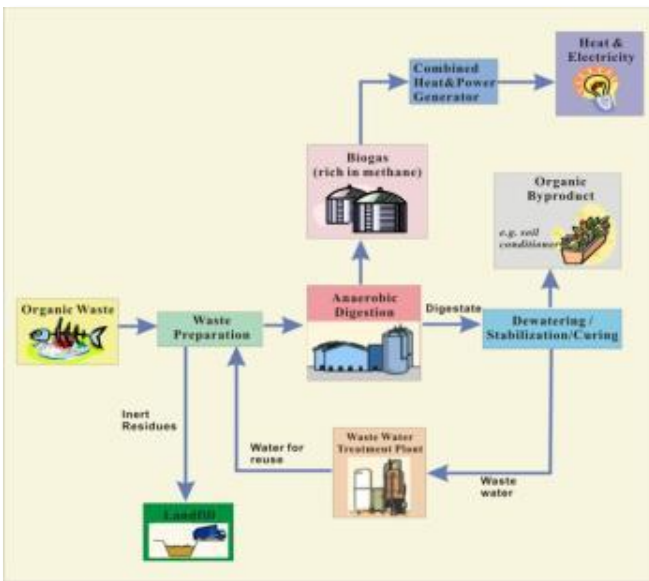


O·PARK 1

Opened in 2015, T·PARK adopts advanced incineration technology to treat up to 2 000 tonnes of sewage sludge from sewage treatment works each day. Apart from self-sustaining the operation of the facility, surplus electricity is exported to the power grid, supporting the electricity need of about 4 000 households annually. Nearly 2 million tonnes of sewage sludge have been treated so far.

Commenced full operation in March 2018, WEEE·PARK can treat up to 30 000 tonnes of regulated WEEE (including air-conditioners, refrigerators, washing machines, televisions, computers, printers, scanners and monitors) annually, turning them into valuable secondary raw materials. So far, more than 50 000 tonnes of regulated WEEE have been processed.

Commenced operation in July 2018, O·PARK1 adopts anaerobic digestion technology that can convert 200 tonnes of food waste into electricity each day. Apart from self-sustaining the operation of the facility, surplus electricity is exported to the power grid, supporting the electricity need of about 3 000 households annually. Around 85 000 tonnes of food waste have been recovered for transforming into energy so far.



Daily treatment capacity of sewage sludge for turning into electricity: **2 000 tonnes**

Number of households supported by surplus electricity each year: **4 000**

Annual treatment capacity of WEEE: **30 000 tonnes**

Accumulated number of electrical appliances (which would have been disposed of) repaired and donated to people in need: **3 500+**

Daily treatment capacity of food waste for turning into electricity: **200 tonnes**

Number of households supported by surplus electricity each year: **3 000**

Development of Organic Resources Recovery Parks

What is Food Waste?

Food waste is any waste, whether raw, cooked, edible and associated with inedible parts generated during food production, distribution, storage, meal preparation or consumption of meals.

Different sectors of the community and the general public throw away about

3,600 tonnes of food waste every day
which is equal to

20,000,000 Apples (Apple=182g)
20,000,000 Mooncakes (Mooncakes=185g)
144,000,000 Sushi (Sushi=25g)

About one-third comes from food-related commercial and industrial (C&I) sources and two-thirds from households.

Commenced Operation

Jul 2018

O-PARK1



Commencement Year	July 2018
Treatment Capacity	200 tonnes of food waste/day
Surplus Electricity Generation	14 million kwh/year
Reduction of Greenhouse Gas Emission	42 000 tonnes/year

Progress of O-PARK1



Under Construction

2023 expected

Food Waste/Sewage Sludge Anaerobic Co-digestion Trial (Sha Tin Sewage Treatment Work)



Commencement Year	2023 (expected)
Treatment Capacity	50 tonnes of food waste/day
Surplus Electricity Generation	(mainly for internal use of the STW)
Reduction of Greenhouse Gas Emission	650 tonnes/year

Under Construction

2024 expected

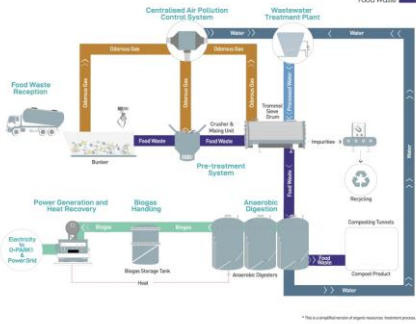
O-PARK2



Commencement Year	2024 (expected)
Treatment Capacity	300 tonnes of food waste/day
Surplus Electricity Generation	24 million kwh/year
Reduction of Greenhouse Gas Emission	67 000 tonnes/year

惜食先行 轉廢為能

Food Wise Synergy Waste To Energy



Source-separated Food Waste



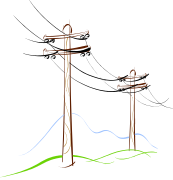
Recycle



Contract Arrangement	Design-Build-Operate (DBO)
Contractor	OSCAR Bioenergy JV
Capital Cost	~HK\$1.5 billion
Total Operation Fee	~ HK\$72 million per year
Design Capacity	200 tonnes per day



6500 tons/yr
Mature Compost



Electricity

O-PARK 1 Plant
Power Supply

14 million kWh of
surplus electricity
export to CLP
Grid



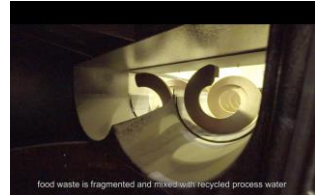
Heat Energy

Plant Reuse



Waste Water

Treated Effluent



Organic Resource Recovery Centre (O-Park 1) Education Centre From Hardware to Software to Campaign/Education



| Opening of Visitor Centre



Government Funding Support and Facilitation for Waste Collection, Recycling and Recovery



The Chief Executive tried out the operation of RVM at Green@Tuen Mun



A member of the public returned used plastic beverage containers via the RVM at Hong Kong City Hall



An ambassador guided a member of the public to use the RVM at Tin Shui Shopping Centre



Launch and Implementation of 10 Years Food Waste and Yard Waste Plan 2014-2022 in Hong Kong Recognised as a Good Practice in C40 and Awarded Marketing Excellence

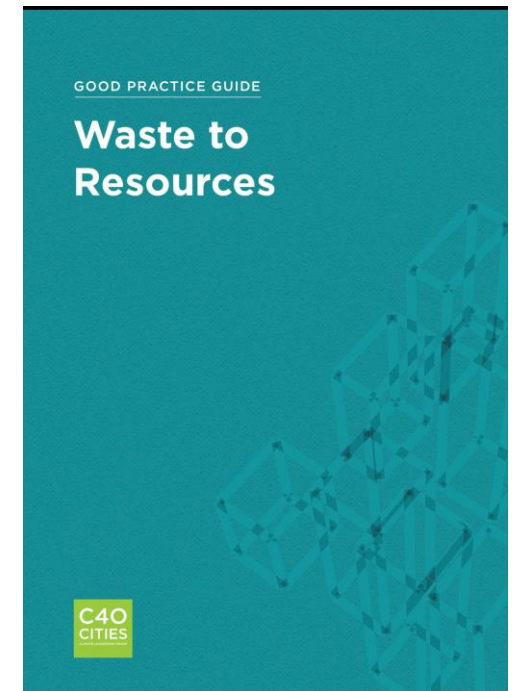


Attending the press conference on "A Food Waste & Yard Waste Plan for Hong Kong 2014-2022" today (February 20) are (from left) the Deputy Director of Environmental Protection, Mr Howard Chan; the Secretary for the Environment, Mr Wong Kam-sing; and the Assistant Director of Environmental Protection, Mr Elvis Au.



Mr Wong (centre) unveils "A Food Waste & Yard Waste Plan for Hong Kong 2014-2022" at the press conference.

[Close](#)



Charging Mechanisms for Hong Kong



Charging modes

Food and Environmental Hygiene Department (FEHD)'s collection service

Private waste Collectors(PWCs)' service

Through FEHD's refuse collection vehicles (RCVs)

At FEHD's refuse collection points (RCPs)

Through RCVs of PWCs

Through non-RCVs of PWCs



~50%

~30%

~20%

Charging by pre-paid designated garbage bags



Charging by weight (gate fee)

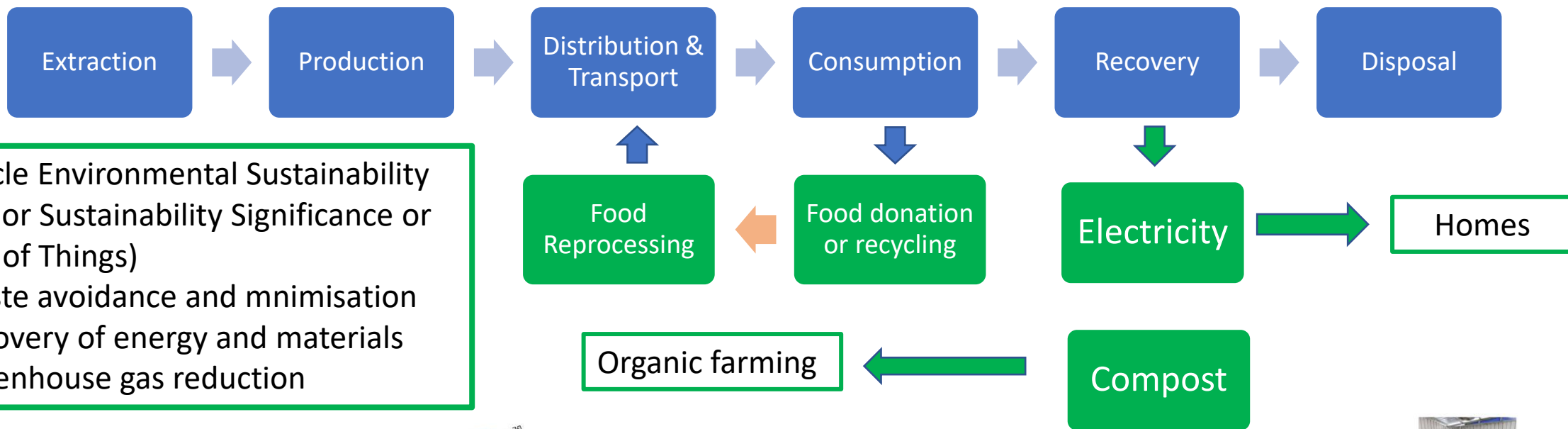


~80%

~20%



Life Cycle Management of Food Waste



Life Cycle Environmental Sustainability Issues (or Sustainability Significance or Senses of Things)

- Waste avoidance and minimisation
- Recovery of energy and materials
- Greenhouse gas reduction

Eco-design of Products

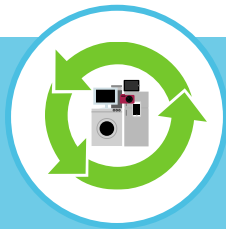
Eco-design of Services



Circular Economy for Waste Electrical and Electronic Equipment

Multi-pronged Strategies

Policies, legislation and regulatory control



Producer Responsibility Schemes (PRSs)

(c) Waste electrical and electronic equipment (WEEE) PRS Scheme in 2018



PRs on WEEE

capacity of treating 30,000 tonnes/year



To underpin the PRS, the WEEE • PARK was built to turn regulated electrical equipment into valuable secondary raw materials



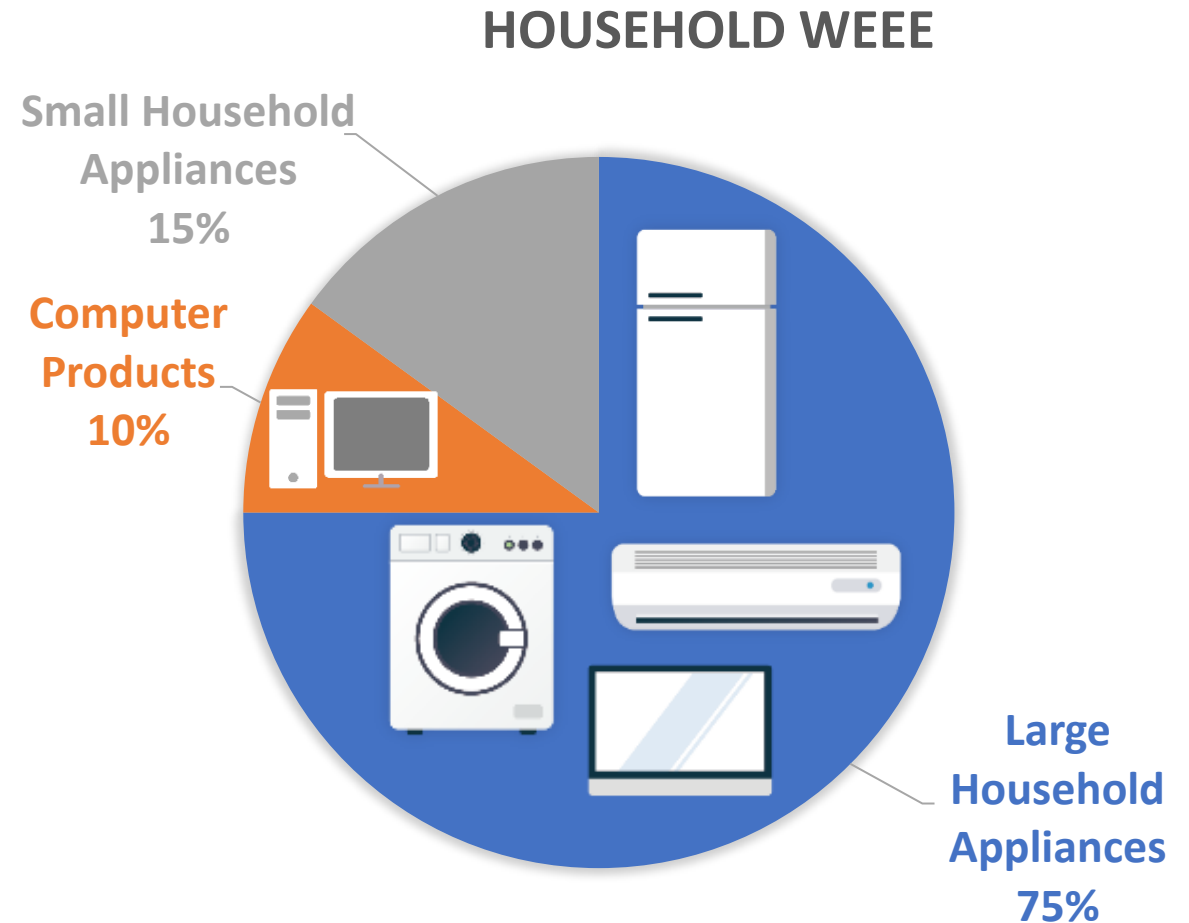
free door-to-door removal service



Regulated electrical equipment generated locally are now collected and recycled properly into resources

WEEE Generation in HK: Present Situation

- Hong Kong generates ~70 000 tonnes of Waste Electrical and Electronic Equipment (WEEE) annually, most of which are exported
- Reliance on export may not be sustainable in the long run as demand for secondhand products in markets outside Hong Kong may decline over time
- We need a system to promote proper disposal and recycling

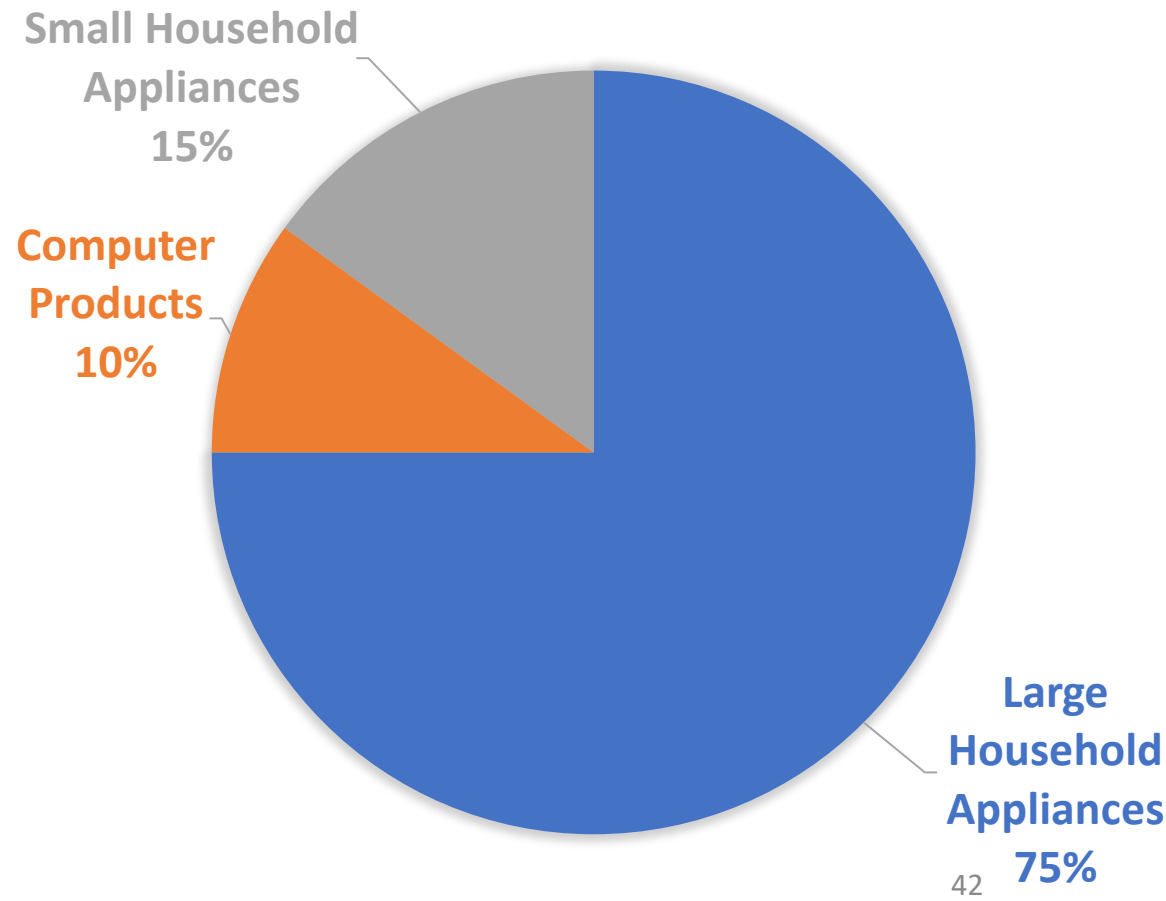


Levels of Recycling Levy



- televisions, refrigerators per item \$165
- washing machines, air conditioners per item \$125
- monitors per item \$45
- computers, printers, scanners per item \$15

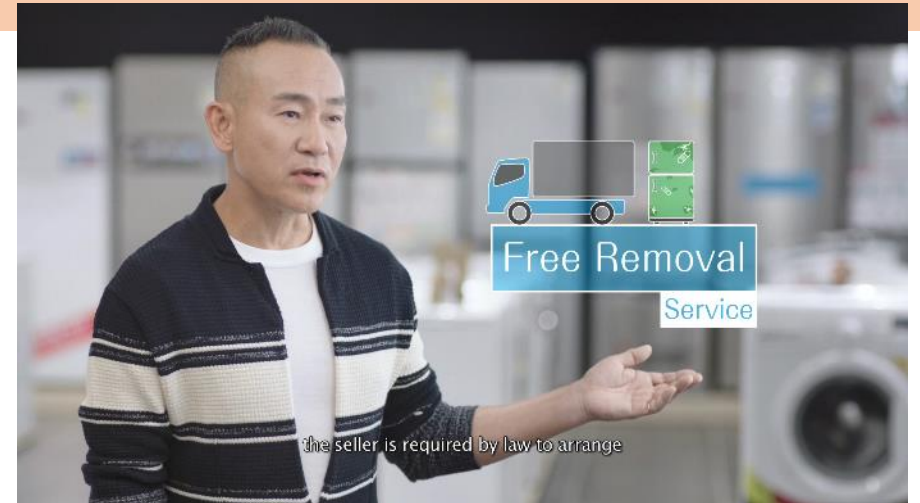
HOUSEHOLD WEEE



We envisage the WPRS should be able to achieve full cost-recovery with the recycling levy set at the aforesaid levels

Publicity and Public Education

- Thematic Website
- API and Posters
- Choice Magazine articles





WEEE·PARK



Detoxify · Dismantle · Recycle



3 hectares site in EcoPark
Design Capacity of 30,000 tonnes per year

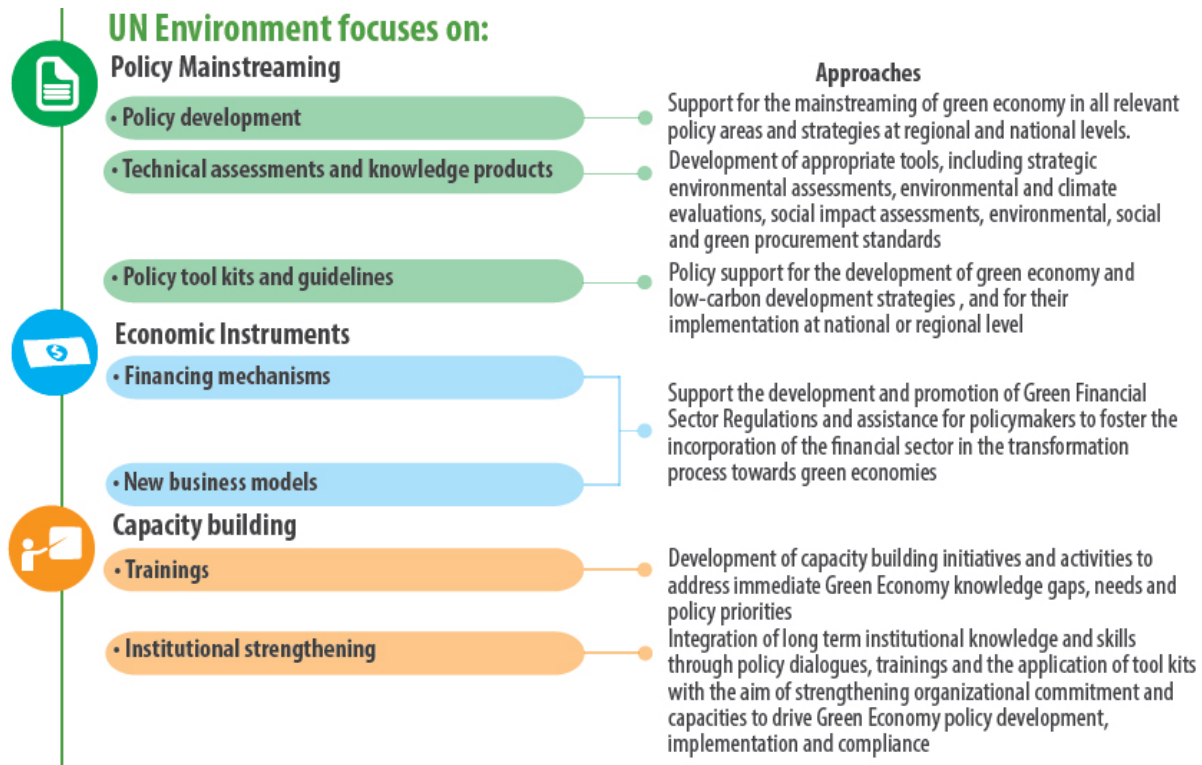
Concluding Remarks

Key Challenges and Opportunities of Circular Economy in the Asian Context

Challenges

- Spatial constraints
- High density city development
- Urbanisation lock-ins
- Technological constraints
- Varying social and political capital to effect major behavioral changes
- Difficulties in closing the material/energy loops given the existing international and regional interdependence
- Circularity thinking, trans-disciplinary challenge and the related education revolution

From Circular Economy to Circular Green Economy



UNEP's Definition of Green Economy

- A green economy is defined as low carbon, resource efficient and socially inclusive. In a green economy, growth in employment and income are driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services.

Circular Green Economy Challenge in China and Greater Bay Area

China's Green Development in the New Era
The State Council Information Office of the
People's Republic of China
January 2023

<http://www.scio.gov.cn/gxzt/dtzt/49518/49519>

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IV. Extensive Application of Green Production Methods	25
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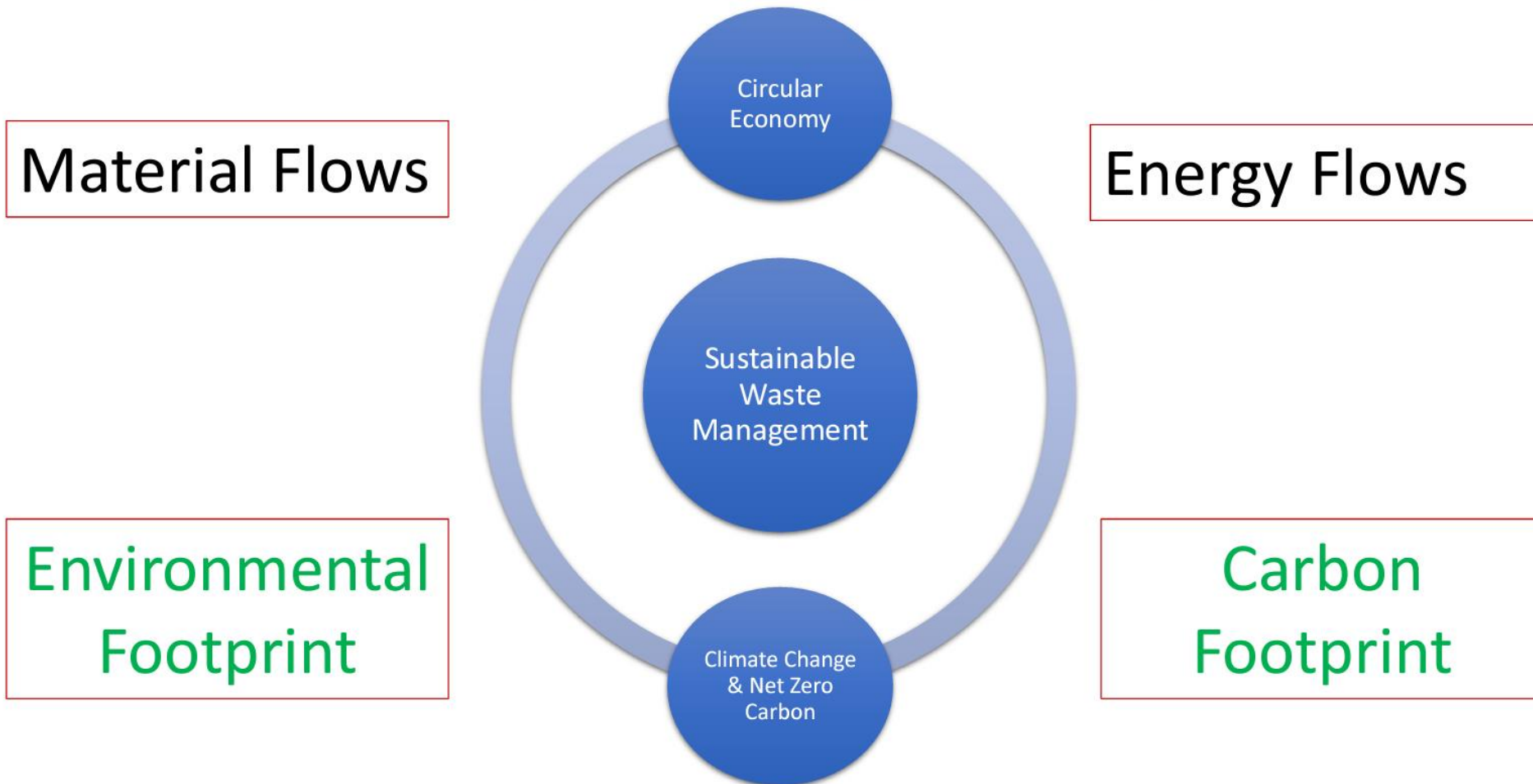
Preface

- Green is the color of nature and the symbol of life. A sound eco-environment is the basic foundation for a better life, and the common aspiration of the people. **Green development is development that follows the laws of nature to promote harmonious coexistence between humanity and nature, development that obtains the maximum social and economic benefits at minimum cost in resources and environmental impact, and sustainable and high-quality development that protects the eco-environment.** It has become the goal of all countries.
- Since the 18th CPC National Congress in 2012, under the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, China has firmly upheld the belief that lucid waters and lush mountains are invaluable assets. **It has prioritized eco-environmental conservation and green development, promoted the comprehensive green transformation of economic and social development, and achieved modernization based on harmony between humanity and nature**



Circular Green Economy Challenges: Material/Resource Balance, Energy Balance and Carbon Balance in All Sectoral and Landuse Planning – A New Paradigm Shift

Relationship among Sustainable Waste Management, Circular Economy, Climate Change And Life Cycle Thinking, Management and Analysis



Striving for Circular Green Economy, Decarbonisation and Digital Economy and the Associated Spatial Implications



Strategic Management of Circular Economy, Life Cycle Assessment and Carbon Transition on Smart Platforms

New Urban Use Category: Multi-storey and Multi-functions Circular Economy and Resource Recovery Complex



Key Challenges and Opportunities of Circular Economy in the Asian Context

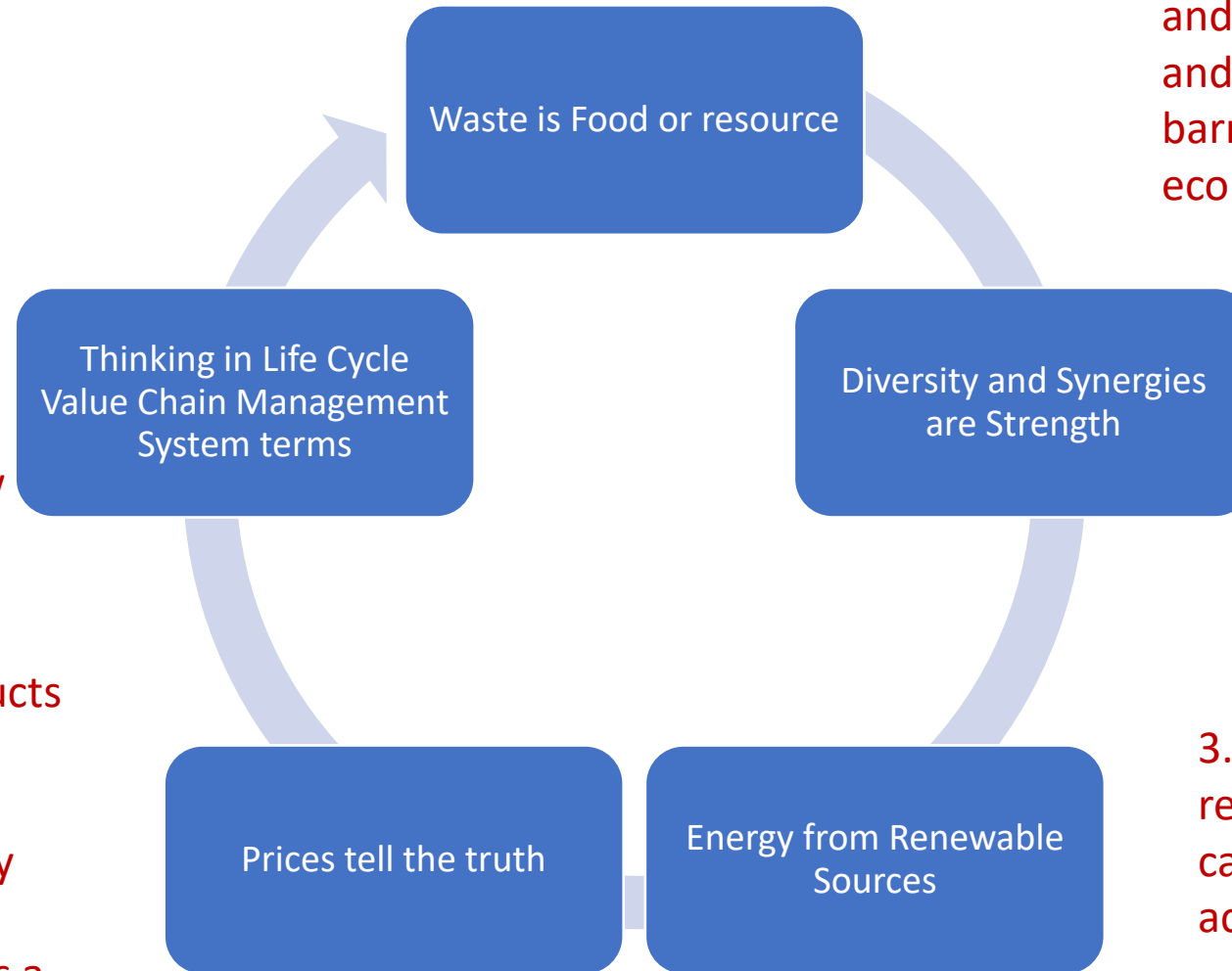
Opportunities

- Jumpstart to new green growth and new, more efficient mode of production and consumption
- Re-building social capital and cohesion through community engagement and re-training
- Creating fertile ground for technological innovations, product/service/process/system revolutions through down-to-earth eco-designs
- Fostering long term prospects and hopes for the young generation and generations to come

Possible Directions of Solutions for Circular Green Economy in Asia

5. Urgently call for very innovative , bold development and application AI-enabled real time digital technologies to support home grown but modern solutions to create and harvest of the values of circular economy as a new engine of green growth

4. Needs to make eco-products and eco-services very affordable, enhance the convenience factor, and fully internalise the principle of “resource steward earns”, as a complement to the principle of “polluter pay”



1. Needs redefinitions of waste and resources in environmental and custom laws to remove legal barriers and enable circular economy

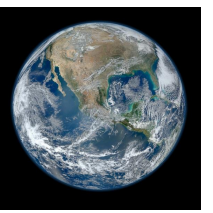
2. Calls for compact and vertical circularity technologies

3. Needs a global and regional renewable energy strategy that can benefit those with limited access to renewable energy



Concluding Remarks

10 Key Success Factors for Circular Economy in Asia



- Build **partnership** and raise **public awareness** as the first most important step, but must be done **continuously**, at all levels, across all industries, and among all stakeholders
- Ground the strategies and actions on **scientific truths**, objective facts and political findings and **sound life cycle science** prevails, but at the same time do not ignore perception issues
- **Incentives** matter: monetary or non-monetary (including recognitions, awards and the principle of resource manager earns
- **Link up** different sub-systems and build an effective, yet convenient ecosystem
- Seek **quick wins** or small/medium **success stories** and widely share such wins or stories to build trust and support
- **Engage political leaders** as early as possible on fact finding visits and dialogue and seek early dialogue on possible win-win strategies resolve conflicts or differences in interests
- Take **parallel, concerted and coordinated actions** on the various fronts, not necessarily in sequence, as the sequential approach results a much longer overall timeframe to achieve results
- Treat objections and negative feedback with a **positive and proactive approach** to understand the underlying reasons and find creative means to address the foundation or root concerns, rather than ignoring them altogether
- Take bold, innovative usage of **AI-Enabled Real-time Digital Technologies** to build links and close loops
- **Think globally, Act locally**, embracing new driving concepts or approaches (ie. a **jumpstart** approach on circular economy concept, even though you are lagging behind on some conventional means.

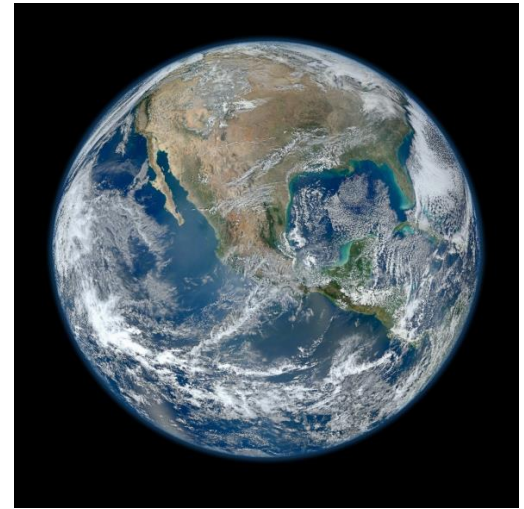
Sustainable Waste Management, Circular Economy and Planetary Crises: The Calls from United Nation Environmental Programme on the first International Zero Waste Day on 30 March 2023



“ International zero waste day, observed for the first time on 30 March 2023 and jointly facilitated by UNEP and UN-Habitat, aims to raise awareness of the importance of responsible consumption and production practices and urban waste management. The day calls for rethinking humanity’s waste-related practices and for embracing a circular economy, which means reducing resource use and emissions to the environment throughout all stages of a product’s life cycle. This is considered key to addressing the triple planetary crisis of climate change, nature and biodiversity loss, and pollution and waste.”



Transition to circular Economy is one of most important transformations of our time and calls for new thinking !



“ The world as we have created it is a process of our thinking. It cannot be changed without changing our thinking.

Albert Einstein

Our Journey Together for a Better Future Thank You !



