Circular Economy towards Achieving the SDGs

UN Forum,
14 November 2023 (13:00-14:30 pm)
Nagoya Gakuin University

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New Urban Agenda 2016

Paris Agreement 2015

COP21·CMP11
PARIS2015
UN CLIMATE CHANGE CONFERENCE

UN Decade on Ecosystem Restoration (2021-2030)

2030 Agenda for Sustainable Development/SDGs

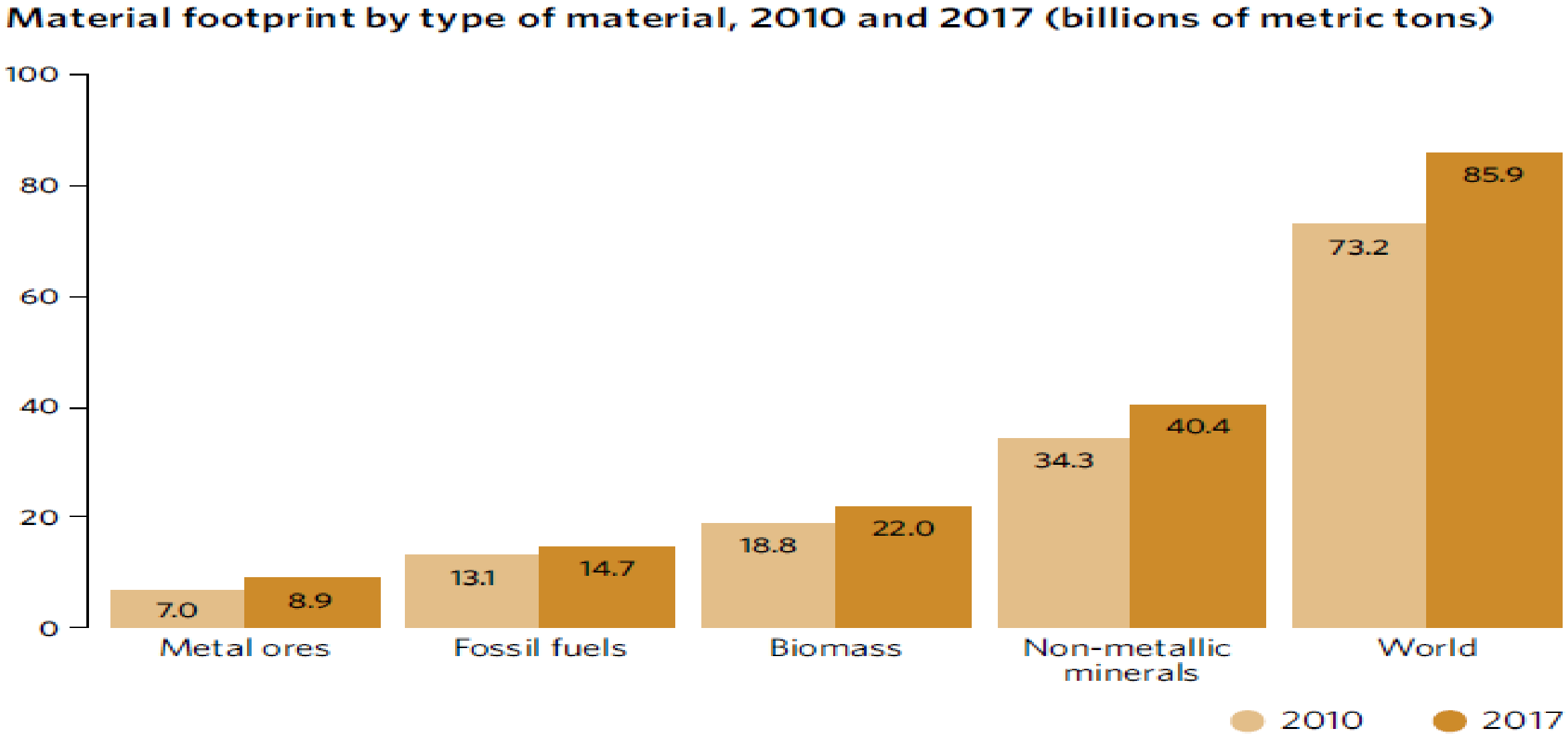
Nairobi Mandate 2016

Addis Ababa Action Agenda 2015

THIRD INTERNATIONAL CONFERENCE
FINANCING FOR DEVELOPMENT
13-16 JULY 2015 · ADDIS ABABA · ETHIOPIA
TIME FOR GLOBAL ACTION

Reaffirming Doha Mandate, moving towards an inclusive and equitable global economic environment for trade and development

The World Continues on a path of using natural resources unsustainably…



(Source: The Sustainable Development Goals Report, UN, 2020)

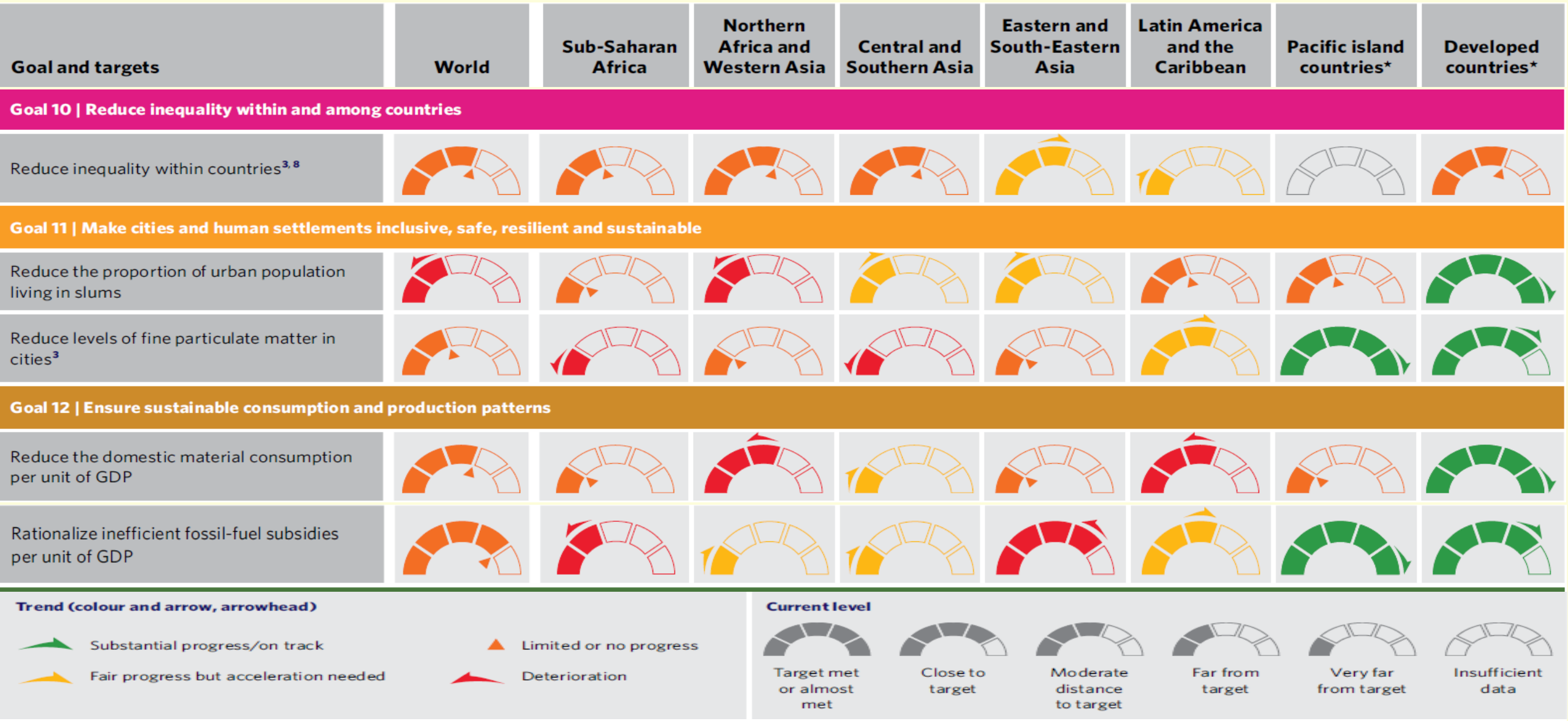
Consumption patterns are key drivers of resource use and waste generation

- The use of resources, water, energy and the generation of waste are all driven by our patterns of consumption and production.

- The majority of greenhouse gas emissions, acidifying substances, tropospheric ozone precursor emissions and material input caused by the life-cycles of activities related to consumption can be allocated to the main consumption areas of eating and drinking, housing and infrastructures, and mobility.

The European environment – state and outlook 2010: Synthesis Chapter 4: natural resources and waste

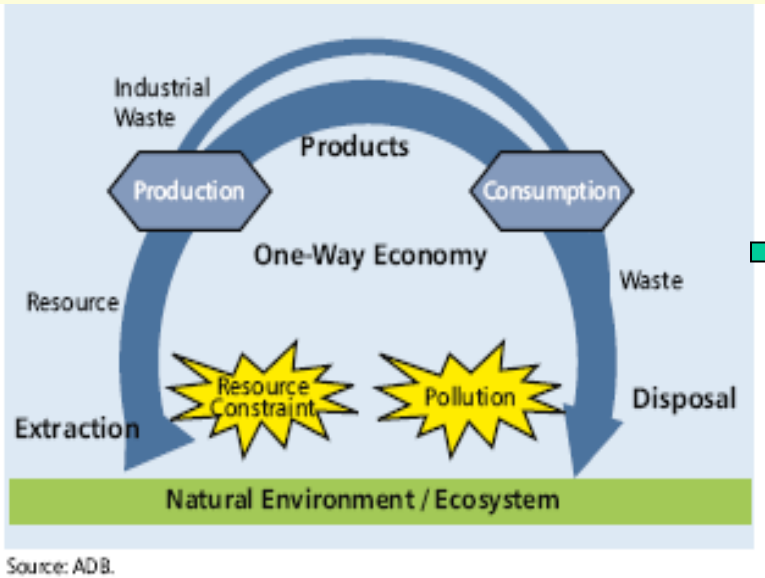
Progress and achievements on Sustainable Development Goals (SDGs) progress - 2020



(Source: UN DESA, 2020, UN Sustainable Development Goals Progress Chart 2020)

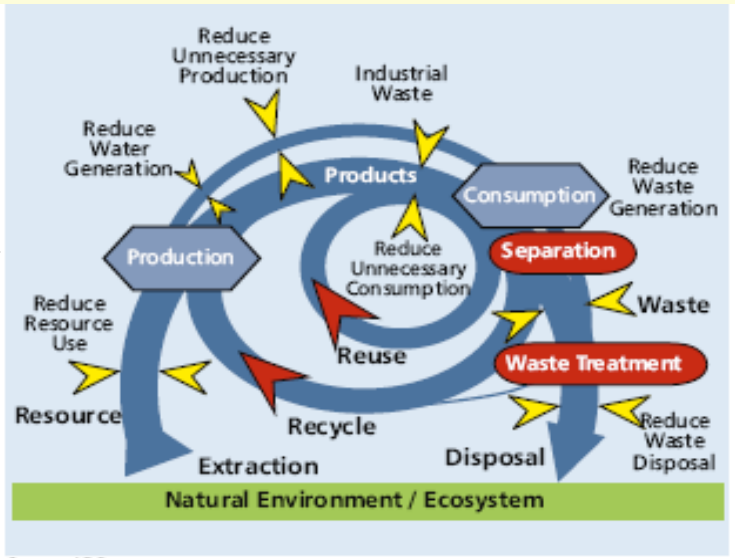
Nature of the economy => linear or one-way --> resource efficient --> closed loop economy..

1. One-way/conventional Economy



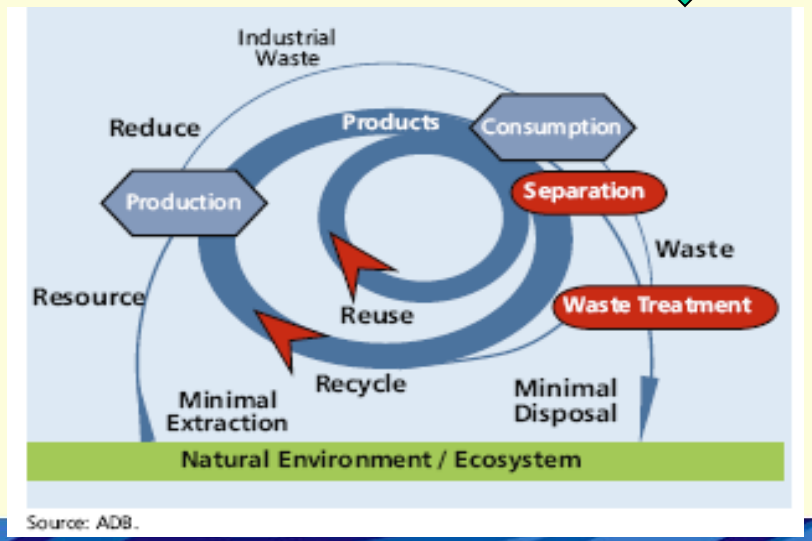
Source: ADB.

2. More resource efficient economy



Source: ADB.

3. Closed Loop Economy

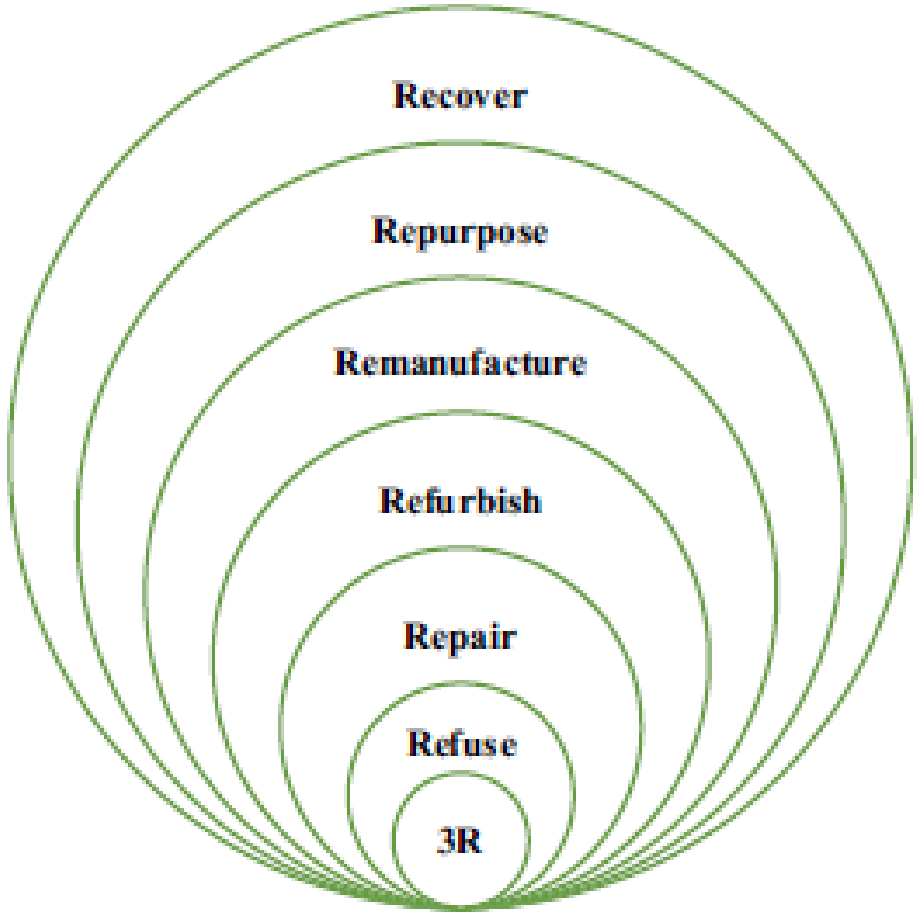


Source: ADB.

1. **one way economy** -> a little effort is made to reduce the amount of materials consumed in production and hence the wastes are produced. Also little effort is made to reuse or recycle those wastes which mainly go for landfill.
2. **greater resource efficiency** -> by reducing economy wide consumption and waste of materials, and by reusing and recycling waste/byproducts minimize (per unit of product or services) – quantity of input raw material/energy /water as well as pollution /emission/environmental impact of the residual materials flow that flow to disposal sites.
3. **closed-loop economy** -> nearly all waste/outputs either become inputs to other manufacturing processes or are returned to natural systems as benign emissions rather than as pollutants.
4. Environmental Impact = f (p, c, t)

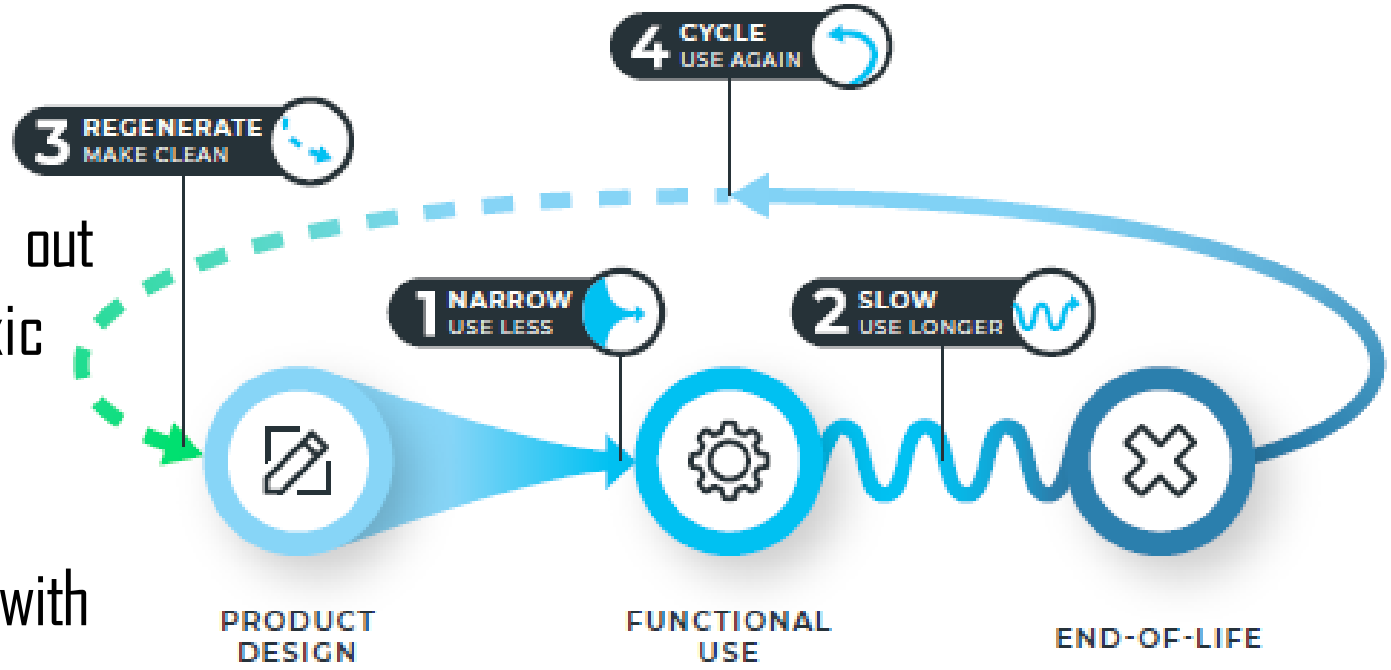
Circular Economy Framework

i. Reduce: reducing the use of raw materials;
ii. Reuse: product reuse (second-hand, sharing of products);
iii. Recycle: processing and reuse of materials;
iv. Refuse: preventing the use of raw materials;
v. Repair: maintenance and repair;
vi. Refurbish: refurbishing a product;
vii. Remanufacture: creating new products from (parts of) old products;
viii. Repurpose: product reuse for a different purpose; and
ix. Recover energy: incineration of residual flows



https://doi.org/10.1007/s43615-023-00302-0

THE KEY LEVERS TO TRANSITION TOWARDS A CIRCULAR ECONOMY



Regenerate strategies phase out hazardous or toxic materials and processes and substitute them with regenerative biomass resources.

Narrow strategies reduce material and energy use.

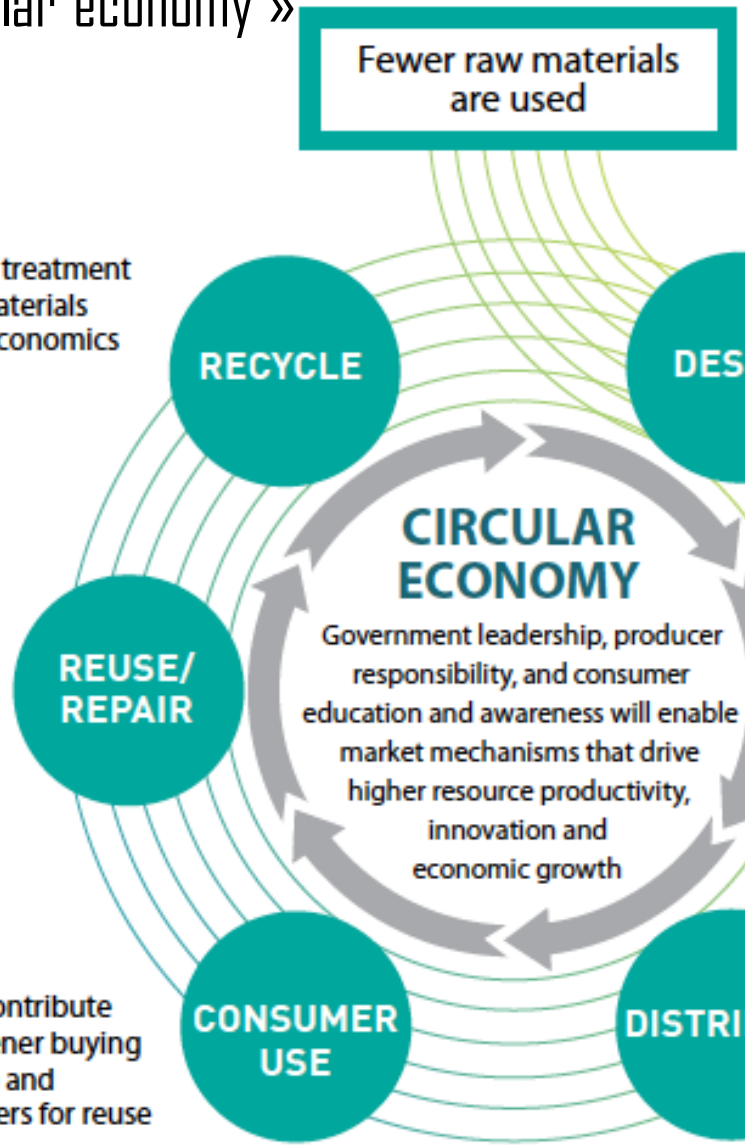
Cycle strategies aim to cycle and reuse materials at their highest value: they maximise the volume of secondary materials re-entering the economy, ultimately minimising the need for virgin material inputs and therefore also narrowing flows.

Slow strategies aim to keep materials in use for as long as possible, for example through design for durability and repairability.

Mainstreaming Circular Economy – Role of Key Stakeholders

A linear « make-use-dispose » process to « circular economy »

- ✓ Government leadership
- ✓ Producer responsibility
- ✓ Consumer education and awareness



Improved, cost-efficient collection and treatment systems will lead to fewer and fewer materials ending up in landfill and support the economics of circular design

Products and packaging are designed to last longer and be more durable, using more sustainable materials that can be easily recycled at end-of-life

Producers are fully responsible for recovering materials from their products and packaging throughout their lifecycle

Businesses collaborate and coordinate across sectors to reduce greenhouse gas production and fossil fuel use

There are many ways consumers can contribute to a circular economy, like making greener buying choices, sharing assets (e.g., cars, tools) and repairing them or offering them to others for reuse and refurbishing

Retailers offer products that can be easily reused and refurbished, offer end-of-life take back or maintenance and repair services, and support producers in providing education and awareness to consumers

Source: Takamura presentation-11th Regional 3R and CE Forum 2023

Maldives 3R Forum - 3R AS AN ECONOMIC INDUSTRY TOWARDS RESOURCE EFFICIENT & ZERO WASTE SOCIETY

R & D/Engineering

Energy Efficiency

Energy service companies (energy audit, energy efficient system design /equipment manufacturing, specialty engg. services, etc.

Nano tech market : more than US$1 trillion

Green Chemistry & Nano Technology

- cosmetics, baby lotion, computer chips, paints, medical equipments, etc.

Water Efficiency

- Water saving devices
- distribution efficiency
- Zero leakage,
- Waste water treatment,
- Rain water harvesting, etc.

Waste-Water-reuse for urban agriculture practices

- Water purification technologies, waste water treatment (ecological engineering: constructed wetlands for pre-treatment of urban run off water & river water)
- Distributed sewage treatment systems, etc.

Green Buildings

- Engineering, design & construction materials

Bio-economy (high value processing/conversion of biomass)

- Bio-products
- Bio-energy
- Bio-Engineering
- Landscape trimming, etc.

Synthetic fibers/oil, bioplastics, materials from fiber by-products, composts, animal feeds, bio-chemical

Resource Recovery/3R

Sustainable Transportation

- ITS, IFS, BRT, Railways, walkways & bicycle ways
- Fuel efficiency measures
- Vehicle I/M
- Alternative fuels,
- PPP for urban transport. etc.

Sustainable Farming Support Companies

- Efficient water & nutrient management system
- Water & nutrient delivery system
- Biomass energy company
- Energy efficient cultivating, harvesting, hauling equipment
- Compost industry (e.g. Dhaka Community-based Composting System)
- Roof top agriculture (urban greening) for food security

CH4 & fertilizer from animal manure /sewage sludge with anaerobic or aerobic digesters, refused-derived fuel (RDF), etc.

Urban Services and Supplies

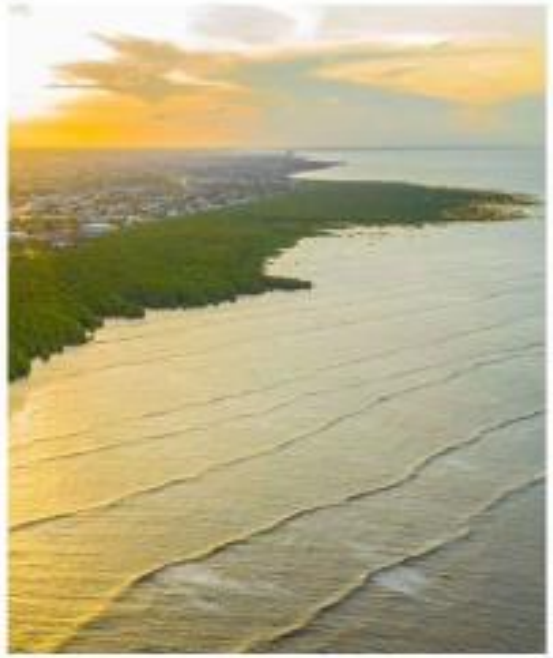
Bioeconomy in Asia

A study conducted under UN FAO's work on bioeconomy found that:

- Countries in Asia are rich in biological resources and offer opportunities for bioeconomy development.
- Understanding the bioeconomy landscape is crucial for effective strategies.
- Harmonizing policies and integrating incentives and funding is necessary for effective bioeconomy development.
- Implementation mechanisms include dedicated investment platforms, co-financing to increase feasibility, collaborative mechanisms to absorb risk - feedstock guarantees.
- The sustainability trade-offs, environmental factors and competition with other uses are not entirely clear.
- Need for thorough monitoring to address sustainability in socio-economic and environmental aspects.

Source: Marta Gomez San Juan Presentation-11th Regional 3R and CE Forum 2023

Nature based Solutions (NbS)



Nature-based solutions

Nature-derived solutions

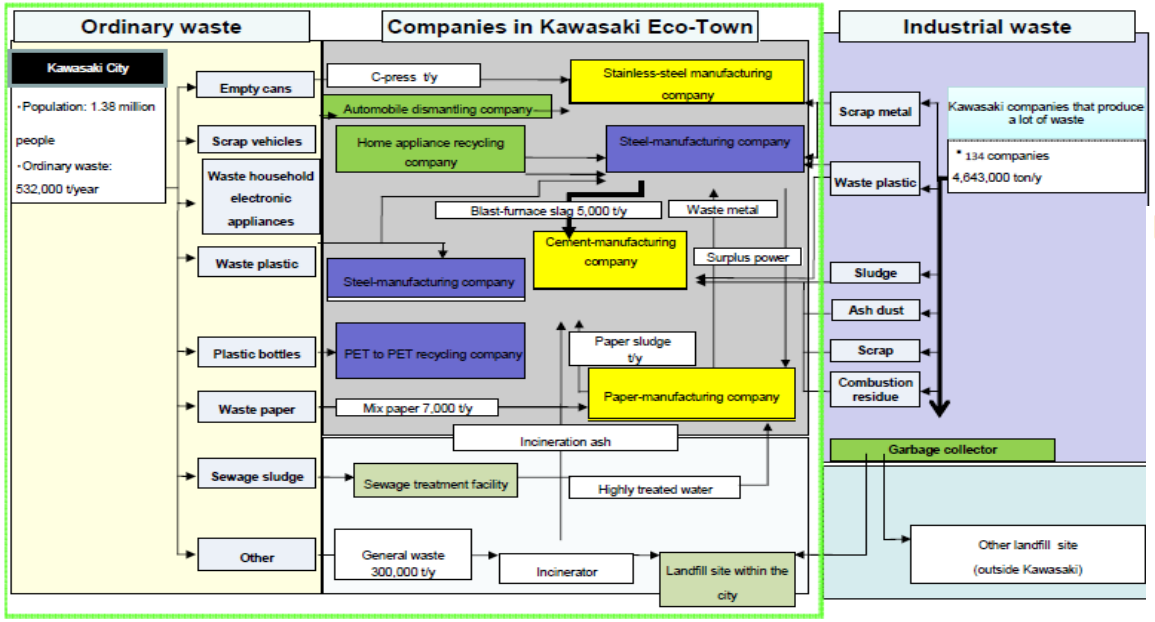
Nature-inspired solutions

> NbS are often described as 'no-regret' options, providing benefits to people in a range of scenarios

> Nature-based Solutions have a vitally important role to play in addressing both the causes and consequences of climate change

Source: International Union for Conservation of Nature (IUCN)

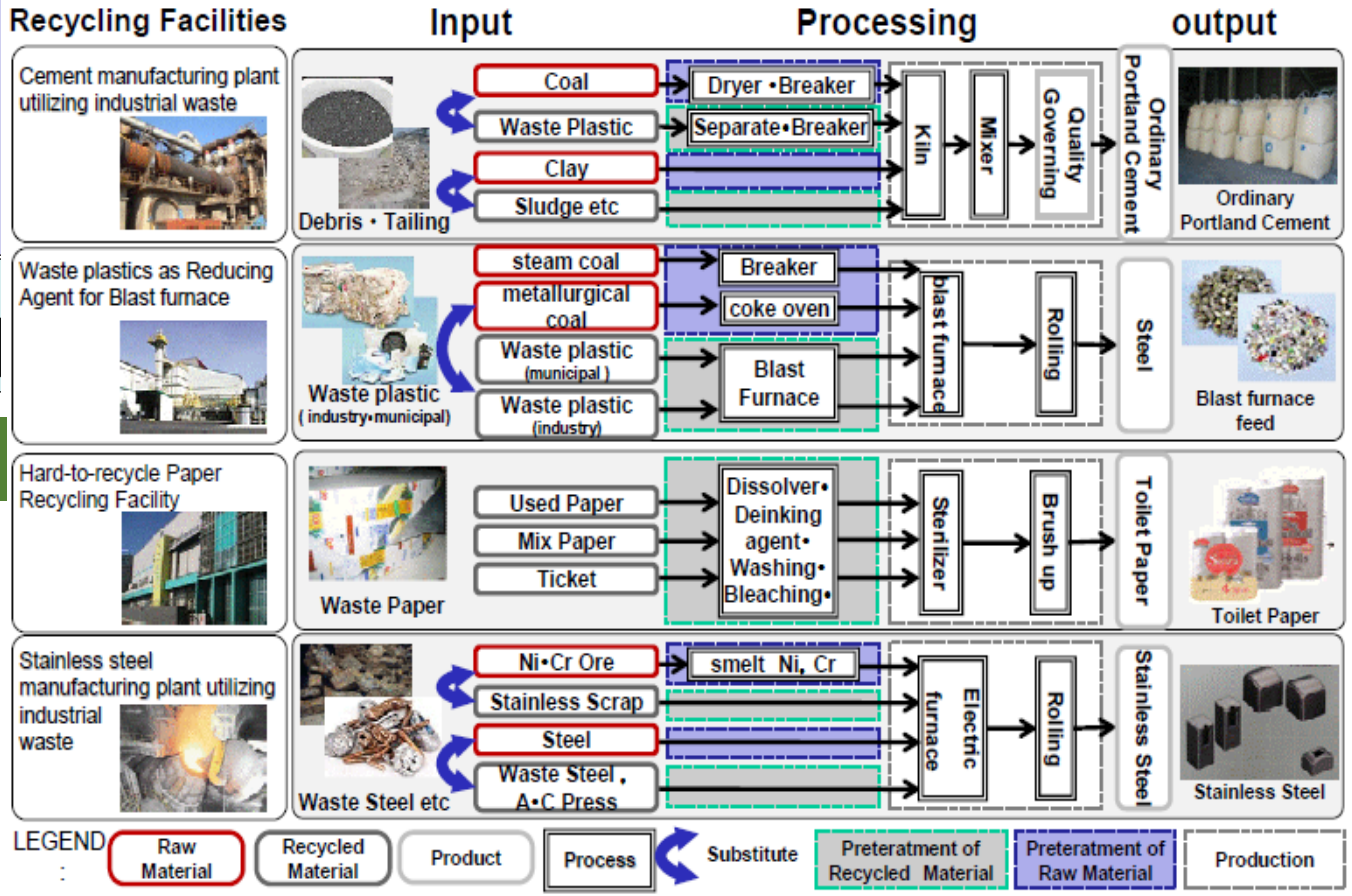
Example: 3R as an economic industry -> Kawasaki Eco-Town where economy and environment are integrated not to create only sustainable business opportunities, but also promote a strong science-policy-business interface..



Key Features of Kawasaki Eco-Town

1. revitalization through environmental technologies accumulated in traditional industries
2. Industrial symbiosis through a regional network for resource reuse/recycling
3. local private companies take their own initiative in environmentally sound business operations and contribute to preventing local and global environmental pollution.
4. strong collaboration between R&D industries and private companies on environmental technologies
5. international cooperation in technology transfer

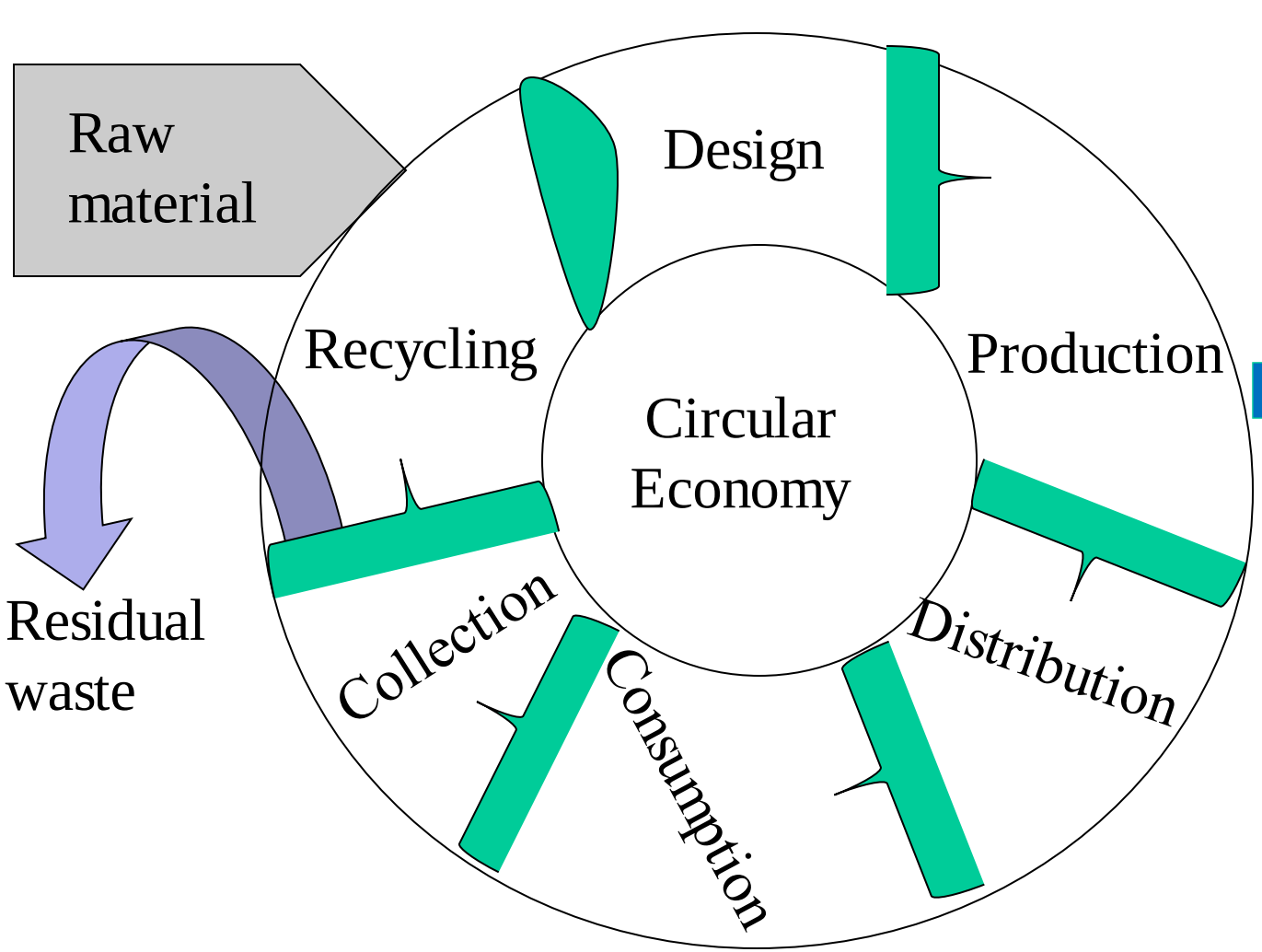
Formation of a Regional Network for Resource Recycling

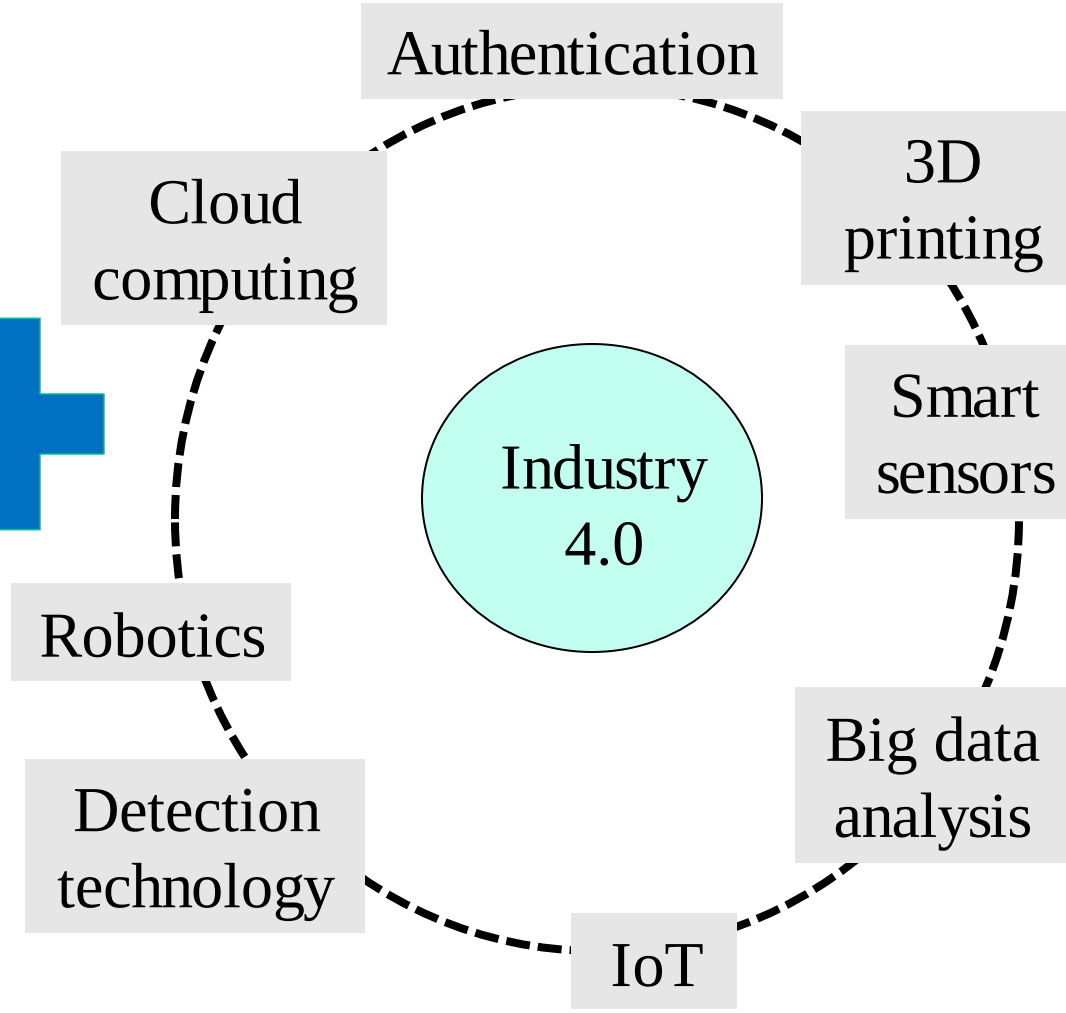


Quantified material accounting for Symbiosis in Kawasaki

Source: SABURO KATO, Special Advisor to the Mayor of Kawasaki for International Environmental Policy, President of Research Institute for Environment and Society
http://nett21.gec.jp/Ecotowns/data/et_b-kawasaki.html R.V. Berkel and T. Fujita et. al. ; Environmental Science & Technology(2009

Integrating Industry 4.0 and Circular Economy





The new set of diverse and complex set of technologies are crucial for promoting transition to circular economy at a higher level

Adapted from: 8th Regional 3R Forum, presentation circular economy and 4.0 industry

Japan's Action to Facilitate 3R
"Circulating and Ecological Economy" and "Society 5.0"

	"Circulating and Ecological Economy"	"Society 5.0"
Energy	**Autonomous Distributed Energy System** • Locally-produced and locally-consumed energy • Inter-regional accommodation	• Smart grid by making full use of big data, AI, and IoT (Network-type energy system resilient to disaster)
Disaster Prevention	**Disaster-Resilient Community** • Avoiding and mitigating impacts from climate change (adaptation)	• Advanced and prompt disaster prediction using remote-sensing, IoT, and AI • Communication enhancement by digitization
Mobility	**User-Friendly Transportation System** • Safe and convenient • Appealing	• Seamless/optimization transfer and logistics using traffic information, big data and AI • Provision of safe and comfortable automatic traveling mobility
Lifestyle	**Lifestyle of Harmony with Nature** • Communities in harmony with the water cycle • Shift to experiential consumption	• Provision of comfortable housing and service using big data based on living needs • Smart agriculture using remote sensing, IoT, automatic traveling, etc.

Source: Ministry of the Environment, Japan

Plastics issue – vast implications on coastal and marine environment

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- Up to 8 million tons of plastic waste ends up in the ocean each year; by 2050, there could be more plastic in there than fish.
- Plastics carry hazardous chemicals in marine environment (e.g., PCBs)
- More than 200 species of animals are known to have ingested plastic debris, including birds, fish, turtles and marine mammals.
- Transfer of chemicals from ingested plastics to biological tissue has been confirmed (bio-magnification).
- Micro-plastics (size < 5 mm) in coastal and marine environments is a critical problem, including bio-accumulation of hydrophobic persistent organic pollutants (POPs) like PCBs, DDTs, HCHs and others from the plastics through ingestion or food-chain (fist to fish and fish to people),

(Source: Prof. Hideshige Takada and 6th Regional 3R Forum in AP, 2015)

Source: http://surfingindia.net/

Source of photos: UNEP, http://www.unep.org/regionalseas/marinelitter/publications/gallery/default.asp

UNCRD/UN DESA High-Level Regional 3R and Circular Economy Forum in Asia and the Pacific

Aligned with SDGs, UNCRD 3R & CE initiative calls for lasting supply security of resources as the basis for sustainable development. It aims to provide a policy framework to implement 3R & resource efficiency measures to achieve circular economic development – an alternative economic growth model which is not at the expense of finite natural resources and ecological assets, rather regenerative. UNCRD's 3R & circular economy initiative brings up both the policy, scientific & research community & private sector to convene on an annual basis the high-level Regional 3R & Circular Economy Forum in Asia-Pacific to strengthen the science-policy interface in addressing 3R & resource efficiency as the basic for economic growth, pollution prevention and strengthening resilience of cities & communities, and after all, to achieve the international agendas & agreements – SDGs, Paris Agreement, NUA, among others.

Ministry of the Environment Japan

1st Japan 2009 → 2nd Malaysia 2010 → 3rd Singapore 2011 → 4th Vietnam 2013 → 5th Indonesia 2014 → 6th Maldives 2015 → 7th South Australia 2016 → 8th India 2018

- 1st Japan 2009 → Tokyo 3R Statement
- 3rd Singapore 2011 → Singapore Recommendation
- 4th Vietnam 2013 → Ha Noi 3R Declaration (2013-2023)
- 5th Indonesia 2014 → Surabaya 3R Declaration
- 6th Maldives 2015 → Male 3R Declaration
- 7th South Australia 2016 → Adelaide 3R Declaration on Circular Economy
- 8th India 2018 → Indore 3R Declaration on Clean Water, Land, Air in Cities

9th Thailand 2019 → 10th Webinar 2020 → 11th Cambodia 2023 → 12th Vietnam 2024

- 9th Thailand 2019 → Bangkok 3R Declaration Towards Prevention of Plastic Waste Pollution through 3R and Circular Economy
- 12th Vietnam 2024 → New 3R& CE Declaration (2024-2034) expected to be adopted at 12th Forum in 2024

SUSTAINABLE DEVELOPMENT GOALS

IPLA – a SDG Partnership

Partnership is key to expand waste management services of local authorities that lack resources, institutional capacity, and technological know-how…

- **Partnerships** offer alternatives in which governments and private companies assume co-responsibility and co-ownership for the delivery of solid waste management services. Waste disposal is expensive – financially and in lost resources (substantial inputs of labour, material, energy, land resources for land filling, etc.)
- **Partnerships** combine the advantages of the private sector (dynamism, access to financial resources and latest technologies, managerial efficiency, and entrepreneurial spirit, etc.) with social concerns and responsibility of the public sector (public health and better life, environmental awareness, local knowledge and job creation, etc.).
- **Partnerships** (PPP) are indispensable for creating and financing adaptation measures towards resilient cities which in turn are more attractive for private investments.
- **Partnerships** provide win-win solutions both for the public utilities and private sector—if duly supported by appropriate policy frameworks. Such partnerships could lead to savings in municipal budgets where waste management usually consumes a large portion. The private sector, on the other hand, may use this opportunity to convert waste into environmentally friendly products and energy that could also serve as income generating opportunities.

IPLA

UNCRD · UN-HABITAT · Asian Institute of Technology 1959 · Griffith University · SACEP · USC · SPREP PROE · SWEEPNET

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3R and Circular Economy Policy Implementation in Asia and the Pacific

Region	Country	Circular Economic Framework	Year
East Asia	Japan	Circular Economy Vision	2020
	Republic of Korea	Framework Act on Resource Circulation	2016
	People's Republic of China	Circular Economy Promotion Law	2008
South East Asia	Singapore	Zero Waste Masterplan	2019
	Thailand	Bio-Circular-Green economy	2021
	Indonesia	Indonesia's Vision 2045	2019
	Cambodia	Circular economy strategy and action plan	2021
	Brunei Darussalam	Wawasan Brunei 2035	2020
	Regional Policy	Framework for Circular Economy for the ASEAN Economic Community	2021
		SEA Circular	2018
Oceania	Australia	National Waste Policy Action Plan 2019	2019
	Regional Policy	Cleaner Pacific 2025 Regional Waste Strategy	2016
South Asia	India has identified 11 areas for circular economy – MSW & liquid waste, scrap metal, e-waste, Li-ion batteries, solar panels, gypsum, toxic and hazardous industrial waste, used oil waste, agriculture waste, tyre and rubber recycling, end-of-life vehicles		

https://doi.org/10.1007/s43615-023-00302-0

Key Messages – a comprehensive package of strategies: for countries to integrate circular economic approach in the overall policy, planning and development, including infrastructure development, there is a need to -

a) progressively adopt and implement circular economy plans, a whole-of-value chain approach – NOTHING IS WASTE / waste as resource;
b) promote 3R as an economic industry offers competitive solutions to many environmental issues and benefits to cities and communities provided 3Rs and resource efficiency are integrated into the macro-economic development policies (e.g., circular economic policy of China);
c) promote eco-industrial parks/zones (industrial symbiosis) and regional infrastructure to support resource optimization and efficiency in industries, SMEs;
d) formulate and implement enabling policies to promote partnerships (multi-layer partnerships, PPPs), investment atmosphere to expand markets for environmental goods; moving towards zero waste societies is inherently a multi-stakeholders partnerships (e.g., IPLA)
e) divert wastes from landfill to recycling and recovery facilities; end-of-pipe waste disposal is a sunk cost;
f) drive a science, innovation and technology based culture in overall policy setting and development agendas;
g) promote networks of innovation and national innovation centers for resource efficiency;
h) promote government and international collaborative research projects in the areas of strengthening basic statistics, material flow and waste accounting and analysis, and material and waste footprint analysis and resource productivity analysis;
i) promote research and development (R&D) oriented industrial structures to address resource efficiency related problems in industry sector, including SMEs; greening the industries;
j) encourage industry-industry cooperation (so that by-products circulate fully in the local production system), green products and green consumerism, renewable energy programs;
k) promote inter-municipal or city-city cooperation to integrate different production and consumption systems in the region so that resources or by-products circulate among the industries and urban systems within the same region;
l) develop reuse and recycling infrastructure for environmentally-sound management of disaster wastes;
m) promote both horizontal (among line Ministries and agencies such as – environment, industry, urban development, public works, agriculture, mining, tourism, etc.) and vertical cooperation (between cities and national governments for circular economic development policies and programmes to trickle down from central to local level as part of urban development strategy); and
n) explore bilateral/multilateral cooperation for human resource, financing for (resilient) infrastructure development (A-A-A-A), knowledge and technical know-how, among others.