Development and Policy of Resource Circulation in Taiwan

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2 Policies and Measures for Resource Circulation

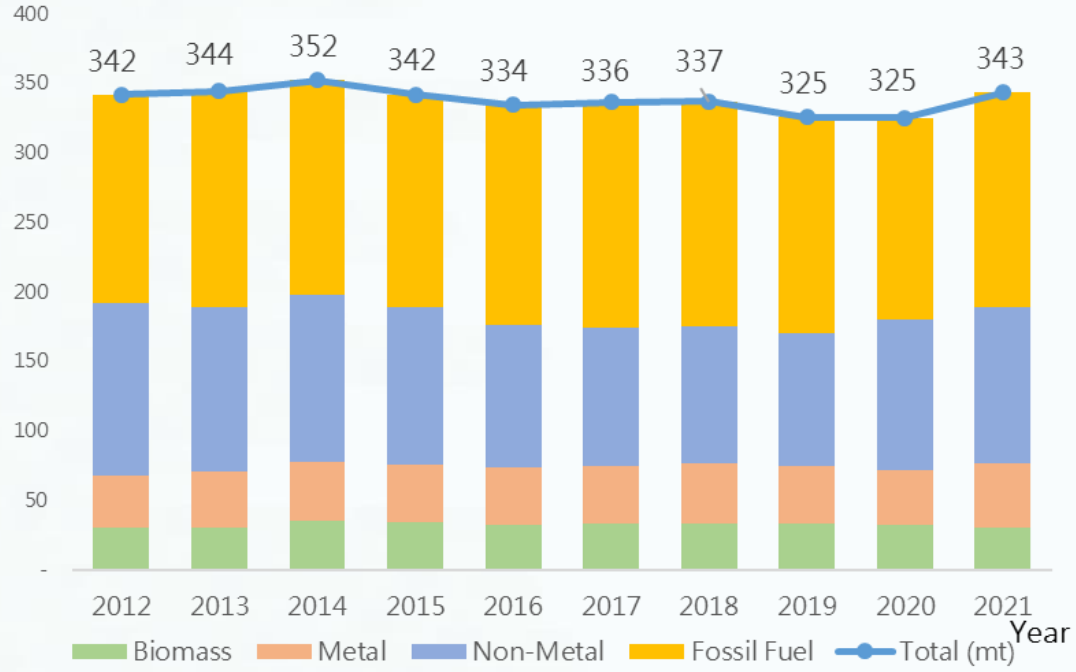
3 Key Strategy for Resource Recycling and Zero Waste

4 Future Perspectives

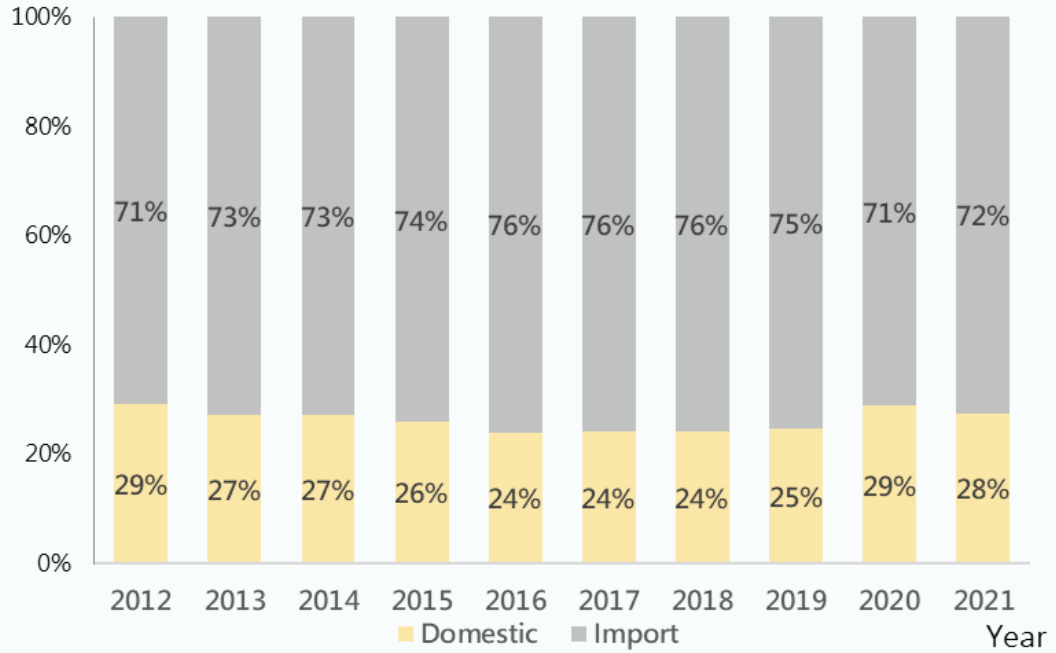
1. Background

Status Statement

- Approximately 300 million tonnes per year of materials have been utilized in Taiwan, with 70% of these being imported.
- Total domestic material consumption is more than 200 million tonnes which is equivalent to 11 tonnes per capita per year.

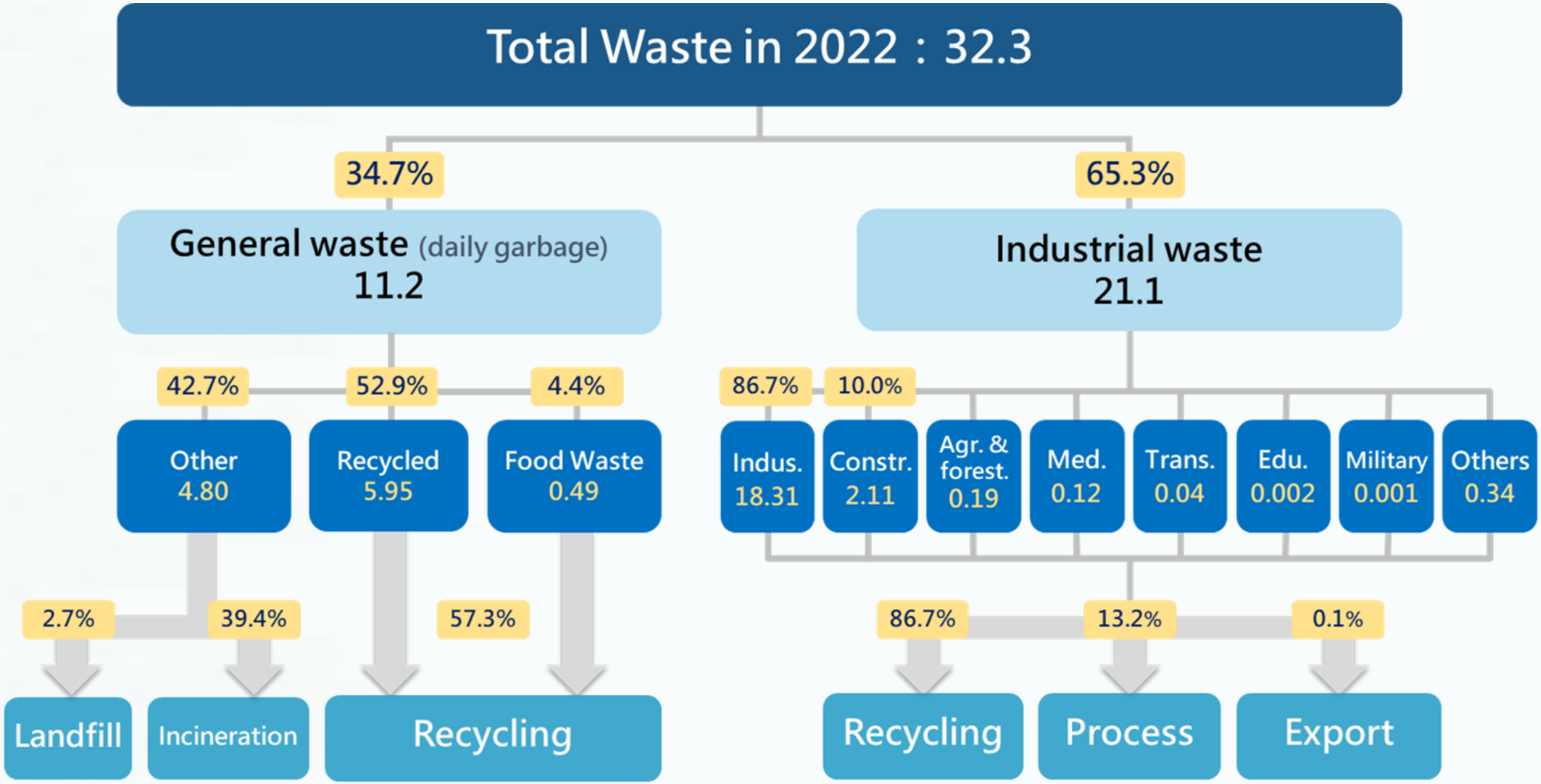


Direct Material Input from 2012 to 2021



The ratio of import and
export of raw materials from 2012 to 2021

Waste Statistics



(Unit: Million tonnes)

Resource Circulation Management Framework

Maximize
Resource Recycling

Minimize
Waste
Treatment

Incineration

Landfill

Bio-Resources

- Waste from animals and plants
- Fertilization, anaerobic fermentation, etc.

Organic Chemical Resources

- Plastics, waste solvents, oil, etc.
- Pyrolysis, gasification, purification, heat recovery, etc.

Metals

- E-waste, photovoltaic panels, etc.
- Recycled Cu and rare precious metals

Inorganic Recycled Aggregate Resources

- Furnace stones, slag, sludge, coal ash, concrete blocks/bricks, etc.
- Roadworks, urban building materials

Credit to: Professor Zu-En Zhang, National Cheng Kung University

Promote Resource Circulation Cooperation between Industries

Waste management → Secondary material market → Production

Venous Industry

Examples

Waste Plastics

Waste Inorganic Material

Waste Management Industry

- SOP
- Quality Criteria
- Guidebook

Arterial Industry

Increase people's willingness to use

Secondary Plastic Material

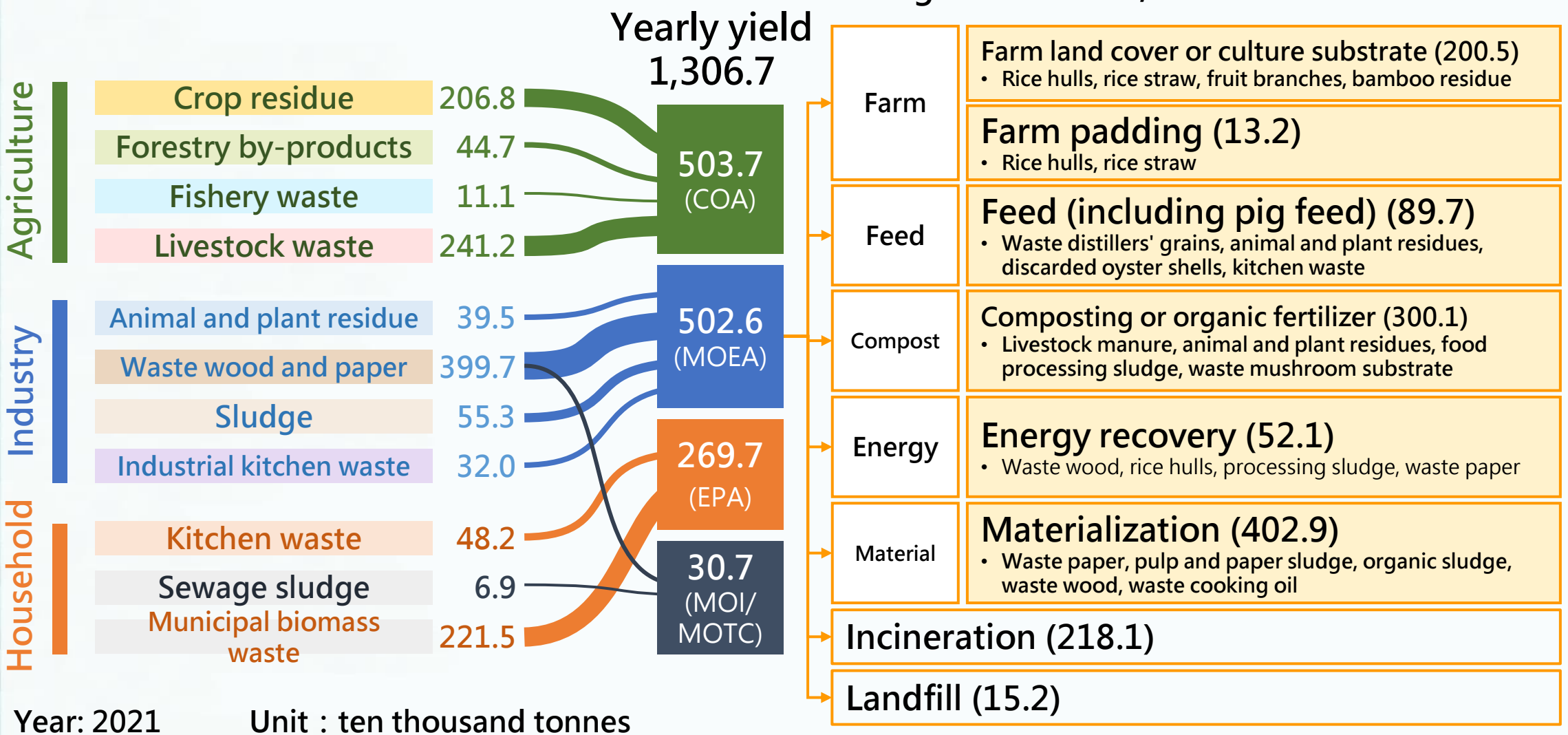
Containers

Secondary Aggregate

Engineering

Producer

Resource Inventory and Waste Flows for Biomass



Year: 2021　　Unit：ten thousand tonnes

2. Policies and Measures for Resource Circulation

Resource Circulation Policies and Measures

4-in-1 Resource Recycling Program

Ensure that participants, cleaning teams and recyclers obtain reasonable profits or rewards, thus ensuring the integrity and circularity of the recycling system.

Disposable Products Reduction at Source (Restriction of Plastics)

Restrictions on disposable products (especially single-use plastics) are becoming increasingly stringent, with the aim of altering people's consumption and lifestyle habits.

Industrial Waste Report and Management System

Promote the digital declaration and traceability control of waste, and require the installation of real-time tracking systems on waste transportation vehicles to enable continuous monitoring of their entire journey.

Key Strategy for Resource Recycling and Zero Waste

With the goal of sustainable consumption and production, enhancing resource efficiency, and implementing value-added waste management, cross-departmental strategies have been developed to achieve the vision of net-zero emission.

The Four-in-One Recycling Program

Waste Generators

◆To form community-based recycling organizations and promote the separation of waste and recyclables.

Funding Sources

◆To be funded by responsible enterprises, approximately NT 700 million / year

◆To subsidize the collection and recycling systems.

Municipal Collection System

◆To transport waste and recyclables separately.

◆Part of the revenue is given to the general public.

Private Recycling System

◆To purchase waste from the public, communities and local governments.

Financial Tools

❑ Four-in-One Recycling Fund

Implement Extended Producer Responsibility (EPR) by establishing a fund from producers' recycling fee and subsidize the recycling and disposal system and local governments.

❑ Green Modulated Fees

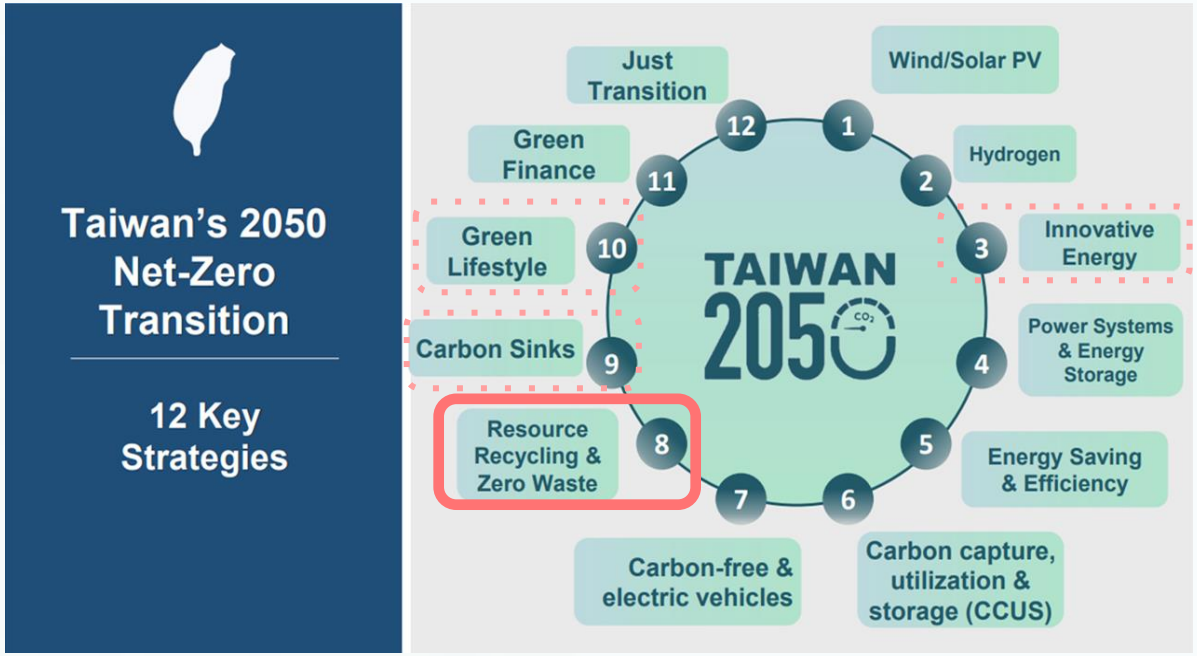
Establish a standardized operating procedure (SOP) whereby producers can receive a recycling fee discount if their products meet the criteria for green products. Encourage the adoption of circular design and commit to a roadmap for circular economy products.

❑ Resource Circulation Fund (Planning Stage)

- For resources without stable recycling & reuse value or without market competitiveness after reuse, or for resources that have the necessity of being circulated, we will designate them as articles belonging to responsible industries.
- Impose resource circulation promotion fees on the producers of these responsible objects.
- Subsidize the final users of recycled products to guide the appropriate placement of these products.

3. Key Strategy for Resource Recycling and Zero Waste

Taiwan 2050 Net Zero Emission Pathway and Strategy Overview (2022)



- Promote economic growth, stimulate private investment, create green jobs, achieve energy independence and enhance social well-being.
- Plan twelve key strategies to integrate cross-ministry resources.
- The eighth strategy is "Resource Recycling & Zero Waste".

Strategy 8 – Resource Recycling & Zero Waste

3 goals、4 strategies、10 key projects、37 implementation measures、72 actions

Overall Performance Indicators

		2020	2025	2030
Resource productivity	NTD / kg	77	90	104
Domestic material consumption per capita	tonne / capita	10.9	10.8	10.7

note：1. Resource productivity = real GDP / Domestic material consumption
2. Domestic material consumption per capita = Domestic material consumption / population

Priority Strategies

- **Green designs for waste reduction at source** - Reduce the use of virgin materials, promote circular procurement and extend the product lifespan.
- **Resource reuse and energy recovery** - Promote the conversion of waste into recycled materials, renewable energy and fertilizers.
- **Establish a well-functioning circular economy network** - Create regional circular networks or virtual industrial parks.
- **Innovative technologies and systems** - Drive the development of carbon-reducing technologies for resource circulation and integrate digital technology advancements into laws and regulations.

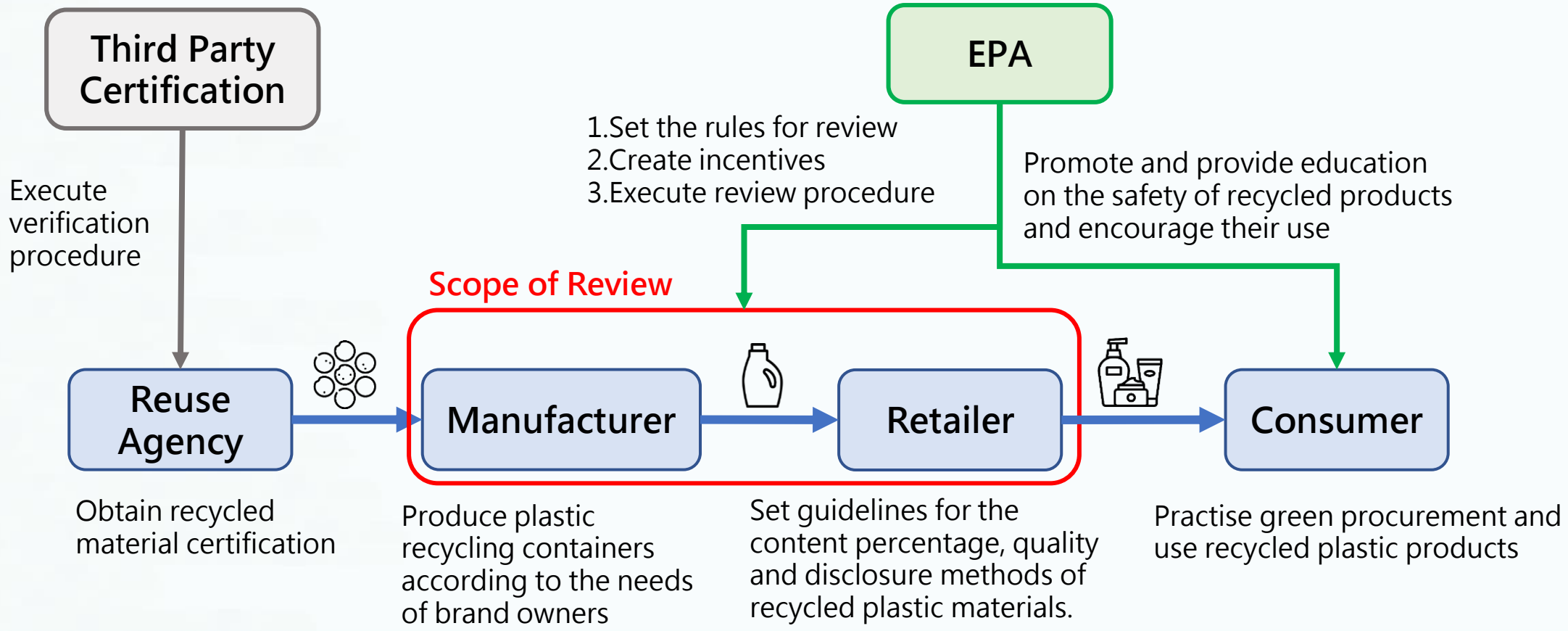
Green Design

■ Introduce the green design concept into all phases of the product life cycle to increase the circularity and sustainability and reduce the environmental impact.

Life Cycle	Green Design Principles
Product Design	Recyclable; Easy to disassemble; Durable; Energy-saving; Low-pollution
Choice of Material	Reduced amount; Single material; Secondary material; Reusable
Production	Reduce residue; Reduce waste
Package Design	Minimize weight and volume
Distribution	Low carbon transportation; Reusable boxes; Product repair for extending life
Use	Renting, not buying; Green consumption
Waste & Recycling	Efficient collection and sorting; Complete recycling system

Promote Recycled Content

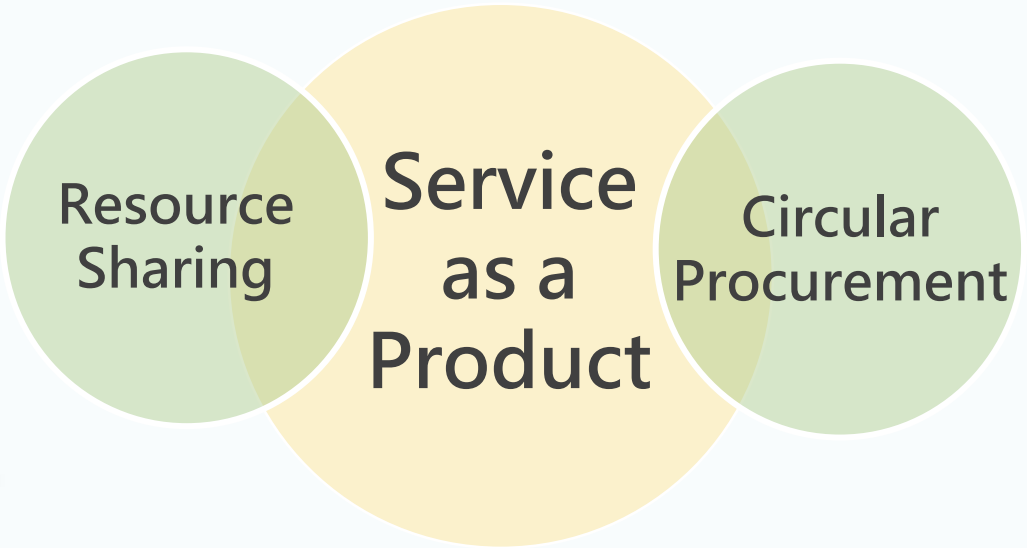
- Using recycled materials to make products reduces the need for virgin materials.
- Encourage plastic container manufacturers and retailers to add recycled materials, and those containers with a eco-label will be qualified for a recycling fee discount.



Extend the Life of Products

■ Establish a circular procurement model by implementing rental services for sustainable consumption.

- Build sharing platform
- Rent instead of buying
- Increase product utilization rate



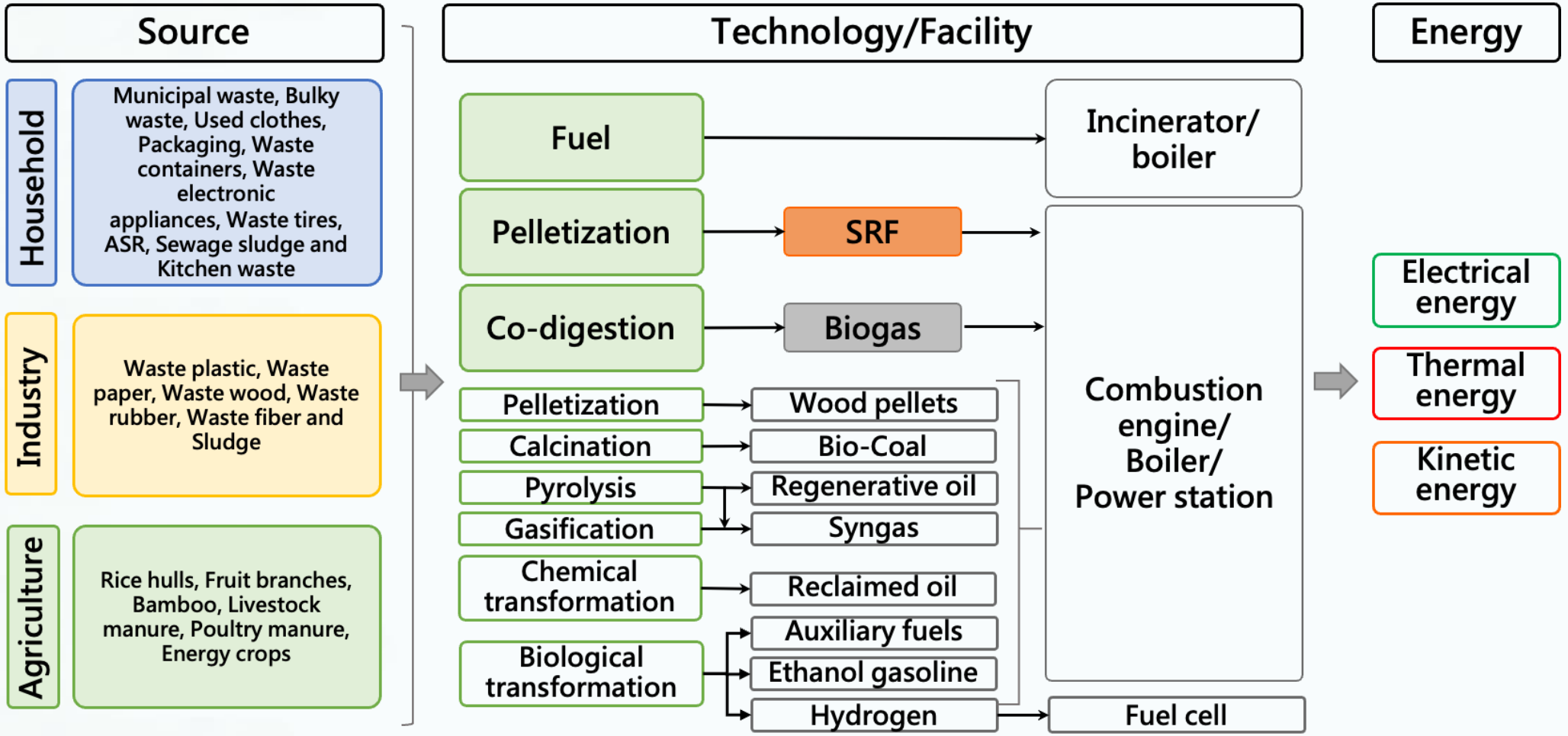
- Formulate circular procurement guidelines
- Encourage the procurement of services by the public and private sectors
- Promote new business models

Circular Village
Taisugar Company

Business computer service
Bestyield Company

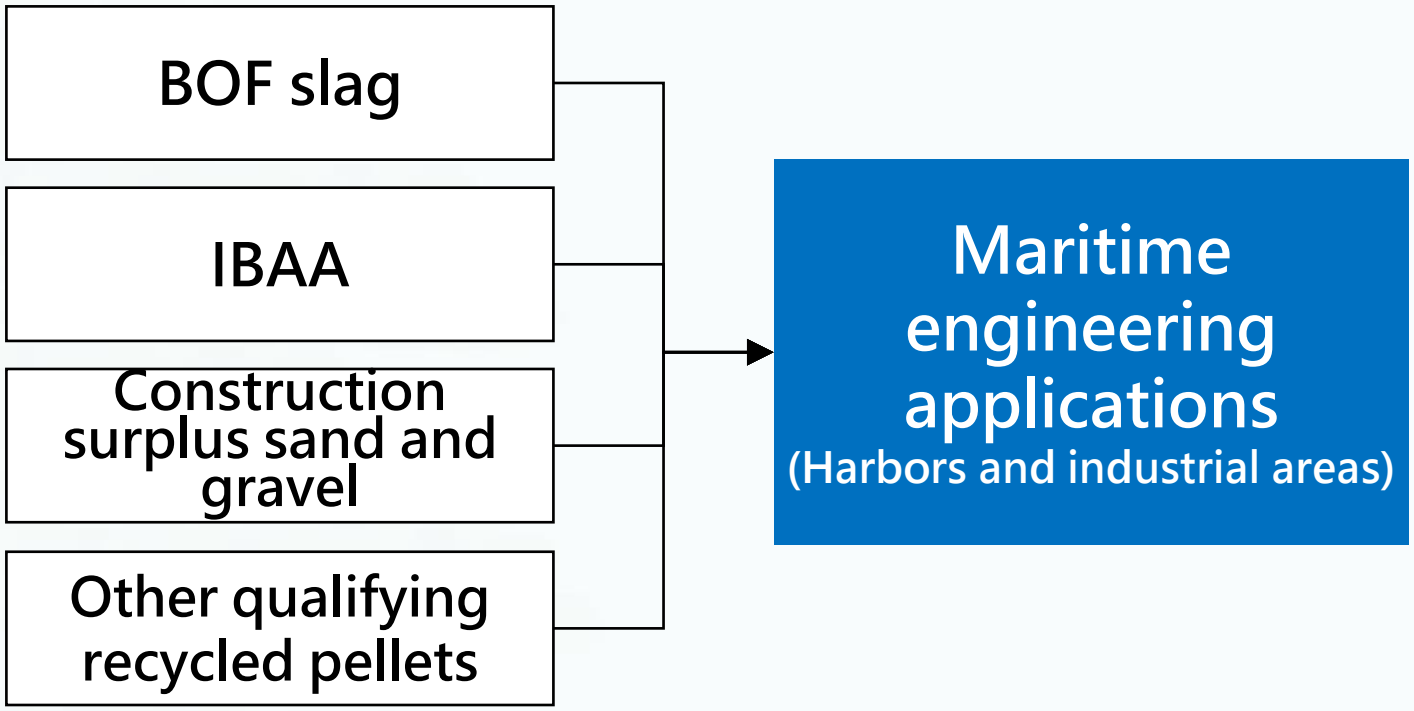
Turning Waste into Energy

- Turning organic waste or biomass into energy can effectively reduce carbon emissions.



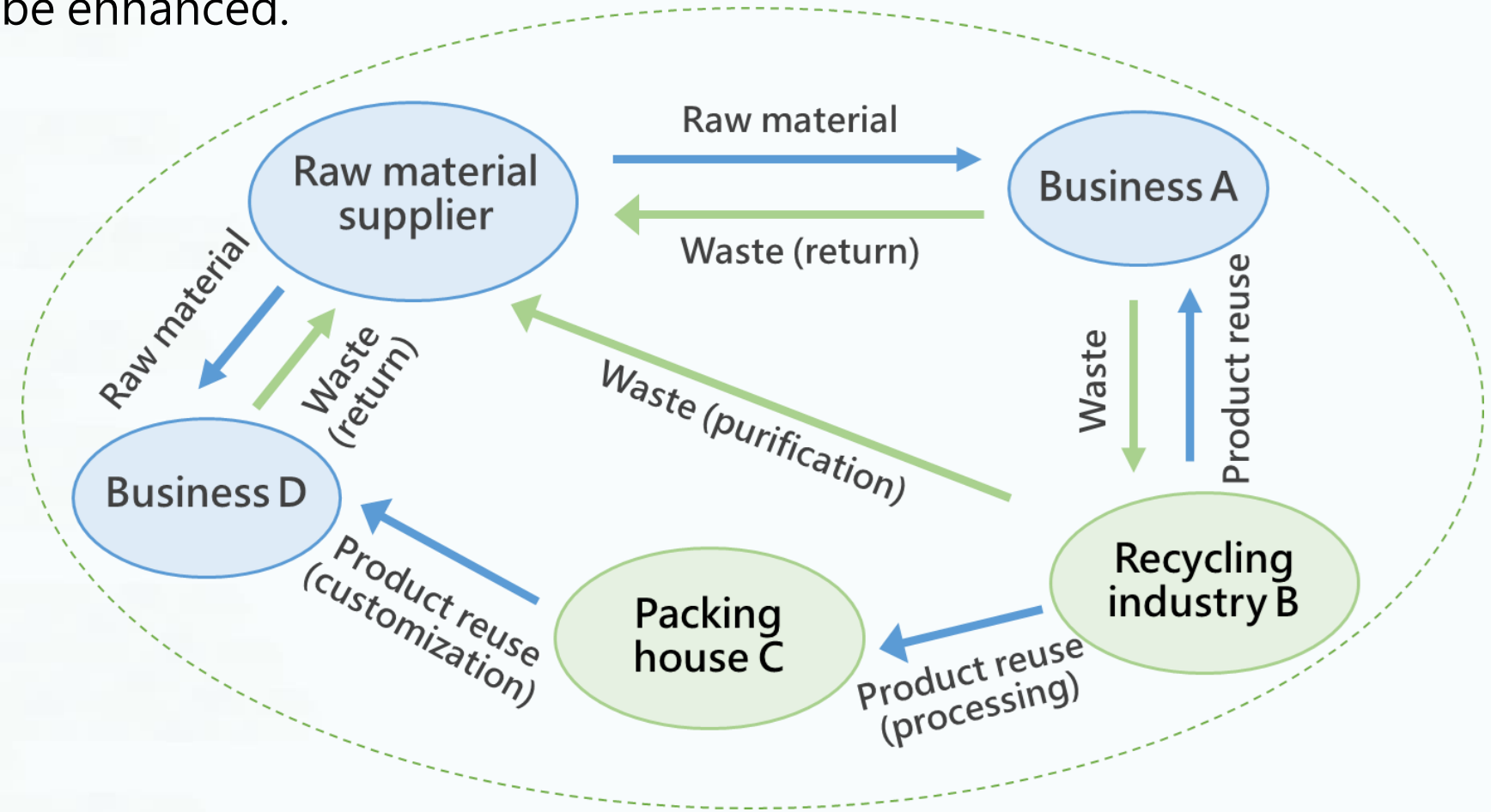
Land Reclamation for Ports

- Recycled inorganic pellets are to be used as port filling materials in a way that complies with environmental standards, purpose and location of use, and engineering standards.
- Port land reclamation locations are distributed between the northern, central and southern ports in Taiwan, and they can be used for 20 years.



Circular Net Work

- Different industries can utilize materials of different purities.
- By refining or customizing recycled products, their competitiveness in the market can be enhanced.



Product Information Disclosure

Central competent authorities

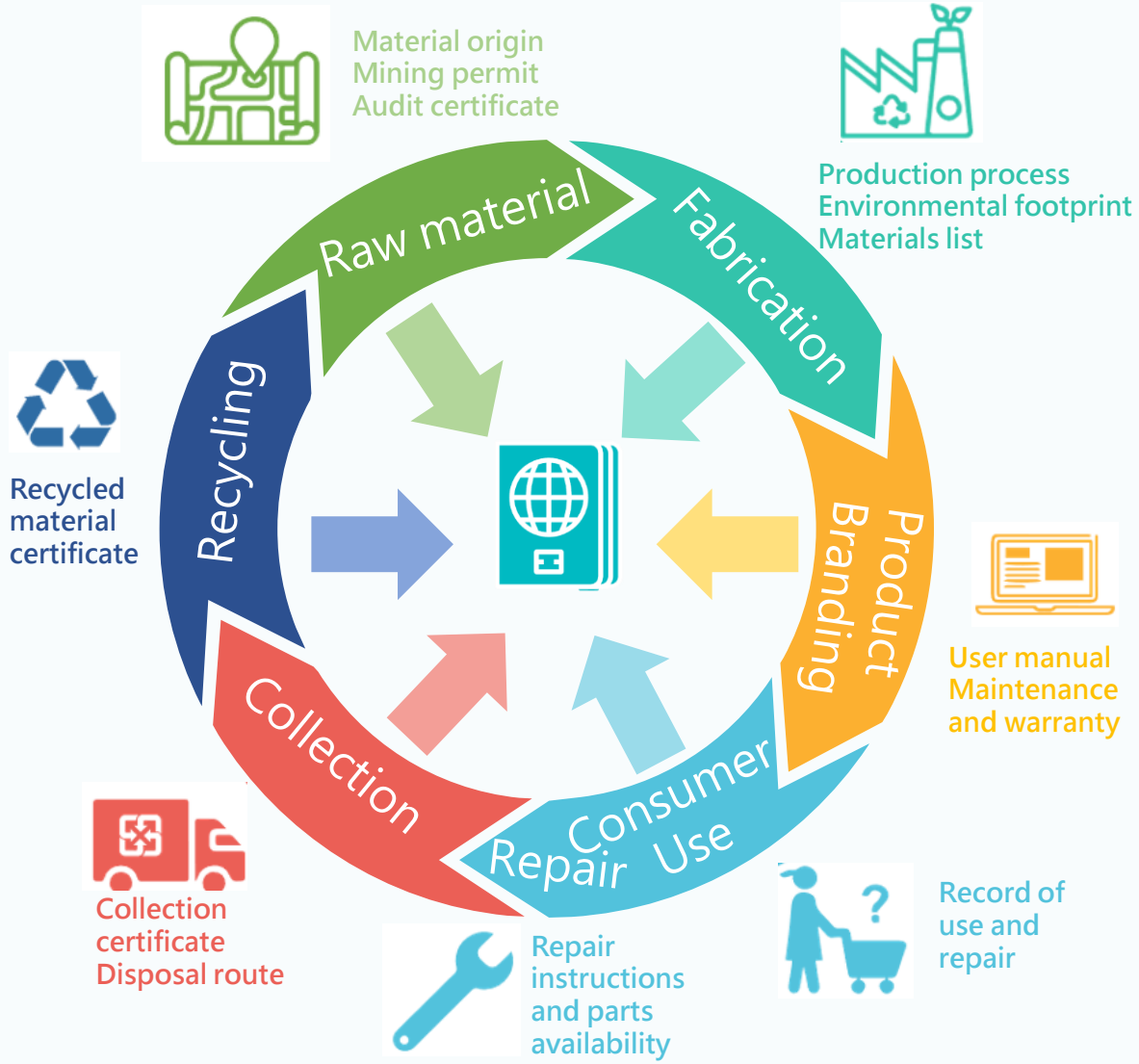
- Create a "digital product resume" to track the use of substances
- Provide product environmental information to consumers (product carbon footprint, use of recycled materials, repair, recycling, etc.)

Manufacturer

- Provide product information
- Green design, Green production

Consumer

- Obtain product environmental information
- Green consumption

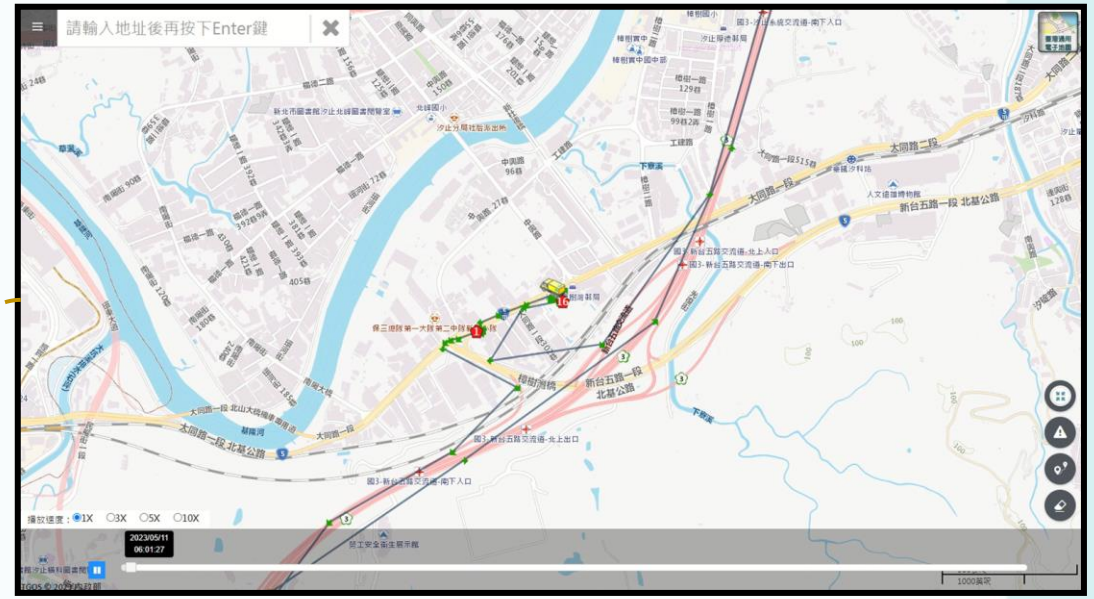


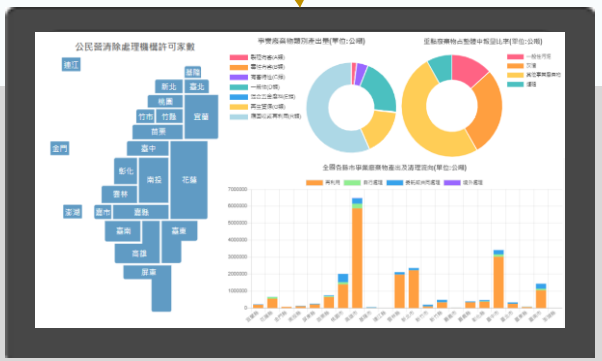
Waste Management Information System

☐ IWR & MS

- In 2000, the EPA formulated the "Industrial Waste Control Center" as well as a reporting system that controls the complete life cycle of industrial waste from generation to disposal.

☐ GPS





Waste management information system

Database of Resource Cyclical Management

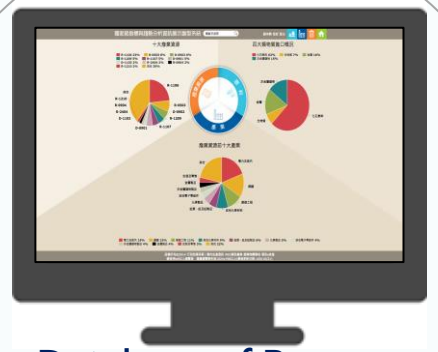
National Indicators of Material Flow

Domestic Material Consumption (DMC) ★
DMC = DMI − exported materials

2021
Domestic Material Consumption
(tonne/capita)
11.57
↑0.66

Resource Productivity (RP) ★
RP = GDP/DMI

2021
Resource Productivity
(NTD/kg)
77.99
↑1.02



Database of Resource Cyclical Management

Direct Material Input (DMI)
DMI = Domestic extraction used + imported material

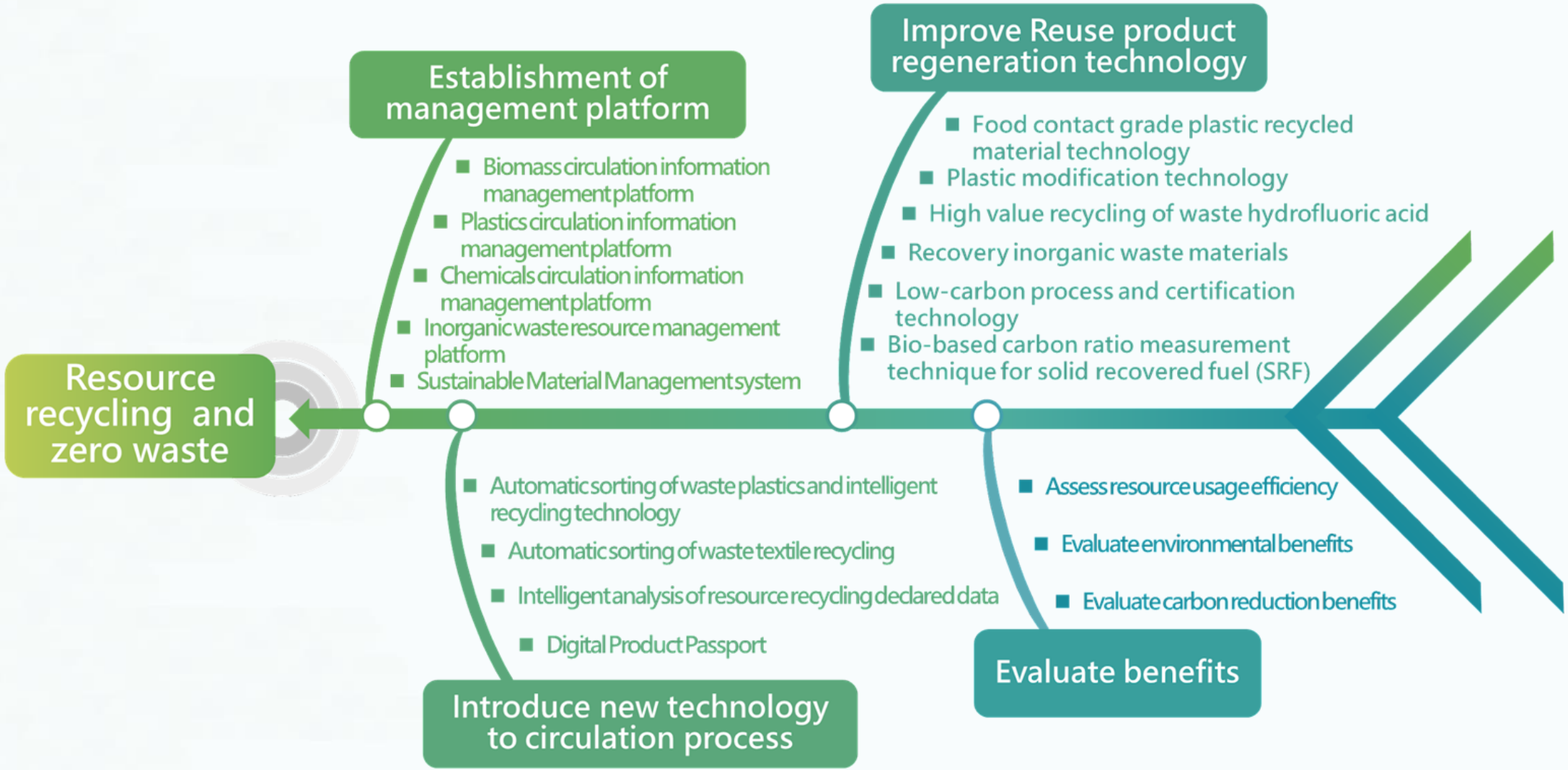
Cyclical Use Rate (CUR)
CUR = Cyclical use / (cyclical use + input of resources)

Environmental Load Density
Environmental Load Density (as Material Consumption) = DPO / DMC

Domestic Processed Output (including GHG) (DPO)
DPO = pollutants (air [including GHG] + water + solid waste)

★ Overall Performance Indicators

Resource Circulation Technology Plan

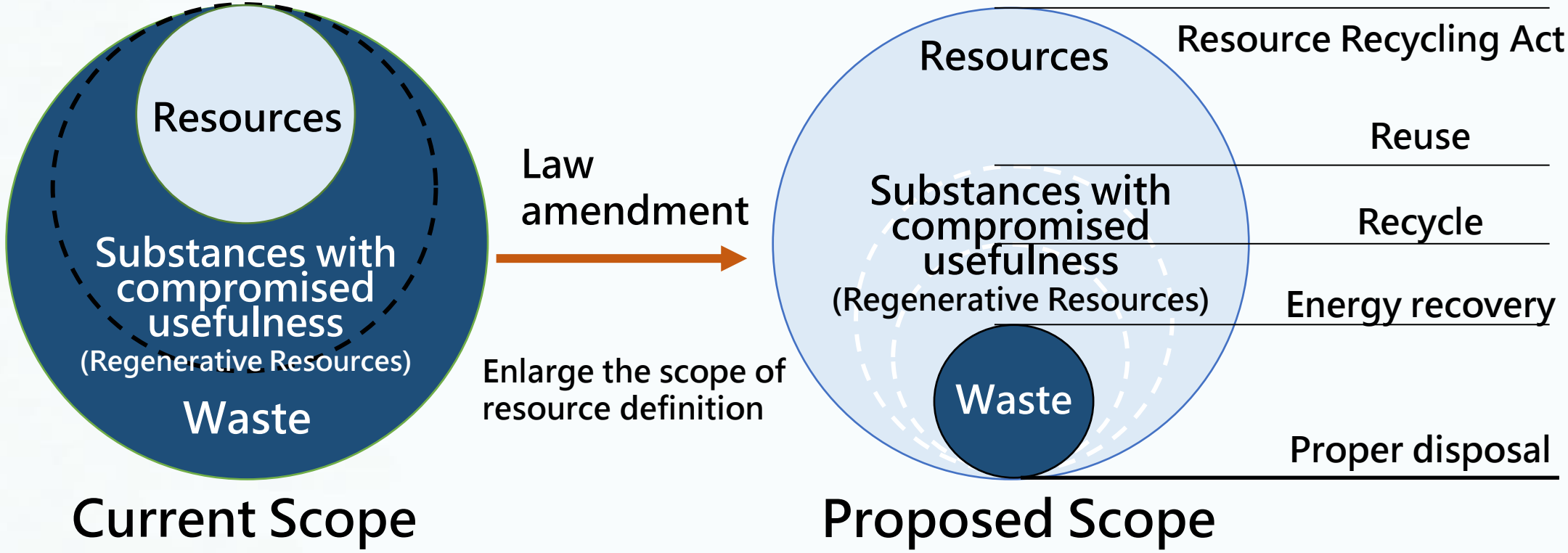


4. Future Perspectives

Legislative Proposal – Flipping the Concept of Waste Management

Maximize resource recycling and minimize waste treatment

Reduce Waste → Reuse → Recycle → Energy Recovery → Proper Disposal

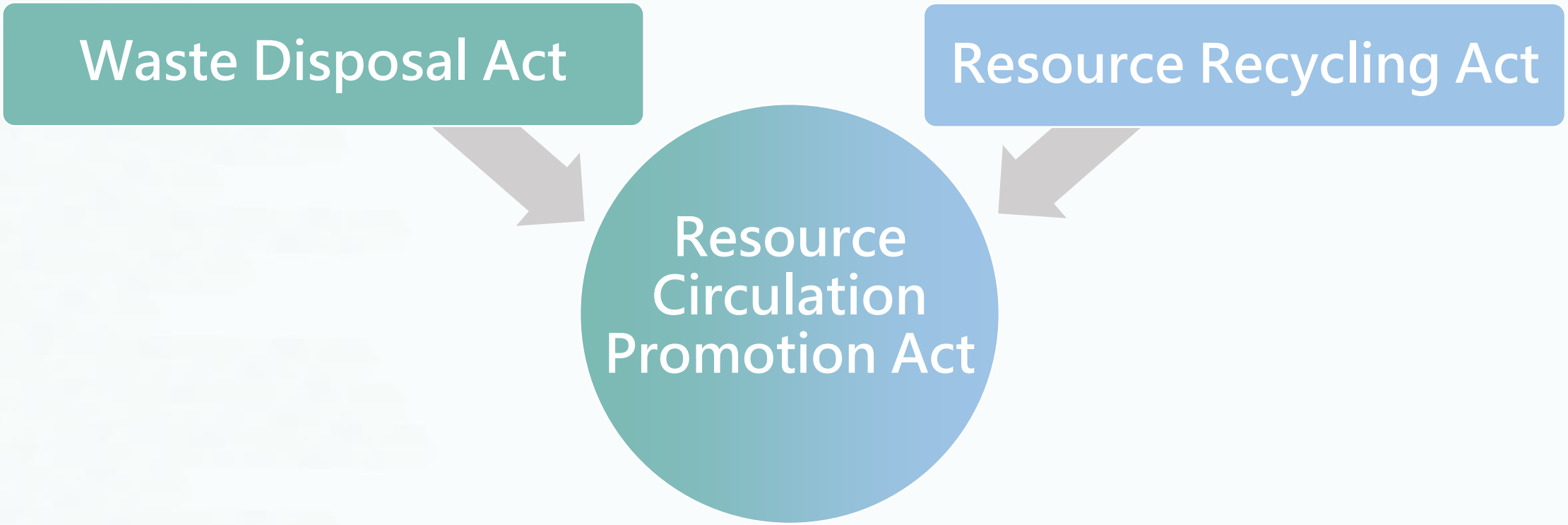


Current Scope

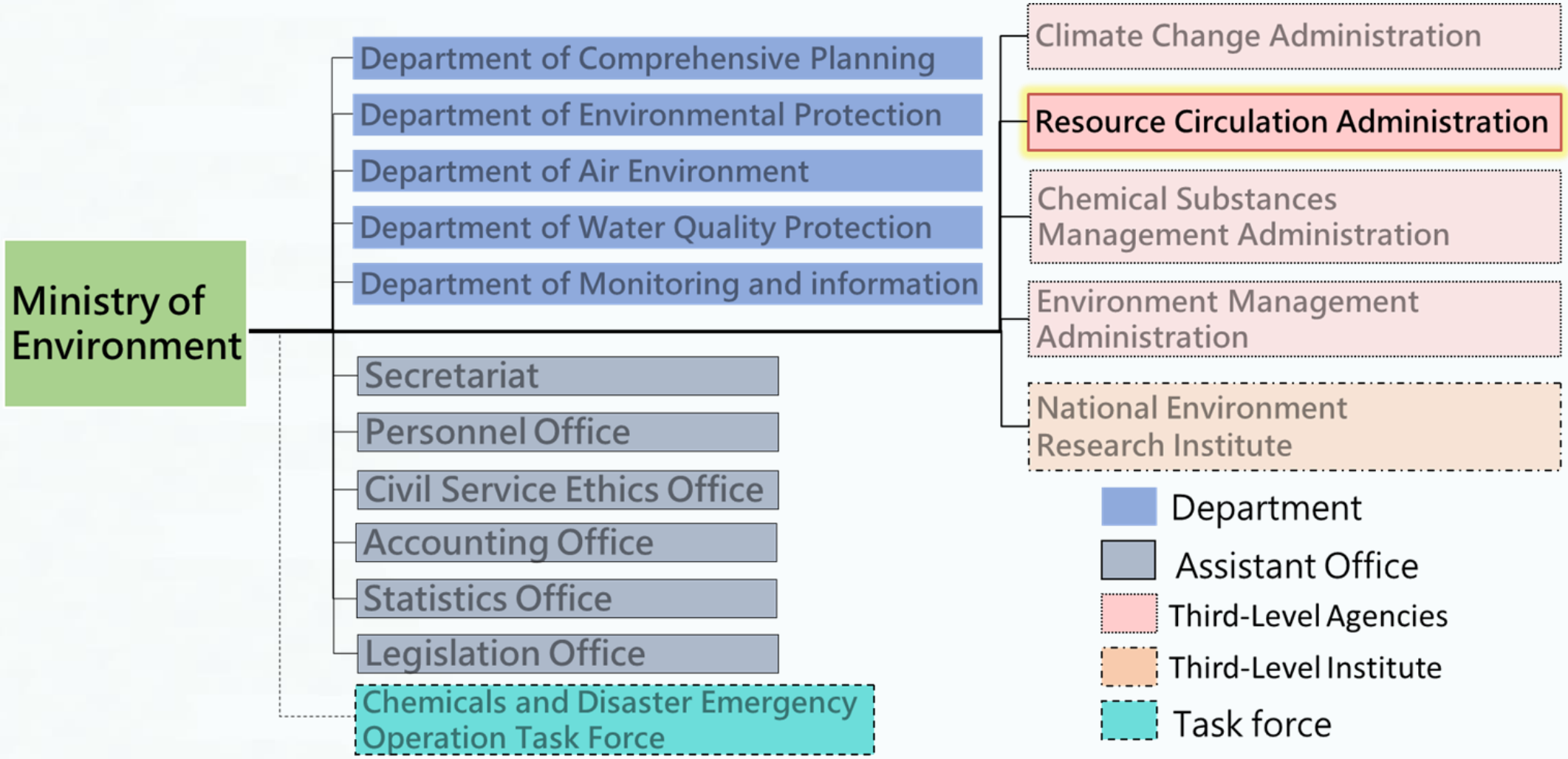
Proposed Scope

Legislative Proposal – Resource Circulation Promotion Act

- Key focuses: Green Source Management, Waste Management, Enhanced Recycling, Proper Disposal and Deterring Illegal Activities



Organizational Transformation – Establish Ministry of Environment



Resource Circulation Administration

Changing Mindset	Draft a Resource Circulation Act, execute a "Waste management and recycling action plan" and a "Resource recycling and zero waste strategy"
Organizational Integration	Integrate the Department of Waste Management and the Recycling Fund Management Board, and centrally coordinate with agencies and ministries regarding reuse management approach
Resource Circulation System	For new waste and waste requiring attention, build systematic treatment methods or systematic waste clearance or recycling models

Comprehensive Planning Office
Resource Circulation Policy Making, Net-zero strategy, Data Cloud, Legislation

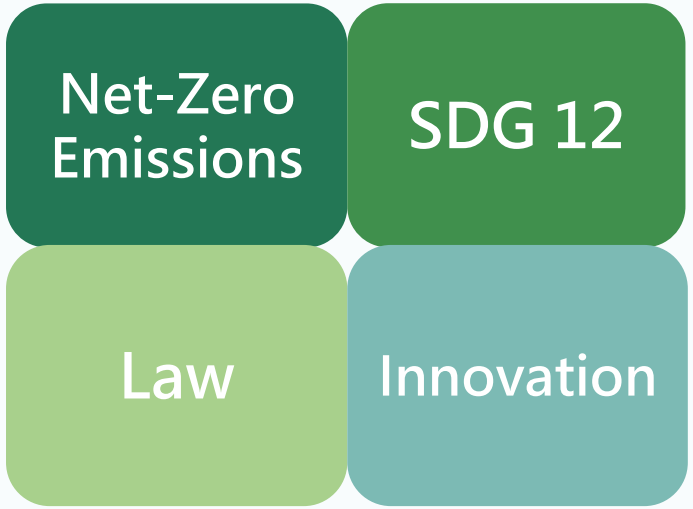
Sustainable Consumption Office
Sustainable Consumption Management, Source Reduction, Responsible Industry Management, Resource Recycling

Reuse Promotion Office
Sustainable Production, Clearance and Disposal and Import and Export, Co-organize Reuse Management, Tracking Systems

Circulation and Treatment Office
Resource Recovery Policy, Circulation of 4 Categories of Materials, Resource Treatment facilities, Resource Treatment Industry Management

Future Perspectives

- Continue to promote resource circulation and improve resource efficiency in line with net zero emission trends and policies.
- Promote green designs and circular business models to build a society with sustainable resource utilization based on the United Nations SDG 12.
- Revise regulations and develop innovative technologies; build circular networks and strengthen social communication.



Thank you for listening