Overview of Regional Circular Economy Indicators and Models

Vol.2

Circular Partners Secretariat

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*In this document, the term “circular economy” is hereinafter referred to as “CE,” except in proper nouns and quotations.

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Ch.1 : About CPs

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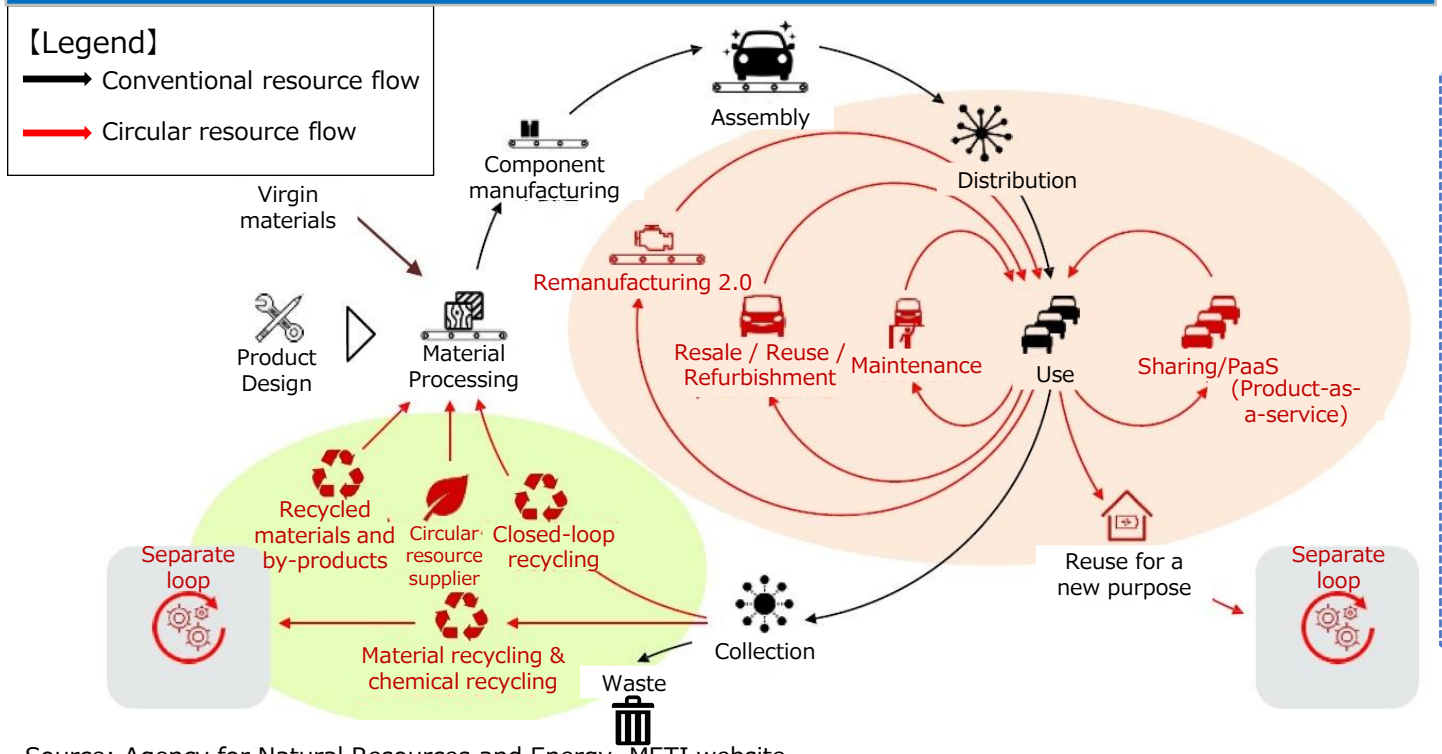
Overview of the Circular Economy

The circular economy (CE)*1 is a new economic system that aims to maximize the added value of products and services and reduce waste while promoting the efficient, circular use of resources.

- The conventional economic model has largely been linear, moving in a one-way flow from mass production to mass consumption and ultimately to mass disposal. This model places a significant burden on natural resources and the environment and poses long-term risks, including resource depletion.
- The circular economy (CE)*1 seeks **to reduce environmental impacts and expand business opportunities by keeping resources in circulation through the 3Rs and other approaches. It also promotes the longer use of products through life extension and new business models. At the same time, the local circulation of resources is expected to contribute to regional revitalization.**

Conventional Resource Flows and CE Resource Flows (Example: Automotive Industry)



Source: Agency for Natural Resources and Energy, METI website,
(成長志向の資源循環経済システム「CE」（前編）どんな課題を解決するの？｜エネこれ｜資源エネルギー庁)

<Note> The Difference Between the 3Rs and the Circular Economy

The 3Rs are **positioned as one set of initiatives for realizing a circular economy**

3Rs (Reduce, Reuse, Recycle)	Initiatives to reduce the consumption of virgin natural resources and environmental impacts by mitigating waste generation and minimizing final disposal.
Circular Economy	A broader economic system that uses resources effectively through product design, resource circulation, and business models such as sharing and resale.

*1: In this document, the term “circular economy” is hereafter referred to as “CE” (except in proper nouns and quotations).

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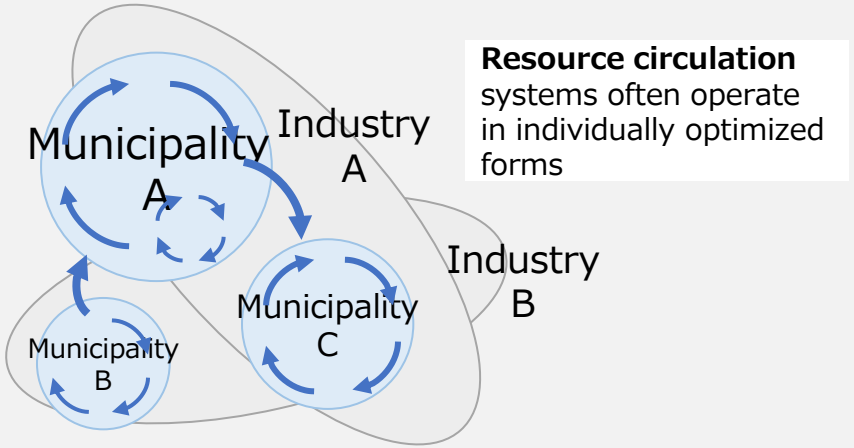
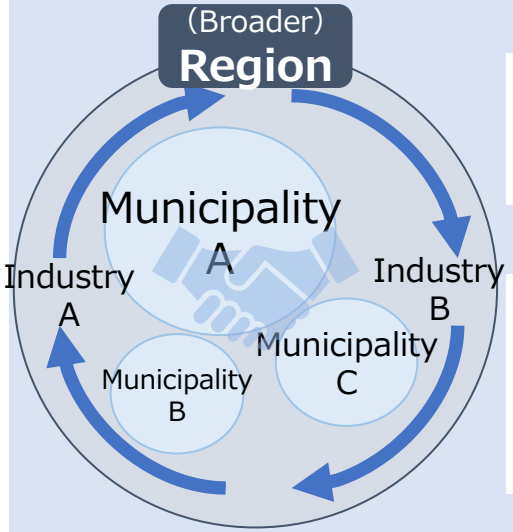
Current State and Future Vision of Resource Circulation in Japan's Regions

Resource circulation in Japan has at times remained individually optimized. To achieve overall optimization by making use of regional characteristics, new resource circulation models will be created based on the regional perspective.

	Current Situation	Future vision
Image	 **Resource circulation** systems often operate in individually optimized forms	 **Achieve overall optimization of resource circulation on a "regional" scale** **Design and implement regional circulation models that leverage the specific characteristics of each area**
Overview	■ In some regions, these systems **have not progressed beyond partial optimization** to achieve **overall efficiency and maximize resource value**. ■ Consequently, they **do not fully reflect regional characteristics**, such as industrial structure and demographic composition.	■ While **maintaining regional self-sufficiency**, resources are used and circulated across sectors in ways that **make the most of each region's strengths**. ■ To maximize resource efficiency, the goal is to shift from thermal recovery to more advanced recycling methods.

Source: Prepared by the Secretariat based on the Growth-Oriented Strategy for a Self-Reliant Circular Economy of Resources, as well as discussions held by the Study Group on Designing a Growth-Oriented Self-Reliant Circular Economy of Resources and the Subcommittee on the Circular Economy.

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Circular Economy at the Regional Level

Efforts to advance the circular economy (CE) are underway across Japan.

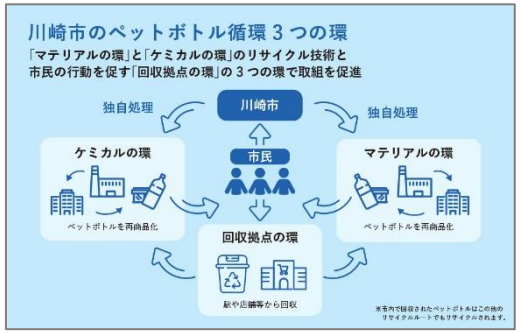
Gamagori City

Joint efforts by the city and local businesses to realize “Circular City Gamagori.”

サーキュラーシティ蒲郡 CIRCULAR CITY GAMAGORI

Kawasaki City

Collaboration between businesses and local government, leveraging the characteristics of the industrial complex, to advance the “Kawasaki Carbon Neutral Industrial Complex Concept.



Hiroshima Prefecture

Measures to address marine plastic litter through collaboration among companies within and beyond the prefecture.

2050輝くGREEN SEA 瀬戸内ひろしま宣言

Kobe City

Public-private initiatives including “KOBE PLASTIC NEXT” and “Kobe Saisei Rin,” a project to recover phosphorus from wastewater.

KOBE PLASTIC NEXT

Sources: Circular Partners official website（Circular Partners 公式サイト｜トップページ）、City of Kobe official website（KOBE PLASTIC NEXT、こうべ再生リン）

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Approach to Regional Circularity in Circular Partners

The Working Group recognizes that regional CE initiatives are important for advancing resource circulation in Japan. It aims to develop regional circular models tailored to local characteristics to support the promotion and implementation of CE in local communities.

Overview of Circular Partners (CPs)

Background		■ Circular Partners was established amid growing attention to the circular economy (CE) as a means of addressing waste-related challenges, climate change, increasing resource demand, and rising geopolitical risks, while promoting the efficient and circular use of resources and maximizing added value.
Purpose		■ A transformational shift to CE cannot be achieved efficiently through the efforts of individual municipalities or companies alone. Accordingly, the partnership was established to expand areas of collaboration among relevant stakeholders and enhance economic viability through coordinated action.
Members		■ CPs brings together stakeholders from the public, private, and academic sectors, including: ①Companies and industry associations, ②Local governments, ③Universities, research institutions, and related organizations
Working Group Activities (WG)		■ To examine the measures necessary for realizing CE through organic collaboration among relevant stakeholders ■ To promote the practical implementation of the outcomes of such discussions, primarily through CPs members
	Vision and Roadmap WG	■ This Working Group aims to formulate a national vision and medium- to long-term roadmap for realizing CE across Japan, with a view toward 2030 and 2050, in order to define the future direction of CE in Japan. It also seeks to develop visions and medium- to long-term roadmaps for individual products and materials.
	CE Information Circulation Platform Development WG	■ This Working Group aims to establish, by around 2025, a CE Information Circulation Platform to facilitate the circulation of data, thereby promoting the visualization of information on products and materials required for circularity, as well as the actual state of resource circulation.
	Regional Circular Model Development WG	■ This Working Group aims to accelerate regional CE initiatives and promote their practical implementation by developing regional circular models tailored to local characteristics and by assessing the impacts of regional initiatives, with a view to broader deployment.

Source： CPs official website（Circular Partners 公式サイト｜トップページ）

For further details on regional circular models, please refer to the following pages.

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Purpose of Developing Regional Circular Models

By establishing "regional circular models" based on four objectives, addressing environmental constraints, addressing resource constraints, capturing growth opportunities, and enhancing well-being, regions can advance the circular economy (CE).

- Regional circular models should be designed in accordance **with local characteristics to address environmental and resource constraints, capture growth opportunities, and enhance well-being**
- **It is important to build resource circulation systems at the right scale for each region**. Resources that can be circulated locally should be kept within the region wherever possible, while those that are difficult to circulate locally should be circulated over a wider area

Developing Regional Circular Models

Addressing Environmental Constraints

- **Reducing CO_2 emissions**
- **Reducing waste generation**

etc.

Capturing Growth Opportunities

- **Growth of local SMEs**
- **Creation of local startups**
- **Business transformation and growth of large companies**

etc.

Addressing Resource Constraints

- **Local waste streams**
- **Underutilized resources**

etc.

Enhancing Well-being

- **Resident participation and interaction**
- **Better living environments**
- **Local employment**

etc.

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Relationship between Regional Circular Models and Regional CE Indicators

Regional CE indicators provide a quantitative assessment of a region's current conditions and the status of its circular economy (CE) initiatives. Based on these assessments, regional circular models offer region-specific approaches as proposed directions for action toward the realization of CE.

Regional Circular Models

Present recommended **approaches for establishing circular systems** for individual products and materials, together with **the information required for implementation**

(Information required for implementation includes the effects of different circular system approaches, actions and support measures for developing regional circular models, and examples of advanced initiatives and the regional characteristics that supported them.)

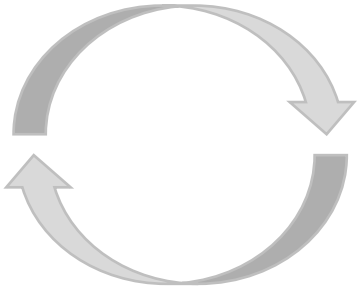
Provide local communities with recommended approaches to resource circulation and guidance on how these approaches can be implemented

Provide quantitative methods for assessing regional conditions and the progress of CE initiatives

Regional CE Indicators

Regional CE indicators consist of an evaluation framework and related indicators that enable an objective understanding of a region's current CE position and the status of its initiatives. They are designed to support **quantitative assessment** and provide suggestions for **appropriate courses of action.**

Refine regional circular models and regional CE indicators through the demonstration and implementation of regional circular models.



Local governments advance the demonstration and implementation of regional circular models and use regional CE indicators to verify their effects.

Demonstration and implementation of CE-related policies and initiatives

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Ch. 2: Regional CE Indicators

2-1. Overview

2-2. Purpose

2-3. Approach to Regional CE Indicators

2-4. Main Indicator (Categories and Subcategories)

2-5. How to Interpret the Indicators

2-6. List of Regional CE Indicators

Reference: Alignment with the GCP

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2-1. Overview

Develop a common set of indicators for use by local governments to understand current conditions and consider policy directions from a CE perspective, and to measure and communicate the effects of their initiatives both internally and externally.

Development of Regional CE Indicators	Overview	Reference *Partially excerpted from the evaluation tool manual.
Why develop these indicators?	• To understand **the current conditions of the target municipality, including its current position and trends**, and to consider future policy directions. • To quantitatively measure **the effects of initiatives** and communicate those effects to other departments, residents, businesses, and other stakeholders.	• Purpose of Regional CE Indicators
Approach to Indicator Development	• Extract and organize CE indicators that are recognized **as standard** in Japan and overseas, together with indicators for understanding the potential of regions in Japan (i.e. regional indicators). • Based on this review, develop a total of **230 indicators** related to the following four objectives: **Addressing Resource Constraints, Addressing Environmental Constraints, Capturing Growth Opportunities, and Enhancing Well-being**. • Of these, select **189 indicators for which data can be obtained** from statistical sources.	• Approach to the Indicators • List of Indicators

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2-2. Purpose

Regional CE initiatives are being advanced in stages; however, because KPIs and indicators are not clearly defined, challenges remain in understanding current conditions, measuring the effects of demonstration projects and other initiatives, and communicating results externally.

Before Using the Indicators

Want to implement CE initiatives, but do not understand the **region's characteristics or current conditions**, and therefore **do not know what kind of initiatives to undertake**

Business: Want to implement CE initiatives, but **do not know what direction to take**

Municipality A: Want to implement some kind of CE initiative, but do not know **which region to focus on**

Demonstration projects and initiatives are being carried out, but their **effects cannot be evaluated and improvements cannot be considered**

Municipality A: For demonstration projects, **data are scattered, and it is unclear what should be reviewed to evaluate effects and make improvements**

- Volume Xt
- Recycling Volume Xt
- Costs X円
- CO2 XtCO2

CE efforts have been carried out continuously, **but year-to-year changes in economic effects and other impacts cannot be measured**
Results cannot be communicated externally, making it difficult to gain understanding from local residents and within the municipality

Municipality A: Demonstration projects have been conducted, but it is **unclear what economic effects they have generated. Results cannot be communicated externally,,,**

After Using the Indicators

Regional CE indicators enable **a quantitative understanding of local conditions and characteristics**
Enable comparison and benchmarking with other municipalities and businesses using the same definitions, and help set priorities and targets

Measuring effects makes it easier **to set benchmarks, targets, and KPIs for each measure, and to identify improvements and run the PDCA cycle**

Regional CE indicators make it possible **to quantify and present progress**, providing evidence for External Communications and budget allocation

Local Residents
It becomes easier to gain understanding and cooperation from local residents

Within the Municipality
Visualizing effects and tracking year-to-year changes helps support budget allocation

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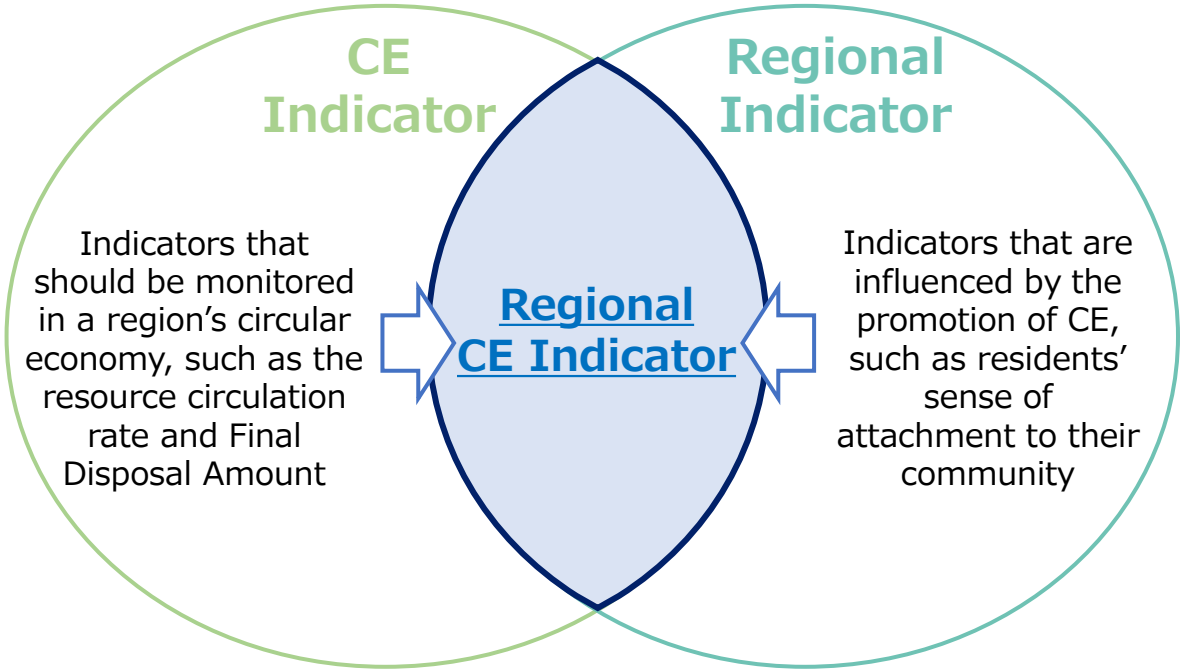
2-3. Approach to Regional CE Indicators

While multiple indicators have been proposed in Japan and abroad to measure the status of regional CE initiatives, no clearly unified framework exists. Accordingly, regional CE indicators were comprehensively organized based on domestic and international literature and the conceptual approach below.

What Are Regional CE Indicators

- Regional CE indicators are indicators that provide **an integrated assessment of regional CE from the following four perspectives**, “Addressing Environmental Constraints”, “Addressing Resource Constraints”, “Capturing Growth Opportunities”, and “Enhancing Well-being”.
- They have been organized by drawing on CE indicators used in Japan and abroad, together with **indicators for understanding the potential of regions in Japan** (i.e. **regional indicators), to identify the indicators necessary for measuring regional CE.**

Conceptual Approach to Regional CE Indicators



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【Reference】What Are CE Indicators and Regional Indicators

References

CE indicators used internationally

- **WBCSD「Global Circularity Protocol for business (GCP)」**
  - Year : 2025
  - Description : A practical protocol for corporate circularity assessment that supports the measurement, improvement, and communication of circularity through standardized procedures and indicators
- **WBCSD「CTI v4.0」**
  - Year : 2020年
  - Description : Common indicators and guidance to help companies understand, analyze, and improve their CE performance
- **UNEP「Circular Economy: From Indicators and Data to Policy-making」**
  - Year : 2024
  - Description : A report presenting core indicators based on CE measurement guidelines, as well as how they can be used for policy monitoring and examples from different countries
- **UNECE「Guidelines for Measuring Circular Economy」**
  - Year : 2024
  - Description : Guidelines for measuring CE, presenting definitions, a framework, 19 harmonized core indicators, and supplementary indicators based on linkages with the SEEA
- **WBCSD「Circular Transition Indicators (CTI) Social Impact guide」**
  - Year : 2025
  - Description : Guidelines for assessing and improving the social impacts of circular strategies from the perspective of a just transition
- **OECD「The Circular Economy in Cities and Regions of the European Union」**
  - Year : 2025
  - Description : A report outlining the circular economy and the need for and benefits of the transition in the EU, together with the role of local governments and specific data

※References to literature on CE indicators in specific regions such as the EU were also reviewed.

CE / regional indicators used in Japan

<Regional indicators>

- **Digital Agency「Regional Well-being Indicators」**
  - Year: 2023
  - Description: Indicators that quantify and visualize residents' quality of life and well-being
- **Ministry of the Environment「Regional Circular and Ecological Sphere」**
  - Year: 2018
  - Description: Development of objective indicators based on uniformly available data for all municipalities
- **Ministry of Internal Affairs and Communications「Statistical Observations of Municipalities」**
  - Year: 2024
  - Description: A compilation of various uniformly available data for all municipalities in Japan, including population, economy, administration, and living conditions
- **UNEP「Inclusive Wealth Report 2023」**
  - Year: 2023
  - Description: Presents inclusive wealth, integrating natural, human, and produced capital, as a rational indicator for assessing national and global development and economic progress

<CE Indicator>

- **METI / Circular Partners「Guidelines for Setting Quantitative Targets」**
  - Year: 2024
  - Description: Guidelines developed by the CPs Vision and Roadmap Working Group to help CPs member companies set CE targets and identify relevant steps and reference materials
- **「The Fifth Fundamental Plan for Establishing a Sound Material-Cycle Society」**
  - Year: 2024
  - Description: Material flow indicators for understanding and improving the overall state of a sound material-cycle society, and action indicators for measuring and evaluating progress
- **Ministry of the Environment「Sustainable Finance Related to CE」**
  - Year: 2021
  - Description: Indicators to help companies communicate their values, business models, strategies, governance, and other CE-related elements to investors in an integrated manner

※References to literature on CE indicators in cities in Japan and abroad were also reviewed.

Sources: WBCSD, CTI v4.0; Ministry of the Environment, Sustainable Finance Related to CE; Ministry of Internal Affairs and Communications, Statistical Observations of Municipalities; and others

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2-4. Main Indicator (Major categories and Mid. categories)

In accordance with the above approach and based on a review of data availability, 46 Indicators were defined as regional CE indicators at the major and intermediate category levels. Including the more detailed subcategory level, a total of 230 indicators are covered.

objectives	No.	Major Category	Mid. Category	
Addressing Resource Constraints	1			
	2	Inflow Circularity Rate <%>	Circular Resource Use<t・%>	
	3		Resource Use (per Regional GDP)<t>	
	4	Outflow Circularity Rate<%>		
	5		Total Waste Generation<t>	
	6			Municipal Solid Waste Generation<t>
	7			Industrial Waste Generation<t>
	8		Recycling Amount<t>	
	9		Refurbishment Amount <t>	
	10		Reuse Amount <t>	
	11		Repair Amount<t>	
	12		Biodegradation Amount <t>	
	13		Throughput at Waste Treatment Facilities<t>	
	14		Number of Waste Treatment Facilities<facilities>	
	15	Resource Productivity <JPY/t>		
	16		Natural Resource inflow<t>	
	17		Regional GDP <JPY>	
Addressing Environmental Constraints	18	Final Disposal Amount <t>		
	19		Municipal Solid Waste Final Disposal Amount <t>	
	20			Direct Final Disposal Amount <t>
	21			Incineration Residue Amount<t>
	22			Treatment Residue Amount <t>
	23		Industrial Waste Final Disposal Amount <t>	

Objectives	No.	Major Category	Mid. Category	
Addressing Environmental Constraints	24	Energy Consumption<TJ>		
	25		Energy Self-Sufficiency Rate<%>	
	26		Renewable Energy Supply Amount and Share<TJ・%>	
	27		Fossil Fuel Supply Amount and Rate<TJ・%>	
	28	CO2 Emissions <tCO2>		
	29		CO2 Emission Reductions<tCO2>	
	30	Ecological Footprint <gha/person>		
	31	Environmental Pollution Volume<t>		
	32	Water Circularity Rate<%>		
Capturing Growth Opportunities	33	CE-related Revenue<JPY>		
	34	CE-related Treatment Costs <JPY>		
	35		Waste Treatment Costs<JPY>	
	36		Recycling Costs <JPY>	
	37	Number of CE-related employees <people>		
	38	Investment in CE-related Activities <JPY>		
	39	Local economic value added of CE-related businesses <JPY>		
	40		Employees' disposable income from CE-related businesses <JPY>	
	41		Local Tax Revenue from CE-related Businesses<JPY>	
	42		Net profit for the current fiscal year of local CE-related businesses <JPY>	
	43	Extent of CE Initiatives in Municipalities (target values, etc.) <->		
Enhancing Well-being	44	Community Building<->		
	45	Environmental satisfaction<->		
	46		Satisfaction with CE<->	

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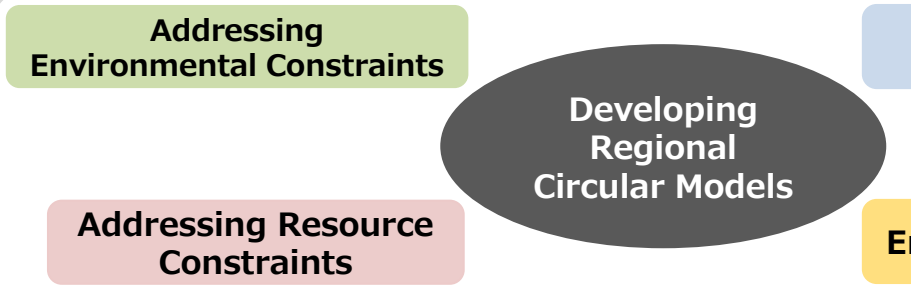
*Grayed-out items indicate indicators for which statistical data cannot be obtained.

2-5. How to Interpret the Indicators : Organization by Objective

Regional Circular Economy indicators are grouped into four categories. Local governments can refer to the relevant category based on their circular economy priorities and use the indicators for communication and other purposes.



To promote the Circular Economy (CE) at the regional level, it is important to establish a regional circular economy model that addresses four objectives: resource constraints, environmental constraints, growth opportunities, and well-being.

These indicators are organized into four objectives to support KPI setting and progress monitoring for the transition to a regional circular economy.

Objectives	Example Indicators	Key Points to Confirm in CE Initiatives	Example
①Addressing Resource Constraints	Circular Resource Use, Recycling Amount, etc.	• Confirm whether CE initiatives contribute to improved resource input efficiency and waste reduction.	For **products and materials with low recycling rates**, consider **strengthening separate collection systems and introducing improved recycling methods**.
②Addressing Environmental Constraints	CO2 Emission Reductions, Water Circularity Rate, etc.	• Confirm whether CE initiatives contribute to CO_2 reduction, lower environmental impacts, and contribute to environmental improvement.	**If CO_2 reduction is a key objective, understand the current values of related indicators** and monitor changes over time.
③Capturing Growth Opportunities	CE-related Revenue, Waste Treatment Costs, Recycling Costs, etc.	• Confirm whether CE initiatives contribute to increasing regional economic value added and stimulating economic activity.	**Assess opportunities to transition recyclable or revenue-generating materials** from waste disposal **to resource circulation and recycling pathways.**
④Enhancing Well-being	Community Building, Environmental satisfaction, Satisfaction with CE, etc.	• Confirm whether CE measures contribute to improving the living environment, strengthening community attachment, and enhancing well-being.	**Monitor the long-term effects of collection points and resident participation initiatives** on the local environment and community attachment.

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2-5. How to Interpret the Indicators : Indicator Hierarchy and Use Cases

The Regional CE Indicators are organized into a five-level hierarchy, based on the hierarchical structure among indicators. Because the indicators can be used effectively by examining them progressively according to the purpose of analysis.

Hierarchical structure of indicators in the calculation formula

Example:

Four Objectives

Addressing resource constraints

a. Major Category

Outflow Circularity Rate =

b. Mid Category ①

Recycling Amount ÷ (

c. Mid Category ②

Municipal Solid Waste Generation + Industrial Waste Generation)

Items representing components within the calculation formula

Items representing components within the calculation formula

d. Sub Category ①

Municipal Solid Waste Generation = Waste Collected by Municipalities + Directly Delivered Waste + Community Collection Amount …

Items representing components within the calculation formula
Further organized by item and material in **e. Sub Category ②**

Breakdown Example

Level	Positioning	Main Use Cases	Example
Major Category	Indicators that represent the **macro-level status of the municipality or region as a whole.**	• Assess overall **circular economy progress in the region**. • Support external communication on circular economy initiatives.	Review CE progress across the entire municipality and identify **which area among Resource, Environment, Economy, and Well-being should be prioritized**, helping to formulate future policies.
constitute → **Mid Category ①/②**	Indicators that constitute major categories and show the status of **individual sectors and thematic areas.**	• Identifying and assessing **issues and characteristics by sector/theme.** • Identify and prioritize key focus areas.	Identify priority areas for action in resource management, **such as waste reduction, recycling, or final disposal.**
constitute → **Sub Category ①/②**	Indicators that constitute subcategories and show more specific conditions **by product, material, or other detailed classifications.**	• Examining **where improvement opportunities exist for specific issues, materials, and products.** • **Monitor and improve progress of individual initiatives.**	For efforts to strengthen recycling, identify **which materials (e.g., paper, metals, plastics) are facing the greatest challenges** and consider concrete countermeasures.

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2-6. List of Regional CE Indicators : Indicators for addressing resource constraints (112 Indicators)

①addressing resource constraints

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
1	Inflow Circularity Rate <%>					To measure the share of circular resources in total resource inflow [Inflow Circularity Rate = Circular Resource Use Amount ÷ (Circular Resource Use Amount + Natural Resource and Other inflows)]
2		Circular Resource Use Amount<t>				To measure Circular Resource Use Amount as a component of the inflow Circularity Rate ＊The items in Subcategory 2 were based on data published by the Japan Environmental Management Association for Industry.
3		Total Resource inflow<t>				To measure total resource inflow as a component of the inflow Circularity Rate
4	Outflow Circularity Rate<%>					To measure the share of circulated resources in total waste generation [Outflow Circularity Rate= (Municipal Solid Waste Recycling Amount + Industrial Waste Recycling Amount) ÷ (Municipal Solid Waste Generation + Industrial Waste Generation)]
5		Total Waste Generation<t>				To measure total waste generation as a component of the Outflow Circular Use Rate
6			Municipal Solid Waste Generation<t>			To measure municipal solid waste generation as a component of the Outflow Circular Use Rate
6-1				Waste Collected by Municipalities <t>		To measure Waste Collected by Municipalities as a component of municipal solid waste generation
6-1-1					Mixed Waste<t>	To measure Waste Collected by Municipalities by category
6-1-2					Combustible<t>	
6-1-3					Non-combustible<t>	
6-1-4					Recyclable Waste<t>	
6-1-6					Other<t>	
6-1-6					Bulky Waste<t>	
6-2				Directly Delivered Waste <t>		To measure Directly Delivered Waste as a component of municipal solid waste generation
6-2-1					Mixed Waste<t>	To measure Directly Delivered Waste by category
6-2-2					Combustible<t>	
6-2-3					Non-combustible<t>	
6-2-4					Recyclable Waste<t>	
6-2-5					Other<t>	
6-2-6					Bulky Waste<t>	

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＊1:As the Environmental White Paper published by the Ministry of the Environment calculates both inflow-side circularity indicators using circular use volume, this indicator also uses Circular Resource Use Amount to calculate the inflow-side Circular Use Rate.

2-6. List of Regional CE Indicators : Indicators for addressing resource constraints (112 Indicators)

①addressing resource constraints

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
6-3	Outflow Circularity Rate<%>	Total Waste Generation <t>	Municipal Solid Waste Generation <t>	Community Collection Amount<t>		To measure Community Collection Amount as a component of municipal solid waste generation
6-3-1					Paper<t>	To measure Community Collection Amount by category ＊The items in Subcategory 2 were determined based on data from the Ministry of the Environment of Japan.
6-3-2					Beverage Cartons<t>	
6-3-3					Paper Containers and Packaging<t>	
6-3-4					Metals<t>	
6-3-5					Glass<t>	
6-3-6					PET Bottles<t>	
6-3-7					White Polystyrene Trays <t>	
6-3-8					Plastic Containers and Packaging<t>	
6-3-9					Plastics<t>	
6-3-10					Textiles<t>	
6-3-11					Fertilizer <t>	
6-3-12					Animal Feed<t>	
6-3-13					Molten Slag<t>	
6-3-14					Solid Fuel <t>	
6-3-15					Fuel<t>	
6-3-16					Incineration Ash/Fly Ash Used as Cement Raw Material<t>	
6-3-17					Direct inflow into Cement Production and Other Processes<t>	
6-3-18					Fly Ash Returned to Smelters <t>	
6-3-19					Used Cooking Oil (BDF)<t>	
6-3-20					Other<t>	
6-4				Illegally Dumped Waste<t>		To measure Illegally Dumped Waste as a component of municipal solid waste generation

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2-6. List of Regional CE Indicators : Indicators for addressing resource constraints (112 Indicators)

①addressing resource constraints

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
7	Outflow Circularity Rate<%>	Total Waste Generation <t>	Industrial Waste Generation<t>			To measure industrial waste generation as a component of the Outflow Circular Use Rate
7-1				Cinders<t>		To measure industrial waste generation by category [Generation of each subcategory = industry-specific cinder generation factor × production or shipment value of each industry in the municipality]
7-2				Sludge<t>		
7-3				Waste Oil<t>		
7-4				Waste Acid<t>		
7-5				Waste Alkali <t>		
7-6				Waste Plastics<t>		
7-7				Paper Waste<t>		
7-8				Wood Waste<t>		
7-9				Textile Waste<t>		
7-10				Animal and Plant Residues<t>		
7-11				Solid Animal Waste<t>		
7-12				Rubber Waste<t>		
7-13				Metal Scrap<t>		
7-14				Glass and Ceramic Waste<t>		
7-15				Slag<t>		
7-16				Construction Debris<t>		
7-17				Animal Manure <t>		
7-18				Animal Carcasses<t>		
7-19				Dust<t>		

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2-6. List of Regional CE Indicators : Indicators for addressing resource constraints (112 Indicators)

①addressing resource constraints

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
8		Recycling Amount<t>				To measure material Recycling Amount as a component of the Outflow Circular Use Rate
8-0-1				Paper (excluding Beverage Cartons and Paper Containers and Packaging)		To measure material Recycling Amount by category [Recycling Amount for each category = direct Recycling Amount + facility-based Recycling Amount + Community Collection Amount] ＊The items in Subcategory 1 were determined based on data from the Ministry of the Environment of Japan.
8-0-2				Beverage Cartons		
8-0-3				Paper Containers and Packaging		
8-0-4				Metals		
8-0-5				Glass		
8-0-6				PET Bottles		
8-0-7				White Polystyrene Trays		
8-0-8				Plastic Containers and Packaging (excluding White Polystyrene Trays)		
8-0-9	Outflow Circularity Rate<%>			Product Plastics		
8-0-10				Other Plastic Waste		
8-0-11				Textiles		
8-0-12				Fertilizer		
8-0-13				Animal Feed		
8-0-14				Molten Slag		
8-0-15				Solid Fuel (RDF, RPF)		
8-0-16				Fuel (excluding Solid Fuel)		
8-0-17				Incineration Ash/Fly Ash Used as Cement Raw Material		
8-0-18				Direct inflow into Cement Production and Other Processes		
8-0-19				Fly Ash Returned to Smelters		
8-0-20				Used Cooking Oil (BDF and Non-BDF)		
8-0-21				Other		

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2-6. List of Regional CE Indicators : Indicators for addressing resource constraints (112 Indicators)

①addressing resource constraints

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
8-1	Outflow Circularity Rate<%>	Recycling Amount<t>	Material Recycling Amount<t>			To measure material Recycling Amount as a component of Recycling Amount＊This is based on data published by the Japan Environmental Management Association for Industry.
8-2			Chemical Recycling Amount<t>			To measure chemical Recycling Amount as a component of Recycling Amount
8-3			Thermal Recycling Amount<t>			To measure thermal Recycling Amount as a component of Recycling Amount
9		Refurbishment Amount <t>				To measure Refurbishment Amount as a component of the Outflow Circular Use Rate
10		Reuse Amount <t>				To measure Reuse Amount as a component of the Outflow Circular Use Rate
11		Repair Amount<t>				To measure Repair Amount as a component of the Outflow-side Circular Use Rate
12		Biodegradation Amount <t>				To measure Biodegradation Amount as a component of the Outflow-side Circular Use Rate
13	Outflow Circularity Rate<%>	Throughput at Waste Treatment Facilities<t>				To measure Throughput at Waste Treatment Facilities as one of the indicators affecting the Outflow Circular Use Rate
13-1				Throughput at Incineration Facilities<t>		To measure Throughput at Waste Treatment Facilities by facility type. [Throughput at municipal solid waste incineration facilities with an annual treatment volume greater than 0 t (i.e., facilities actually in operation)]
13-2				Throughput at Material Recycling Facilities <t>		
13-3				Throughput at Composting Facilities<t>		
13-4				Throughput at Anaerobic Digestion Facilities<t>		
13-5				Throughput at Waste Fuel Production Facilities<t>		
13-6				Throughput at Bulky Waste Treatment Facilities<t>		
13-7				Throughput at Other Treatment Facilities<t>		
13-8				Throughput at Repair and Reuse Facilities<t>		

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2-6. List of Regional CE Indicators : Indicators for addressing resource constraints (112 Indicators)

①addressing resource constraints

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
14		Number of Waste Treatment Facilities<facilities>				To measure the number of waste treatment facilities as one of the indicators affecting the Outflow Circular Use Rate
14-1				Number of Incineration Facilities<facilities>		To measure the number of waste treatment facilities by facility type [Number of municipal solid waste incineration facilities with an annual treatment volume greater than 0 t (i.e., facilities in operation)]
14-2				Number of Material Recycling Facilities<facilities>		
14-3				Number of Composting Facilities<facilities>		
14-4				Number of Anaerobic Digestion Facilities<facilities>		
14-5				Number of Waste Fuel Production Facilities<facilities>		
14-6				Number of Bulky Waste Treatment Facilities<facilities>		
14-7				Number of Other Treatment Facilities<facilities>		
14-8				Number of Repair and Reuse Facilities<facilities>		
15	Resource Productivity <JPY/t>					To measure the status of efficient resource use in the municipality [Resource Productivity = Regional GDP ÷ Total Resource inflow]
16		Natural Resource inflow<t>				To measure total resource inflow as a component of Resource Productivity
17		Regional GDP <JPY>				To measure the total value of goods and services produced within the region as a component of Resource Productivity

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2-6. List of Regional CE Indicators : Indicators for Addressing Environmental Constraints (32 Indicators)

②addressing environmental constraints

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
18	Final Disposal Amount <t>					To measure the municipality's dependence on final disposal (landfilling and incineration residues)
19		Municipal Solid Waste Final Disposal Amount <t>				To measure municipal solid waste Final Disposal Amount as a component of Final Disposal Amount
19-0-1				Incineration Rate<%>		To measure the incineration rate in municipal waste treatment. [Incineration Rate (%) = Direct Incineration Volume ÷ Municipal Solid Waste Treatment Volume]
19-0-2				Landfill Rate<%>		To measure the landfill rate in municipal waste treatment. [Landfill Rate (%) = (total facility capacity (m³) − total remaining capacity of facilities (m³)) ÷ total facility capacity (m³) × 100]
19-0-3				Remaining Capacity <m³>		To measure the remaining acceptance capacity and risk of capacity shortage at final disposal sites in the municipality
19-0-4				Remaining Service Life <year>		To measure the remaining service life of final disposal sites in the municipality. [Remaining service life of final disposal sites by municipality = total remaining capacity of facilities in the municipality (m³) ÷ total annual landfill volume of facilities in the municipality (m³/year)]
19-0-5				Number of Final Disposal Sites<facilties>		To measure the development status of infrastructure for final disposal in the municipality. [Number of final disposal sites with remaining capacity greater than 0 m³]
19-0-6				Landfill Capacity of Final Disposal Sites <m³>		To measure the acceptance capacity of infrastructure for final disposal in the municipality
19-0-7				Number of New Final Disposal Sites<facilities>		To measure the status of newly introduced infrastructure for final disposal
20			Direct Final Disposal Amount <t>			To measure direct Final Disposal Amount as a component of municipal solid waste Final Disposal Amount
21			Incineration Residue Amount<t>			To measure incineration Residue Amount as a component of municipal solid waste Final Disposal Amount
22			Treatment Residue Amount <t>			To measure treatment Residue Amount as a component of municipal solid waste Final Disposal Amount
23		Industrial Waste Final Disposal Amount <t>				To measure industrial waste Final Disposal Amount as a component of Final Disposal Amount

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2-6. List of Regional CE Indicators : Indicators for Addressing Environmental Constraints (32 Indicators)

②addressing environmental constraints

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
24	Energy Consumption <TJ>					To measure energy consumption in the municipality
25		Municipal Energy Self-Sufficiency Rate<%>				To measure the energy self-sufficiency rate as a component of energy consumption
26		Renewable Energy Supply Amount and Rate<TJ・%>				To measure Renewable Energy Supply Amount and Share as a component of energy consumption
26-1		Renewable Energy Resource Utilization Amount and Rate<TJ・%>				To measure Renewable Energy Resource Utilization Amount and Rate as a component of energy consumption
26-2		Renewable Energy Resource Utilization Volume and Rate<TJ・%>				To measure renewable energy resource utilization volume and rate as a component of energy consumption
27		Fossil Fuel Supply Amount and Rate<TJ・%>				To measure Fossil Fuel Supply Amount and Rate as a component of energy consumption
27-1		Fossil Fuel-based Energy Generation Amount and Rate<TJ・%>				To measure Fossil Fuel-based Energy Generation Amount and Rate as a component of energy consumption
27-2		Fossil Fuel Resource Utilization Amount and Rate<TJ・%>				To measure Fossil Fuel Resource Utilization Amount and Rate as a component of energy consumption

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2-6. List of Regional CE Indicators : Indicators for Addressing Environmental Constraints (32 Indicators)

②addressing environmental constraints

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
28	CO2 Emissions <tCO2>					To measure CO2 emissions in the municipality
29		CO2 Emission Reductions<tCO2>				To measure CO2 emissions in the municipality
28-1		CO2 Absorption<tCO2>				To measure CO2 Absorption in the municipality
30	Ecological Footprint <gha/person>					To measure resource consumption and the biologically productive area required for regeneration in the municipality
31	Environmental Pollution Volume<t>					To measure environmental pollution volume in the municipality
31-1		Pollutant Emissions <t>				To measure pollutant emissions as a component of environmental pollution volume
31-2		Air Pollutant Emissions<t/year>				To measure air pollutant emissions as a component of environmental pollution volume
31-3		Water Pollutant Discharges <t/year>				To measure water pollutant discharges as a component of environmental pollution volume
31-4		Number of Open Dump Sites<sites>				To measure the number of open dump sites as a component of environmental pollution volume
31-5		Soil Pollution <mg/m³, concentration>				To measure soil pollution as a component of environmental pollution volume
32	Water Circularity Rate<%>					To measure the share of circular water in total potable water use ＊This indicator is measured in accordance with the definition established by Japan's Ministry of Economy, Trade and Industry.

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2-6. List of Regional CE Indicators : Indicators for Capturing Growth Opportunities (83 Indicators)

③Capturing Growth Opportunities

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
33	CE-related Revenue<JPY>					To measure CE-related Revenuein the municipality.
34	CE-related Treatment Costs<JPY>					To measure waste treatment and recycling costs in the municipality. [CE-related Treatment Costs (JPY) = Waste Treatment Costs (JPY) + Recycling Costs (JPY)]
35		Waste Treatment Costs<JPY>				To measure waste treatment costs in the municipality. [Waste Treatment Costs (JPY) = Operation and Maintenance Costs (JPY) + Construction and Improvement Costs (JPY)]
35-1			Operation and Maintenance Costs <JPY>			To measure operation and maintenance costs as a component of waste treatment costs. [Operation and Maintenance Costs (JPY) = Personnel Costs (JPY) + Treatment Costs (JPY) + Vehicle and Equipment Acquisition Costs (JPY)]
35-1-1				Personnel Costs <JPY>		To measure personnel costs as a component of operation and maintenance costs.
35-1-2				Treatment Costs <JPY>		To measure treatment costs as a component of operation and maintenance costs.
35-1-3				Vehicle and Equipment Acquisition Costs <JPY>		To measure Vehicle and Equipment Acquisition Costs as a component of operation and maintenance costs.
35-1-4				Outsourcing Costs <JPY>		To measure outsourcing costs as a component of operation and maintenance costs.
35-2			Construction and Improvement Costs <JPY>			To measure construction and improvement costs as a component of waste treatment costs. [Construction and Improvement Costs (JPY) = Construction Costs (JPY) + Survey Costs (JPY) + Association Contributions (JPY)]
35-2-1				Construction Costs <JPY>		To measure construction costs as a component of construction and improvement costs.
35-2-2				Survey Costs <JPY>		To measure survey costs as a component of construction and improvement costs.
35-2-3				Association Contributions <JPY>		To measure association contributions as a component of construction and improvement costs.

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2-6. List of Regional CE Indicators : Indicators for Capturing Growth Opportunities (83 Indicators)

③Capturing Growth Opportunities

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
36	Waste Treatment Costs<JPY>	Recycling Costs <JPY>				To measure recycling costs in the municipality [Recycling Costs (JPY) = Recycling Processing Cost<JPY/kg> ×Recycling Amount<t>] *Calculate Recycling Amount<t>after converting the value into kilograms
36-0-0-1				PET Bottles <JPY/kg>		To measure recycling costs by category in the municipality
36-0-0-2				Cans<JPY/kg>		
36-0-0-3				Glass Bottles<JPY/kg>		
36-0-0-4				Plastic Containers and Packaging<JPY/kg>		
36-0-0-5				Paper and Cartons<JPY/kg>		
36-0-0-6				White Polystyrene Trays<JPY/kg>		
36-0-0-7				Textiles<JPY/kg>		
36-0-0-8				Waste Oil <JPY/kg>		
36-0-0-9				Small Household Appliances<JPY/kg>		
36-0-0-10				Small Metal Items<JPY/kg>		
36-0-0-11				Food Waste<JPY/kg>		
36-0-0-12				Used Diapers<JPY/kg>		
36-0-0-13				Storage Batteries (including Rare Metals) <JPY/kg>		

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2-6. List of Regional CE Indicators : Indicators for Capturing Growth Opportunities (83 Indicators)

③Capturing Growth Opportunities

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
36-0-1	Waste Treatment Costs<JPY>	Recycling Costs <JPY>	Recycling Processing Cost<JPY/kg>			To measure the unit processing cost for recycling as a component of recycling costs.
36-0-1-1				PET Bottles <JPY/kg>		To measure the unit processing cost for recycling PET bottles.
36-0-1-2				Cans<JPY/kg>		To measure the unit processing cost for recycling cans.
36-0-1-3				Glass Bottles<JPY/kg>		To measure the unit processing cost for recycling glass bottles.
36-0-1-4				Plastic Containers and Packaging<JPY/kg>		To measure the unit processing cost for recycling plastic containers and packaging.
36-0-1-5				Paper and Cartons<JPY/kg>		To measure the unit processing cost for recycling paper and paper cartons.
36-0-1-6				White Polystyrene Trays<JPY/kg>		To measure the unit processing cost for recycling white trays.
36-0-1-7				Textiles<JPY/kg>		To measure the unit processing cost for recycling textiles.
36-0-1-8				Waste Oil <JPY/kg>		To measure the unit processing cost for recycling waste oil.
36-0-1-9				Small Household Appliances<JPY/kg>		To measure the unit processing cost for recycling small household appliances.
36-0-1-10				Small Metal Items<JPY/kg>		To measure the unit processing cost for recycling small metal items.
36-0-1-11				Food Waste<JPY/kg>		To measure the unit processing cost for recycling food waste.
36-0-1-12				Used Diapers<JPY/kg>		To measure the unit processing cost for recycling Used Diapers.
36-0-1-13				Storage Batteries (including Rare Metals) <JPY/kg>		To measure the unit processing cost for recycling storage batteries (including rare metals).

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2-6. List of Regional CE Indicators : Indicators for Capturing Growth Opportunities (83 Indicators)

③Capturing Growth Opportunities

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
36-0-2	Waste Treatment Costs<JPY>	Recycling Costs <JPY>	Unit Sales Price of Recyclable Materials <JPY/kg>			To measure the Unit Sales Price of Recyclable Materials as a component of recycling costs.
36-0-2-1				PET Bottles <JPY/kg>		To measure the unit sales price of PET bottles sold as valuable recyclables.
36-0-2-2				Cans<JPY/kg>		To measure the unit sales price of cans sold as valuable recyclables.
36-0-2-3				Glass Bottles<JPY/kg>		To measure the unit sales price of glass bottles sold as valuable recyclables.
36-0-2-4				Plastic Containers and Packaging<JPY/kg>		To measure the unit sales price of plastic containers and packaging sold as valuable recyclables.
36-0-2-5				Paper and Cartons<JPY/kg>		To measure the unit sales price of paper and paper cartons sold as valuable recyclables.
36-0-2-6				White Polystyrene Trays<JPY/kg>		To measure the unit sales price of white trays sold as valuable recyclables.
36-0-2-7				Textiles<JPY/kg>		To measure the unit sales price of textiles sold as valuable recyclables.
36-0-2-8				Waste Oil <JPY/kg>		To measure the unit sales price of waste oil sold as valuable recyclables.
36-0-2-9				Small Household Appliances<JPY/kg>		To measure the unit sales price of small household appliances sold as valuable recyclables.
36-0-2-10				Small Metal Items<JPY/kg>		To measure the unit sales price of small metal items sold as valuable recyclables.
36-0-2-11				Food Waste<JPY/kg>		To measure the unit sales price of food waste sold as valuable recyclables.
36-0-2-12				Used Diapers<JPY/kg>		To measure the unit sales price of Used Diapers sold as valuable recyclables.
36-0-2-13				Storage Batteries (including Rare Metals) <JPY/kg>		To measure the unit sales price of storage batteries (including rare metals) sold as valuable recyclables.

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2-6. List of Regional CE Indicators : Indicators for Capturing Growth Opportunities (83 Indicators)

③Capturing Growth Opportunities

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
36-1	Waste Treatment Costs<JPY>	Recycling Costs <JPY>				To measure processing and maintenance costs as a component of recycling costs. [Processing and Maintenance Costs <JPY> = Collection and Transportation Costs <JPY> + Intermediate Treatment Costs <JPY>]
36-1-1			Processing and maintenance costs <JPY>	Collection and transportation costs <JPY>		To measure processing and maintenance costs as a component of recycling costs. [Processing and Maintenance Costs <JPY> = Fuel Costs <JPY> + Personnel Costs <JPY>]
36-1-1-1					Fuel costs <JPY>	To measure fuel costs as a component of processing and maintenance costs.
36-1-1-2					Personnel Costs <JPY>	To measure personnel costs as a component of processing and maintenance costs.
36-1-2				Intermediate treatment costs <JPY>		To measure intermediate treatment costs as a component of recycling costs. [Intermediate Treatment Costs <JPY> = Storage Costs <JPY> + Sorting Costs <JPY> + Reprocessing Costs <JPY>]
36-1-2-1					Storage costs <JPY>	To measure storage costs as a component of intermediate treatment costs.
36-1-2-2					Sorting costs <JPY>	To measure sorting costs as a component of intermediate treatment costs.
36-1-2-3					Reprocessing costs <JPY>	To measure reprocessing costs as a component of intermediate treatment costs.
36-2			Construction and improvement costs <JPY>			To measure construction and improvement costs as a component of recycling costs. [Construction and Improvement Costs <JPY> = Transportation Costs Excluding Collection <JPY> + Selling Expenses <JPY>]
36-2-1				Transportation Costs Excluding Collection <JPY>		To measure Transportation Costs Excluding Collection as a component of construction and improvement costs.
36-2-2				Selling expenses <JPY>		To measure selling expenses as a component of construction and improvement costs.
37	Number of CE-related employees <people>					To measure the number of employees engaged in CE-related businesses in the municipality.

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2-6. List of Regional CE Indicators : Indicators for Capturing Growth Opportunities (83 Indicators)

③Capturing Growth Opportunities

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
38	Investment in CE-related Activities <JPY>					To measure the Investment in CE-related Activities by businesses and municipalities. [Investment in CE-related Activities = Private Investment in CE-Related Activities + Public Investment in CE-Related Activities]
38-1		Private investment in CE-related activities <JPY>				To measure the Investment in CE-related Activities by businesses.
38-2		Public investment in CE-related activities <JPY>				To measure the Investment in CE-related Activities by municipalities.
38-2-1			Capital Investment <JPY>			To measure the amount of investment in facilities as a component of public investment in CE-related activities.
38-2-1-2				Capital Expenditures for Waste Treatment		To measure expenditures required for the development of social capital related to waste treatment.
39	Local economic value added of CE-related businesses <JPY>					To measure the impact of CE initiatives on local economic value added. [Local Economic Value Added = Employees' Disposable Income + Local Taxes + Local Business Profits]
40		Employees' disposable income from CE-related businesses <JPY>				To measure local consumption capacity and living standards as a component of the local economic value added of CE-related businesses.
41		Local Tax Revenue from CE-related Businesses <JPY>				To measure the fiscal soundness of municipalities as a component of the local economic value added of CE-related businesses.
42		Net profit for the current fiscal year of local CE-related businesses <JPY>				To measure the growth potential of the local economy generated by local businesses as a component of the local economic value added of CE-related businesses.
43	Extent of CE Initiatives in Municipalities (target values, etc.) <->					To measure the Extent of CE Initiatives in Municipalities .
43-1		Medium- to long-term plans				To measure the status of formulation of medium- to long-term plans for achieving CE.
43-2		Measures for local residents				To measure the status of initiatives for local residents.
43-3		Measures for local businesses				To measure the status of initiatives for local businesses.
43-4		External Communications				To measure the extent of External Communications.
43-5		Infrastructure and facilities				To measure the status of infrastructure-related initiatives.

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2-6. List of Regional CE Indicators : Indicators for Enhancing Well-being (3 Indicators)

④Enhancing Well-being

*Some major categories are calculated based on their intermediate categories.

#	Major	Mid.1	Mid.2	Sub.1	Sub.2	Rationale / Calculation Formula※
44	Community Building <->					To measure the degree of the strength of ties between local residents and municipalities.
45	Environmental satisfaction <->					To measure the level of satisfaction of local residents with the natural and living environment in their daily lives.
46		Satisfaction with CE <->				To measure the level of satisfaction of local residents with municipal CE policies and initiatives.

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【Reference】What is GCP（Global Circularity Protocol for Business）

The first version of the Global Circularity Protocol for Business (GCP) is a global voluntary framework to provide organizations with a standardized approach to measure, manage, and communicate their impacts to investors, regulators, customers, and value chain partners.

	Circular performance assessment	
Close the loop	% Circular Inflow	•Measures the share of inflow materials that are non-virgin or renewable. *Optionally, percentages by critical resource type may also be included.
Close the loop	% Circular Outflow	•Measures the share of Outflow materials that are recoverable (recovery potential) and actually recovered. *Optionally, this may also be broken down by recovery type (e.g., reuse, recycling, etc.)
Close the loop	% Material circularity	•Aggregates inflow and Outflow into a single performance metric. (%circular inflow + %circular Outflow) / 2
Narrow & Slow the loop	% Absolute dematerialization	•Measures the total reduction in material. •Measures material use per unit of Outflow (e.g., per product or revenue). *Material reduction approaches: refuse, reduce (lightweighting), digitalization/virtualization, Performance model (servitization/ platform as a service – PaaS), Access model (sharing economy), Design for durability and longevity, reuse/repair/refurbish/remanufacture, on-demand production
Narrow & Slow the loop	% Relative dematerialization	
Narrow & Slow the loop	Actual lifetime	•Measures the average duration of product use before disposal or recovery

	Value and impact assessment	
Value the loop	Circular material productivity	•Measures revenue generated per unit of linear material inflow. •Revenue / total mass of linear inflow
Value the loop	Material circularity revenue	•Measures the share of revenue generated from circular products or services •(%circular inflow + %circular Outflow) / 2 × Revenue
Impact the loop	GHG impact	•Measures emissions savings from circular sourcing and recovery (e.g., GHG Scope 3 reductions)
Impact the loop	Nature impact	•Assesses land use and biodiversity impacts of material inflow (Nature impact scorecard)
Impact the loop	Social impact	•Evaluates social risks and opportunities in circular transitions (impacts on jobs and other social communities)

Source: Prepared by Deloitte based on World Business Council for Sustainable Development and One Planet Network (2025), Global Circularity Protocol for Business.

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【Reference】What is GCP（Global Circularity Protocol for Business）: The corresponding indicator

For each of the developed regional CE indicators, there is a corresponding indicator in the regional CE indicator set that aligns with each GCP indicator.

【Legend】 : Addressing Resource Constraints : Capturing Growth Opportunities : Addressing Environmental Constraints : Enhancing Well-being

Close the loop	% Circular Inflow	Inflow Circularity Rate(%) Circular Resource Use Amount(t) Total Resource inflow(t)
	% Circular Outflow	Outflow Circularity Rate(%) Total Waste Generation(t) Municipal Solid Waste Generation(t) Recycling Amount(t)
	% Material circularity	Calculation formula: (Circular inflow + circular Outflow) ÷ 2 At present, this has not yet been added as an indicator; however, since data can be obtained using the above calculation formula, the addition of "Material Circularity <%>" is under consideration.
Narrow & Slow the loop	% Absolute dematerialization	Not added because reduction in inputs is not relevant, as municipalities do not engage in manufacturing
	% Relative dematerialization	
	Actual lifetime	Not added because measurement is not necessary for municipalities

Value the loop	Circular material productivity	Resource Productivity (JPY/t)
	Material circularity revenue	Local economic value added of CE-related businesses (JPY) CE-related Revenue(JPY)
Impact the loop	GHG impact	CO2 Emissions (tCO2) CO2 Emission Reductions(tCO2)
	Nature impact	Water Circularity Rate(%) Ecological Footprint (gha/person)
	Social impact	Number of CE-related employees (people) Community Building (-) Environmental satisfaction (-)

*Based on the GCP definition, only indicators that are clearly included are listed.

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Ch. 3: Regional Circularity Models (Overview)
3-1: Methods for building circular systems

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3-1. List of methods for building circular systems

We have revised the methods for building circular systems through interviews and detailed discussions in each sub-working group with the businesses and municipalities promoting these initiatives.

↑Reuse (including sharing, etc.)

Corporate product sharing

A company retains ownership and control of products and shares them among multiple users, thereby **increasing product-use efficiency** and reducing waste generation.

CLAS "暮らす"を自由に、軽やかに / airCloset / Circloop / KAMAN

Regional collaboration-based reuse

Through regional hubs or online platforms, new users are identified, enabling products to be reused in ways that **reduce environmental impact while promoting effective resource use and waste reduction.**

ECOMMIT / mercari

Repair utilizing local talents

Citizens, local businesses, and people with specialized skills within the region are engaged to restore functionality and **add new value** before passing products on to the next user.

REPAIR-CHALLENGE SHIGA-PREF CE PILOT PROJECT / YOURMYSTAR

Corporate product remanufacturing

A company collects used products directly from consumers or through retailers, **then disassembles, cleans, and otherwise processes them to restore performance and quality equivalent to new products** before reselling them.

RICOH

↑Material recycling (Recycle)

Recycling utilizing regional resources

Waste generated within the region is recycled and sold by leveraging its characteristics as well as existing collection routes and facilities, while also **adding the value of circulating resources within the region**.

長井市 Nagai City / 亀岡市 KAMEOKA CITY

Citizen-based detailed sorting and recycling

Citizens carry out detailed sorting in advance at home or at collection stations, thereby **minimizing local capital investment and accident risks, enhancing the value of resources**, and connecting them to market demand.

KOBE / 薩摩川内 SDGsチャレンジ

Recycling through collaboration with neighboring areas

Waste that is difficult to process within a single municipality is consolidated in neighboring core municipalities or facilities, thereby **increasing the regional circulation rate while also benefiting from economies of scale**.

埼玉県 / Circular Park 九州 / 松田産業株式会社 MATSUDA SANGYO CO.,LTD.

Large-scale recycling

In industrial clusters, **advanced technologies are utilized** to build a supply chain that processes waste in an optimal manner, thereby **securing both the quality and quantity of recycled materials**.

Colors, Future! いろいろって、未来。 川崎市

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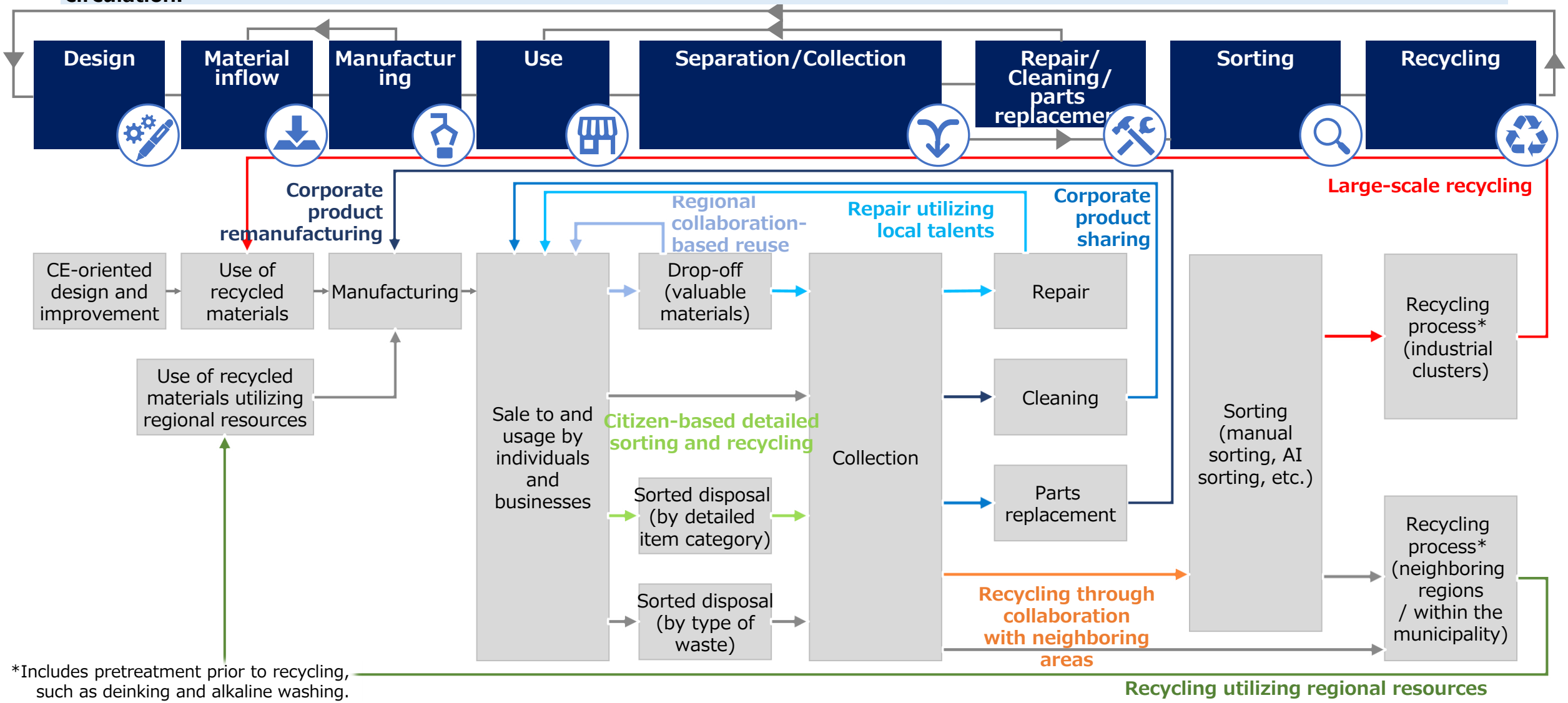
【Reference】 Conceptual diagram of methods for building circular systems

Characteristic elements of each method for building circular systems are highlighted in color. As these methods may be combined in a modular manner, linking multiple approaches rather than applying them individually is expected to promote more effective resource circulation.



*Includes pretreatment prior to recycling, such as deinking and alkaline washing.

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3-1. Structure and overview of this material

: At a level of maturity where discussions can be held on further advancement and horizontal deployment
: Individual discussions are being advanced in sub-working groups (sub-W8Gs)
: Among CPs members, demonstration projects are progressing outside the regional working groups (regional WGs)

Methods for realizing each circular flow are being developed as a "package of information," starting with combinations of high-priority products/materials and circular system construction approaches. Going forward, these will be utilized and updated to further advance each initiative and promote broader horizontal deployment.

Product and material categories			Methods for building circular systems							
			Reuse (including sharing, etc.)				Material recycling (Recycle)			
			Corporate product sharing	Regional collaboration-based reuse	Repair utilizing local talents	Corporate product remanufacturing	Recycling utilizing regional resources	Citizen-based detailed sorting and recycling	Recycling through collaboration with neighboring areas	Large-scale recycling
Products	**Daily-use items** E.g.: daily goods, small home appliances, etc.		**Plastic products × Corporate product sharing**	Satsumasendai City × ECOMMIT (clothing, individual demonstration project)		*Municipality under consideration (home appliances)		**Plastic× Citizen-based detailed sorting and recycling**		
	Durable goods E.g.: furniture, home appliances, etc.				**Furniture × Repair utilizing local human resources**					
Materials	**High-value** E.g.: iron, lithium-ion secondary batteries, aluminum, etc.						Nasushiobara City × JFE, River (metals, Ministry of the Environment)		**Lithium battery × Recycling through interregional collaboration with neighboring areas**	
	Low-value	**Heavy** E.g.: food waste, waste wood/materials, etc.			Kawasaki City × HUB STOCK (building materials, Ministry of the Environment)		Fukuoka City × Value Way (food waste, Ministry of the Environment / Working Group ② #1)	Gamagori City × Kayama Kogyo (Used Diapers, Ministry of the Environment)		
		Lightweight E.g.: plastics, etc.			Fukuyama City × Ecolog Recycling Japan (clothing, Ministry of the Environment)		Tomioka City × TBM (industrial waste plastics, Ministry of the Environment) Fukui Prefecture × CYKLUS (textiles, Ministry of the Environment)	Ishinomaki City × Kao (municipal waste plastics, Ministry of the Environment)	**Plastic × collaboration with neighboring areas /Large-scale recycling**	

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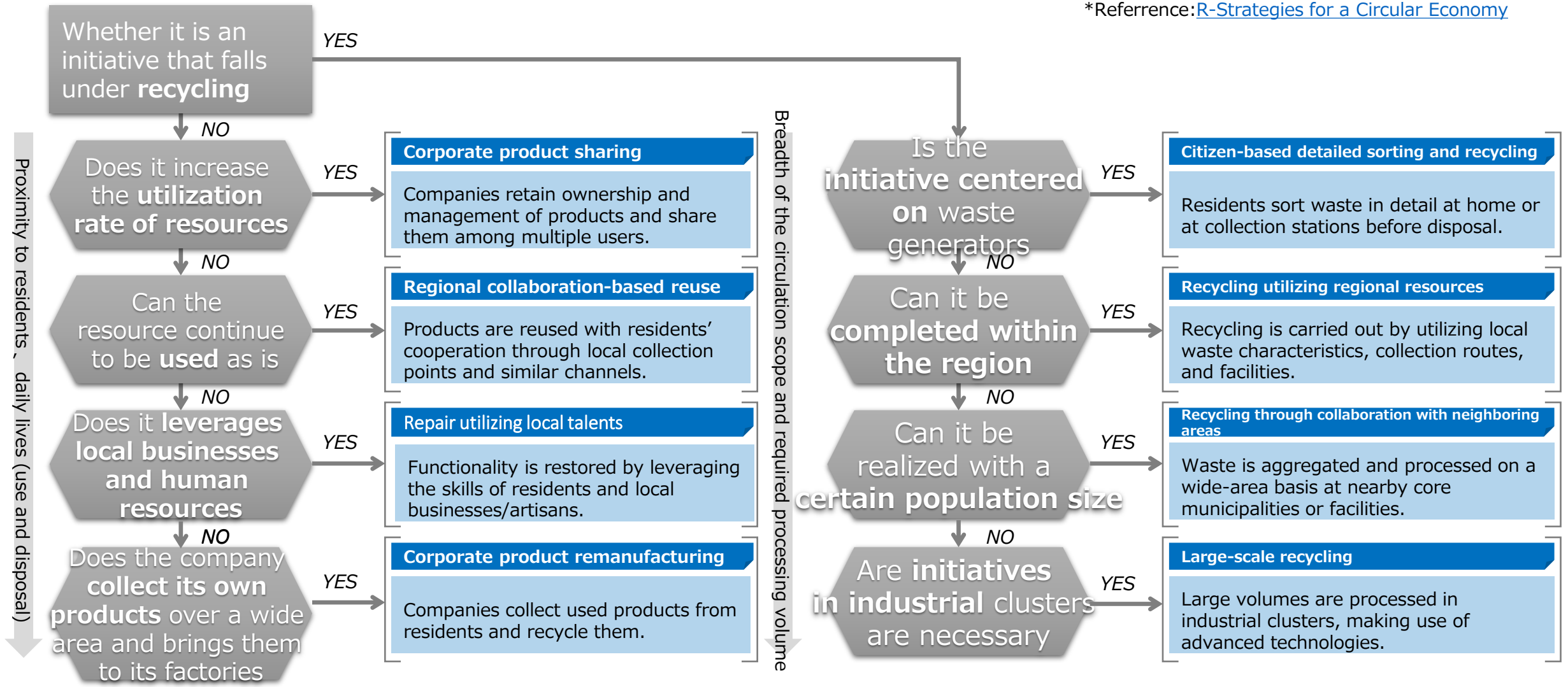
(Reference) Ministry of the Environment, FY2025 Regional Resource Circulation Promotion Support Program:List of Selected Proposals for the "Circular Business Model Demonstration Project" : https://www.env.go.jp/content/000327200.pdf

【Reference】Characteristics of Resource Circulation Models

Resource circulation models can be broadly divided into reuse and recycling. Initiatives can also be categorized according to factors such as their proximity to residents' daily lives (use and disposal)*, the scope of the circulation system, and the required processing volume. Please identify and refer to the circulation model best suited to your region.

*Referrence:R-Strategies for a Circular Economy



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Appendix: Glossary

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Glossary（1/2）

Term	Definition
Circular Economy (CE)	A Circular Economy is a new economic system that aims to maximize the added value of products and services while promoting the efficient and circular use of resources at every stage. This includes designing products from the production stage with reuse and other forms of circular use in mind and minimizing the use and consumption of new resources as much as possible. It is also referred to in Japanese as junkan keizai or junkangata keizai, and is often abbreviated as CE, derived from the initials of the English term Circular Economy. In international discussions, a Circular Economy is generally understood as an economic system in which resources, including renewable resources, and products are used in a circular manner by maintaining, restoring, or enhancing their value. The significance of the Circular Economy has also been discussed in international forums such as the United Nations Environment Assembly (UNEA) and the International Organization for Standardization (ISO).
CCTI	The Circular City Transition Indicator (CCTI) is a support tool for circular city transition, operated by Harch Inc. and Sumitomo Mitsui Trust Bank, Limited. It is designed to objectively and quantitatively assess the progress of local governments in transitioning to a circular city, and to support the development of circular city policies and strategies, related actions, and the maximization of outcomes.
CPs	An abbreviation for “Circular Partners,” a partnership that brings together the national government, local governments, universities, companies, industry associations, and related institutions and organizations that are taking ambitious and advanced approaches to the Circular Economy (CE), with the aim of examining the measures necessary to realize a Circular Economy in Japan.
Circular resources	Under the Basic Act for Establishing a Sound Material-Cycle Society, this refers to useful materials among waste.
Four objectives	This refers to the four objectives set out by CPs to be achieved through regional circularity: “Addressing environmental constraints,” “Addressing resource constraints,” “Capturing growth opportunities,” and “Enhancing well-being.”

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Glossary（2/2）

Term	Definition
Addressing resource constraints	In this indicator, this refers to the perspective for measuring the degree of efforts toward resource circulation within the region
Addressing environmental constraints	In this document, this refers to the perspective used to measure the degree of efforts to address environmental risks within the region.
Capturing growth opportunities	In this indicator, this refers to the perspective for measuring the degree of contribution to regional GDP through the circulation of resources and funds within the region.
Well-being/ Enhancing of well-being	Generally, this refers to a state in which individual rights and self-fulfillment are ensured, and a person is in good physical, mental, and social condition. In this tool, this refers to the perspective used to measure residents' awareness and perceptions regarding their region and daily life.
CE-related Revenue	In this indicator, this refers to the Outflow of the waste management industry.
Number of CE-related employees	In this indicator, this refers to the number of employees in the waste management industry.
Local economic value added of CE-related businesses	This refers to the "local benefits" generated by CE-related businesses. Regional economic value added can be calculated as the sum of employees' disposable income, local tax revenue, and profits earned by regional businesses
Inclusive wealth	This refers to the wealth held by society that generates the well-being of people living today and of future generations.
Inclusive Wealth Indicator	This refers to the monetary valuation of Inclusive Wealth. It is an indicator composed of produced capital, human capital, and natural capital, comprehensively covering areas from the economy to the environment and health, and is used as an indicator for understanding the degree of SDG achievement and regional prosperity.
Methods for building circular systems	This refers to a group of resource circulation typologies of an optimal scale suited to regional characteristics

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Revision History

Version	Revision Date	Section Updated	Description of Revision
Vol.1.1	June 24th, 2026	Chapter 2 List of Regional CE Indicators	Reordered the indicators under “①addressing Resource Constraints” and “②addressing Environmental Constraints”.
		Chapter 2 List of Regional CE Indicators	Revised the calculation formula for “Recycling Costs <JPY>”.
		Chapter 2【Reference】What is GCP（Global Circularity Protocol for Business） : The corresponding indicator	Revised the section on alignment with GCP.
Vol.2	August 3th, 2026	Chapter 2 Main Indicator, List of Regional CE Indicators	Updated “Environmental Awareness” and “Degree of Implementation of Environmentally Conscious Behavior,” originally under “Realization of Well-being,” as indicators for “Acquisition of Growth Opportunities.”

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