Ministry of National
Development Planning/Bappenas
Republic of Indonesia



NATIONAL ROADMAP & ACTION PLAN
CIRCULAR ECONOMY INDONESIA 2025-2045

NATIONAL ROADMAP
& ACTION PLAN

CIRCULAR ECONOMY INDONESIA 2025–2045

Ministry of National
Development Planning/Bappenas
Republic of Indonesia

in collaboration with

LOW CARBON DEVELOPMENT INDONESIA

EUROPEAN UNION

PAGE PARTNERSHIP FOR ACTION ON GREEN ECONOMY

UNDP

Editorial Team

NATIONAL ROADMAP & ACTION PLAN ECONOMY CIRCULAR INDONESIA 2025-2045

Advisor

Suharso Monoarfa
Minister of National Development Planning/Head of Bappenas

Director

Vivi Yulaswati
Deputy for Maritime Affairs and Natural Resources
Ministry of National Development Planning/Bappenas

Person-in-Charge

Priyanto Rohmattullah
Director for Environmental Affairs
Ministry of National Development Planning/Bappenas

Editorial Team

Kementerian PPN/Bappenas

Medrilzam
Asri Hadiyanti Giastuti
Caroline Aretha Merylla
Anggi Pertiwi Putri
Anna Amalia
Irfan Darliazi Yananto
Martha Theresia Juliana Br Siregar

LCDI

Adhitya Yusuf
Putri Ghassani
Sulistiawati Pratiwi
Aisyah Putri Lestari
Dian Septa Rianti

Experts Team

Team Leader

Maria Dian Nurani

Food Sector Expert

Wahyudi David

Electronics Sector Expert

Jessica Hanafi

Textiles Sector Expert

Mohamad Widodo

Plastic Pakaging Sector Expert

Pranandya Wijayanti

Construction Sector Expert

Ade Asmi

Governance Expert

Derry Wanta

Team Members

Elma Elkarim
Made Urmylla Sunaya
Angga Safik Ul Ridwan
Aditya Handoyo
Rizka Tezara Go

Design & Layout

Oki Triono
Agung Saputra

Acknowledgment

The realization of this book is the result of support and collaboration from various parties. We extend our appreciation to the ministries/agencies, business actors, and development partners for their support in developing the **Circular Economy Roadmap and Action Plan in Indonesia**. We also thank all those who have contributed to the preparation of this book, which is hoped to serve as an inspiration and guide for the transition to a circular economy in Indonesia.

Ministries/Agencies

- Coordinating Ministry for Economic Affairs
- Coordinating Ministry for Maritime Affairs and Investment
- Ministry of Environment and Forestry
- Ministry of Public Works and Public Housing
- Ministry of Industry
- Ministry of Agriculture
- Ministry of Tourism and Creative Economy
- Ministry of Cooperatives and SMEs
- Ministry of Health
- Ministry of Trade
- Ministry of Maritime Affairs and Fisheries
- Ministry of Energy and Mineral Resources
- Ministry of State-Owned Enterprises
- Ministry of Home Affairs
- Ministry of Finance
- Financial Services Authority
- Ministry of Investment (Investment Coordinating Board)
- Indonesian Food and Drug Authority (BPOM)
- National Food Agency
- National Standardization Agency (BSN)
- National Research and Innovation Agency (BRIN)
- National Public Procurement Agency (LKPP)
- Provincial Government of DKI Jakarta

Development Partners

EUROPEAN UNION

PAGE PARTNERSHIP FOR ACTION ON GREEN ECONOMY

UNDP

GGGI

EMBASSY OF DENMARK Jakarta

Supported by:
Federal Ministry for Economic Affairs and Climate Action
on the basis of a decision by the German Bundestag

IKI INTERNATIONAL CLIMATE INITIATIVE

implemented by:
giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Support from other partners:

The Embassy of Switzerland, JICA, the Embassy of the Kingdom of the Netherlands, Business Finland, ADB Indonesia, the World Bank, P4G.

Associations

- Indonesian Food and Beverage Producers Association (GAPMMI)
- Indonesian Hotel and Restaurant Association (PHRI)
- Indonesian Plastic Recycling Association (ADUPI)
- Indonesian Olefin, Aromatic, and Plastic Industry Association (INAPLAS)
- Indonesian Retailers Association (APRINDO)
- Chairperson of the Indonesia Packaging Recovery Organization (IPRO)
- Indonesian Electric Manufacturers Association (APPI)
- Association of Indonesian Electronics and Household Electrical Appliance Industries (GABEL)
- Association of Indonesian Telematics Device Industries (AIPTI)
- Green Building Council Indonesia (GBCI)
- President of the Indonesian Contractor Association (ICA)/AKI)
- Chairperson of the Indonesian Cement Association
- Chairperson of the Indonesian Precast and Prestressed Concrete Association (AP3I)
- President of the Indonesian Textile Association (API)
- Chairperson of Rantai Tekstil Lestari (RTL)
- Indonesian Plastic Bag Diet Movement Association (Dietplastik Indonesia)
- Association for the Rational Plastic Movement for Indonesia (PASTI)
- Indonesian Sustainable Blue Initiative (WAIBI)

Private Sectors & Organization

Food Sector

- Super Indo
- Great Giant Foods Indonesia
- Surplus Indonesia
- Garda Pangan
- Foodbank of Indonesia

Retail Sector
(Focus on Plastic Packaging)

- PT Chandra Asri Petrochemical
- Danone Indonesia
- PT Unilever Indonesia Tbk
- Nestlé Indonesia
- Carrefour
- PT Cahaya Inti Putra Sejahtera
- PT Sumber Alfaria Trijaya, Tbk
- Siklus Refill
- Saruga
- Zero Waste Living Lab - Enviu
- Cleanomic
- PT. Polindo Utama
- Waste4Change
- Rekosistem

Electronic Sector

- PT. Teknotama Lingkungan Internusa (TLI)
- Mukti Mandiri Lestari (MML)
- Prasadha Pamunah Limbah Industri (PPLI)
- Citra Asia Raya (CAR)
- Tes-AMM Indonesia
- Samsung Electronics Indonesia
- PT Sharp Electronics Indonesia
- PT. Panasonic Gobel Indonesia
- PT Sony Indonesia
- PT. Dell Indonesia
- PT. Indonesian Electronic & Engineering (Polytron)
- PT Dulang Sirkular Nusantara
- PT. Gotion

Construction Sector

- PT. Jaya Real Property Tbk
- PT. Adhi Karya Tbk.
- PT. SBI (Solusi Bangun Indonesia)
- PT. Wijaya Karya Beton
- PT. Gunung Raja Paksi
- SCG Indonesia
- PT Total Bangun Persada
- Rebricks
- Plana

Textiles Sector

- PT Asia Pacific Rayon
- PT Sri Rejeki Isman (Sritex)
- PT Kahatex
- PT. Pan Brothers
- PT Daur Langkah Bersama (Pable)
- PT Superbtex & Ecotouch
- H&M Indonesia

Governance Aspects

- PT. Sarana Multi Infrastruktur
- Center for Sustainability & Waste Management - Universitas Indonesia (CSWM UI)
- National Battery Research Institute
- Essential Services Reform (IESR)
- Indonesian Institute for Energy Economics (IIEE)
- Indonesia Research Institute for Decarbonization (IRID)
- Center of Reform on Economics (CORE) Indonesia
- Madani Berkelanjutan
- GoTo Impact Foundation
- Indonesia Business Council for Sustainable Development



NATIONAL ROADMAP & ACTION PLAN CIRCULAR ECONOMY INDONESIA 2025-2045



Foreword

Suharso Monoarfa
Minister of National Development Planning/
Head of Bappenas

The world is currently facing a triple planetary crisis, encompassing the threats of climate change, pollution and environmental degradation, and biodiversity loss. These crises are the result of unsustainable human activities. Over the past 20 years, the use of natural resources has increased by 65%, and if this trend continues, three planet Earths would be required to meet the global demand for natural resources.

Therefore, a green economic development model is needed to support sustainable development, focusing on greener investments and capital accumulation, green infrastructure, and green jobs to achieve social welfare and environmental sustainability. In implementing a green economy, the circular economy serves as a vehicle to achieve green economic targets. The circular economy can minimize resource use, design products for prolonged utility, and return production and consumption residues back into the value chain.

The implementation targets for the green economy and circular economy have been incorporated into Indonesia's future national development planning, including the National Long-Term Development Plan (RPJPN) 2025–2045 and the National Medium-Term Development Plan (RPJMN) 2025–2029. The inclusion of green and circular economy strategies in these plans demonstrates Indonesia's long-term commitment to transforming its economy from a business-as-usual model to a more sustainable one.

To accelerate the transition from a linear economy to a green economy, Bappenas has conducted several studies: (1) Economic, Social, and Environmental Benefits of Circular Economy in Indonesia across five priority sectors—food, construction, electronics, textiles, and retail with a focus on plastic packaging; (2) A Study on Food Loss and Waste in Indonesia; and (3) The Future is Circular Book, which documents best practices of circular economy already implemented in Indonesia. These studies, along with various other government policies, serve as valuable resources for the preparation of **Circular Economy Roadmap and Action Plan in Indonesia**.

The development of Circular Economy Roadmap and Action Plan in Indonesia has undergone a series of discussions involving Ministries/ Agencies, Subnational Governments, business actors, associations, and development partners. This document outlines the strategies, actions, and targets for circular economy in Indonesia, focusing on three key indicators: the circular input rate, usage rate, and recycling rate. The formulation of enabling conditions also took place, concentrating on institutional and regulatory framework, data management, financing, communication, and incentives.

We extend our appreciation to all parties who have supported the preparation of this Roadmap and Action Plan as a reference for building a more sustainable and circular national development in Indonesia.

Jakarta, June 2024



Suharso Monoarfa
Minister of National Development Planning/
Head of Bappenas



Foreword

Vivi Yulaswati
Deputy for Maritime Affairs and Natural Resources
Ministry of National Development Planning/Bappenas

On this occasion, the Ministry of National Development Planning/National Development Planning Agency is launching Circular Economy Roadmap and Action Plan for Indonesia, which represents a collaborative effort between the government, business actors, associations, and development partners following a series of discussions since 2023. This document reflects a strategic national step toward fulfilling our commitment to building a more sustainable and environmentally friendly economy.

The global circularity rate in material use has continued to decline, from 8.6% in 2020 to 7.2% in 2023. Unsustainable material usage practices contribute to 70% of greenhouse gas emissions and 90% of biodiversity loss. These figures highlight the urgency for all stakeholders to swiftly transition from the extractive linear economy model of take-make-dispose to a circular economy. Implementing a circular economy has the potential to reduce material use by 28% and lower greenhouse gasses (GHGs) emissions by 39% by 2050.

For this reason, countries around the world are increasingly pushing for the transition to a circular economy. The European Union has already implemented its Circular Economy Action Plan, and ASEAN has launched the Framework for Circular Economy as a guide for achieving resilience, resource efficiency, and sustainable and inclusive growth across the region. It is now time for Indonesia to adopt this wave of change, one step of which is through the launch of Circular Economy Roadmap and Action Plan.

Various strategies have been formulated within Circular Economy Roadmap and Action Plan based on the 9R framework: Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, and Recover. The 9R principles encompass the entire value chain, from production, distribution, and consumption to the end of product life. Therefore, cooperation among all stakeholders is crucial, as comprehensive collaboration and intervention are key to establishing a circular economy ecosystem.

I believe that Indonesia possesses strong natural and social capital to achieve the targets outlined in Circular Economy Roadmap and Action Plan. This document marks a promising beginning for building an inclusive and sustainable circular economy ecosystem.

Let us use the Circular Economy Roadmap and Action Plan as a guide to collectively create a better future for the generations to come.

Jakarta, June 2024

Vivi Yulaswati
Deputy for Maritime Affairs and Natural Resources
Ministry of National Development Planning/Bappenas



Foreword

Norimasa Shimomura
Resident Representative, UNDP Indonesia

The launch of Indonesia's Roadmap and Action Plan for Circular Economy is an important milestone in accelerating the Government of Indonesia's vision and commitment to tackling the global triple planetary crisis: climate change, biodiversity loss, and pollution. This shift to the circular economy is crucial to move away from traditional linear economic models which are leading to resource depletion, environmental degradation, and significant waste generation.

The journey of developing the Circular Economy Roadmap and Action Plan has been a meticulous and collaborative effort. Since 2020, UNDP has been privileged to engage closely with the Ministry of Development Planning (Bappenas) in exploring the economic, social, and environmental potential in transitioning to a circular economy in Indonesia. Our previous studies identified priority sectors and showcased circular practices and businesses demonstrating various benefits. The Partnership for Action on Green Economy (PAGE), a joint UN initiative, further facilitated the roadmap's development by identifying additional opportunities to inform the action plan.

Focusing on five priority sectors—food, retail (focus on plastic packaging), textile, construction, and electronics—which represent almost one-third of Indonesia's GDP and provided jobs to more than 43 million people in 2019, the implementation of the Circular Economy Roadmap offers massive potential. Our previous study with Bappenas projected that transitioning to circularity could contribute around IDR 638 trillion (USD 39 billion) to Indonesia's GDP by 2030, create 4.4 million new jobs, reduce waste generation by 18-52%, and reduce GHG emissions by 126 million tons of CO_2. However, this will require an annual investment of IDR 308 trillion (USD 19 billion) to build the necessary infrastructure and enable circular economy business opportunities. This necessitates focused efforts on implementing the plan's financing strategy, leveraging diverse domestic and international funding sources, and fostering public-private partnerships.

Ensuring an inclusive and just transition to a circular economy is crucial. The plan highlights the need for inclusive policies to integrate marginalized groups, including informal sector workers, into formal systems. This enhances their roles in waste management and the circular value chain, improving livelihoods and working conditions. Additionally, gender inclusivity is vital, as women's participation drives innovation and economic growth.

In this SDG Decade of Action, I extend my heartfelt congratulations to Bappenas for its leadership on this important issue. I also express my gratitude for entrusting UNDP to work closely with Bappenas and other partners in shaping Indonesia's circular economy ecosystem. We look forward to seeing the collective efforts of all stakeholders transform this vision into reality, driving Indonesia towards a sustainable and inclusive future.

Jakarta, June 2024

Norimasa Shimomura
Resident Representative, UNDP Indonesia



ROADMAP &
NATIONAL ACTION PLAN
CIRCULAR ECONOMY INDONESIA 2025-2045

Table of Contents

Editorial Team 1

Acknowledgment 2

Foreword 5

Executive Summary 11

1 THE URGENCY OF CIRCULAR ECONOMY TRANSITION 13

Environmental and Natural Resources Conditions 14

Operational Definition of Circular Economy 17

Circular Economy Priority Sectors in Indonesia 19

Circular Economy in the National Policy Framework 20

Roadmap and Action Plan for Circular Economy in Indonesia 25

2 BASELINE & DIRECTION OF THE NATIONAL CIRCULAR ECONOMY 27

Policy Scope 28

Circular Economy Indicators 29

Supporting Indicators 31

3 NATIONAL ROADMAP & ACTION PLAN FOR CIRCULAR ECONOMY 35

Food Sector 37

Retail Sector (Focus on Plastic Packaging) 50

Electronics Sector 64

Construction Sector 78

Textile Sector 92

4 GOVERNANCE FOR CIRCULAR ECONOMY ECOSYSTEM 107

Institutional Framework and Regulations 108

Financing 114

Incentives 119

Data Management 126

Communication 129

Subnational Implementation 135

5 MONITORING, EVALUATION, & REPORTING WITHIN THE NATIONAL DEVELOPMENT PLANNING FRAMEWORK 139

Coordination Framework and Monitoring, Evaluation, and Reporting Institution 140

Implementer and Monitor 141

Evaluation and Reporting on Circular Economy Actions 141

Appendix 143

Glossary and List of Abbreviations 157

List of Figures

Figure 1.1 The 9R Principles in Circular Economy 17

Figure 1.2 Analysis of Priority Sectors for Circular Economy in Indonesia 19

Figure 1.3 Formulation Steps of Roadmap & National Circular Economy Action Plan 25

Figure 2.1 Circular Economy Performance of Priority Sectors 32

Figure 3.1 Infographic Indonesia Circular Economy Roadmap 2045 36

Figure 3.2 Policies Relevant to Circular Economy in the Food Sector 39

Figure 3.3 Comparison of the Linear and Circular Value Chains in the Food Sector 40

Figure 3.4 Circular Economy Ecosystem in the Food Sector 41

Figure 3.5 Milestones of Circular Economy in the Food Sector 44

Figure 3.6 Policies relevant to circular economy in the Retail Sector (Focus on Plastic Packaging) 52

Figure 3.7 Comparison of Linear and Circular Value Chains in the Retail Sector (Focus on plastic packaging) 53

Figure 3.8 Circular Economy Ecosystem in the Retail Sector (Focus on Plastic Packaging) 54

Figure 3.9 Circular Economy Phases for the Retail Sector (Focus on plastic packaging) 57

Figure 3.10 Policies relevant to the circular economy in the electronics sector 65

Figure 3.11 Comparison of Linear and Circular Value Chains in the Electronics Packaging 66

Figure 3.12 Circular Economy Ecosystem in the Electronics Sector 67

Figure 3.13 Milestones of circular economy in the Electronics Sector 70

Figure 3.14 Relevant policies for circular economy in the construction sector 81

Figure 3.15 Comparison of Linear Value Chains with Circular Value Chains in the Construction Packaging Sector 82

Figure 3.16 Circular Economy Ecosystem in the Construction Sector 83

Figure 3.17 Milestones of Circular Economy in the Construction Sector 86

Figure 3.18 ies relevant to circular economy in the electronics sector 94

Figure 3.19 Comparison of Linear and Circular Value Chains in the Textile Sector 95

Figure 3.20 Circular Economy Ecosystem in the Textile Sector 96

Figure 3.21 Circular Textile Economy Roadmap Indonesia 2025-2045 99

Figure 4.1 Governance structure supporting the implementation of circular economy action plan 108

Figure 4.2 Monitoring and Evaluation of Subnational Government Circular Economy 137

Figure 5.1 Implementation Mechanism for Circular Economy Monitoring and Evaluation 140

List of Tables

Table 1.1 Definitions and Applications of the 9R Principles (R0-R9) in Indonesia 18

Table 1.2 Examples of Policies and Programs by the Government of Indonesia Supporting the Implementation of a Circular Economy 21

Table 3.1 Circular Economy Strategy & Action Plan for Food Sector 45

Table 3.2 Circular Economy Strategy & Action Plan for Plastic Packaging 58

Table 3.3 National Strategy and Action Plan for Circular Economy in the Electronics Sector 71

Table 3.4 National Circular Economy Strategy and Action Plan for the Construction Sector 87

Table 3.5 National Strategy and Action Plan for Circular Economy in the Textile Sector 100

Table 4.1 Action Plans for Institutional and Regulatory Structuring of Circular Economy 112

Table 4.2 Action Plan for Governance Aspects: Funding 117

Table 4.3 Business Grouping and Financing in Circular Economy 118

Table 4.4 Existing Incentive Policies 119

Table 4.5 Fiscal Incentive Instruments 121

Table 4.6 Non-Fiscal Incentive Instruments 122

Table 4.7 Action Plan for Governance Aspects: Incentives and Disincentives 123

Table 4.8 Existing Data Information and Management Systems 126

Table 4.9 Action Plan for Governance Aspect: Data Management 128

Table 4.10 Action Plan on Governance Aspect: Communication 132

Table 4.11 Action Plan for Subnational Implementation 136

Executive Summary

In Indonesia, circular economy has been integrated into national development planning documents, where in the draft of the National Long-Term Development Plan (RPJPN) 2025–2045, circular economy will become one of the strategies to achieve a Green Economy.

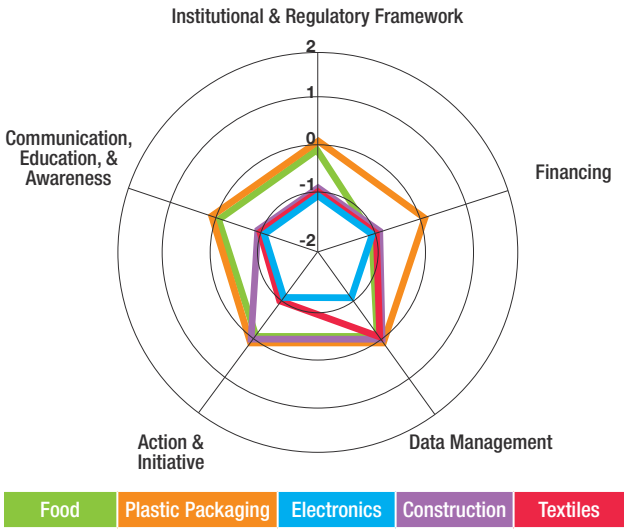
Operational Definition of Circular Economy:
Circular economy is an economic model that applies a systemic approach to minimizing resource use, designing products to last as long as possible, and returning the residuals from production and consumption back into the value chain.

Policy Directions and Key Indicators CIrcular Economy in Indonesia

9R Framework	Policy Directions	Key Indicators	Baseline (2023)
R0 Refuse	Reduction in Resource Use	Circular Input Rate	9%
R1 Rethink			
R2 Reduce			
R3 Reuse	Extension of product and material use	Usage Rate	4%
R4 Repair			
R5 Refurbish			
R6 Remanufacture			
R7 Repurpose			
R8 Recycle	Enhancement on Recycling and Recovery of post production and consumption waste	Recycling Rate	5%
R9 Recover			

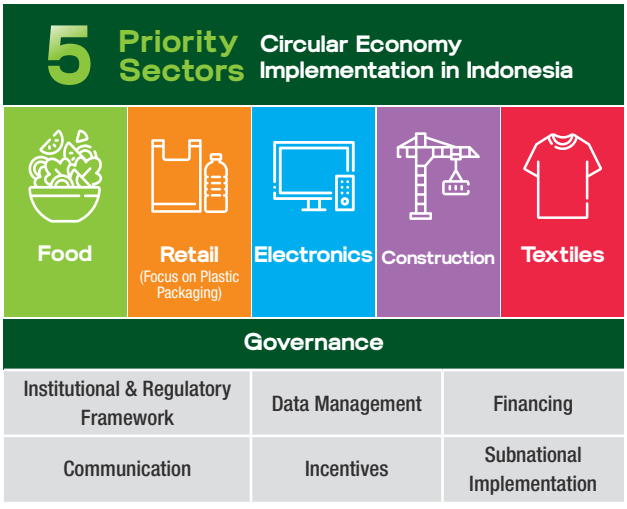
Circular Economy Performance Indicators

Expert Analysis (2023)



Legend:
-2: No initiatives, programs, or policies have taken place
-1: Performance not yet visible, but initiatives or improvements have been initiated
0: Satisfactory/ adequate performance.
+1: Efforts to enhance performance, yielding tangible improvements beyond the baseline score of 0, but still not optimal.
+2: Excellent and optimal performance and commitment.

The National Roadmap and Action Plan for Circular Economy in Indonesia focuses on five priority sectors and the supporting aspects to build the circular ecosystem. This document serves as a reference for stakeholders in driving the transition from a linear to a circular economy in Indonesia. The action plan is set for a 20-year implementation period (2025–2045), with periodic evaluation every five years.





NATIONAL ROADMAP
& ACTION PLAN

CIRCULAR ECONOMY INDONESIA 2025-2045



1

THE URGENCY OF CIRCULAR ECONOMY TRANSITION

Environmental and Natural Resource Conditions

The Industrial Revolution in the 18th century significantly transformed human life. The economy has rapidly grown, social and employment structures have shifted, and people's behavior and lifestyles have evolved. Some of these changes were positive, such as more efficient production processes through the use of machinery, which boosted industrial productivity and supported more equitable economic development and rapid population growth.

However, development focused solely on economic growth can have negative impacts, particularly on the environment. Population growth drives the increasing demand for natural resources to support economic activities. The efficiency of production processes also leads to faster consumption and production cycles, resulting in a tendency toward exploitative extraction of natural resources. In the last two decades, global material consumption has increased by up to 66%.[1] Meanwhile, of the total resources consumed, only 7.2% are reused in economic activities, with the rest being discarded.[2]

This unsustainable pattern of production and consumption is known as a linear economy, which follows the 'take-make-dispose' approach. In a linear economy, all economic activities are solely focused on adding value during the production process, which is then utilized in the consumption phase. When a product no longer has any utility, it is immediately discarded at the landfills.

As a developing country, Indonesia's Domestic Material Consumption (DMC) increased by 36% in 2023 compared to ten years earlier[3]. Waste generation in Indonesia is projected to reach 82 million tons per year by 2045, with per capita waste generation estimated at 0.89 kg per person per day. Under the Business as Usual (BaU) scenario, landfills in Indonesia are projected to exceed their capacity by 2028 or sooner. Currently, several subnational regions, including DKI Jakarta, Bandung City, and Yogyakarta area – Sleman – Bantul (Kartamantul), are already experiencing landfills overcapacity.[4]

The practice of a linear economy has significantly contributed to the triple planetary crisis, which include climate change, pollution, and biodiversity loss. The handling and use of materials, including natural resource extraction, processing and manufacturing, transportation, and product use, account for 70% of total global greenhouse gasses (GHGs) emission[5] . Moreover, the residual effects of poorly managed production and consumption activities have polluted the environment—land, sea, and air alike. By 2050, it is estimated that the amount of plastic waste will exceed the number of fish in the ocean[6]. Ultimately, these impacts will affect humanity, leading to biodiversity loss and disrupting ecosystem balance.

[1] United Nations. 2023. The Sustainable Development Goals Report. Accessed in https://unstats.un.org/sdgs/report/2023/The-Sustainable-Development-Goals-Report-2023.pdf

[2] Circle Economy. 2023. The Circularity Gap Report. Accessed in https://www.circularity-gap.world/2023#download

[3] Consultant Analysis. 2023. Data source: UN Environment Programme dan International Resource Panel. Global Material Flows Database. Accessed in https://www.resourcepanel.org/global-material-flows-database

[4] Bappenas. Kajian Lingkungan Hidup StrategisRencana Pembangunan Jangka Panjang Nasional 2025-2045. Accessed in https://lcdi-indonesia.id/dokumenpublikasidirektoratlingkunganhidup/

[5] Circle Economy. 2021. The Circularity Gap Report. Accessed in https://www.circularity-gap.world/2021

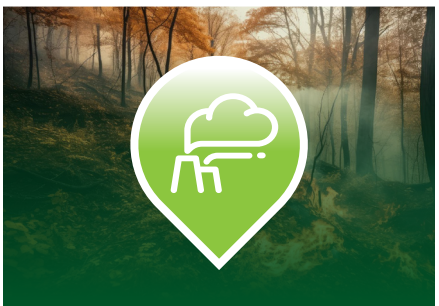
[6] Ellen MacArthur Foundation, The New Plastics Economy: Rethinking the future of plastics & catalysing action (2017)

The Triple Planetary Crisis



Climate Change

Approximately **50-75%** of the global population may face life-threatening climate conditions by the year 2100[7].



Pollution & Environmental Degradation

Air pollution has been identified as the leading cause of disease and premature death globally, accounting for up to **4.2 million** deaths annually.[8]



Biodiversity Loss

The loss of biodiversity poses a risk to human health and ecosystem services. Currently, around **1 million** plant and animal species are at risk of extinction.[9]

Currently, many countries are making efforts to address the triple planetary crisis, with a primary focus on transitioning to renewable energy and improving energy efficiency. While these steps are crucial, interventions in the energy sector alone can only address about 55% of emissions. The remaining 45% comes from the production of cars, clothing, food, and other everyday products.[10] A comprehensive and integrated approach across the entire value chain is needed to effectively mitigate the impacts of the triple planetary crisis.

Circular economy offers a regenerative approach to natural resource management, where materials produced and consumed are never wasted. The implementation of circular economy is promoted through the Sustainable Development Goals (SDGs), specifically Goal 12: Responsible Consumption and Production. From a production standpoint, products are designed to be durable, easily repairable, and recyclable. Sustainable design ensures that products have longer lifecycles and can be reprocessed into new products once they reach the end of their useful life. On the consumption side, circular economy encourages changes in consumer behavior, urging them to choose environmentally friendly products and to use these products for longer periods. Circular economy optimizes the continuous use of materials throughout the entire value chain, thereby reducing waste generation and pollution.

[7] IPCC (2022)

[8] INFCCC (2022)

[9] IPBES (2019)

[10] Macharthur (2019). How the circular economy tackles climate change. *Ellen MacArthur Found*, 1, 1-71.

Given its significant potential benefits, the concept of circular economy has begun to be adopted as a development agenda at the global level. European Union countries like Denmark, the Netherlands, and Finland have established national action plans for circular economy, each focusing on specific areas and sectors. Similarly, ASEAN countries like Singapore and Thailand have integrated circular economy principles into their development agendas.

Box 1.1 Examples of Circular Economy Policies in Other Countries



Denmark

Action Plan for Circular Economy - National Plan for Waste Prevention and Management 2020–2032

Denmark's Circular Economy Action Plan focuses on three areas with significant environmental and climate impacts: biomass, construction, and plastics. The key focus areas of the action plan strategy include: waste reduction and better utilization of natural resources, improved recycling, better utilization of biomass, building a sustainable environment, and a circular economy for plastics. Some of circular economy implementation indicators used by Denmark are:

- Total CO_2e emissions from the waste sector
- Municipal waste generation
- Municipal waste recycling
- Number of products and services certified with the Nordic Swan Ecolabel
- Proportion of construction certified with the Nordic Swan Ecolabel, DGNB, LEED, or BREEAM



Thailand

Bio Circular Green Economy[11]

Bio Circular Green (BCG) Economy is Thailand's government strategy for national development and post-pandemic recovery. The BCG model emphasizes the application of science, technology, and innovation to enhance Thailand's competence in biodiversity and culture, focusing on four strategic sectors:

1. agriculture and food
2. health and medicine
3. energy, materials, and biochemistry, and
4. tourism and creative economy.

The model aims to implement the concepts of bioeconomy, circular economy, and green economy to develop high-value, environmentally friendly products and services that require fewer resource inputs, while simultaneously conserving natural and biological resources.

[11] https://www.bcg.in.th/eng/background/

Operational Definition of Circular Economy

Circular economy extends beyond waste management and recycling. Its core principles include: (1) Eliminating waste and pollution, (2) Keeping resources and products in use within the economic cycle for as long as possible, and (3) Building regenerative ecosystems.

In the application of circular economy, products and materials are preserved through processes such as maintenance, reuse, repair, remanufacturing, recycling, and composting. Circular economy decouples the linear relationship between economic activity and resource consumption, ultimately allowing for economic growth even as resource extraction decreases.

Operationally, circular economy is defined as an economic model that applies a systemic approach to minimizing resource use, designing products to last as long as possible, and returning the residuals from production and consumption back into the value chain.

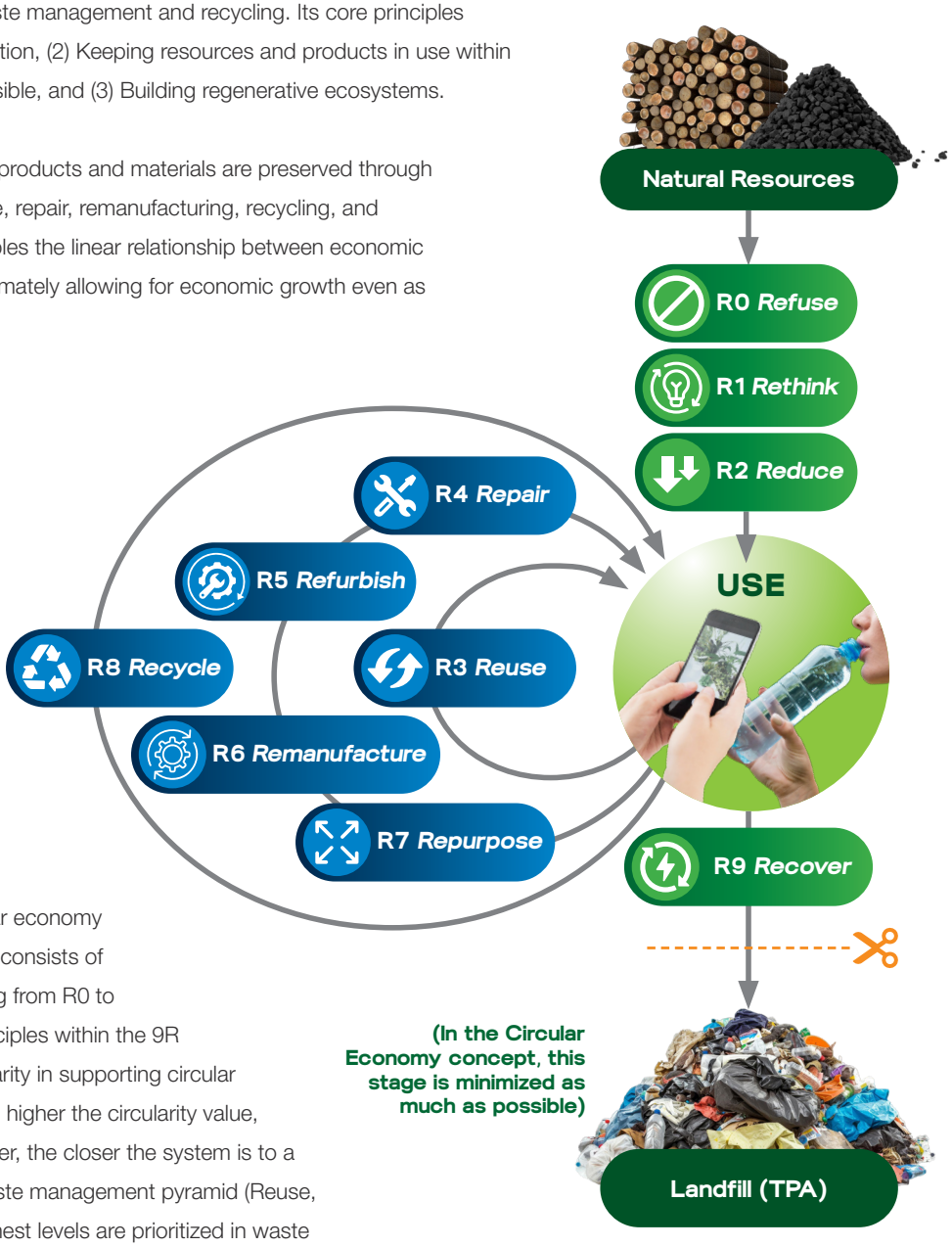


Figure 1.1 The 9R Principles in Circular Economy[15]

The framework for developing a circular economy strategy is the 9R Framework[12], which consists of 10 circular economy strategies, ranging from R0 to R9[13]. The categorization of the 10 principles within the 9R framework illustrates the level of circularity in supporting circular economy. The lower the R number, the higher the circularity value, and conversely, the higher the R number, the closer the system is to a linear economy[14]. Similar to the 3R waste management pyramid (Reuse, Reduce, Recycle), initiatives at the highest levels are prioritized in waste management.

[12] PBL Netherlands Environmental Assessment Agency. 2017. Circular economy: Measuring innovation in the product chain. accessed in: https://www.pbl.nl/sites/default/files/downloads/pbl-2016-circular-economy measuring-innovation-in-product-chains-2544.pdf

[13] PBL Netherlands Environmental Assessment Agency. 2017. Circular economy: Measuring innovation in the product chain. accessed in: https://www.pbl.nl/sites/default/files/downloads/pbl-2016-circular-economy measuring-innovation-in-product-chains-2544.pdf

[14] Bappenas. 2022. The Future is Circular: Langkah Nyata Inisiatif Ekonomi Sirkular di Indonesia. accessed in: https://lcdi-indonesia.id/wp-content/uploads/2022/08/The-Future-is-Circular.pdf

[15] PBL Netherlands Environmental Assessment Agency. 2018. *Circular economy: what we want to know and can measure Framework and baseline assessment for monitoring the progress of the circular economy in the Netherlands*. accessed in: https://www.pbl.nl/sites/default/files/downloads/pbl-2018-circular-economy-what-we-want-to-know-and-can-measure-3217.pdf

Table 1.1 Definitions and Applications of the 9R Principles (R0-R9) in Indonesia

9R Principles	Definition	Examples of Application
R0 Refuse	Avoiding redundancy in the creation of products with the same function.	Removal of formwork using modular and precast concrete in construction projects.
R1 Rethink	Using products more intensively.	Utilizing digital platforms by businesses to facilitate product sharing.
R2 Reduce	Improving production efficiency and product utility by using fewer materials.	Creating clothing patterns with cutting processes designed to reduce fabric waste in the garment industry.
R3 Reuse	Reusing products that are still usable without altering their function.	Using wearable clothing and household textiles (curtains, tablecloths, bedding) from donations or resale.
R4 Repair	Repairing damaged products.	Repairing electronic products at service centers.
R5 Refurbish	Refurbishing products, typically older products, to restore their functionality.	Reusing old wooden doors from older buildings that are sanded and repainted for use in new buildings.
R6 Remanufacture	Using components from old, non-functional products in new products with the same function.	Retrieving Smart Meters from PLN (State Electricity Company) customers to replace worn-out components and then reusing them for other PLN customers.
R7 Repurpose	Repurposing non-functional products for use in a different function.	Processing food waste into animal feed.
R8 Recycle	Processing materials to produce the same material (with the same or lower quality).	Recycling plastic packaging into secondary raw materials (plastic pellets/ chips) used to produce new plastic packaging.
R9 Recover	Converting materials into energy.	Recovering plastic packaging into energy in the form of oil, RDF, or gas.

In practice, the 9R principles have varying degrees of relevance and application across different sectors, and therefore, their implementation may not be applicable to all sectors. This depends on the resources or materials targeted for intervention in each sector.

Moreover, the application of the 9R principles in business or economic activities can encompass more than one principle. For example, the processing of agricultural waste into alternative materials incorporates both the Reduce (R2) and Repurpose (R7) principles. The Reduce (R2) principle is applied by processing leftover materials into alternative raw materials for new products, while Repurpose (R7) is implemented by using agricultural waste as natural dyes for textile products.

Circular Economy Priority Sectors in Indonesia

The implementation of circular economy in Indonesia is prioritized in five key sectors: food, retail (focusing on plastic packaging), electronics, construction, and textiles. These five priority sectors represent nearly one-third of Indonesia's GDP and provided employment for over 43 million people in 2019.[16] Circular economy in Indonesia is projected to boost additional GDP on the top of Business-as-Usual (BaU) scenario by up to 638 trillion rupiah by 2030, create 4.4 million new jobs by 2030, reduce waste generation by 18-52% under a BaU scenario by 2030, and contribute to reducing greenhouse gas emissions by 126 million tons of CO_2 by 2030.[17]

The management actions for these five priority sectors are aligned with and represent the implementation of the majority of efforts to achieve the 10-Year Framework of Programmes (10-FTP) on Sustainable Consumption and Production Patterns at the global level, as well as the Strategic Framework for Achieving Sustainable Consumption and Production in Indonesia for 2020-2030.[18]

The Ministry of National Development Planning (PPN)/ National Development Planning Agency (Bappenas), in collaboration with UNDP Indonesia and The Kingdom of Denmark, has conducted a Study on the Economic, Social, and Environmental Benefits of Circular Economy in Indonesia. This study involved a series of discussions and communications with stakeholders, including various Ministries/Agencies, the private sector, community representatives, and experts. The analysis within this study focused on the potential of circular economy in five industrial sectors, based on three criteria: 1) Economic potential; 2) Circularity potential; and 3) Stakeholder support in each sector.

Based on this analysis, the five identified priority industrial sectors are:

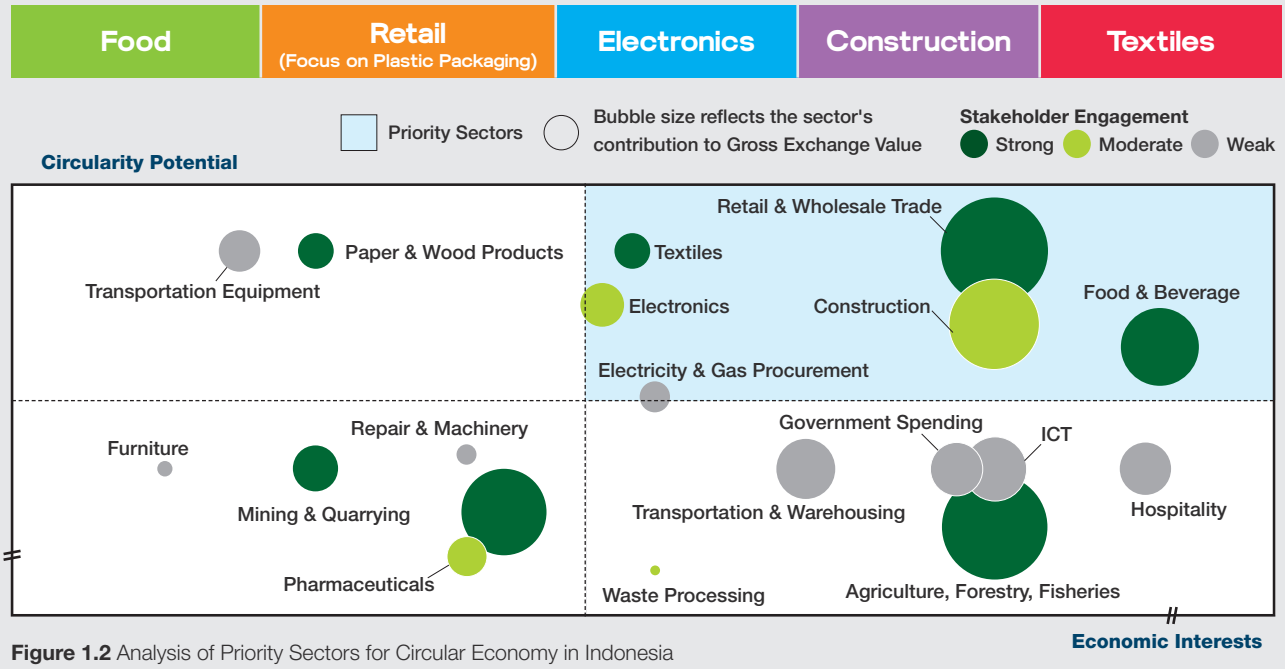


Figure 1.2 Analysis of Priority Sectors for Circular Economy in Indonesia

In addition to these five priority sectors, other sectors with significant potential for implementing circular economy principles include the Paper and Wood, Agriculture, Forestry, Fisheries, and Hospitality sectors.

[16] Bappenas. 2021. Buku Manfaat Ekonomi, Sosial, dan Lingkungan Ekonomi Sirkular di Indonesia. Accessed in https://lcdi-indonesia.id/wp-content/uploads/2021/09/The-Economic-Bahasa_.pdf

[17] *ibid*.

[18] KLHK & Bappenas. 2020. Dokumen Kerangka Kerja Strategi Pencapaian Konsumsi dan Produksi Berkelanjutan Indonesia Tahun 2020-2030. Accessed in chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://pusfaster.bsilhk.menlhk.go.id/wp-content/uploads/2021/04/Kerangka-Kerja-SCP-2030-ISBN-Digital-0709.pdf

Circular Economy in the National Policy Framework

Circular economy policies have been integrated into the National Medium-Term Development Plan (RPJMN) 2020-2024 through National Priority (PN) 1: Strengthening Economic Resilience for Quality Growth and (PN) 6: Building Environmental Sustainability, Enhancing Disaster Resilience, and Addressing Climate Change. Circular economy is closely related to three of the five sectors of Low-Carbon Development, namely sustainable energy development, waste management, and the development of green industries.

In the 20-year development plan or the National Long-Term Development Plan (RPJPN) 2025-2045, circular economy becomes one of the policy directions under the Economic Transformation Development Agenda, specifically Goal 5: Implementation of Green Economy. The RPJPN 2025-2045 is then further elaborated in the National Medium-Term Development Plan (RPJMN) 2025-2029, where circular economy is designated as one of the Priority Programs (PP). The Industrial Circular Economy in the RPJMN 2025-2029 will be implemented through four Development Activities: (1) Implementation of Resource Efficiency, (2) Development of Environmentally Friendly Products, (3) Application of Reuse and Extension of Product and Material Lifespan, and (4) Strengthening the Recycling Ecosystem.

In the Social, Cultural, and Ecological Resilience Development Agenda, circular economy approach to waste management is implemented through the Priority Program for the Participatory Implementation of Circular Economy in Municipal Waste (Upstream). This Priority Program encompasses two Key Activities: (1) Waste Reduction and Segregation at the Source, along with Scheduled Segregated Collection and Transport; and (2) Provision and Optimization of Upstream Waste Processing Facilities Based on 3R (Reduce, Reuse, Recycle).

Box 1.2 **Circular Economy Box in the Draft National Long-Term Development Plan 2025-2045**

Indonesia 2045 Target: A Sovereign, Advanced, and Sustainable Archipelagic Country — 17 *Goals* — 8 Development Agenda — 45 Indicators

The realization of Indonesia's 2045 Vision is reflected in 5 (five) Main Targets:

Development Targets	Target 1. Per capita income equivalent to advanced countries	Target 2. Poverty towards 0% and inequality reduced	Target 3. Increased leadership and influence in the international world	Target 4. Increased competitiveness of human resources	Target 5. Greenhouse Gas (GHG) emission intensity reduction towards Net Zero Emissions
Target 2045	GNI per Capita	Gini Ratio (index)	Global Power Index (ranking)	Human Capital Index	Reduction in GHG emission intensity
	30,300 USD	0.290-0.320	Rank 15	0.73	93.5%

Development Agenda: Economic Transformation — ***Goal:*** Green Economy — **Policy Direction:** Energy Transition | Low Carbon Development | Circular Economy | Green Financing

To strengthen the analysis of the RPJPN and RPJMN, particularly to accelerate the transition to a circular economy, the Government of Indonesia, through the Ministry of National Development Planning/ National Development Planning Agency, has developed the **Roadmap and Action Plan for Circular Economy in Indonesia**. The structure of this Roadmap and Action Plan is integrated with the framework of the RPJPN and RPJMN, containing components such as Targets, Key Indicators, Policy Directions, Strategies, and Actions, which serve as references for formulating policy directions, Priority Programs, Development Activities, Priority Programs, and Output Details in the RPJPN and RPJMN.

The Roadmap and Action Plan for circular economy in Indonesia are also designed to align with and support the achievement of SDG Target 12 on Responsible Consumption and Production. For instance, this includes Target 12.3 for reducing food loss and waste (FLW) and Indicator 12.7 related to the implementation of sustainable procurement of goods and services. Circular economy provides a framework for various environmental development initiatives and targets, which also offer economic benefits.

The Government of Indonesia has developed various policies related to the circular economy, as implemented by Ministries/ Agencies (K/L), as exemplified in **Table 1.2**. Specifically, national policies supporting the implementation of circular economy in five sectors are detailed in the chapters of the Roadmap and Action Plan for each sector. The presence of the national circular economy roadmap and action plan aims to develop and strengthen governance aspects of existing policies to build a circular economy ecosystem in Indonesia.

Table 1.2 Examples of Policies and Programs by the Government of Indonesia Supporting the Implementation of a Circular Economy

Ministries/ Agencies	Policies/Programs
Ministry of National Development Planning (PPN)/National Development Planning Agency (Bappenas)	• Integration of circular economy into national development plans (National Long-Term Development Plans and National Medium-Term Development Plans) • Synchronization of circular economy policies • National Circular Economy Roadmap and Action Plan
Ministry of Environment and Forestry	• Regulation of the Minister of Environment and Forestry No. 1 of 2021 on Public Disclosure Program for Environmental Compliance (PROPER) • Regulation of the Minister of Environment and Forestry No. 2 of 2024 regarding eco-labeling • Regulation of the Minister of Environment and Forestry No. 75 of 2019 on the Roadmap for Waste Reduction by Producers as part of the implementation of Extended Producers Responsibility (EPR) • Regulation of the Minister of Environment and Forestry No. 14 of 2021 on Guidelines for Implementing Reduce, Reuse, and Recycle through Waste Banks
Ministry of Industry	• Regulation of the Minister of Industry No. 51 of 2015 on Guidelines for Developing Green Industry Standards • Green Industry Standards, Certification, and Award Programs • Eco Industrial Park Policy

National Public Procurement Agency (LKPP)	Decision of the Head of National Public Procurement Agency of the Republic of Indonesia No. 157 of 2024 on Guidelines for Sustainable Public Procurement (SPP)
Financial Services Authority (OJK)	OJK Regulation No. 51 of 2017 on the Implementation of Sustainable Finance for Financial Service Institutions, Issuers, and Public Companies, which covers: • Sustainable Finance Roadmap • Sustainability Reports • Sustainable Taxonomy
Ministry of Energy and Mineral Resources (ESDM)	• Regulation of the Minister of Energy and Mineral Resources No. 14 of 2021 on the Implementation of Minimum Energy Performance Standards for Energy-Using Equipment to enforce energy efficiency • Regulation of the Minister of Energy and Mineral Resources No. 2 of 2024 on Rooftop Solar Power Plants Connected to the Electricity Grid of License Holders for Public Electricity Supply, which includes related incentives
Ministry of Cooperatives and SMEs	• Shared Production Facility Program (factory sharing) • Facilitation of Organic Certification (for agribusiness) • Implementation of Green Business Education • SMESCO Centre of Excellence (R&D lab center for SME development)
Ministry of Tourism and Creative Economy	• Sustainable Tourism Village Policy Based on a Circular Economy • Policy direction for blue, green, circular economy in the tourism sector
Ministry of Agriculture	Regulations on Good and Sustainable Agricultural Practices (Good Agricultural Practices).
National Standardization Agency (BSN)	Development of Circular Economy Standards (ISO and SNI).
Ministry of Finance/ Environmental Fund Management Agency (BPDLH)	Management of environmental funds in a professional, credible, and reliable manner, supporting Indonesia's commitment towards Net Zero Emissions, including circular economy
National Food Agency	Commitment to reducing Food Loss and Waste (FLW) through strategies such as good agricultural processing (GAP), good handling processing (GHP), and good distribution processing (GDP), enhancing cultivation technology, extension services, improving infrastructure, and strengthening market access for produced goods.

Box 1.3 Progress in Circular Economy-Related Policies

Sustainable Development Goals (SDGs)

Goal 12: Responsible Consumption and Production

Indicator 12.3.1.(a) Percentage of Food Waste

In 2022, municipal waste from 268 cities/districts across Indonesia amounted to 29.28 million tons per year, with approximately 40% of this waste being organic. When analyzed by source, 36.1% of the waste originated from households, 32.3% from traditional markets, and 32.3% from commercial centers.

Source: SDGs Progress Report 2023

Public Disclosure Program for Environmental Compliance

PROPER is an assessment tool that evaluates company performance in the management of water, air, and hazardous waste against the criteria established by PROPER, which aligns with the standards set forth in regulations of the law.

PROPER Achievement 2023

Participation
3,694 industries

Greenhouse Gas Emissions Reduction
299.6 million tons CO_2e

Energy Efficiency
554.8 million GJ

Water Efficiency
437.32 million m^3

Implementation of 3R for Non-Hazardous Waste
34.81 million tons

Source: Buku PROPER 2023 (KLHK)

Green Industry Certification

The Green Industry Standards (Standar Industri Hijau - SIH) are criteria developed to encourage the application of green industry principles. These criteria include:

- **Technical Aspects:** Raw materials, auxiliary materials, energy, water, production processes, products, packaging, waste management, and greenhouse gas emissions.
- **Management Aspects**: Policies and organization, strategic planning, implementation and monitoring, management reviews, corporate social responsibility, and employment.

Green Industry Progress 2021

Participation
152 companies

Energy savings
IDR 3.2 trillion

Water savings
IDR 169 billion

Source: https://bbt.kemenperin.go.id/news/konten-14

The transition to a circular economy also depends on industries, Micro, Small, and Medium Enterprises (MSMEs), and startups that adopt circular business models. Industries, MSMEs, and startups often lead in implementing sustainable business models, innovating products, reducing and managing production waste, and expanding recycling practices within their supply chains. Successful circular economy practices provide concrete evidence that circular economy offers economic, social, and environmental benefits.

Box 1.4 Circular Economy Initiatives in Indonesia[19]



In 2022, The Future is Circular Book was launched, showcasing best practices in the implementation of circular economy by various actors, including the government, businesses, and NGOs. The book highlights 36 initiatives across the value chain, from upstream to downstream, which have the potential to generate positive economic, social, and environmental impacts. The adoption of circular economy business models can reduce operational costs by IDR 431.91 billion, create 14,270 green jobs, decrease energy and water usage by up to 4.8 million MWH and 252,000 m^3, and reduce waste generation by up to 827,000 tons. With these benefits, circular economy can also support low-carbon development actions with the potential to reduce emissions by approximately 1.4 million tons of CO_2-equivalent.

[19] Bappenas, UNDP, and the Government of the Kingdom of Denmark. 2022. The Future is Circular: Langkah Nyata Inisiatif Ekonomi Sirkular di Indonesia.

Roadmap and Action Plan for Circular Economy in Indonesia

The preparation of the Roadmap and Action Plan for Circular Economy (RAN-ES), was carried out from August 2022 to June 2024, with 12 main stages. The methodology included data collection (both primary and secondary), data analysis, result interpretation, and validation to produce outputs in line with the scope of priority sectors. The National Circular Economy Roadmap and Action Plan is formulated for the period 2025–2045.



Figure 1.3 Formulation Steps of National Roadmap & Action Plan of Circular Economy in Indonesia



NATIONAL ROADMAP
& ACTION PLAN

CIRCULAR ECONOMY INDONESIA 2025-2045



2

BASELINES & POLICY DIRECTION OF THE NATIONAL CIRCULAR ECONOMY

Policy Scope

The implementation of circular economy in Indonesia is directed by three main policies: (1) Reduction in resource use, (2) Extension of product and material use, and (3) Enhancement on Recycling and Recovery of post production and consumption waste. These circular economy policy directions serve as a guide in designing transition strategies and determining measurable actions and implementations of circular economy across the five priority sectors and their supporting factors.

Policy Directions of Circular Economy

Reduction in resource use

The reduction of resource and material use is implemented through the 9R principles, specifically Refuse (R0), Rethink (R1), and Reduce (R2). These principles are applied in activities before and during the production phase, such as product design, material selection, and determining business models/ activities.



Extension of product and material use

Efforts to extend the lifespan of products by enhancing the usability of products and materials are realized through the implementation of the 9R principles: Reuse (R3), Repair (R4), Refurbish (R5), Remanufacture (R6) and Repurpose (R7).



Enhancement on recycling and recovery of post production and consumption waste

The enhancement of recycling and the utilization of post-production and consumption waste is achieved through the implementation of the 9R principles, namely Recycle (R8) and Recover (R9).



Circular Economy Indicators

Key Indicators

The baselines of circular economy in Indonesia are measured using three key indicators. These indicators are circularity metrics that enable the measurement of efforts and performance related to resource use (such as water, raw materials, and energy), waste management, and the production of renewable energy from waste. The key indicators are divided into three categories:

Policy Direction, Key Indicators, and Baselines in the Circular Economy

1

Circular Input Rate

This indicator measures the efficiency of resource use in the production of goods or services. The “Circular Input Rate” not only includes the use of recycled materials but also raw materials or products that are reintroduced into the production process, including those resulting from reuse, refurbishment, remanufacturing, and the use of renewable materials in a product. This indicator is similar to the 'secondary material use' and ‘recycled content,’ but has a broader scope that considers all types of secondary material use.

2

Usage Rate

Usage refers to the lifespan of a product before it is considered to be at the end of its use or consumption. Durable products contribute to circular economy by extending the duration between production and disposal, thus reducing the frequency of resource extraction and disposal. The usage indicator encompasses the principles of Reuse (R3), Repair (R4), Refurbish (R5), Remanufacture (R6) and Repurpose (R7). These five principles contributing to the usage rate do not always apply uniformly across sectors, as they depend on the characteristics of the materials and products being addressed. For example, actions in the food sector are limited to the principle of Repurpose (R7), implemented through food rescue.

3

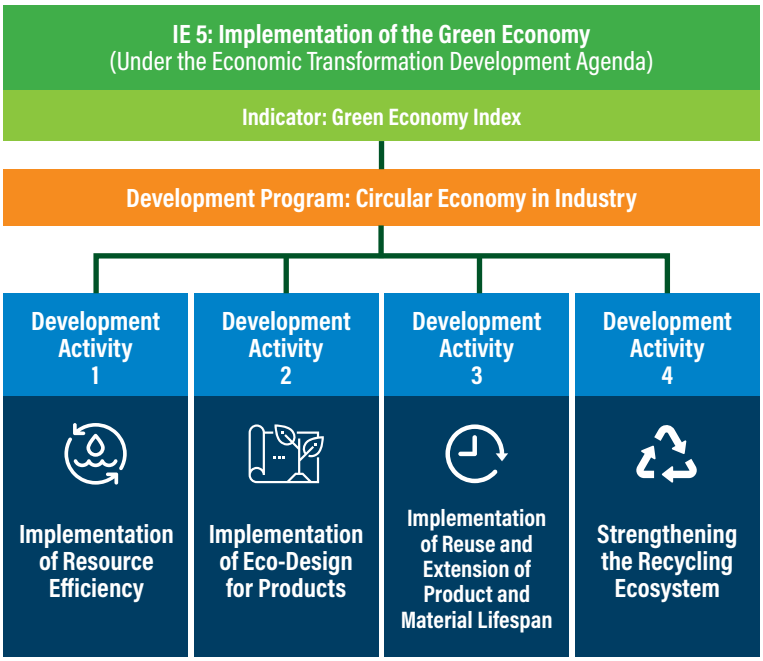
Recycling Rate

The recycling rate indicates how effectively a system manages the waste products and materials that have reached the end of their useful life, transforming these materials back into usable forms. This indicator includes the rates of waste material collection prepared for Recycling (R8) and Recovery (R9) activities.

The baselines of circular economy implementation in Indonesia in 2023
based on three key indicators across five priority sectors in Indonesia.

Policy Directions	Key Indicators	Baseline
Reduction in Resource Use	Circular Input Rate	9%
Extension of Product and Material Use	Usage Rate	4%
Enhancement of Recycling and Utilization of Post-Production and Consumption Waste	Recycling Rate	5%

Box 2.1 Circular Economy Indicators in the National Medium-Term Development Plan (RPJMN) 2025-2029



- **Development Program (PP):** Industrial Circular Economy
  Indicator: Circular Material Input Rate
- **Development Activity (KP):** Implementation of Resource Efficiency
  Indicator: Number of Companies Certified as Green Industry
- **KP:** Implementation of Eco-design in Products
  Indicator: Number of Environmentally Friendly Certified Products (Eco-label, SKEM)
- **KP:** Implementation of Reuse and Extension of Product and Material Lifespan
  Indicator: Amount of Food Saved and Plastic Waste Prevented
- **KP:** Strengthening the Recycling Ecosystem
  Indicator: Industrial Recycling Rate

Box 2.2 Circular Economy Indicators in Other Countries

Each country may have different approaches to developing circular economy indicators, depending on local priorities, policies, and conditions.

The Netherlands — The Netherlands has developed various indicators to measure progress toward a circular economy. One well-known tool is circular economy monitor, which includes indicators like secondary raw material utilization, waste reduction, and energy use efficiency.

Germany — Germany has the National Resource Efficiency Monitoring (NaRess), which records data on resource consumption, emissions, and material efficiency across various economic sectors

Scotland — Scotland developed a Circular Economy Investment Fund and uses indicators such as recycling ratios and waste reduction to measure progress in achieving a circular economy.

European Union — The European Union utilizes Eurostat to collect data and produce statistics on resource use and circular efficiency across its member states.

Sweden — Sweden has indicators that measure the recycling rate and the use of secondary raw materials in production.

Supporting Indicators

Supporting Indicators are circularity indicators that use measurements based on the performance of the circular economy, which supports the progress of circular input rate, usage rate, and recycling rate. Supporting Indicators reflect circular economy performance using the Reference Scale Method based on qualitative and quantitative data. The performance aspects included in Supporting Indicators are:

1. **Institutional and Regulatory Framework**

This dimension evaluates the effectiveness of the policy framework, regulatory mechanisms, and institutional support that promote circular economy practices. The assessment of this aspect includes mandatory compliance with regulations and voluntary adherence to standards and technical guidelines.

2. **Financing and Incentives**

This assessment includes the availability and strategic use of funds, incentives, and investment schemes designed to promote circular economy initiatives.

3. **Infrastructure and Data Management**

This dimension measures the presence and quality of physical and technological infrastructure necessary for the optimal operation of the circular economy. It also evaluates data management systems, including mechanisms for data collection, processing, and use to inform decision-making and enhance the achievement of key indicators.

4. **Communication, Education, and Awareness**

This dimension reflects the level of public understanding and awareness, as well as the dissemination of circular economy concepts through educational programs.

5. **Actions and Initiatives**

This examines the concrete steps and programs that organizations, businesses, and government bodies have undertaken to implement the principles of the circular economy.

Circular economy performance matrix identify performance across key sectors, with the Reference Scale ranging from -2 (indicating no initiatives, programs, or policies have taken place) to +2 (indicating excellent performance). The performance of circular economy in the five priority sectors can be seen in **Figure 2.1**:

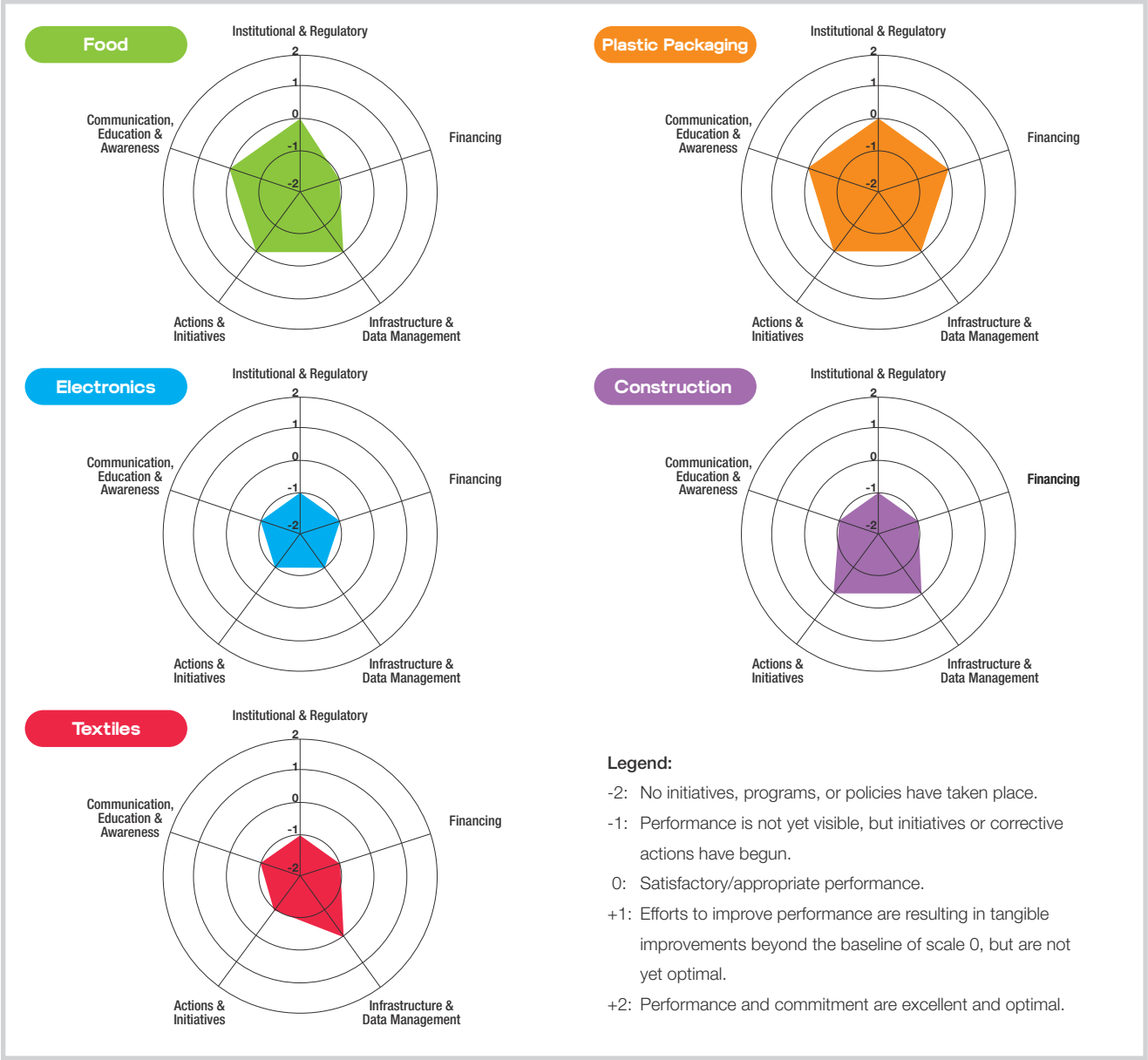


Figure 2.1 Circular Economy Performance of Priority Sectors[20]

The performance of circular economy in the food sector for aspects such as Institutional and Regulatory Framework, Infrastructure and Data Management, Actions, and Public Awareness is rated as "0," indicating a compliance level. However, for financial aspects, it remains at "-1." This is due to the lack of specific financing and incentives for circular economy in the food sector, such as financing and incentives tailored for businesses implementing organic farming and processing of food waste.

For the construction sector, the performance of circular economy in the areas of Communication, Education, and Public Awareness, Institutional and Regulatory Framework, and Financial aspects is rated as "-1," indicating below standard

[20] Source: Analisis Hasil Perhitungan Tim Studi, 2024

performance. Meanwhile, the performance in the areas of Actions, Infrastructure, and Data Management is rated as "0." National regulations (Institutional and Regulatory Framework) for the construction sector are available, but their implementation is deemed inadequate. For the areas of Actions, Infrastructure, Technology, and Data Management, a score of "0" reflects that the use of Building Information Modeling (BIM) technology is regulated and implemented, but further development is needed.

In the plastics sector, the performance of circular economy across all aspects is rated as "0," indicating that while systems have been established, they are not yet optimal and have room for development.

In the electronics sector, the performance across all aspects is rated as "-1," or below compliance standards, meaning it is still suboptimal but there are some efforts and initiatives underway to improve. The absence of regulations on extended producer responsibility (EPR) for electronic waste and requirements for ecolabelling indicates that the Institutional and Regulatory Framework still requires development. Material recovery infrastructure has started to emerge, achieving a score of "0," with the condition that its implementation still needs further development and the existing recycling infrastructure still operates on 20% of its capacity.

In the textile sector, the aspects of Infrastructure, Technology, and Data Management have shown progress. The performance in the area of infrastructure is rated as "0," indicating that it meets standards due to positive business trends with circular economy models, particularly in recycling and reusing textile waste. In terms of technology utilization, some industries are promoting the use of new and renewable energy and water-saving technologies, but have not yet demonstrated significant contributions. For the Institutional and Regulatory Framework, there are no specific policies or government programs promoting circular economy practices within the textile sector.

Optimal performance in the governance of circular economy is necessary to accelerate the implementation of the 9R principles across various sectors. The ideal condition includes a detailed outline of the roles and responsibilities of each stakeholder in the value chain, from producers, consumers, and waste collectors and processors, as well as policymakers. In this context, the Institutional and Regulatory Framework must also be adaptive to developments in circular business model innovations.

One of the issues and challenges in developing circular business models is related to the classification of industries in the Indonesian Standard Industrial Classification (KBLI). KBLI classifies economic activities in Indonesia that produce goods or services, based on business fields, to ensure consistency in concepts, definitions, and classifications as economic activities evolve and shift in Indonesia[21]. With the advancement of circular economy practices by both industries and startups, there are undoubtedly new circular business models that may not yet be covered by the KBLI. For example, Alner, a startup that sells household products (such as soap and food) using packaging that can be returned and reused, currently uses the KBLI category for 'Packaging Activities' due to the absence of a specific KBLI for reuse system operators.

Furthermore, the scheme for green and sustainable product incentives through government sustainable procurement (Green/ Sustainable Public Procurement, G/SPP) has not yet been fully optimized. The G/SPP principles have been integrated into the draft revision of Presidential Regulation No. 12 of 2021 concerning Government Procurement of Goods/Services. The government has also identified six products for G/SPP implementation and three pilot provinces for G/SPP. However, its implementation has not yet been widely applied and is still in the process of identifying supplier availability. Environmentally friendly product showcases on the e-catalog have been provided by National Public Procurement Agency (LKPP), but further development is needed to ensure that they are optimally utilized by goods/ services providers.

Building an ecosystem that supports circular economy requires a clear framework and strong coordination among all stakeholders. In the context of Indonesia, the government can play a role in developing supportive regulations, while financial institutions can provide incentives or financing schemes attractive to circular economy-oriented projects. With a clear picture of the ideal conditions, each sector can systematically identify gaps and potentials and work collectively to achieve the broader goals of sustainability and optimal resource efficiency.

[21] https://oss.go.id/informasi/kbli-berbasis-risiko



NATIONAL ROADMAP
& ACTION PLAN

CIRCULAR ECONOMY INDONESIA 2025-2045



3

NATIONAL ROADMAP AND ACTION PLAN FOR CIRCULAR ECONOMY

The Indonesia Circular Economy Roadmap and Action Plan includes:

- 3 Policy Directions
- 6 Governance Aspects
- 5 Priority Sectors
- 56 Sectoral Action Plans
- 32 Governance Action Plans



Food Strategy

Number of RAN-ES 11

1. Improvement in Production Quality of Raw Food Materials and Processed Food
2. Prevention and Utilization of Food Loss and Waste

Plastic Packaging Strategy

Number of RAN-ES 9

1. Redesign & Increase Recycled Content of Plastic Packaging
2. Management of Bioplastic Packaging
3. Development of Reusable Packaging Ecosystem
4. Enhancement of Plastic Packaging Collection, Recycling, & Recovery

Electronics Strategy

Number of RAN-ES 13

1. Development & Implementation of EPR Policy for Electronic Products
2. Development of Circular Economy Infrastructure
3. Application of Ecodesign & Product Innovation
4. Development of Circular Economy Ecosystem for New Technologies and Battery of Electric Vehicles

Construction Strategy

Number of RAN-ES 10

1. Application of Sustainable Design & Work Method
2. Utilization of Construction and Demolition Waste
3. Use of Environmentally Friendly Products and Materials and Implementation of Green Buildings

Textiles Strategy

Number of RAN-ES 13

1. Development of Infrastructure and Strengthening of Circular Economy Ecosystem for Textile Sector
2. Reduction of Textile Waste
3. Enhancement of Resource Efficiency in Textile Production Processes

Figure 3.1 Infographic Indonesia Circular Economy Roadmap 2045

Food Sector



Existing Condition of Circularity in Food Sector

The food sector contributed 9.3% to the National GDP in 2019[22]. The baseline of the circularity indicators in the food sector shows that the circular input rate is 2.88%, the usage rate is 0.0038%, and the recycling rate is 16.3%. In this sector, the usage rate is calculated by the amount edible food rescued compared by the potential amount of edible food wasted.

Policy Directions	Key Indicators	*Baseline*
Reduction in Resource Use	Circular Input Rate	2.88%
Extension of Product and Material Use	Usage Rate	0.0038%
Enhancement of Recycling and Utilization of Post-Production and Consumption Waste	Recycling Rate	16.3%

Several issues and challenges impact the progress of circular economy in the food sector:

1 Massive application of conventional agriculture

Some principles of circular economy, such as organic farming practices and certification of superior seeds, have been implemented in the food sector in Indonesia. However, the application of conventional agriculture method remains more widespread compared to a more sustainable way of farming. Policies and practices aimed at boosting agricultural growth still focus on the expansion of conventional agriculture.

[22] Bappenas. 2021. Buku Manfaat Ekonomi, Sosial, dan Lingkungan Ekonomi Sirkular di Indonesia. Accessed in https://lcdi-indonesia.id/wp-content/uploads/2021/09/The-Economic-Bahasa_.pdf.

2 Lack of financing schemes, adoption of environmentally friendly technology, and distribution of infrastructure

Implementing circular economy in the food sector, particularly in agriculture, generally requires higher costs compared to conventional approach. This is due to limited infrastructure (e.g., facilities for producing organic fertilizers) and the costs associated with product certification. Additionally, the market for organic agriculture in Indonesia is still limited, as consumers often prefer more affordable food options without considering environmental aspects. Therefore, dedicated financing and improved infrastructure could be key drivers for adopting agriculture aligned with circular economy principles. Meanwhile, the agricultural technology in use is often inefficient, leading to suboptimal productivity and increased resource use.

3 Suboptimal management of food loss and waste (FLW)

The generation of FLW in Indonesia from 2000 to 2019 ranged from 115 to 184 kg per capita per year. This has resulted in a contribution of 1,702.9 $MtCO_2e$, or 7.29% of national greenhouse gas emissions, economic losses amounting to IDR 213-551 trillion per year, equivalent to 4-5% of GDP, and also has the potential to provide food for 61-125 million people. Food crops are the highest contributors to FLW in the agricultural sector, while horticultural crops, particularly fruits, are the least efficient. Without control measures in the value chain, FLW is expected to increase to 344 kg per capita per year by 2045. With the implementation of a circular economy, it is anticipated that FLW could decrease from the Business-as-Usual (BaU) projection to 166 kg per capita per year. [23]

4 Lack of data collection systems

There are currently no official standards for FLW data collection, and the data collection for circular economy practices in the food sector has not been conducted in an integrated manner. Data on agricultural product outputs and organic waste are generally published regularly, but they are not detailed or connected sufficiently to support more accurate calculations of circular economy progress.

The government has developed several regulations aligned with the principles of circular economy in the food sector, including Ministerial Regulation 64/2013 on Organic Farming Systems, Ministerial Regulation 73/2014 on Good Post-Harvest Guidelines, and Government Regulation 81/2012 on Waste Management of Household and Similar to Household Waste, which includes provisions related to organic waste/ food waste.

[23] Bappenas. 2021. Food Loss and Waste di Indonesia dalam rangka mendukung penerapan ekonomi sirkular dan pembangunan rendah karbon. Accessed in https://lcdi-indonesia.id/wp-content/uploads/2021/06/Report-Kajian-FLW-FINAL-4.pdf

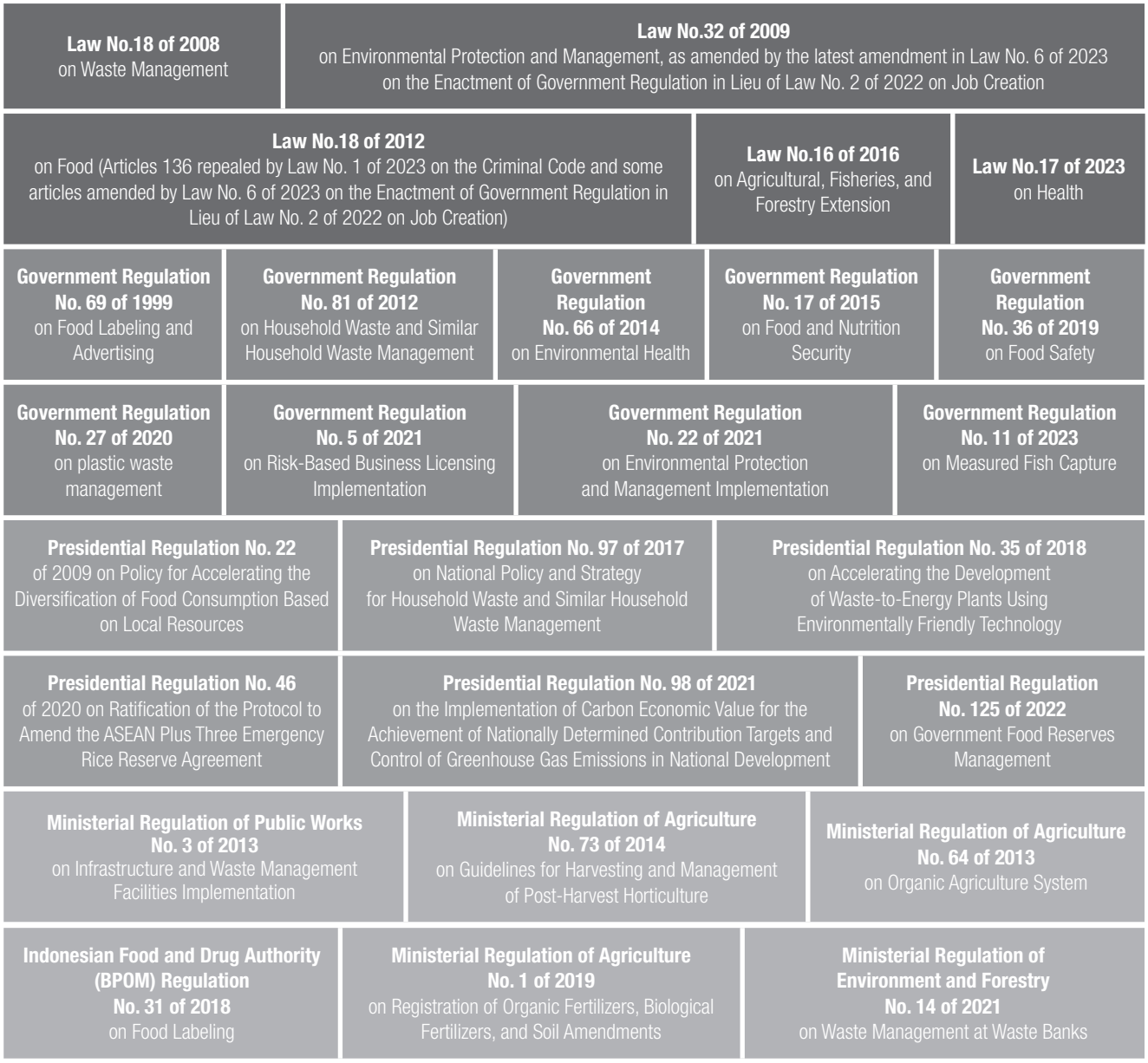


Figure 3.2 Policies Relevant to Circular Economy in the Food Sector

Transition from Linear to Circular Economy in Food Sector

In Indonesia, the food production and consumption process chain is generally linear, starting with production, followed by post-harvest processing, further processing into food and beverages, distribution and marketing, consumption phase, and waste management which typically ends up in the landfills. This linear practice results in resource-intensive production, the overuse of additives, the use of non-environmentally friendly packaging, and unsustainable disposal methods, all of which contribute to environmental and social issues.

In recent years, there has been growing awareness of the importance of transitioning to a circular economy model, which focuses on efficient resource use, waste reduction, and utilizing waste as new inputs, such as in the production of fertilizers and animal feed from loss and waste. The circular approach encompasses principles such as organic farming, processing edible food surplus, composting, and reducing food waste, as well as redistributing unconsumed but edible food with strict food quality and safety standards..

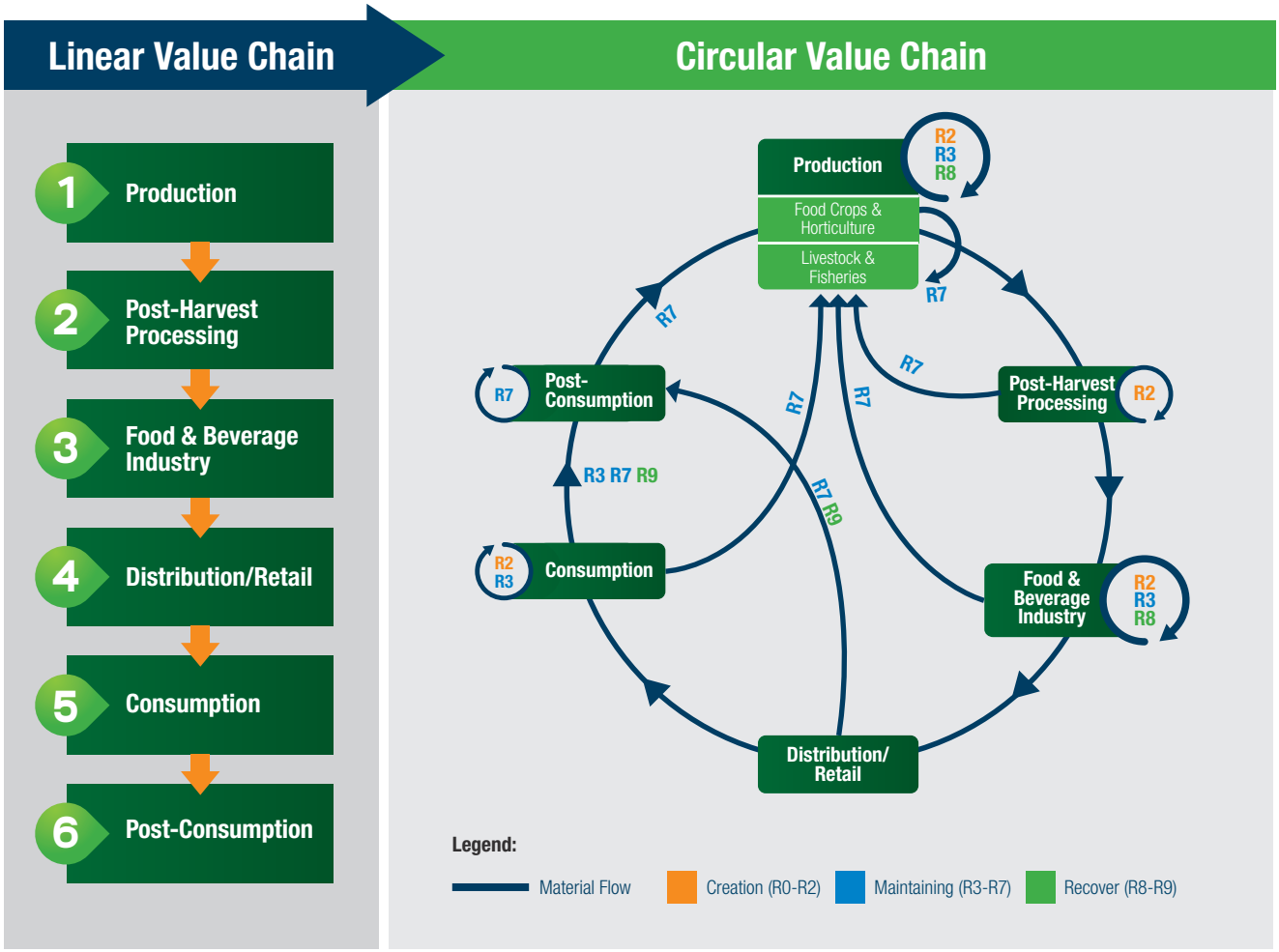


Figure 3.3 Comparison of the Linear and Circular Value Chains in the Food Sector

Circular Economy Ecosystem in Food Sector

In circular economy ecosystem of the food sector, stakeholders in the food value chain can be divided into six main groups: production, post-harvest processing, food and beverage processing, retail and distribution, consumption, and post-consumption. Each entity in the food value chain has the potential to utilize and support one another in applying circular economy principles, which in turn can enhance the effectiveness and efficiency of resource use. The application of circular economy in the food sector includes implementing sustainable farming practices, improving resource efficiency in production processes, and reducing FLW.

In principle, circular economy activities focused on Reducing Resource Use (R0, R1, R2) can be implemented through collaboration between food and beverage production and processing stakeholders. On the other hand, efforts to extend the usefulness of products and materials (R3, R4, R5, R6, R7), as well as recycling and utilizing production and consumption waste (R8, R9), are more directed towards consumption and post-consumption actors. However, some of the 9R principles, such as repair (R4), refurbish (R5), and remanufacture (R6), are not entirely relevant in the context of the food sector. This is due to the nature of how food products is consumed, and the short lifespan compared to the other sectors. Circular economy practices of the 9R principles conducted by circular economy actors in the food sector can be seen in more detail in **Figure 3.4**.

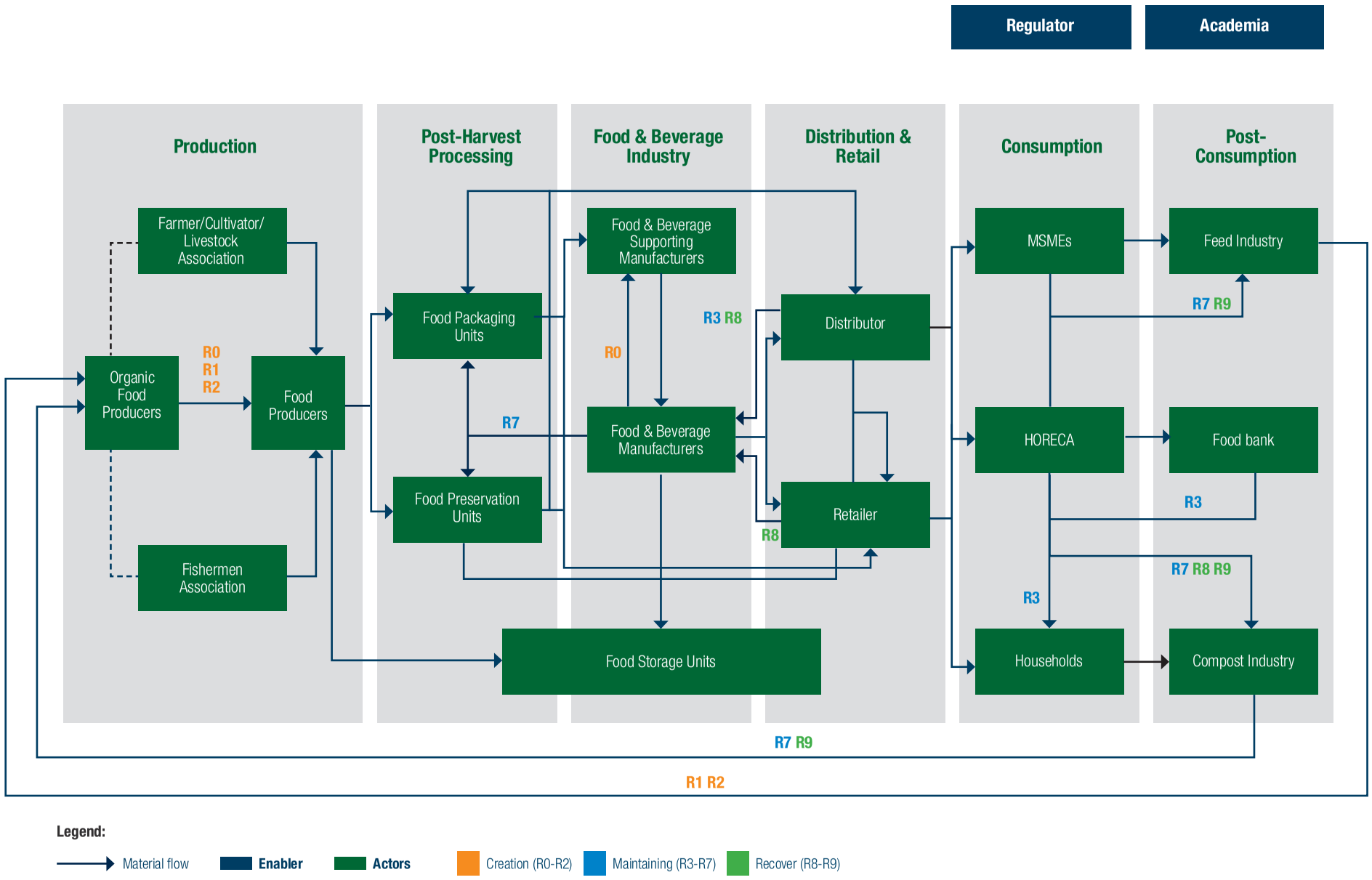


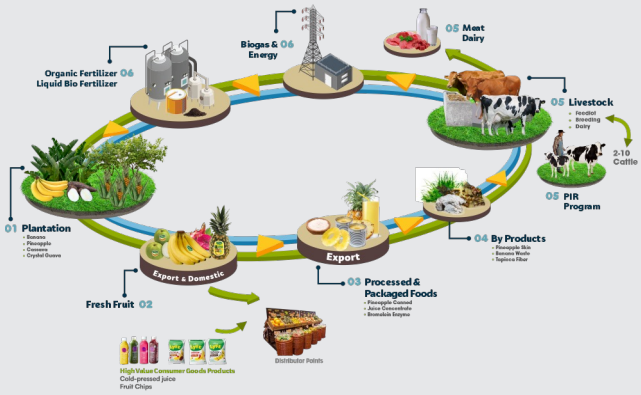
Figure 3.4 Circular Economy Ecosystem in the Food Sector

Box 3.1 Best Practices in Circular Economy Implementation in Food Sector

Great Giant Pineapple

Utilization of pineapple production waste for livestock feed and bromelain enzyme

Since 1979, GGP has harvested over a million pineapples annually for processing into canned pineapple products. To reduce production waste, GGP has innovated by converting 90,000 tons/year of pineapple peels into livestock feed for Great Giant Livestock (GGL). Additionally, 45,000-50,000 tons/year of livestock manure is processed into organic fertilizer for GGP's pineapple plantations. By utilizing 19,200 tons/year of pineapple stems, GGP has created a new business opportunity by producing Bromelain Enzyme for health supplements. Furthermore, wastewater is processed into biogas, which is used as 7-8% of the electricity source and 100% of the residual fossil fuel for boilers. GGP has demonstrated that circular economy practices in industry can bring additional benefits to both the company and its surrounding value chain.





Application of 9R

Reduce (R2), Repurpose (R7), Recycle (R8), Recover (R9)

Garda Pangan

Distributing Surplus Food to Those in Need

Garda Pangan aims to prevent surplus food waste, which can harm farmers and contribute to global greenhouse gas emissions. Its two business lines include selling off-grade food products or processed fruit and vegetable products that do not meet quality control (QC) standards. Before being sold, some types of food products are processed into jams, fruit, ice cream, and other processed foods. In 2023, Garda Pangan successfully saved 90,123 food portions, equivalent to 11.3 tons of potential food from becoming FLW, benefiting 17,288 recipients from underprivileged groups.





Application of 9R

Rethink (R1), Reduce (R2), Reuse (R3), Repurpose (R7)

Source: The Future is Circular (2021), Great Giant Pineapple (GGP) (2024), Garda Pangan (2023), and Magalarva (2024)

MAGALARVA

Transforming FLW into high-protein livestock feed

Magalarva processes food waste while producing insect-based livestock feed using the Black Soldier Fly (BSF) method. A total of 2,735 tons of organic waste has been managed into 574 tons of BSF products annually. This method produces live or dried larvae, livestock feed, oil for feed, protein raw materials, organic fertilizers, and supplements for shrimp farms. The products are reintegrated into the food value chain, providing a circular solution for the food sector.





Application of 9R

Rethink (R1), Reduce (R2), Repurpose (R7)

Box 3.2 **Global Circular Economy Ecosystem in the Food Sector**

UK's FLW Reduction Policy with the Courtauld Commitment 2030



The UK has committed to the Courtauld Commitment 2030 to support collaborative actions in the food sector aimed at reducing surplus food waste across the farm-to-fork spectrum, lowering greenhouse gas emissions, and managing water resource usage. The Food Waste Reduction Roadmap (FWRR) indicators target increasing business commitment to setting FLW reduction goals, consistently measuring data, and implementing FLW reduction actions in their operations. The reduction actions are categorized into: (1) FLW actions within company operations, (2) collaborative actions across the value chain, and (3) initiatives to raise awareness among the public and employees to reduce FLW. In 2022, 22% of large F&B businesses had set FLW reduction targets, with a projection of reaching 95% of businesses by 2028. The main goal for 2030 is a 50% reduction in FLW by F&B businesses compared to the baseline data.

Source:
WRAP. 2023. The Food Waste Reduction Roadmap - Progress Update 2023. Accessed in https://www.wrap.ngo/resources/report/food-waste-reduction-roadmap-progress-update-2023

Milestones of Circular Economy in Food Sector

The benefits of implementing a circular economy in the food sector have the potential to generate an increase of IDR 375 trillion in the National GDP, 2.4 million green jobs, a reduction of 59 million tons of CO_2-equivalent in greenhouse gas emissions, and a decrease of 4 billion m^3 in water consumption. The phasing of circular economy in the food sector for 2025-2045:

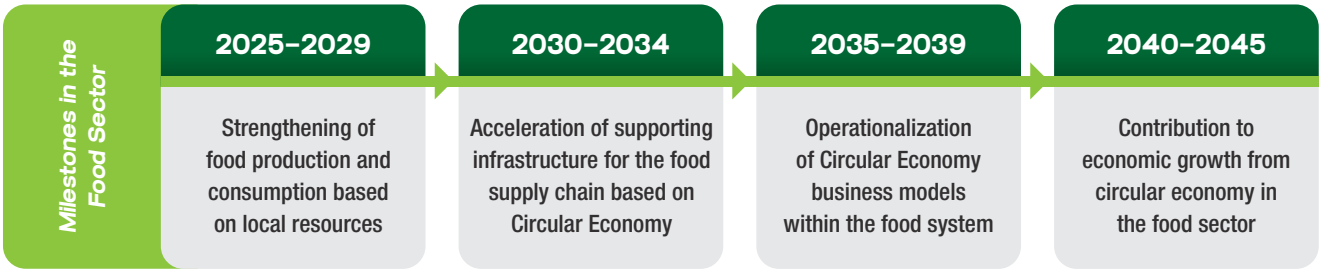


Figure 3.5 Milestones of Circular Economy in the Food Sector

In the period 2025-2029, the main focus will be on strengthening food production and consumption based on local resources, with the goal of reducing reliance on chemicals that support food production and improving the diversity and quality of food.

Strengthening local production will serve as a crucial foundation for the next phase, which focuses on accelerating the development of supporting infrastructure for a circular economy-based food supply chain in the period 2030-2034. With a robust local production base, the need for infrastructure to process and distribute local food will also increase. This will drive the development of facilities for converting food waste into valuable resources, thereby enabling the widespread application of organic farming practices.

The acceleration of infrastructure will create an environment conducive to the growth of circular economy business models within the food system during the period 2035-2039. Thus, the strengthening of local food production and consumption will be supported by adequate infrastructure and contribute to the growth of circular economy in the food sector by 2045, providing economic, social, and environmental benefits to the food value chain.

Strategy & Action Plan for Circular Economy in the Food Sector

Circular economy roadmap for the food sector consists of **2 strategies and 11 action plans**, each with targets, indicators, baseline data, and milestone phases. The strategies for circular economy in the food sector are as follows:

STRATEGY 1

Improvement in Production Quality of Raw Food Materials and Processed Food

STRATEGY 2

Prevention and Utilization of Food Loss and Waste

The main indicators for the food sector are measured based on FLW tonnage, the percentage of salvaged food, and the percentage of recycling rates.

Table 3.1 Circular Economy Strategy & Action Plan for Food Sector

STRATEGY 1: Improvement in Production Quality of Raw Food Materials and Processed Food

The improvement of raw food material and processed food production quality is aimed at increasing harvest productivity, extending the shelf life of food raw materials, and reducing the amount of food products that fail to meet quality control standards, which could potentially contribute to food waste.

Organic farming is an agricultural system that uses natural materials without synthetic chemical fertilizers, pesticides, and herbicides, aiming to increase crop productivity, reduce the use of chemical inputs, and decrease food waste (SNI 6729 on Organic Farming Systems). Furthermore, food waste from agriculture can serve as an alternative protein source for animal feed, helping to reduce reliance on imported soybeans. In addition to the agricultural sector, the implementation of standards is necessary to support sustainability and efficiency in agricultural processes, post-harvest, industry, and food distribution. This includes the application of green industry standards and environmentally friendly principles in the food industry.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
1.1. Use of Superior, Local, and Certified Seeds and Seedlings	1. Increase harvest yields 2. Reduce the use of water, energy, & other materials 3. Decrease the use of fertilizers and feed 4. Reduce offgrade food waste	1.1.a. Percentage of certified superior seeds used compared to total products (%)	64% (rice crops) *Source: Central Statistics Agency (2023)*	Baseline study for all food crops and milestone target setting				Ministry of Agriculture, Ministry of Maritime Affairs and Fisheries
		1.1.b. Productivity of certified superior seeds (tons/ha)	5.71 (rice crops) *Source: Central Statistics Agency (2023)*	Baseline study for all food crops and milestone target setting				
		1.1.c. Amount of certified local seeds used	N/A	Baseline study and milestone target setting				
1.2. Production and Use of High-Quality Organic Fertilizers	1. Increase the use of organic fertilizers 2. Reduce energy consumption for fertilizer production inputs	1.2.a. Amount of organic fertilizer produced (tons/year)	302,632 tons/year *Source: Indonesian Fertilizer Producers Association (2022)*	669,177 tons/year	1,378,340 tons/year	2,649,772 tons/year	4,245,015 tons/year	Ministry of Agriculture, Ministry of Maritime Affairs and Fisheries
		1.2.b. Percentage of organic fertilizer used compared to total national fertilizer consumption (%)	3.04% *Source: Indonesian Fertilizer Producers Association (2022)*	7%	15%	30%	50%	
		1.2.c. Total energy intensity of fertilizer production (GJ/ton)	17,89 GJ/ton *Source: Shi et al. 2020*	16,46	15,22	12,89	9,78	

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
1.3. Production and Use of Alternative Protein Sources for Local Feed	1. Reduce the use of soybean-based (imported) protein in feed by using local legumes/ maggots as alternative protein sources 2. Lower energy inputs for feed production.	1.3.a. Availability and use of alternative protein sources for feed	N/A	Baseline study and milestone target setting for alternative feed protein sources				Ministry of Agriculture, Ministry of Maritime Affairs and Fisheries
		1.3.b. Number of production centers for feed with a minimum protein content of 30%	N/A					
		1.3.c. Amount of available alternative protein sources for feed (tons/year)	589,947 tons/year *Source: Ministry of Agriculture (2024)*	1,883,728	4,740,303	8,283,840	13,028,660	
		1.3.d. Percentage of alternative protein sources used compared to total feed production	1.64% *Source: PKPP (2020); National Waste Management Information System (2023*	5%	12%	20%	30%	
		1.3.e. Research and development of alternative protein sources (Number of Intellectual Property Rights, existing applied technologies)	N/A	Baseline study and milestone target setting				National Research and Innovation Agency
1.4. Implementation of Green Industry Standards and Environmentally Friendly Principles in the Food Industry	The implementation of green industry and/ or ecolabel-certified food and beverage industries can support: 1. More efficient use of water, energy, & materials 2. Reduction in greenhouse gas emissions	1.4.a. Number of Green Industry Standards in the food sector	11 Green Industry Standards Existing Green Industry Standards are categorized as follows: • Green Industry Standards for agriculture: 3 standards • Green Industry Standards for food and beverages: 8 standards *Source: Ministry of Industry (2024)*	Milestone target setting study				Ministry of Industry, Ministry of Environment and Forestry, Indonesian Food and Drug Authority (BPOM)
		1.4.b. Number of food industry producers certified with Green Industry Standards	N/A	Baseline study and milestone target setting				
		1.4.c. Number of food products with environmental labels (Type I, II, III, and/or others) in the market	N/A					

STRATEGY 2: Prevention and Utilization of Food Loss and Waste

Increasing the efficiency of food management to reduce FLW and efficiently utilize existing food resources is achieved through the implementation of Good Agricultural, Good Manufacturing, and Good Handling Practices; enhancement of composting facilities; post-harvest processing and integrated agricultural processing facilities; strengthening initiatives for rescuing edible food waste; providing portion size options in the HORECA sector; utilizing non-edible food waste and off-grade food products; and standardizing food labeling and date marking.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
2.1. Implementation of Good Agricultural, Good Manufacturing, and Good Handling Practices according to SNI	Increased implementation of SNI in food-supporting infrastructure (harvest, post-harvest, and industry) can reduce Food Loss.	2.1.a. Number of participants implementing SNI 22000, SNI CPPOB, CPPOB (PPSI)	N/A	Baseline study and milestone target setting				Ministry of Agriculture, Ministry of Maritime Affairs and Fisheries, Ministry of Industry,Indonesian Food and Drug Authority (BPOM), National Standardization Agency
		2.1.b. Existence of mandatory implementation of SNI 22000, SNI CPPOB, and CPPOB	N/A* **Application of standards remains voluntary*		Terdapat mandatory partisipasi SNI			
		2.1.c. Percentage reduction in national food loss and waste (FLW) generation (thousand tons) *Note: The percentage is calculated based on the difference between the strategy implementation projection and the BaU (Business as Usual) projection, compared to the BaU projection for that year. FLW generation below the target milestones is the projection with strategy implementation.*	48,016 thousand tons *Source: National Development Planning Agency (2021) Food loss and waste in Indonesia. Baseline data from BaU projection and target from strategy implementation projection.*	34.45% 42,295 thousand tons	45.03% 44,855 thousand tons	51.88% 47,085 thousand tons	55.88% 49,345 thousand tons	Ministry of Environment and Forestry, Ministry of Agriculture
2.2. Increasing the distribution of composting facilities for organic farming needs	Increased recycling rate percentage **TSO: Organic Waste Generation (tons/year)*	2.2.a. Number of districts/ cities with composting facilities	312 *Source: National Waste Management Information System (2023)*	334	386	437	514	Ministry of Environment and Forestry, Ministry of Agriculture, Subnational Government
		2.2.b. Percentage of FLW (tons/year) processed into compost (%)	16.3% *Source: National Waste Management Information System (2023)*	20%	25%	35%	50%	
2.3. Expanding post-harvest processing and integrated agricultural processing facilities	1. Reducing Food Loss during production 2. Extending the shelf life of food products 3. Increasing the economic value of materials and products through food downstreaming	2.3.a. Existence of data on post-harvest processing facilities and agricultural product processing	N/A	Baseline study and milestone target setting				Ministry of Agriculture, Ministry of Maritime Affairs and Fisheries, Ministry of Cooperatives and SMEs, Ministry of Trade, Ministry of Industry

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
		2.3.b. Number of integrated post-harvest processing facilities (collection, post-harvest processing, and sales hubs for farmer groups/ cooperatives)	N/A	Baseline study and milestone target setting				Ministry of Agriculture, Ministry of Maritime Affairs and Fisheries, Ministry of Trade, Ministry of Industry
		2.3.c. Number of cold storage facilities provided (to extend the shelf life of raw food materials to 6 months)						
		2.3.d. Number of agricultural product processing facilities for food downstreaming (processing raw materials into food products with a shelf life of 3 years)						Ministry of Industry, Ministry of Coopera-tives and SMEs, Ministry of Trade, Ministry of Industry
2.4. Providing portion size options according to consumer needs in the hotel, restaurant, cafe (HORECA) sector	Increased participation of HORECA in providing portion size options to reduce food waste.	2.4.a. Existence of data on the number of HORECA establishments providing portion size options according to needs	N/A	Baseline study and milestone target setting				Ministry of Industry, Ministry of Tourism and Creative Economy
		2.4.b. Percentage of HORECA establishments providing portion size options according to needs						
2.5. Participation of the food & beverage industry, HORECA, markets, commerce, and households in the utilization of food waste	Increased participation of the food & beverage industry, HORECA, markets, commerce, and households in utilizing food waste, including supporting the provision of raw materials for compost production and alternative feed.	2.5.a. Existence of data on the amount of food waste generated by the food & beverage industry, HORECA, markets, commerce, and households	N/A	System for recording the amount of food waste generated by the food and beverage industry and HORECA				Ministry of the Environ-ment and Forestry, National Food Agency
		2.5.b. Number of food & beverage industries, HORECA establishments, markets, and commerce participating in the utilization of edible food waste		Baseline study on the number of food and beverage industries, HORE-CA establish-ments, markets, and businesses				

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
		2.5.c. Number of food & beverage industries, HORECA establishments, markets, commerce, and households participating in the utilization of non-edible food waste (food scraps)	N/A	Baseline study on the number of food and beverage industries, HORECA establishments, markets, and businesses				Ministry of the Environment and Forestry, National Food Agency
		2.5.d. Percentage of household organic waste utilized		Baseline study on the utilization of organic waste				
		2.5.e. Percentage reduction in national FLW generation (thousand tons) *Note:* *The percentage is calculated based on the difference between the strategy implementation projection and the BaU (Business as Usual) projection, compared to the BaU projection for that year. FLW generation below the target milestones is the projection with strategy implementation.*	48,016 thousand tons *Source: National Development Planning Agency (2021) Food loss and waste in Indonesia. Baseline data from BaU projection and target from strategy implementation projection.*	34.45% 42,295 thousand tons	45.03% 44,855 thousand tons	51.88% 47,085 thousand tons	55.88% 49,345 thousand tons	Ministry of the Environment and Forestry, Ministry of Agriculture
2.6. Utilization of off-grade food products	Utilization of off-grade food products can support the reduction of food loss and waste.	2.6.a. Amount of off-grade food produced and utilized	N/A	Data collection on the amount of off-grade food produced and utilized				Indonesian Food and Drug Authority (BPOM)
		2.6.b. Number of participants in off-grade food processing		Baseline study and milestone target setting				
2.7. Standardization of food labeling and date marking	The existence of food labeling and date marking regulations that can reduce food waste.	2.7.a. Existence of regulations on food labeling (quality) and date marking (safety)	Regulation is in the drafting process.	Implementation of regulations				Indonesian Food and Drug Authority (BPOM)
		2.7.b. Percentage of products meeting labeling criteria	N/A	Baseline study and milestone target setting				

Retail Sector (Focus on Plastic Packaging)



Existing Condition of Circularity in Retail Sector (Focus on Plastic Packaging)

The retail sector contributes 10.7% to Indonesia's GDP[24]. In the context of circular economy policy, the retail sector focuses on Plastic Packaging. Plastic Packaging refers to products made from plastic materials used for protecting, shipping, and presenting goods, from raw materials to processed items, from producers to users or consumers in the retail sector, such as single-use shopping bags, protective packaging for processed foods, bottled water, etc[25].

Based on the analysis of two main indicators, the Retail Sector (focusing on Plastic Packaging) has a circular material input rate of 6.92% and a recycling rate of 9.16%. The Utilization Rate Indicator for the Retail Sector (focusing on Plastic Packaging), which measures the implementation of Reduce (R2) and Reuse (R3), cannot currently be measured due to data and methodological limitations.

Policy Directions	Key Indicators	Baseline
Reduction in Resource Use	Circular Input Rate	6.92%
Extension of Product and Material Use	Usage Rate	-
Enhancement of Recycling and Utilization of Post-Production and Consumption Waste	Recycling Rate	9.16%

Several issues and challenges affect the implementation of circular economy in the Retail Sector (focusing on Plastic Packaging), including:

1 Uneven waste management at the subnational level

Plastic waste is the second largest type of waste in Indonesia, accounting for 18% of total waste in 2022. Overall, waste management in Indonesia is at 63.74%, with a waste reduction percentage of 14.54% and waste handling at 49.2%, leaving the remainder unmanaged. Waste management, which falls under the authority

[24] BPS, 2019 dalam Bappenas. 2021. Buku Manfaat Ekonomi, Sosial, dan Lingkungan Ekonomi Sirkular di Indonesia.

[25] BPOM. 2019. Peraturan Badan Pengawas Obat dan Makanan Nomor 20 Tahun 2019 tentang Kemasan Pangan. Accessed in https://standarpangan.pom.go.id/dokumen/peraturan/2019/PBPOM_Nomor_20_Tahun_2019_tentang_Kemasan_Pangan.pdf
Undang-undang (UU) Nomor 18 Tahun 2012 Tentang Pangan. Accessed in tautan UU No. 18 Tahun 2012 (bpk.go.id)

of subnational governments, has not been uniformly implemented across all districts/cities[26], leading to leakage of waste into the environment. Similarly, plastic waste, which is difficult to decompose, continues to be carried away and pollutes the seas. The suboptimal waste management services pose a challenge for implementing Recycle (R7) and Recover (R8) practices to achieve a circular economy in the Retail Sector (focusing on Plastic Packaging).

2 Lack of intervention in the upstream sector related to ecodesign

Redesigning plastic packaging is one solution to reduce the use of resources and/or virgin materials in packaging production. However, several factors hinder the easy application of packaging redesign, such as costs, product durability, diverse contaminants, and the continuous supply of recycled plastic materials. Additionally, redesigning plastic packaging needs to be promoted to extend the lifespan of plastic packaging.

Redesign of plastic packaging has been implemented, for example, in bottled drinking water by eliminating the use of seals on bottle caps and labels on bottles, which can minimize the amount of plastic waste and accelerate sorting processes. Furthermore, approximately 95 cities/districts in Indonesia have regulations prohibiting certain types of single-use plastics in hotels, restaurants, cafes, and retail. In Jakarta, this regulation has reduced the use of single-use plastic bags by 80%, while in Bali, it has reduced the use of single-use plastic bags by up to 57%, styrofoam by 81%, and straws by 70%[27].

These initiatives indicate that the development of a circular economy for plastic packaging is not only aimed at managing waste but also at creating new economic opportunities. This needs to be supported by an appropriate ecosystem and policies.

3 The need to strengthen the role of producers in implementing Extended Producer Responsibility (EPR)

Currently, the plastic sector has an EPR scheme based on Minister of Environment and Forestry Regulation 75/2019 concerning the Roadmap for Waste Reduction by Producers. There are 27 companies that have submitted roadmaps and eight that have reported the implementation of these roadmaps[28]. Involving producers is crucial so that the production process considers every stage from design to end-of-life.

4 The suboptimal management of low-value plastic packaging

The management of low-value plastic packaging remains limited both in terms of collection and processing. The recycling rate of plastic packaging is still dominated by high-value plastics collected by the informal sector, such as scavengers. The management of low-value plastic packaging faces challenges related to logistics, technology, financing, and institutional issues.

[26] SIPSN KLHK. https://sipsn.menlhk.go.id/sipsn/public/data/capaian accessed on 25 April 2024

[27] Diet Kantong Plastik. 2023. Implementasi Peraturan Pembatasan Plastik Sekali Pakai di Beberapa Provinsi dan Kota di Indonesia. https://plasticdiet.id/implementasi-peraturan-pembatasan-plastik-sekali-pakai-di-beberapa-provinsi-dan-kota-di-indonesia/ accessed on April 26, 2024

[28] KLHK. 2023

Regulations developed by the Government to support the implementation of circular economy in the Retail Sector (focusing on Plastic Packaging) are as follows.

Law No. 18 of 2008 on Waste Management	**Law No. 32 of 2009** on Environmental Protection and Management
Government Regulation No. 81 of 2012 on the Management of Household Waste	**Government Regulation No. 78 of 2019** on Income Tax Facilities for Investment in Certain Business Sectors and/or in Certain Subnational Regions
Presidential Regulation No. 97 of 2017 on National Policy and Strategy for the Management of Household Waste and Household-like Waste	**Presidential Regulation No. 83 of 2018** on Marine Waste Management
Minister of Industry Regulation No. 24 of 2010 on the Inclusion of the Food Grade Logo and Recycling Code on Plastic Food Packaging	**Minister of Public Works and Public Housing Regulation No. 3 of 2013** on the Implementation of Infrastructure and Facilities for Household Waste Management and Household-like Waste Management
Minister of Environment and Forestry Regulation No. 2 of 2014 on the Inclusion of the Ecolabel Logo	
Minister of Environment and Forestry Regulation No. 75 of 2019 on the Roadmap for Waste Reduction by Producers	**Indonesian Food and Drug Authority (BPOM) Regulation No. 20 of 2019** on Food Packaging
Minister of Environment and Forestry Regulation No. 5 of 2019 on the Procedures for Implementing Environmentally Friendly Labels for Environmentally Friendly Goods and Services Procurement	
Minister of Industry Regulation No. 15 of 2020 on the Strategic Plan of the Ministry of Industry for 2020-2024	**Minister of Industry Regulation No. 55 of 2020** on Green Industry Standards for the Bag or Shopping Bag Industry and Bioplastic Industry
Minister of Tourism and Creative Economy Regulation No. 5 of 2020 on Guidelines for Plastic Waste Management in Marine Tourism Destinations	
Minister of Industry Regulation No. 47 of 2020 on Green Industry Standards for the Mineral Water Industry	**Minister of Environment and Forestry Regulation No. 14 of 2021** on Waste Management in Waste Banks
Indonesian Food and Drug Authority (BPOM) Regulation No. 12 of 2023 on Supervision of the Manufacture and Distribution of Cosmetics	

Figure 3.6 Policies relevant to circular economy in the Retail Sector (Focus on Plastic Packaging)

Transition from Linear to Circular Economy in the Retail Sector (Focusing on Plastic Packaging)

In the context of plastic packaging use, the linear economy follows the conventional “take-make-use-waste” model, which is unsustainable. The value chain begins with the extraction of petroleum or natural gas, distillation into naphtha, cracking into monomers, and polymerization into polymers, which are then formed into various plastic products. These plastic products are then distributed and marketed, either to businesses or directly to consumers. After use, plastic packaging mostly ends up in the landfills or is littered in the environment, contributing to environmental pollution and ecosystem damage.

In contrast, circular economy model targets waste prevention, enhancement of Reuse (R3) schemes, and increased recycling rates. In a circular ecosystem, plastic packaging that has become waste is sorted for processing into recycled raw materials, which are then reused as feedstock for plastic production or other industries, thus allowing plastic packaging to be repurposed and reducing environmental impact. The design of plastic packaging also needs to consider resource use efficiency and potential processing at end-of-life, without neglecting food safety aspects.

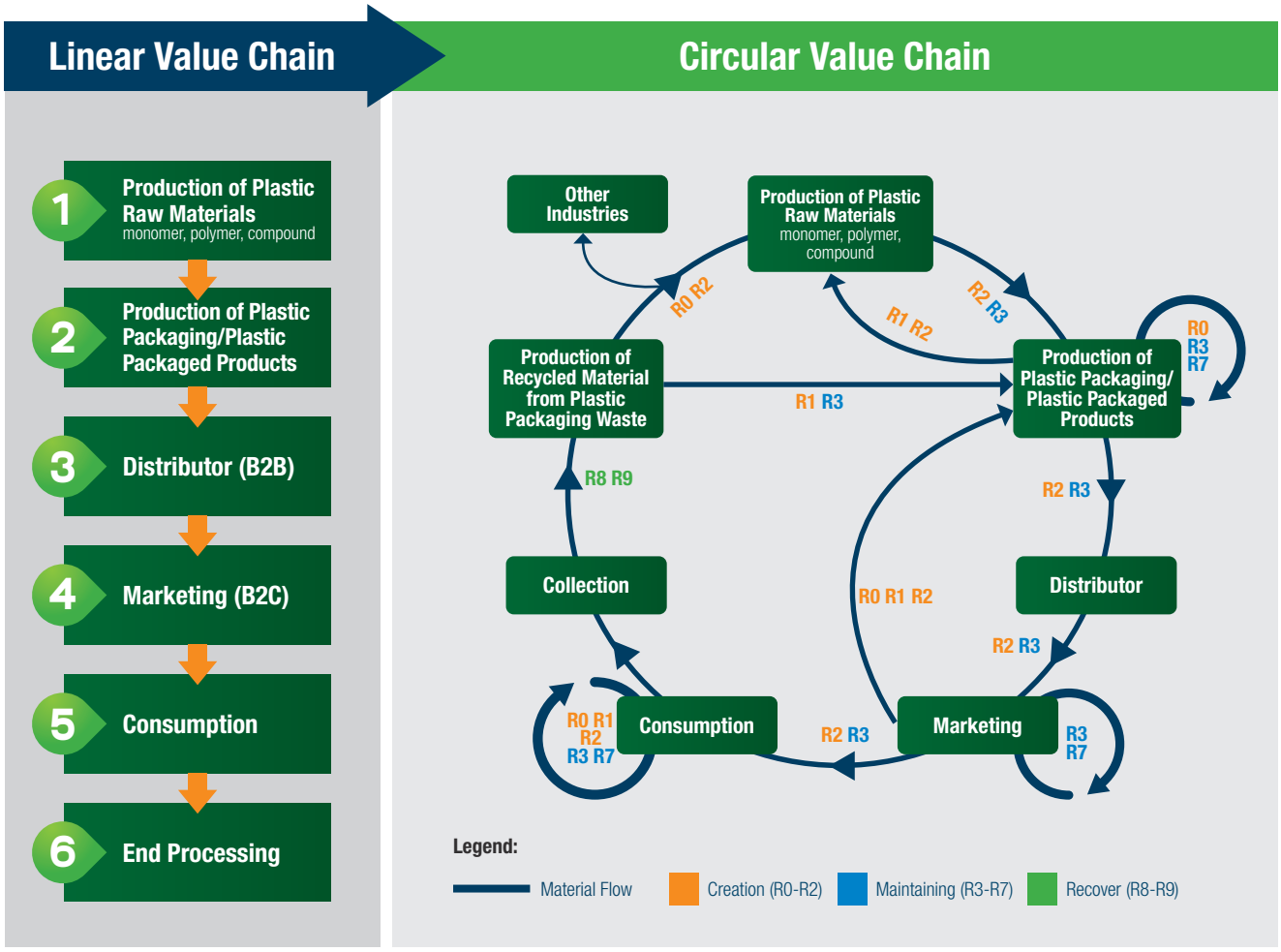


Figure 3.7 Comparison of Linear and Circular Value Chains in the Retail Sector (Focus on Plastic Packaging)

Circular Economy Ecosystem in the Retail Sector
(focusing on plastic packaging)

In circular economy ecosystem, stakeholders in the value chain can be classified into six main groups: production, distribution, marketing, consumption, collection, and recycling. In the context of a circular economy, activities related to reducing resource and material use (R0, R1, R2) should ideally be implemented from the production stage through to consumption. The goal is to enhance the efficiency of raw materials, water, and energy use, as well as reduce plastic waste from production residues. Once plastic packaging has reached the end of its life cycle, integration into the processes of collection, sorting, and recycling or utilization of production and consumption residues (R8 and R9) is necessary.

In this way, efforts to extend the utility of plastic packaging products and materials can be carried out progressively and effectively. However, some of the 9R principles are not relevant to the value chain and characteristics of plastic packaging, namely Repair (R4), Refurbish (R5), Remanufacture (R6), and Repurpose (R7).

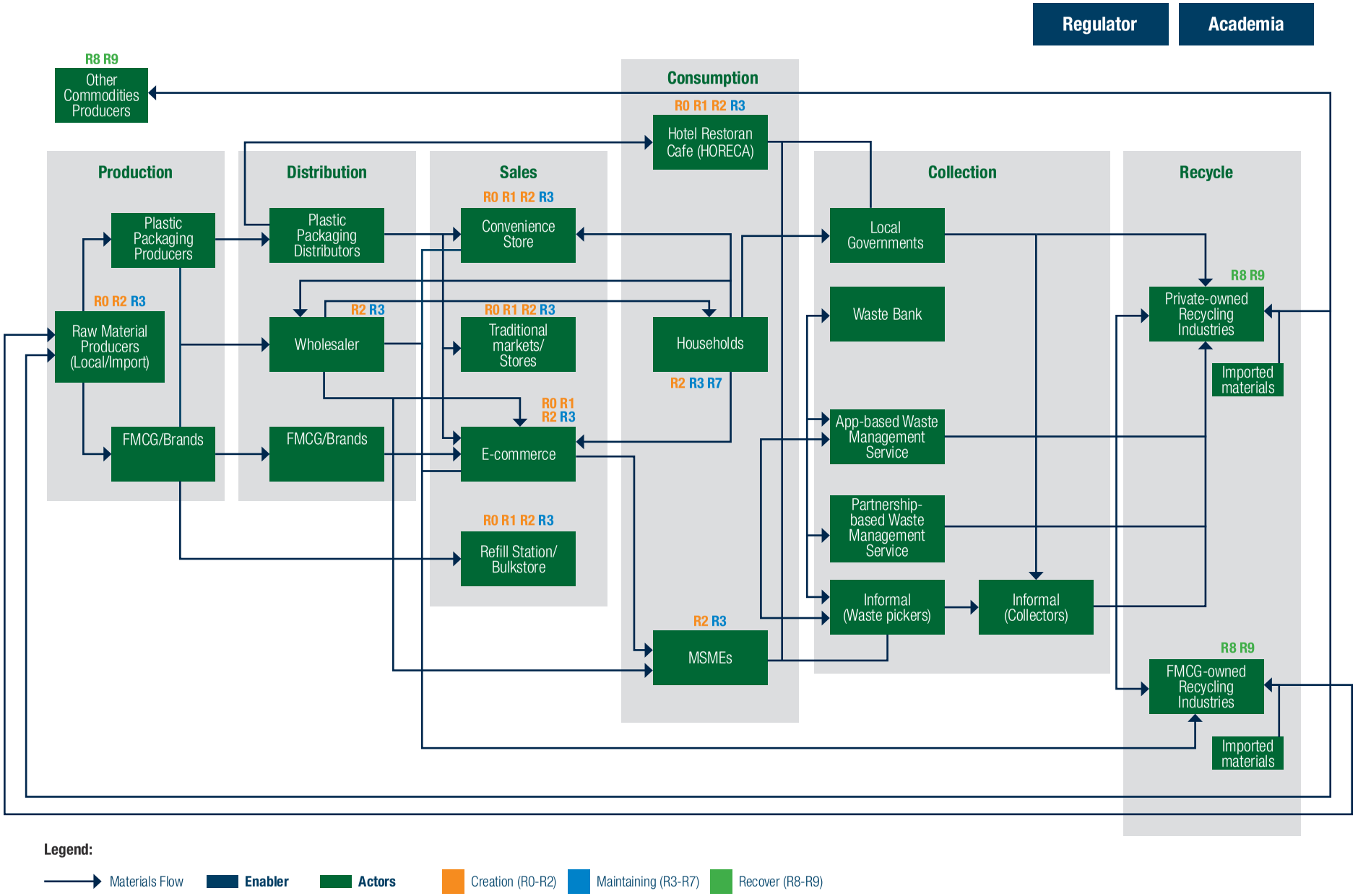


Figure 3.8 Circular Economy Ecosystem in the Retail Sector (Focus on Plastic Packaging)

Box 3.3 Best Practices for Implementing Circular Economy in the Retail Sector (Focus on Plastic Packaging)

Household products with reusable packaging

Alner's customers purchase products with returnable and reusable packaging through their partners (small shops, peer-to-peer sellers, waste banks). Product orders and packaging returns can be made online (a bicycle courier will handle pick-up and delivery). From 2020-2022, Alner prevented more than 165,000 single-use packages from potentially being discarded into rivers, replacing them with packaging.





Application of 9R

Rethink (R1), Reuse (R3), Recycle (R8)

Low-value plastic waste management

Chandra Asri Group promotes circular economy by utilizing low-value plastic as a mixture for asphalt roads. This plastic mixture increases stability by 40% according to research by the Ministry of Public Works and Housing Koinpack/Alner. Chandra Asri has constructed 120.83 km of roads using plastic-mixed asphalt, preventing 1,086 tons of plastic from being dumped into landfills. Chandra Asri also provides support to the Integrated Solid Waste Management Site (IPST) Asari in Cilegon, which processes plastic waste into fuel using pyrolysis machines. IPST Asari has processed 15,927.2 kg of plastic waste and produced 5,944.5 liters of fuel.





Application of 9R

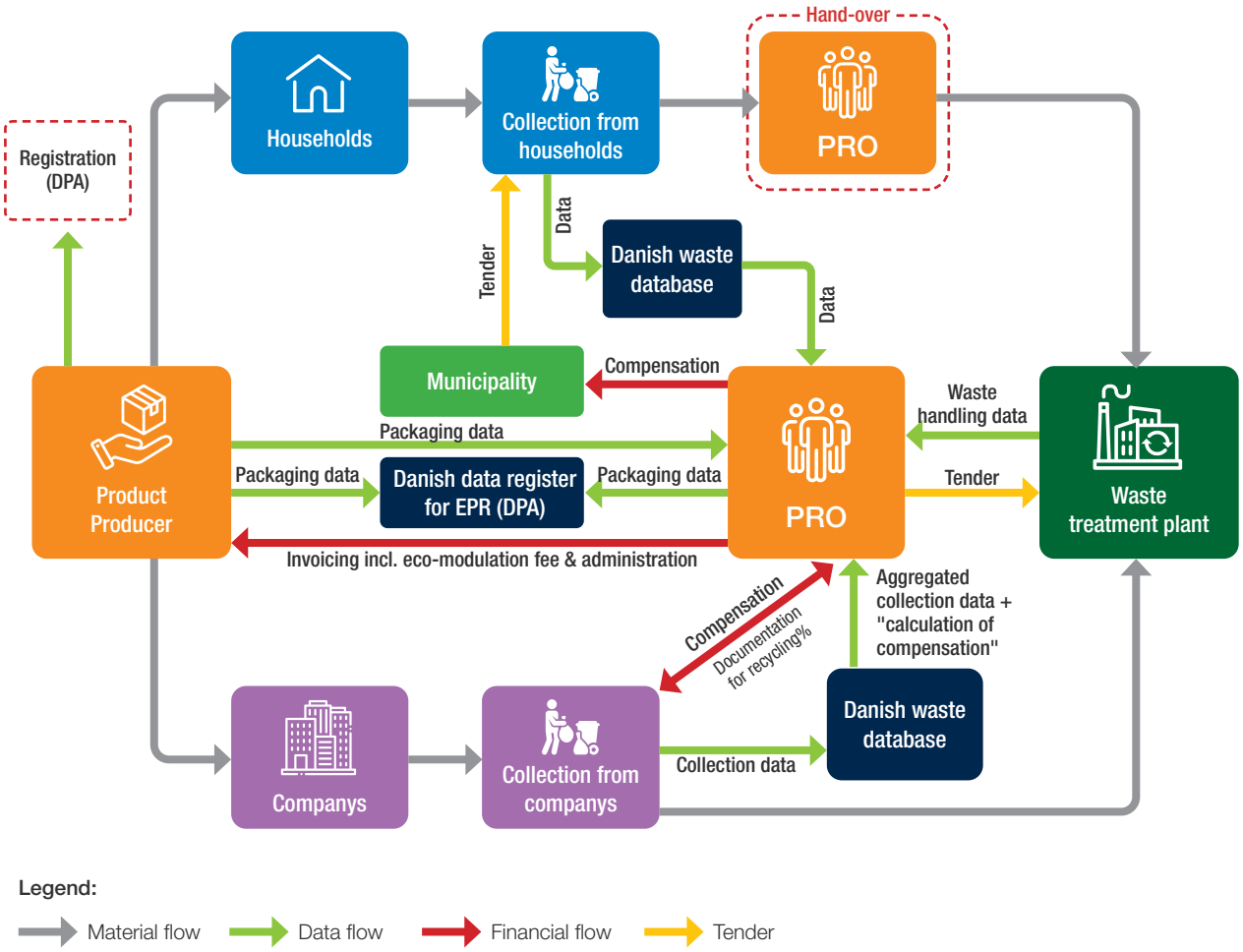
Recycle (R8), Recover (R9)

Source: Bappenas (2022), presentation by Chandra Asri Group at the Nexus3 International Conference on June 4, 2024.

Box 3.4 International Best Practice:Circular Economy Ecosystem in Denmark

Denmark has set a target for January 1, 2025, requiring all businesses, whether importing or using packaging, to bear the cost and organizational responsibility for managing packaging waste, including collection, sorting, and processing of packaging waste. This policy aims to ensure effective waste management by providing incentives to producers who implement environmentally friendly and recyclable designs, promote reuse, and enforce recycling. Denmark has established a clear division of responsibilities among the public, packaging recovery organizations (PROs), producers, and the government. This division of responsibilities also encompasses financial burdens and data management, ensuring transparency and strong collaboration among stakeholders to achieve circular economy targets.

Plastic Packaging Management Scheme in Denmark



Source: EPR Study Visit Presentation Materials (2022)

Milestones of Circular Economy in the Retail Sector
(Focus on Plastic Packaging)

Circular economy roadmap for the Retail Sector (focusing on Plastic Packaging) is formulated based on the National Long-Term Development Plan (RPJPN) milestones across four different periods, each spanning five years, in accordance with the National Medium-Term Development Plan (RPJMN) periods.

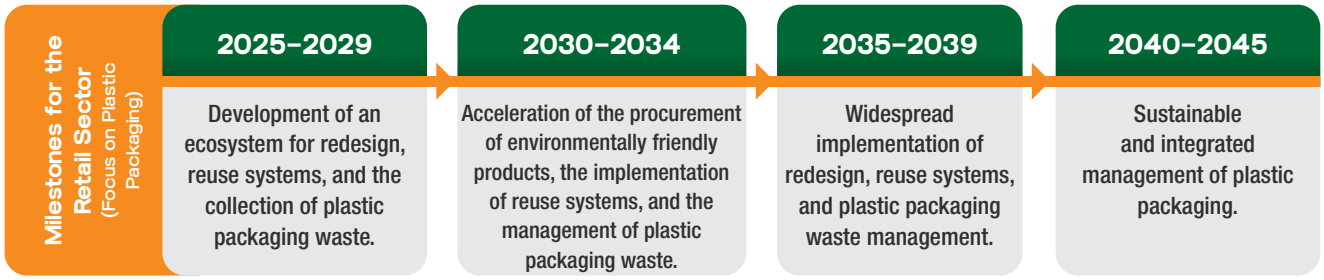


Figure 3.9 Circular Economy Phases for the Retail Sector (Focus on Plastic Packaging)

The first period focuses on the ecosystem development of the redesign, reuse systems, and the collection of plastic packaging waste as the initial steps in the transformation. Minister of Environment and Forestry Regulation No. 75/2019 on the Roadmap for Waste Reduction by Producers 2020-2029 serves as a supporting regulation aimed at reducing the use of certain plastic packaging (especially low-value plastics such as MLP, PS, and PVC) and increasing recycled content to 50% across all types of plastics. The development of supporting policies, technical guidelines, environmental product standards and labeling, and the enhancement and equitable distribution of recycling facilities are key to building circular economy ecosystem in the retail sector (focusing on plastic packaging).

With a strong ecosystem foundation established in the previous period, the medium term (2030–2034) will see the acceleration of the procurement of environmentally friendly products and the implementation of plastic packaging reuse systems. This aims to drive increased demand for recycled plastic raw materials, expand the number of product refill facilities, and prevent the generation of plastic packaging waste.

In the third period (2035–2039), the widespread implementation of sustainable plastic packaging solutions will be pursued, and during the Golden Indonesia period (2040–2045), sustainable and integrated plastic packaging management will be realized through multisectoral collaboration among the government, private sector, and informal sector.

The implementation of a circular economy in the retail sector (focusing on plastic packaging) could reduce waste generation by 21% compared to the Business-as-Usual (BaU) scenario by 2030. By adopting circular economy practices, this sector could generate a net economic impact of IDR 14.4 trillion or 0.5% of the sector's GDP by 2030. Additionally, circular economy could create 107,000 net new jobs by 2030.[29]

Strategy & Action Plan for Circular Economy in the Retail Sector
(Focus on Plastic Packaging)

Circular economy roadmap for the Retail Sector (focus on Plastic Packaging) includes **4 strategies and 9 action plans**, each with supporting indicators, baseline data, and milestone phases based on period-specific targets. The strategies for plastic packaging circular economy are as follows:

STRATEGY 1
Promote Redesign & Increase Recycling Rate of Plastic Packaging

STRATEGY 2
Management of Bioplastic Packaging

STRATEGY 3
Development of Reuse Packaging Ecosystem

STRATEGY 4
Enhancement of Collection, Recycling & Recovery of Plastic Packaging

[29] Bappenas. 2021. Buku Manfaat Ekonomi, Sosial, dan Lingkungan Ekonomi Sirkular di Indonesia. Accessed in https://lcdi-indonesia.id/wp-content/uploads/2021/09/The-Economic-Bahasa_.pdf

Tabel 3.2 Circular Economy Strategy & Action Plan for Plastic Packaging

STRATEGY 1. Redesign & Increase Recycling Rates of Plastic Packaging

STRATEGY 1. Redesign & Increase Recycling Rates of Plastic Packaging
Redesign involves efforts to redesign plastic packaging so that it is easily recyclable or biodegradable and non-toxic (Benjamin M. Hogan, 2020). The Minister of Environment and Forestry Regulation 75/2019 concerning the Roadmap for Waste Reduction by Producers 2020-2029 directs the discontinuation of certain types of plastic packaging (particularly MLP, PS, PVC) and an increase in recycled content to 50% for all types of polymers. Additionally, PS & PVC are polymers that, when used as packaging, are less compatible with recycling processes (D4R Guidelines - GIZ, 2023).

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
1.1. Redesign of low-economic-value plastic packaging	1. Increase the economic value of plastic packaging to make it viable/ easy to recycle by: • Transitioning multi-material plastic packaging to mono-material (PP); • Transitioning PS and PVC polymer-based plastic packaging to PET, HDPE, LDPE, PP polymer-based packaging. 2. Reduce waste generation by: • Redesigning unnecessary packaging components, e.g., using embossing to replace labels; eliminating PVC-based plastic seals.	1.1.a. Percentage of production shares for different types of plastic packaging (%)	HVP: 82% PVC & PS: 18%	HVP: 85% PVC & PS: 15%	HVP: 90% PVC & PS: 10%	HVP: 95% PVC & PS: 5%	HVP: 100% PVC & PS: 0%	Ministry of Industry
		1.1.b. *Recycling rate for High Value Plastics (HVP) (%)* ***Calculation formula:*** *Recycled HDPE plastic raw material/ (Production of recycled and virgin plastic raw materials) x Proportion of High Value Plastic*	HDPE: 12% LDPE: 3% PET: 64% PP: 21% *Source: D4R - GIZ, (2023); Ministry of Industry, (2022)*	HDPE: 13% LDPE: 4% PET: 65% PP: 22%	HDPE: 14% LDPE: 5% PET: 66% PP: 23%	HDPE: 15% LDPE: 6% PET: 67% PP: 24%	HDPE: 16% LDPE: 7% PET: 68% PP: 25%	Ministry of Environment and Forestry
1.2. Increasing the recycled content in plastic packaging	1. Increase the recycled content in HDPE, LDPE, PET, and PP plastic packaging. 2. Provide supporting systems to increase recycled content in plastic packaging by including it in green public procurement requirements and developing standardization for % recycled content.	1.2.a. Recycled Content Rate (%) ***Calculation formula:*** *Recycled plastic raw material/ Production of recycled and virgin plastic raw materials* **both raw materials consumed locally*	6,92% *Source: Ministry of Industry, (2022)*	10%	15%	30%	50%	Ministry of Industry Ministry of Environment and Forestry
		1.2.b. Standardization (SNI) of % recycled content for plastic packaging used in cosmetic, household, and food & beverage products (excluding bottled drinking water)	N/A	There is an SNI for recycled content and recyclability for packaging other than bottled drinking water.	There is an SNI for ecolabeling on plastic packaging.			Ministry of Industry National Standardization Agency
		1.2.c. Percentage of plastic packaging products with environmental labels available in National Public Procurement Agency of Goods/ Services (LKPP) Electronic Catalog	No information is available on environmentally labeled products in National Public Procurement Agencyof Goods/Services (LKPP).	There is regulation regarding the use of environmentally labeled plastic packaging products in Government Goods/ Services Procurement.	10% of plastic packaging has an ecolabel.	30% of plastic packaging has an ecolabel.	50% of plastic packaging has an ecolabel.	Ministry of Environment and Forestry, National Public Procurement Agency

STRATEGY 2. Management of Bioplastic Packaging

The Ministry of Environment and Forestry Regulation No. 75/2019 on the Roadmap for Waste Reduction by Producers 2020-2029 directs the discontinuation of the use of low-value plastic packaging typically used as food/beverage containers. Consequently, environmentally friendly plastic packaging products (shopping bags and food/beverage containers) have emerged, utilizing materials such as tubers, corn starch (PLA), or bacteria (PHA). The management of bioplastic packaging is necessary to regulate production, distribution, usage, and the end-of-life phase of these products.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
2.1. Provision of support systems for the management of bioplastic packaging waste	Providing clear information to consumers, waste collectors, and recyclers to properly sort bioplastic packaging waste and ensure proper management. The categorization of sorting refers to SNI 7188-7: Ecolabel Criteria – Part 7: Product Categories, Product Packaging, and Bioplastic Containers.	2.1.a. Availability of standardization and technical directives for bioplastic packaging products and the management of bioplastic packaging waste.	N/A	Availability of SNI for bioplastic packaging products	Availability of technical directives for managing bioplastic packaging waste			National Standard-ization Agency, Ministry of Environ-ment and Forestry
		2.1.b. Development of a Roadmap for Bioplastic Packaging Development and Management for specific products.	N/A	Availability of a Roadmap for Bioplastic Packaging Development and Management				Ministry of Environ-ment and Forestry, Ministry of Industry
		2.1.c. Number of facilities for post-consumption bioplastic packaging processing.	N/A	Baseline studies and target milestone development				Ministry of Environ-ment and Forestry
		2.1.d.Availability of studies on bioplastic development and the implementation of a traceability system for the bioplastic value chain.	N/A	Baseline studies and target milestone development				Ministry of Environ-ment and Forestry, Ministry of Industry

STRATEGY 3: Development of Reuse Packaging Ecosystem

The implementation of refill stations and reuse practices plays a crucial role in reducing single-use plastic packaging waste (such as sachets). Currently, there is BPOM Regulation No. 12 of 2023 that governs refill stations for Personal Care & Cosmetics (PCC). Additionally, several refill and reuse businesses, such as Siklus Refill, Alner, and others, are already available. However, further development of the ecosystem is needed to enhance collaboration between the government, the circular business sector, and the public to accelerate the implementation of refill and reuse activities.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
3.1. Enhancement of Providers & Refill Facilities for Personal Care & Cosmetics (PCC) Products)	Reduction of single-use plastic packaging waste by: • Increasing the availability of PCC products for refill systems • Expanding verified PCC refill station facilities • Decreasing the generation of single-use plastic packaging waste for PCC products	3.1.a. Number of PCC refill facilities	500 points *Source: Alner (2022*	2.000 points	3.500 points	5.000 points	6.500 points	Indonesian Food and Drug Authority (BPOM), Ministry of the Environment and Forestry, Ministry of Trade, Ministry of Industry
		3.1.b. Market share of large industries providing PCC products for reuse systems	N/A	10%	20%	30%	40%	Indonesian Food and Drug Authority (BPOM), Ministry of Industry
		3.1.c. Avoided generation of single-use plastic packaging waste for PCC products (tons/year)	33,5 tons *Source: Diet Plastik (2024)*	N/A 134 tons	N/A 234 tons	N/A 334 tons	N/A 434 tons	Ministry of the Environment and Forestry
		3.1.d. Technical directives for recycled container requirements & verification of PCC product refill facilities	N/A	Presence of Technical Directives				Indonesian Food and Drug Authority (BPOM), Ministry of the Environment and Forestry
3.2. Enhancement of Reusable Packaging for Home Care, Food, and Beverage Products	Reduction of single-use plastic packaging waste by: • Detailing supporting systems, implementation targets, and reduction goals for plastic packaging waste • Increasing the availability of PCC, Home Care, and Food & Beverage products for reuse systems • Expanding verified refill station facilities for PCC, Home Care, and Food & Beverage products • Decreasing the generation of single-use plastic packaging waste for PCC, Home Care, and Food & Beverage products	3.2.a. Standardization of reverse logistics (distribution flow, washing, etc.) to support reuse implementation	N/A	Presence of reverse logistics standardization				Ministry of the Environment and Forestry, Indonesian Food and Drug Authority (BPOM), Ministry of Health, Ministry of Trade, National Standardization Agency, Ministry of Industry
		3.2.b. Regulations on reuse for Home Care & Food and Beverage products	N/A	Presence of reuse regulations for Home Care products	Presence of reuse regulations for Food and Beverage products			Indonesian Food and Drug Authority (BPOM), Ministry of Health
		3.2.c. Number of refill facilities for Home Care & Food and Beverage products	N/A		2.000 points	3.500 points	5.000 points	Indonesian Food and Drug Authority (BPOM), National Food Agency, Ministry of Trade, Ministry of the Environment and Forestry, Ministry of Industry
		3.2.d. Market share of large industries providing Home Care & Food and Beverage products for reuse systems	N/A	Baseline study: numbers of industry providing home care and food products with reuse system	10%	20%	30%	Ministry of Industry, Indonesian Food and Drug Authority (BPOM), Ministry of Health, Ministry of the Environment and Forestry

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
		3.2.e. Avoided generation of single-use plastic packaging waste for Home Care & Food and Beverage products (tons/year)	8,9 ton *Sumber: Diet Plastik (2024)*		36 ton	62 ton	89 ton	Ministry of the Environment and Forestry
		3.2.f. Number of districts/cities conducting outreach on reuse systems	54 Districts 36 Cities 5 Provinces Total 95 District/Cities/Provinces *Source: Diet Plastik (2024)*	144 Districts 51 Cities 13 Provinces	248 Districts 75 Cities 22 Provinces	392 Districts 85 Cities 31 Provinces	416 Districts 98 Cities 38 Provinces	Indonesian Food and Drug Authority (BPOM), Ministry of Health, Ministry of the Environment and Forestry

STRATEGY 4: Enhancement of Collection, Recycling & Recovery of Plastic Packaging

Efforts to increase the use of recycled materials in plastic packaging are hindered by the limited recycling rate of waste downstream. According to Law No. 18 of 2008, waste management includes sorting, collecting, transporting, processing, and final disposal. Currently, Indonesia's waste management performance has only reached 49.12%, indicating uneven and suboptimal government waste services to the public. Optimizing waste management is necessary to increase recycling rates and manage more waste to prevent it from being disposed of in the environment.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
4.1. Strengthening EPR (Extended Producer Responsibility) schemes in manufacturing, food and beverage services, and retail	Enhancing the implementation of EPR for plastic packaging by involving various stakeholders	4.1.a. Number of manufacturers, food and beverage services, and retailers that have developed EPR implementation roadmaps	27 companies *Source: Ministry of the Environment and Forestry (2023)*	Milestone target study				Ministry of Environment and Forestry, Ministry of Industry, Ministry of Trade
		4.1.b. Number of manufacturers, food and beverage services, and retailers reporting waste reduction efforts	8 companies *Source: Ministry of the Environment and Forestry (2023)*	Milestone target study				
		4.1.c. Number of companies receiving outreach (coaching clinics) from the government	128 companies out of thousands of F&B, PCC, HC producers, making it < 10% *Source: Ministry of the Environment and Forestry (2023)*	300 companies	500 companies	700 companies	1.000 companies	
		4.1.d. Number of published lists of producers & distributors and/or reported EPR performance	N/A	Publication of producers who have reported EPR				
		4.1.e. Number of programs implemented by EPR funds managed by the Producer Responsibility Organization (PRO)	N/A	Baseline study and milestone target setting				
		4.1.f. Presence of follow-up regulations to Permen LHK 75/2019, which will expire in 2029	Minister of Environment and Forestry Regulation 75/2019 will expire in 2030		1 Further Provision of Ministerial Regulation LHK No. 75/2019			

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
4.2. Enhancing collaboration for integrated waste collection	Improving waste collection performance through collaboration between the government, private sector, and informal sector	4.2.a. % Rate of plastic packaging waste collection from the source to sorting and processing facilities	N/A	Baseline study and milestone target setting				Ministry of Environment and Forestry
		4.2.b. Number of SMEs/ micro-enterprises/ informal sector entities facilitated to support integration into the business ecosystem of large companies	N/A	Baseline study and milestone target setting				Ministry of Environment and Forestry
4.3. Increasing plastic recycling facilities	Increasing the recycling rate of plastic packaging by: • Expanding recycling facilities, especially outside Java Island • Optimizing support systems for plastic packaging recycling through the establishment of minimum prices for recycled plastic materials	4.3.a. Number of recycling plants in Indonesia	115 factories (PE, PP, PET) across Indonesia (80% of factories in Java, in 6 provinces *Source: Ministry of Industry (2022)*	120 factories spread across 10 provinces	130 factories spread across 10 provinces	140 factories spread across 10 provinces	148 factories spread across 10 provinces	Ministry of Industry, Investment Coordinating Board, Ministry of State-Owned Enterprises
		4.3.b. % Recycling rate of plastic packaging	9,16% *Source: Ministry of Industry (2022)*	20%	32%	43%	54%	Ministry of Environment and Forestry
4.4. Expanding off-takers for products generated by Waste-to-Energy	Increasing material recovery from plastic packaging by: • Expanding the number of material recovery facilities • Strengthening cooperation with off-takers Waste-to-Energy includes RDF, incineration (Waste-to-Energy Plants), Gasification	4.4.a. Number of facilities for material recovery from plastic into fuel/energy (oil, RDF, gas, electricity)	26 Waste-to-Energy Plants (TPST) with Waste to Energy in Java *Source: National Waste Management Information System (2023)*	31	37	44	52	Ministry of Environment and Forestry, Ministry of Public Works and Public Housing, Ministry of Energy and Mineral Resources
		4.4.b. Number of off-takers cooperating with Waste-to-Energy facilities	N/A	Baseline study and milestone target setting				Ministry of Environment and Forestry, Ministry of Energy and Mineral Resources, Ministry of Industry
		4.4.c. % Rate of plastic waste recovery through Waste-to-Energy processing	0,12% *Source: Waste recovered at Waste-to-Energy Plants (National Waste Management Information System, 2022), Plastic waste composition (National Waste Management Information System, 2022), Plastic packaging composition (Sustainable Waste Indonesia andMinistry of Industry, 2020)*	0,8%	1,5%	2,2%	3%	Ministry of Environment and Forestry

Box 3.5

Implementation of EPR through the Indonesia Packaging Responsibility Organization (IPRO)

IPRO is a non-profit organization initiated by producers and recyclers in 2020 to support the implementation of Minister of Environment and Forestry Regulation No. 75 of 2019 on the Roadmap for Waste Reduction by Producers. This initiative was established by several producers who are members of the Packaging and Recycling Association for Sustainable Environment (PRAISE). The main goal of IPRO is to enhance the collection and recycling rates of packaging waste by managing funding from companies that apply Extended Producer Responsibility (EPR). Collaboration with IPRO can be carried out through three mechanisms:

A Collection and recycling

IPRO receives funding from producers, which is channeled to packaging waste aggregators or recyclers to manage packaging waste equivalent to the amount produced by the producers (polluter pays principle)

B Co-Investment

A co-funding scheme with IPRO to build new collection, sorting, and recycling infrastructure or to develop existing infrastructure

C Communication and Engagement

IPRO finances supporting activities that can expand the implementation of categories A and B

To date, IPRO has collected and recycled:

PET	HDPE	PP	PE	MLP	UBC
9,171 ton	2,338 ton	1,466 ton	625 ton	1,112 ton	1,383 ton



To implement the EPR program widely, a Producer Responsibility Organization (PRO) is required to coordinate management efficiently, ensure regulatory compliance, and promote innovation and transparency in sustainable plastic packaging management.

Source: IPRO. (2024). Available on the company's website at the following link: https://indonesiapro.org/

Electronics Sector



Existing Condition of Circularity in the Electronics Sector

The electronics sector contributed 1.9% to Indonesia's GDP[30]. Based on the analysis of 3 (three) key indicators, the electronics sector has a circular material input rate of 18.25%, a utilization rate of 0.07%, and a recycling rate of 2.61%. The utilization rate in the electronics sector is measured by the implementation of Repair (R4), Refurbishment (R5), and Remanufacture (R6).

Policy Directions	Key Indicators	Baseline
Reduction in Resource Use	Circular Input Rate	18.25%
Extension of Product and Material Use	Usage Rate	0.07%
Enhancement of Recycling and Utilization of Post-Production and Consumption Waste	Recycling Rate	2.61%

In 2023, electronic waste (e-waste) generation in Indonesia amounted to 2.1 million tons. The management of electronic waste in Indonesia is predominantly handled by the informal sector. Several initial initiatives have been undertaken by both the government and start-ups, such as collection and pickup programs, take-back programs by certain brands, remanufacturing of smart meter devices, and the recovery of e-waste for recycling by the informal sector. Currently, there are at least 2 (two) major e-waste recyclers with a total capacity of 31,400 tons per year, but only 15% of this capacity is utilized.

Electronic products contain critical raw materials, which are minerals essential for the national economy and national defense. Critical raw materials generally come from non-renewable natural resources that are limited and reliant on natural extraction, making them susceptible to supply disruptions. The application of a circular economy can provide viable alternative materials for critical raw materials through recycling, remanufacturing, and refurbishing processes. There is also an urgency to develop an

[30] BPS, 2019 dalam Bappenas. 2021. Food Loss and Waste di Indonesia dalam rangka mendukung penerapan ekonomi sirkular dan pembangunan rendah karbon. Accessed in https://lcdi-indonesia.id/wp-content/uploads/2021/06/Report-Kajian-FLW-FINAL-4.pdf

ecosystem for managing the waste from Battery Electric Vehicles (BEVs), which is expected to increase significantly over the next five years.

Electronic waste management is regulated under Government Regulation No. 27 of 2020 on the Management of Specific Waste; however, there are no specific regulations governing electronic waste and electrical equipment. Other challenges in implementing a circular economy in the electronics sector include:

1. The absence of specific EPR regulations for electronic products and waste.
2. The scarcity of electronic waste collection and recovery facilities in districts/cities that collaborate with the government and recyclers.
3. A lack of innovation and information on eco-design for electronic products, as well as inadequate data on e-waste management.
4. The unavailability of an ecosystem for managing New Technologies and Battery Electric Vehicles (KBLBB).

Law No. 18 of 2008 on Waste Management	**Law No. 32 of 2009** on Environmental Protection and Management
Government Regulation No. 27 of 2020 on Specific Waste Management	**Government Regulation No. 22 of 2021** on Environmental Implementation, Protection and Management

Figure 3.10 Policies relevant to the circular economy in the electronics sector

Transition from Linear to Circular Economy in the Electronics Sector

The production of electronic goods relies on raw materials obtained through the extraction of natural resources. Linear economic practices are not designed to utilize electronic product remnants once their useful life ends, resulting in most products ending up in the landfills. In the circular value chain concept, resource use is optimized to minimize waste through durable product design or reuse business models. Stakeholders include raw material producers, manufacturers, distributors, consumers, maintenance providers, collectors, material recovery facilities, and recyclers, all of whom play a crucial role in supporting the transition to a circular economy by reducing waste and extending the lifespan of electronic products.

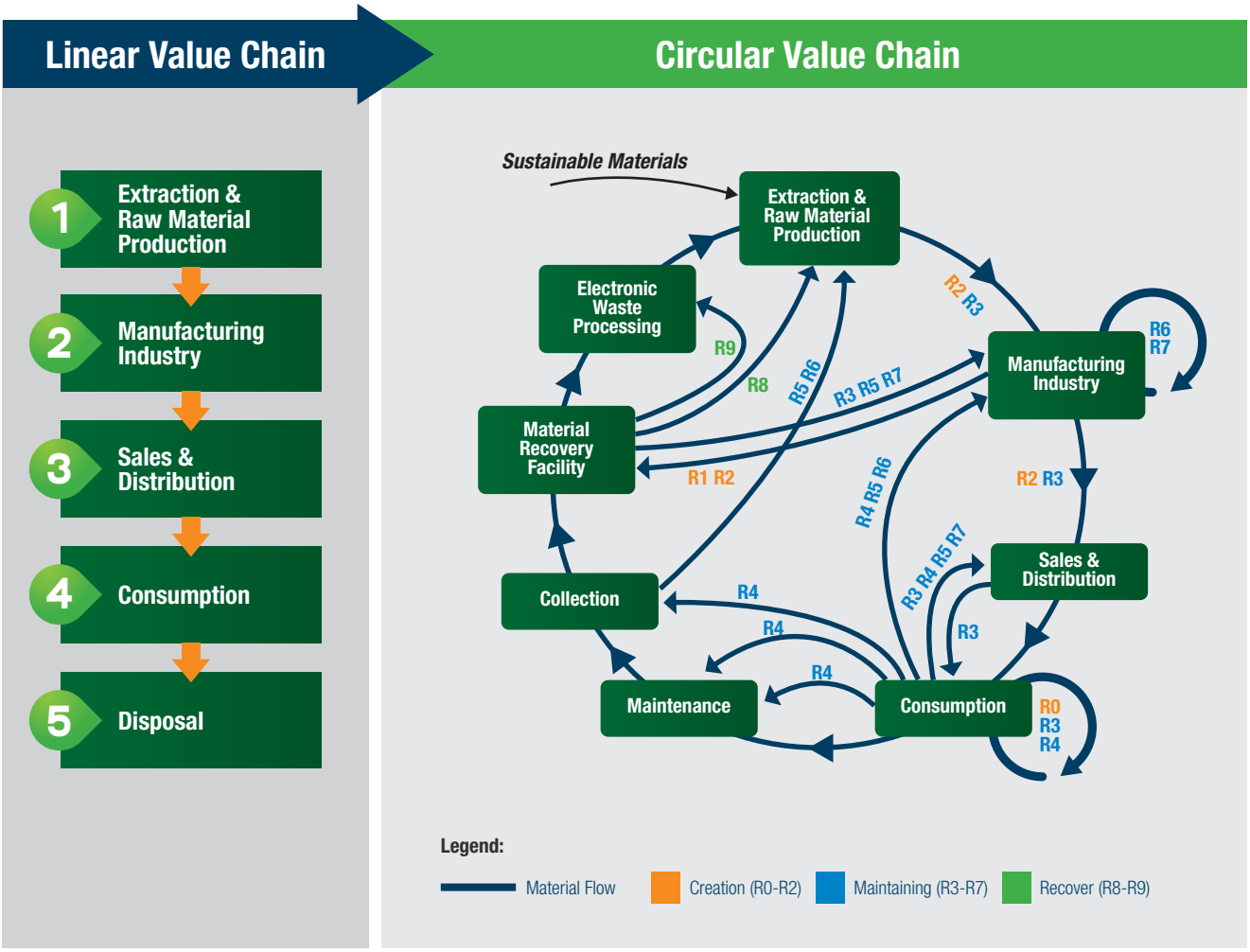


Figure 3.11 Comparison of Linear and Circular Value Chains in the Electronics Sector

Circular Economy Ecosystem in the Electronics Sector

In circular economy ecosystem, actors in the electronics value chain can be categorized into eight main groups: production, manufacturing, distribution, consumption, maintenance, collection, material recovery facilities, and the end of the product lifecycle.

The ideal condition anticipated in the electronics sector involves the realization of activities aimed at extending the utility of products and materials (R3, R4, R5, R6, R7) across all stages, from manufacturing to collection. Extending utility is crucial for enabling the repair and remanufacturing of electronic components that remain usable. Within circular economy framework for the electronics sector, material recovery facilities play a pivotal role in supporting the separation and recovery of components, which is essential for assessing the quality of each electronic product or component to determine whether it is suitable for reuse or requires recycling. Emphasizing recovery and extending product lifespans are key strategies for reducing waste volume and enhancing resource use efficiency.

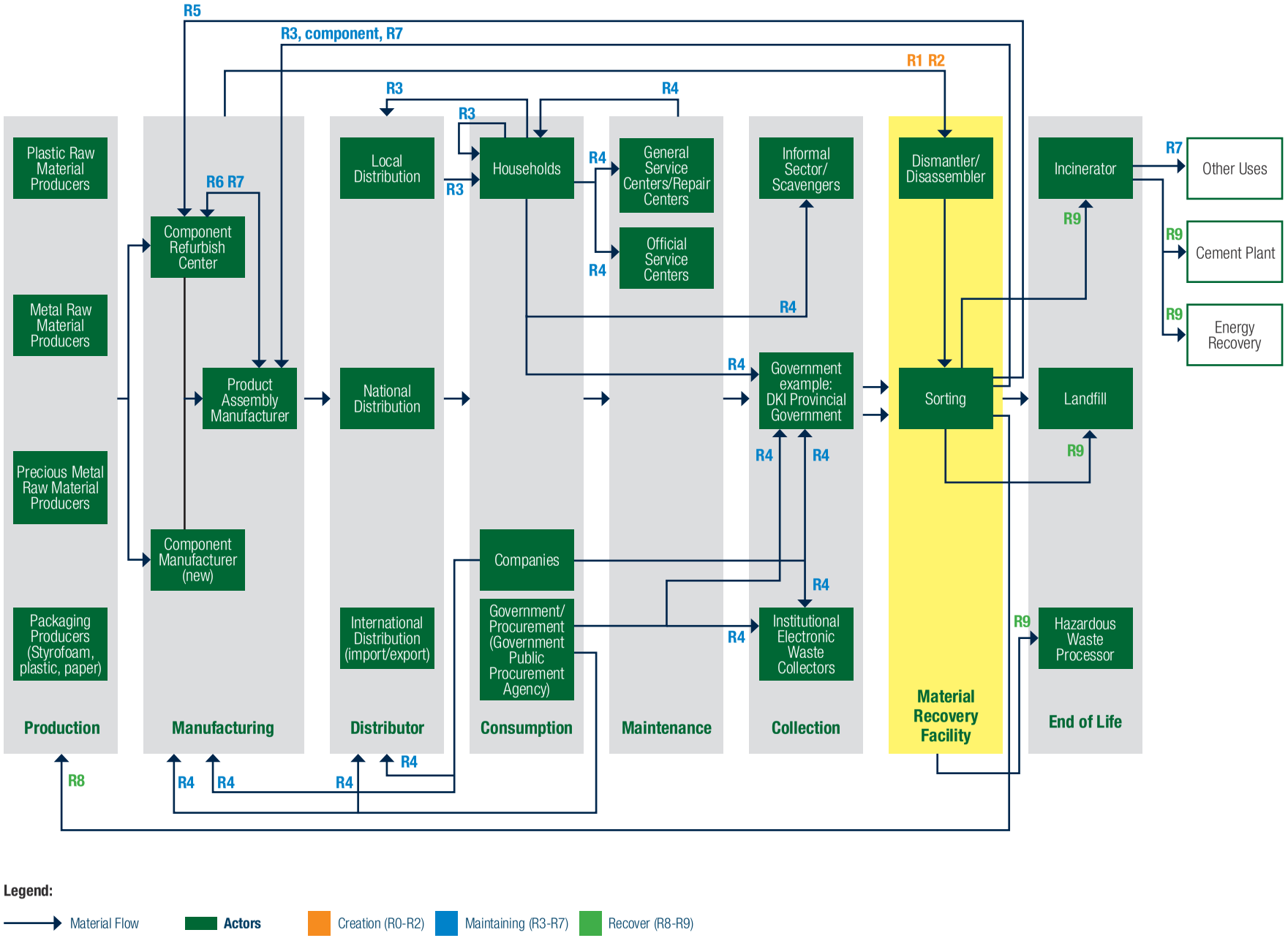


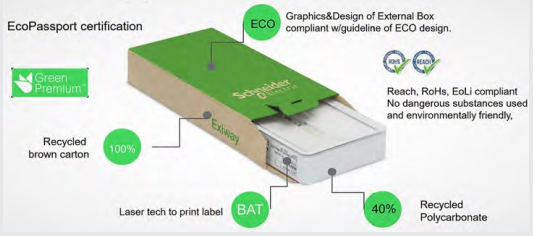
Figure 3.12 Circular Economy Ecosystem in the Electronics Sector

Box 3.6 Best practices in circular economy for the electronics sector in Indonesia

Product Transparency and Selection of Recyclable Materials

Schneider Electric provides transparent information regarding product content and handling instructions for end-of-life products. The product packaging is Eco Passport certified, containing 60% recycled paper and 40% polycarbonate materials. Additionally, Schneider aims to produce packaging with 100% recycled materials by 2025. Since 2019, Schneider has successfully reduced metal and electronic part waste from approximately 3,500 units of products. Furthermore, 99% of the recovered waste from total production waste, equivalent to 1,417 tons, was achieved in 2021.





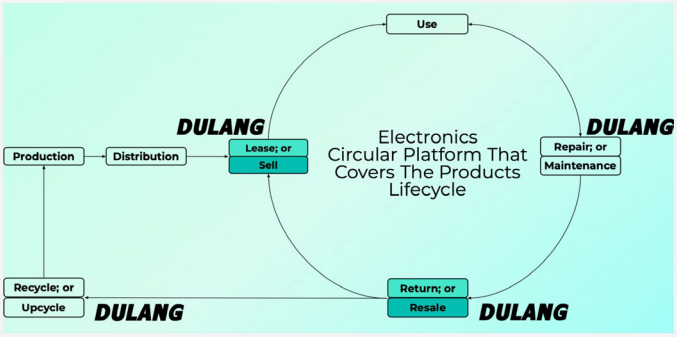
Application of 9R

Rethink (R1), Reduce (R2), Recycle (R8)

Electronic Lifecycle Management Platform

Dulang is a provider of electronic lifecycle management. The company strives to maximize the value and lifespan of electronic devices, particularly through repair, refurbishment, and resale to reduce electronic waste. To date, Dulang has served various corporations, including ride-hailing companies, warehouse management providers, law firms, and startups. Dulang's long-term vision encompasses holistic solutions to electronic waste issues, from leasing post-production devices upstream, optimizing usage through repair, refurbishment, and trade in the midstream, to recycling and upcycling downstream.

Since its launch in 2023, Dulang has focused on B2B operations, handling various repairs, sales, and refurbishments for products such as laptops, mobile phones, smartwatches, audio appliances, and other used electronics. In the future, Dulang plans to expand to handle ICT (Information, Communication, and Telecommunication) equipment, EV batteries, and solar panels. Dulang also intends to collaborate with various stakeholders, including relevant ministries (such as the National Development Planning Agency), subnational governments, state-owned enterprises, and recycling banks.



Application of 9R

Rethink (R1), Reduce (R2), Repair (R4), Recycle (R8)

Source: The Future is Circular (Bappenas, 2022), LimbahElektronik (DKI Jakarta, 2022, https://www.jakarta.go.id/e-waste),Green Tech Entrepreneur Network (Bappenas, 2024, https://www.digi-green.tech/contact-1), Pitch Deck Dulang (2024).

Provincial Government of DKI Jakarta

The Role of Subnational Governments in Electronic Waste Collection

The Environmental Agency of the Province of DKI Jakarta provides a convenient solution for residents unsure of how to dispose of their electronic waste by offering drop boxes at strategic locations. This initiative aims to prevent improper disposal of electronic waste, which can harm the environment. The collected waste is then sent for recycling by PT. Citra Asia Raya. Additionally, Jakarta residents with at least 5 kilograms of electronic waste can register for free pickup through the Environmental Agency's website.





Application of 9R

Reduce (R2), Recycle (R8)

Box 3.7 Benchmarking Electronic Waste Management Practices in Other Countries

IT Asset Disposition (ITAD) Program by SK Tes (Tes-AMM)





A global company based in Singapore, SK Tes (Tes-AMM), facilitates the sustainable management of technology asset lifecycles, including through its IT Asset Disposition (ITAD) program. With 40 facilities across 20 countries, approximately 100,929 tons of technology assets have been managed since 2021. The company collaborates with Original Equipment Manufacturers (OEMs) and retailers through return, buy-back, and trade-in schemes to increase the amount of e-waste managed sustainably. Certified by Sustainable Electronics Recycling International (SERI), Tes-Amm ensures data confidentiality and the management of e-waste in accordance with circular economy hierarchy, achieving a material reuse rate of up to 98%.

Milestones of Circular Economy in the Electronics Sector

The roadmap for circular economy in the electronics sector can help reduce environmental impact by promoting the use of recycled materials, developing recycling technologies, increasing consumer awareness, and encouraging the implementation of the EPR concept. This roadmap is divided into four periods, each consisting of five years.

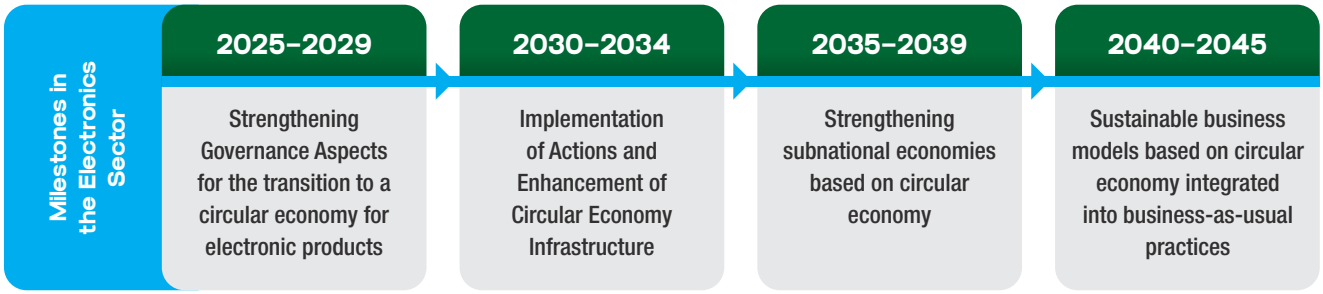


Figure 3.13 Milestones of circular economy in the Electronics Sector

In the first period, the foundation is built, including national regulations related to electronic waste management; EPR; and the management of battery waste from Battery Electric Vehicles (KBLBB), strengthening baseline studies, the development of Green Industry Standards (SIH) and eco-labeling for priority products, and the establishment of a monitoring system. The second period begins the implementation of actions toward sustainable electronics, including the decentralization of national regulations to subnational governments, the establishment and enhancement of management facility capacities, strengthening the ecosystem for circular economy businesses, and increasing EPR reporting by electronics companies.

The third period prioritizes the strengthening of the subnational economy, where the foundations and actions of circular economy are recognized and applied by the community, businesses, and government on a larger scale than in the previous period. Environmentally friendly certified products are widely available in the market and come with circular economy information. Additionally, every major city has established electronic waste management pathways.

In the fourth period, the electronics sector focuses on the realization of sustainable business models based on circular economy, which begin to replace the traditional business-as-usual approach. The ecosystem is formed through ongoing development and innovation from all stakeholders. Furthermore, other resources, including funding and incentive schemes, policies, educational materials/guidelines, and circular economy platforms, are accessible to businesses, government, academia, and the public.

Strategy & Action Plan for Circular Economy in the Electronics Sector

Circular economy roadmap for the electronics sector consists of **4 strategies and 14 action plans**, each with supporting indicators, baseline data, and milestone phases based on the target of each period. Circular economy strategies for the electronics sector are as follows:

STRATEGY 1

Development and implementation of EPR policies for electronic products

STRATEGY 2

Development of Circular Economy Infrastructure

STRATEGY 3

Implementation of Ecodesign and Product Innovation

STRATEGY 4

Development of a circular ecosystem for New Technologies and Battery Electric Vehicles (KBLBB)

Table 3.3 National Strategy and Action Plan for Circular Economy in the Electronics Sector

STRATEGY 1: Development and Implementation of EPR Policies for Electronic Products

Strategy 1 focuses on strengthening EPR regulations to ensure that producers/distributors are accountable for managing the waste generated from their electronic products. In Indonesia, the obligation to manage hazardous waste (B3) is regulated under Government Regulation No. 101 of 2014 concerning the Management of Hazardous and Toxic Waste. Meanwhile, electronic waste is governed by Government Regulation No. 27 of 2023 on Specific Waste. However, the challenges in managing waste and electronic waste (e-waste) cannot be effectively addressed without specific regulations dedicated to e-waste.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
1.1. Establishment of EPR regulations for electronic products	1. Reduction in the generation of electronic waste and e-waste 2. Increased lifespan of electronic products 3. Increased collection of electronic waste and e-waste 4. Increased processing of electronic waste and e-waste 5. Increased content of recycled/ secondary materials in electronic products 6. Reduced intensity of water, energy, and other material usage.	1.1.a. Availability of cross-ministerial regulations on EPR for electronics	0 Currently, there is no specific EPR regulation for e-waste	1 national regulation				Ministry of the Environment and Forestry, Ministry of Industry
1.2. Implementation of EPR for priority products	1. Reduction in the generation of electronic waste and e-waste 2. Increased lifespan of electronic products 3. Increased collection of electronic waste and e-waste 4. Increased processing of electronic waste and e-waste 5. Increased content of recycled/ secondary materials in electronic products 6. Reduced intensity of water, energy, and other material usage.	1.2.a. Number of electronics and KBLBB (Battery Electric Vehicle) producers/ distributors implementing EPR for priority products	Number of distributors/ producers* with a market capitalization > USD 2 million implementing EPR. As of now, there are 0 companies compared to 5 major distributors (Disfold Website, 2023) **Number of electronics producers/ distributors: 32 companies (Ministry of Industry, 2023)*	3 producers/ distributors (market cap > USD 2 million)	5 producers/ distributors (market cap > USD 2 million)	10 producers/ distributors (market cap > USD 2 million)	All companies listed by the Ministry of Industry	Ministry of the Environment and Forestry, Ministry of Home Affairs, Ministry of Industry, Ministry of Trade
				3 producers/ distributors for Battery Electric Vehicle batteries and new technologies	5 producers/ distributors for Battery Electric Vehicle batteries and new technologies	10 producers/ distributors for Battery Electric Vehicle batteries and new technologies	20 producers/ distributors for Battery Electric Vehicle batteries and new technologies	
		1.2.b. Number of priority product types that have implemented Electronic EPR	0 Electronics product categories based on KBLI 26 and 27 Classification KBLI: • 26: Computers, electronics, and optical goods • 27: Electrical equipment	2 categories within Indonesia Standard Industrial Classification 26 and 27	5 categories within Indonesia Standard Industrial Classification 26 and 27	8 categories within Indonesia Standard Industrial Classification 26 and 27	14 categories within Indonesia Standard Industrial Classification 26 and 27	

STRATEGY 2: Development of Circular Economy Infrastructure

Strategy 2 focuses on the infrastructure for recovering electronic waste materials to collect, sort, process, and/or channel electronic waste to further processing facilities for refurbishment, remanufacturing, and recycling. Enhancing infrastructure must also be accompanied by strengthening the capacity of the informal sector in managing electronic waste. Additionally, promoting circular economy businesses supported by research can reduce environmental impact and encourage more sustainable resource use.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
2.1. Increase in the number of material recovery facilities for electronic waste	1. Increased collection of electronic waste 2. Increased processing of electronic waste 3. Protection against the scarcity of critical raw materials through the recovery of critical materials	2.1.a. Proportion (%) of recovery facility capacity compared to the potential e-waste generated at the city/ district level	Proportion of Recovery Facility Capacity/ E-waste Generation: 1.48% Data: • Private Recovery Facility Capacity: 31,400 tons/year (PT CAR & PT MML) • 2.117 million tons/ year of e-waste generation (2023 projection data, source: Mairizal, A.Y. Sembada, K.M. Tse et al., 2021)	Study on the Need for Recovery Facility Infrastructure in 5 Regions	Study on the Need for Recovery Facility Infrastructure in 5 Major Cities	Study on the Need for Recovery Facility Infrastructure in 10 Major Cities	Study on the Need for Recovery Facility Infrastructure in 15 Major Cities Provision of Recovery Facilities with 75% Capacity for E-Waste in 38 Provinces and 10% Capacity in Each Major Island	Ministry of Public Works and Public Housing, Ministry of the Environment and Forestry, Ministry of Industry, National Research and Innovation Agency
				Provision of recovery facilities with a capacity of 30% of the potential e-waste generation in 5 regions	Provision of Recovery Facilities with 50% Capacity for E-Waste in 10 Major Cities	Provision of Recovery Facilities with 80% Capacity for E-Waste in 10 Provinces and a Minimum of One Facility in Each Major Island		
		2.1.b. Percentage of critical materials successfully recovered (tonnage of critical materials recovered compared to potential tonnage of e-waste generated per year)	Critical Raw Material Recovery Rate: 0.15% The recovery rate is calculated based on the ratio of products that can be turned into ingots compared to the tonnage of electronic waste processed by recyclers against the potential e-waste generation in Indonesia.	0.5% of critical materials recovered	1% of critical materials recovered	1.5% of critical materials recovered	2.5% of critical materials recovered	

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
2.2. Increase in electronic waste collection through existing facilities (3R Waste Management Facility, Primary Waste Bank, and other points)	1. Increased collection of electronic waste 2. Increased processing of electronic waste	2.2.a Collection rate (%) of electronic waste compared to the potential generation of electronic waste	Existing Facilities for E-waste Collection: • 0 3R Waste Management Facility (KLHK) • 0 Primary Waste Banks (KLHK) • 0 3R Waste Management Facility FPSS (DKI Jakarta) • 65 *Dropbox* E-waste Collection Rate: 2.82% • Formal Sector: 1.12% • Informal Sector: 1.70%	Collection rate of 30%	Collection rate of 40%	Collection rate of 60%	Collection rate of 70%	Ministry of the Environment and Forestry, Ministry of Industry, Subnational Governments, Ministry of Home Affairs
		2.2.b. Recycling rate (%) of electronic waste compared to the potential generation of electronic waste	Recycling Rate: 2.61% - Calculation Method: = [electronic waste entering the recycling process - tonnage lost during the recycling process] / [total e-waste generation]	Recycling rate of 10%	Recycling rate of 20%	Recycling rate of 30%	Recycling rate of 50%	
2.3. Enhancement of the informal sector's capacity to support material recovery facilities	1. Increased collection of electronic waste 2. Increased processing of electronic waste	2.3.a. Number of informal sectors managing electronic waste according to circular economy and environmentally friendly principles	N/A	Baseline Study on the Number of Informal Sectors Managing Electronic Waste	Capacity Building for the Informal Sector in 10 Major Capital Cities	Capacity Building for the Informal Sector in 15 Major Capital Cities	Capacity Building for the Informal Sector in 38 Major Capital Cities	Ministry of the Environment and Forestry, Ministry of Industry
		2.3.b. Number of informal sectors formalized and supported by industry or relevant ministries/ agencies		Baseline study on the number of informal sectors participating in training, development of training modules (2024-2025) Pilot Program for Capacity Building of the Informal Sector in the Largest E-waste Producing Provinces (2026-2029)	30% of individuals from the informal sector trained in 10 major capital cities	50% of individuals from the informal sector trained in 15 major capital cities	70% of individuals from the informal sector trained in 38 major cities	

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
2.4. Strengthening circular economy-based businesses	1. Increased collection of electronic waste 2. Increased processing of electronic waste 3. Subnational economic improvement	2.4.a. Number of circular economy businesses → reuse (second-hand market/ leasing businesses), repair, refurbish, and remanufacturing centers	1,035 service centers for electronic products by brand, 7 recycling companies, and 6 companies offering electronic device rental services (source: Desk research from Brand Websites)	10% increase in circular businesses	30% increase in circular businesses	50% increase in circular businesses	70% increase in circular businesses	Ministry of Industry, Ministry of Home Affairs, Ministry of Trade
		2.4.b. Percentage of products reused (second-hand market/ leasing businesses), repaired, refurbished, and remanufactured from circular businesses	Remanufacture rate: 1.4%for PLN smart meters E-waste Repurpose Rate (fly ash from recycling process residue turned into bricks): 0.07%	Baseline study on the number of products that have been re-used, repaired, refurbished, or remanufactured by circular businesses	30% increase in circular products	45% increase in circular products	60% increase in circular products	
		2.4.c. % contribution to the regional economy	N/A	Baseline study on the percentage contribution of circular businesses to the subnational economy	5% increase in economic value contribution (1% per year)	10% increase in economic value contribution (2% per year)	20% increase in economic value contribution (4% per year)	
2.5. Integration of IKM/UMKM (Small and Medium Enterprises) and the informal sector into the circular business ecosystem	1. Increased collection of electronic waste 2. Increased processing of electronic waste	2.5.a. Number of IKM/ UMKM/ informal sectors integrated into the business ecosystem of large companies	N/A	Baseline Study on the Number of MSMEs/ Informal Sectors Integrated into the Ecosystem of Large Companies in 8 Provinces	Baseline study on the number of MSMEs/ Informal Sectors in 10 Provinces	Baseline study on the number of MSMEs/ Informal Sectors in 10 Provinces	Baseline study on the number of MSMEs/ Informal Sectors in 10 Provinces	Ministry of Industry, Ministry of Coopera-tives and SMEs, Ministry of Industry
					30% of MSMEs/ Informal Sectors integrated in 10 major cities	50% of MSMEs/ Informal Sectors integrated in 15 major cities	70% of MSMEs/ Informal Sectors integrated in 38 major cities	
2.6. Research and development of recycling technology	1. Increased processing of electronic waste 2. Increased content of recycled/ secondary material in electronic products 3. Decreased intensity of water, energy, and other materials	2.6.a. Number of patents developed for recycling technology	2 patents for lithium battery recycling (Directorate General of Intellectual Property, Ministry of Law and Human Rights, 2023)	25% Increase in Patents	35% Increase in Patents	50% Increase in Patents	65% Increase in Patents	Ministry of Education, Culture, Research, and Tech-nology, National Research- and Innovation Agency
		2.6.b. Number of publications/ scientific research on recycling technology	8 research publications with the keywords “recycling technology”and “electronics” (Google Scholar, 2023)	20% Increase in Publications	35% Increase in Publications	45% Increase in Publications	60% Increase in Publications	

STRATEGY 3: Implementation of Ecodesign and Product Innovation

Implementing ecodesign and product innovation can increase efficiency in the production and use of electronic products, thereby helping to reduce waste and promote more sustainable resource use.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
3.1. Development of Industry Standards (Ecolabel) with Ecodesign Principles	1. Reduced intensity of water, energy, and other materials 2. Increased lifespan of electronic products 3. Increased content of recycled/ secondary materials in electronic products	3.1.a. Number of standards (ecolabel) with ecodesign principles for computer products, optics, electrical equipment	0 standards (currently under development)	5 standards	10 standards	15 standards	30 standards	Ministry of the Environment and Forestry, Ministry of Industry,Ministry of Energy and Mineral Resources, National Standardization Agency
3.2. Application of Ecodesign Principles for Electronic Products and Electrical Equipment	1. Reduced intensity of water, energy, and other materials 2. Increased lifespan of electronic products 3. Increased content of recycled/ secondary materials in electronic products 4. Standards for electronic products and electrical equipment that apply ecodesign and product innovation will be in the form of SNI (Indonesian National Standard), harmonized with international standards for global market acceptance	3.2.a. Number of product types displaying circularity information on SNI products (information on % refurbished or remanufactured content, and % recycled content)	0 number of product types that have displayed circularity information on SNI Data on recycled content: 18.25% Data details: Mobile phones: 20% Computers and laptops: 5%	Baseline Study for Data on Energy Intensity, Water Consumption, and GRK Emission Reduction in Electronic Production	CE Information on 10 Types of Products	CE Information on 15 Types of Products	CE Information on 30 Types of Products	Ministry of the Environment and Forestry, Ministry of Industry, Ministry of Energy and Mineral Resources, National Standardization Agency
		3.2.b. Percentage of electronic products that have met ecolabel standards	0% of products have been certified	Establishment of Ecolabel Verification System for Electronic Products	10% of Products Certified with Ecolabel	30% of Products Certified with Ecolabel	60% of Products Certified with Ecolabel	
		3.2.c. Percentage of recycled critical raw materials (CRMs) used in electronic products (CRMs recycled content)	0% of recycled critical raw materials used in electronic products	Baseline Study on Recycled Critical Raw Materials Content in Electronic Products	10% Recycled CRM Content in Electronic Products	15% Recycled CRM Content in Electronic Products	20% Recycled CRM Content in Electronic Products	

STRATEGI 4. Pengembangan ekosistem sirkular untuk Teknologi Baru dan Baterai Kendaran Bermotor Listrik Berbasis Baterai (KBLBB)

Strategi 4 berfokus [ada Pengembangan Ekosistem industri baterai untuk kendaraan listrik (KBLBB) dengan mendorong peningkatan produksi dan penggunaan baterai li-ion (LiB) dalam negeri. Penerapan ekonomi sirkular dalam konteks teknologi baru dan KBLBB tidak hanya mendukung keberlanjutan lingkungan, tetapi juga memberikan peluang untuk inovasi, pertumbuhan ekonomi, dan membangun masyarakat yang lebih berkelanjutan secara keseluruhan.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
4.1. Establishment of Regulations Covering the Entire Product Life Cycle and Use of Renewable Energy for Battery Operations	1. Reduction in electronic waste generation 2. Extension of electronic product lifespan 3. Increase in collected electronic waste 4. Increase in processed electronic waste 5. Increase in recycled content/ secondary materials in electronic products 6. Reduction in water, energy, & other material intensity	4.1.a Drafting and ratification of regulations covering the entire life cycle of New Technology and EV Batteries	No specific regulations yet for new technology and Battery Electric Vehicles	Regulatory framework study; 1 national regulation	Regulations in 5 Provinces	Regulations in 10 Provinces	Regulations in 38 Provinces	Ministry of the Environment and Forestry, Ministry of Industry, Ministry of Trade
4.2. Development of Logistics Infrastructure for End of Life (EoL) Management and Utilization	1. Reduction in water, energy, & other material intensity 2. Increase in recycled content/ secondary materials in electronic products	4.2.a Development of logistics infrastructure for EoL management (repurposing/ recycling) with sufficient capacity,	No recorded EV battery waste or logistics infrastructure	Baseline study on EV battery waste and logistics infrastructure for EoL management Provision of logistics infrastructure for EV battery EoL management with 30% capacity of potential EV battery waste in 5 Major Cities	Development of a Monitoring, Evaluation, and Reward-Punishment System Provision of Logistics Infrastructure for EoL Battery Management of Battery Electric Vehicles with 50% Capacity of Potential EV Battery Waste in 5 Major Cities	Provision of Infrastruc-ture for EoL Battery Management of Battery Electric Vehicles with 50% Capacity of Potential EV Battery Waste in 10 Major Cities	Provision of Infrastruc-ture for EoL Battery Manage-ment of Battery Electric Vehicles with 80% Capacity of Potential EV Battery Waste in 10 Provinces	Ministry of the Environment and Forestry, Ministry of Industry, Min-istry of Energy and Mineral Resources, Ministry of Trade, Minis-try of Energy and Mineral Resources, Ministry of Trade, Ministry of Transportation
4.3. Increase in the Proportion of Renewable Energy Usage for Battery Electric Vehicle Charging Infrastructure	Increase in Processed Electronic Waste	4.3.a Level of renewable energy usage in charging infrastructure	N/A	Baseline study on renewable energy usage	10%	30%	50%	Ministry of Industry, Ministry of Energy and Mineral Resources, Ministry of Trade

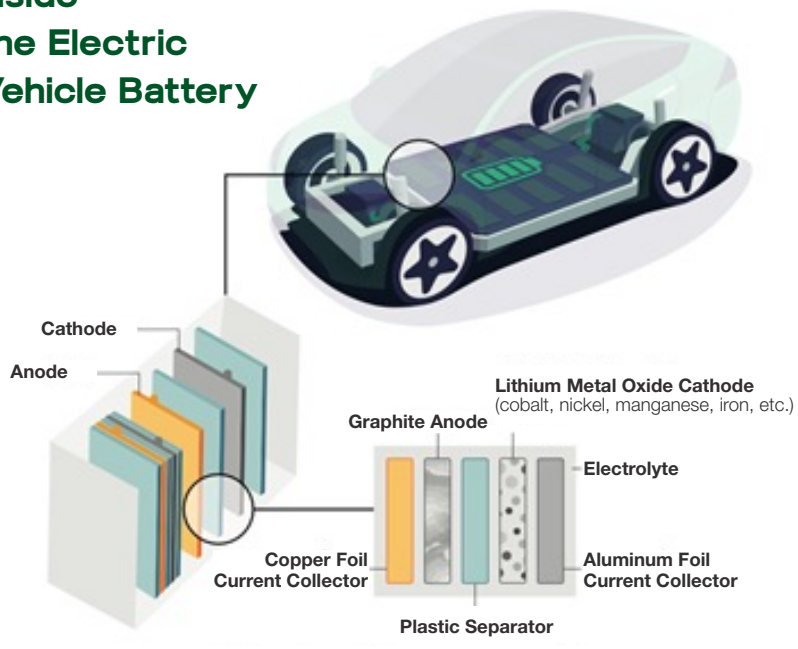
Box 3.8 **Anticipating the Management of EV Batteries**

Anticipating the Management of EV Batteries

Unlike the relatively small car battery, the EV battery forms the foundation of the vehicle itself. EV batteries are expected to have a lifespan of approximately 7-8 years. With the exponential growth of KBLBB, the accumulation of batteries reaching the end of their lifespan could become a significant issue if the Indonesian government does not prepare the ecosystem and infrastructure for repair, refurbishment, remanufacturing, recycling, and/or recovery.

EV batteries contain various valuable metals that can be considered critical raw materials. Given the extensive mining and processing required, the valuable metals within KBLBB batteries should be recycled or recovered. Additionally, due to their large size, adequate logistics infrastructure is necessary to transport and store EV batteries before they are processed.

Inside the Electric Vehicle Battery



Source: Canary Media; Chrobak, U., 2022

Image: Electric vehicle battery (ENTREV, 2023)

Construction Sector



Existing Condition of Circularity in Construction Sector

In 2019, the construction sector contributed 10.1% to Indonesia's GDP[31]. Based on the analysis of three main indicators, the construction sector has a circular material input rate of 73%, a product and material utilization rate of 40%, and a recycling rate of 25%.

Policy Directions	Key Indicators	Baseline
Reduction in Resource Use	Circular Input Rate	73%
Extension of Product and Material Use	Usage Rate	40%
Enhancement of Recycling and Utilization of Post-Production and Consumption Waste	Recycling Rate	25%

National regulations related to Sustainable Construction and Green Building have been established; however, their implementation remains limited and voluntary. Sustainable Construction is defined as an approach to developing physical construction facilities that meet current and future economic, social, and environmental objectives. In this approach, several assessment criteria related to circular economy are emphasized, including the use of local construction materials, construction materials made from recycled content, and prefabricated construction materials. The assessment criteria for Sustainable Construction include[32];

a. Design for the use of environmentally friendly construction materials with evidence provided through specifications in the Detailed Engineering Design (DED)

b. Design for the efficient use of construction materials (reduce) with evidence provided through specifications in the DED

[31] Bappenas. 2021. Food Loss and Waste di Indonesia dalam rangka mendukung penerapan ekonomi sirkular dan pembangunan rendah karbon. Accessed in https://lcdi-indonesia.id/wp-content/uploads/2021/06/Report-Kajian-FLW-FINAL-4.pdf

[32] PUPR. 2021. Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat Nomor 9 Tahun 2021 tentang Pedoman Penyelenggaraan Konstruksi Berkelanjutan. https://jdih.pu.go.id/detail-dokumen/2882/1#div_cari_detail diakses pada 26 April 2024

In addition to Sustainable Construction, there is also a Green Rating System that evaluates the sustainability and environmental friendliness of buildings or construction projects. Essentially, buildings that are certified under the Green Rating System have implemented environmentally friendly work methods and designs, as well as energy and water efficiency measures. Various types of Green Rating Systems are applicable in Indonesia, including:

1

Green Building (BGH)[33]

BGH certification was developed by the M inistry of Public Works and Housing (PUPR) to assess the sustainability performance of buildings. It includes standards and procedures that must be followed to evaluate and accredit buildings as green, focusing on energy efficiency, sustainable resource use, and environmentally friendly practices. To date, a total of 222,658 square meters of buildings in Indonesia have been certified under BGH.[34]

2

Greenship

Greenship certification is a green building certification system developed by the Green Building Council Indonesia (GBCI). Greenship offers six types of certification: New Building, Existing Building, Interior Space, Homes, Neighborhood, and Net Zero Healthy. The main assessment criteria include energy and water efficiency, the use of environmentally friendly materials, indoor environmental quality, innovation, and technology. Currently, only about 2,178,663 square meters of area have been certified under Greenship, representing just around 0.06% of the total building area in Indonesia.

3

EDGE

EDGE Certification is a type of green building certification developed through a collaboration between the International Finance Corporation (IFC) and the Green Building Council Indonesia (GBCI). The goal of EDGE certification is to optimize building design with energy and water efficiency, reduce resource intensity, and lower greenhouse gas (GRK) emissions from both the construction process and building operations. To date, 891,326 square meters of buildings in Indonesia have been certified under EDGE, which represents 0.024% of the total building area in Indonesia.[36]

In terms of work methods, the use of Building Information Modelling (BIM) technology should be encouraged to enhance measurement accuracy, improve material ordering and cutting efficiency, and reduce construction waste by 1.6%-15% . The implementation of BIM is regulated under PUPR Ministerial Regulations No. 22/2018, No. 9/2021, and No. 21/2021. PUPR Regulation No. 22 of 2018 mandates the application of BIM for state building projects larger than 2,000 square meters and more than two stories. The PUPR BIM Dashboard indicates that only 42.5% of National Strategic Projects (PSN) applied BIM in 2023. The integration of sustainability principles into the Public-Private Partnership (KPBU) scheme has also not been recorded. Furthermore, the implementation of BIM still needs to be developed beyond the scope of construction projects carried out by the Ministry of Public Works and Housing.

---

[33] PUPR. 2021. Peraturan Menteri Pekerjaan Umum dan Perumahan Rakyat Nomor 21 Tahun 2021 tentang Penilaian Kinerja Bangunan Gedung Hijau. https://peraturan.bpk.go.id/Details/217002/permen-pupr-no-21-tahun-2021 diakses pada 26 April 2024

[34] Hasil wawancara dengan Kementerian PUPR. 2023

[35] Green Building Council Indonesia.

[36] EDGE Building. 2023. https://edgebuildings.com/edge-excellence-in-design-for-greater-efficiencies-id/. Diakses pada 26 April 2024

[37] Won, J., & Cheng, J. C. P. (2017). Identifying potential opportunities of building information modeling for construction and demolition waste management and minimization. Automation in Construction, 79, 3–18. doi:10.1016/j.autcon.2017.02.002

PUPR Ministerial Regulation No. 9 of 2021 stipulates the use of prefabricated construction materials as a criterion for sustainable construction development. However, data on construction stakeholders who have adopted prefabricated materials in their projects has not been fully collected. For example, in the infrastructure development of the new capital city (IKN), there are 32 work packages that utilize prefabricated product[39]. A private housing development project in Kota Deltamas, Cikarang , is also an example of a residential project that has employed prefabricated concrete.

Energy and water consumption efficiency in the manufacturing process of construction products may have already been implemented. However, data collection remains an issue, as these practices are often initiated by construction stakeholders on their own initiative. Several circularity aspects that can be implemented to improve energy and water consumption efficiency include[40]:

1. designing environmentally friendly properties to minimize the use of lighting and heating/ cooling systems;
2. using energy-efficient certified lighting and equipment;
3. monitoring energy usage with smart metering and implementing innovations according to energy consumption hotspots;
4. increasing the use of rainwater and recycled water in the production process; and
5. updating technology to utilize water/ energy more efficiently.

From the product perspective, the energy and water intensity values are regulated by 10 Green Industry Standards (SIH), with an additional four Green Industry Standards currently under development. Currently, there are 44 companies certified under the SIH, including construction material manufacturers.

The challenges in implementing a circular economy in the construction sector are as follows:

1 Limited and unintegrated data on circular economy practices

In practice, construction waste management in Indonesia is quite comprehensive and already has an integrated value chain, including activities such as the sorting of construction and demolition waste, reuse of materials, and collaboration with related parties in waste transportation and management. However, inadequate data collection on waste management within the construction sector makes it difficult to assess the extent to which circular economy practices have been implemented. Data collection is essential to effectively measure and evaluate circular economy practices. The predominance of informal sector involvement in construction waste utilization is one of the factors that complicates this data collection.

2 Environmental label certification and green rating systems have not been widely implemented

Several factors contribute to the limited implementation of environmental label certification and green rating systems in the construction sector. These include high initial costs, a lack of awareness regarding sustainability and circular economy practices, the absence of regulations mandating certification and green rating systems, insufficient dissemination of information related to environmental label certification and green rating systems, and the fact that many businesses do not yet prioritize circular economy practices.

3 Procurement of products in construction projects still prioritizes cost optimization over the use of environmentally friendly products

Efficiency in construction projects is still primarily measured by the amount of money spent and saved, often overlooking the functionality and benefits of environmentally friendly products. This approach does not yet support circular economy practices that prioritize the environmental impact of product use.

---

[38] Antara Kaltim. (2023). Pembangunan 32 proyek di IKN gunakanmetoderancangbangun. Accessed at:Pembangunan 32 proyek di IKN gunakanmetoderancangbangun - ANTARA News Kalimantan Timur.

[39] Kompas. (2022). Konstruksi Hunian di Cikarang Sudah Gunakan Produk Prefabrikasi. Diakses pada Konstruksi Hunian di Cikarang Sudah Gunakan Produk Prefabrikasi (kompas.com)

[40] Cheshire, D. (2019). Building revolutions: Applying the circular economy to the built environment. RIBA publishing.

Policy also plays a crucial role in supporting the implementation of circular economy in the construction sector. The following are policies related to the principles of sustainable construction and circular economy:

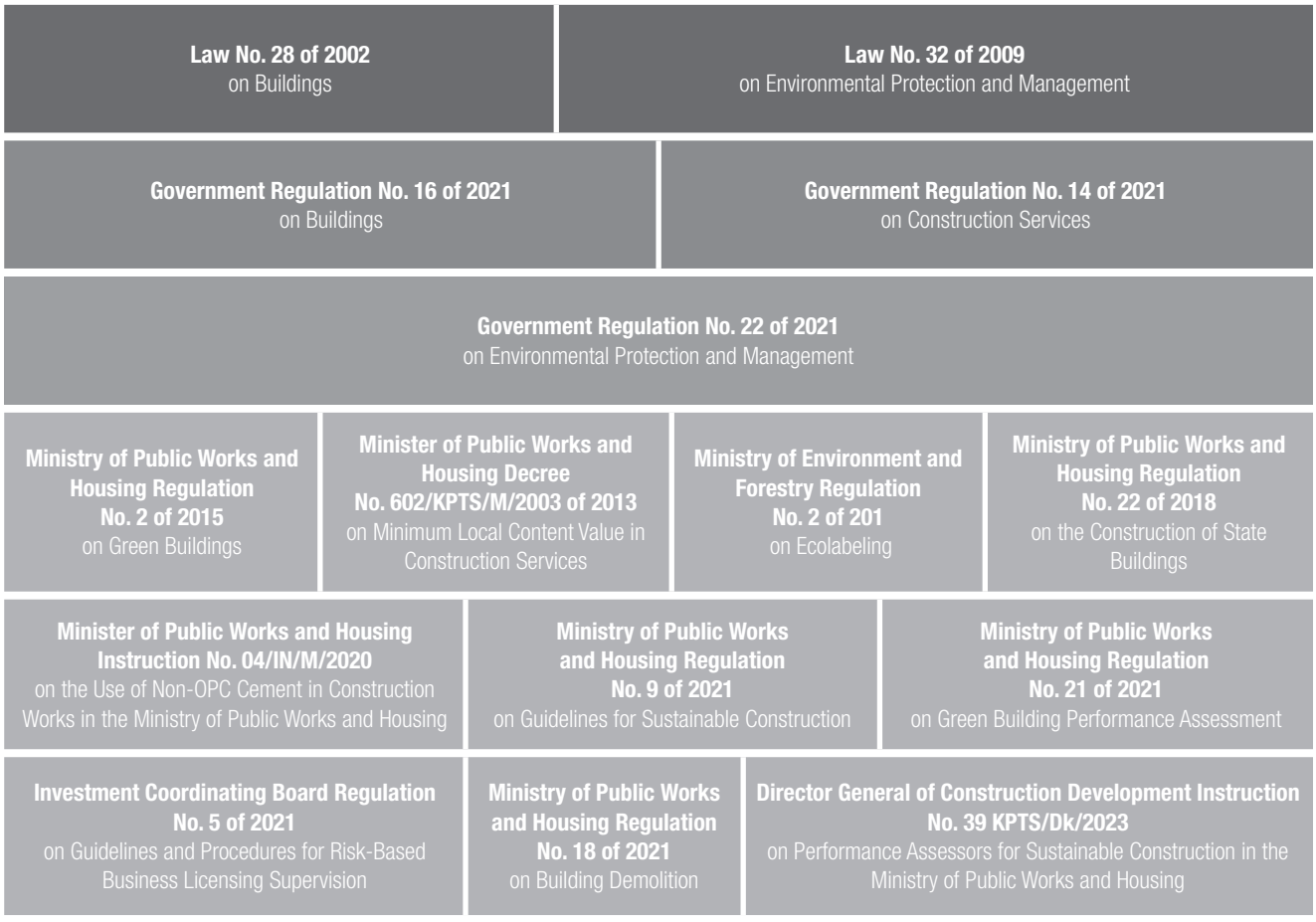


Figure 3.14 Relevant policies for circular economy in the construction sector

Transition from Linear to Circular in the Construction Sector

In the construction sector, the initial linear process chain begins with the production of raw materials, followed by design or pre-construction, distribution to the project site, construction, building operation and maintenance, and finally the deconstruction or demolition of buildings at the end of their lifespan. While this process generally no longer results in waste because there are entities that manage it, the reuse of this waste has not yet been recorded. Stakeholders in the construction sector include raw material producers, design consultants, material distributors, contractors, operations and maintenance management, as well as deconstruction and waste management entities. All stakeholders play a crucial role in creating sustainable value, making it essential to have a shared understanding and perception towards a circular economy.

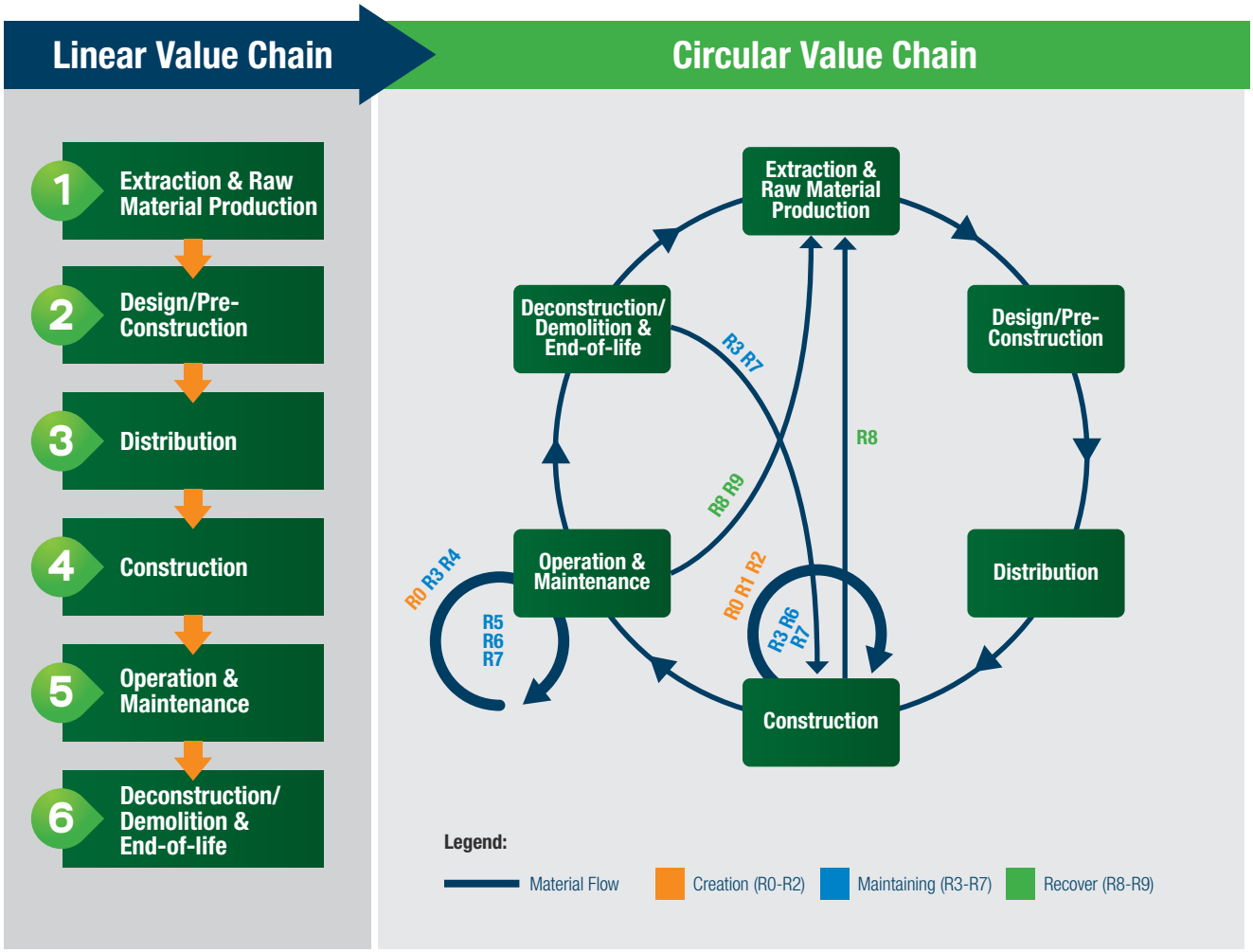


Figure 3.15 Comparison of Linear Value Chains with Circular Value Chains in the Construction Packaging Sector

Circular Economy Ecosystem in the Construction Sector

In a circular economy ecosystem, participants in the construction sector's value chain can be classified into six main groups: raw material production, design/pre-construction, distribution, construction, operations and maintenance, and deconstruction/ demolition at the end of the lifecycle. The ideal conditions expected in circular economy ecosystem for the construction sector include the implementation of activities that reduce resource and material use (R0, R1, R2) as well as the extension of product and material lifespan (R3, R4, R5, R6, R7) during the construction, operation, and maintenance phases. Circular economy practices encourage stakeholders to avoid using materials that are difficult to reuse, recycle, or that may pose negative health impacts. Additionally, during building repairs and renovations, the reuse of components such as doors, windows, plumbing fixtures, wood, flooring, fences, and other building materials should become standard practice, ensuring that products are used for longer periods before disposal.

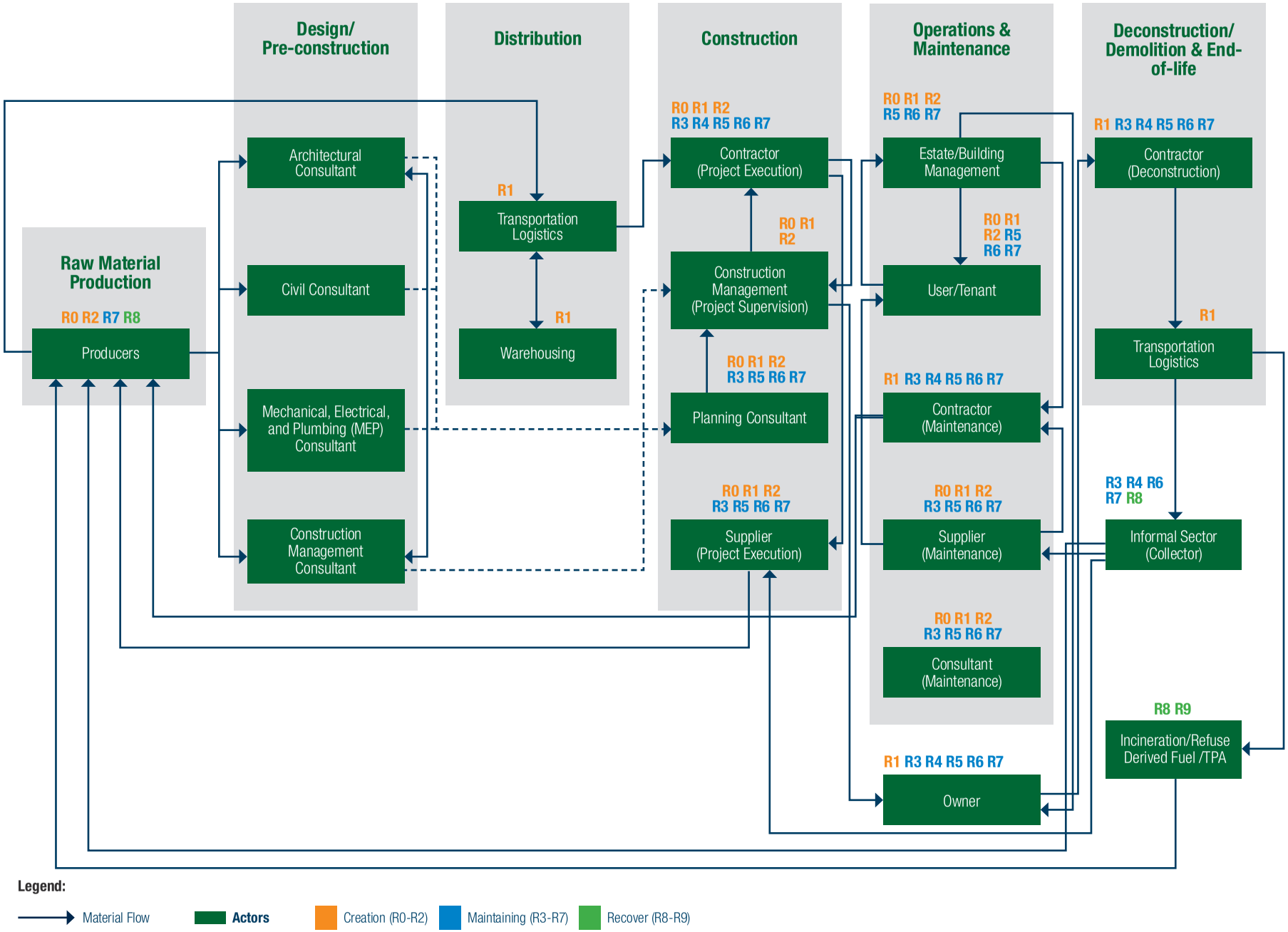


Figure 3.16 Circular Economy Ecosystem in the Construction Sector

Box 3.9 Best Practices for Implementing Circular Economy in the Construction Sector

SOLUSI BANGUN INDONESIA

Decarbonizing Industry through Alternative Fuel Use: RDF from Waste

PT SBI implements the conversion of cement kiln exhaust gases into electricity using a waste heat recovery system. Additionally, PT SBI uses Refuse-Derived Fuel (RDF) from waste in the Cilacap region and its surroundings as an alternative fuel for cement production. This system can substitute 11.4% of thermal energy with alternative fuels. Several SBI plants have also received Green Industry Certification and Green Industry Awards from the Ministry of Industry in recognition of their adherence to resource efficiency and effectiveness criteria.





Application of 9R

Rethink (R1), Recover (R9)

Jakarta International Stadium

Indonesia's First Green Building Concept Stadium

Jakarta International Stadium (JIS) is the first public space in Indonesia to adopt a green building concept, scoring 63 in the Green Building Council Indonesia's (GBCI) Platinum level for design and build due to its green initiatives. JIS incorporates energy efficiency with the use of energy-saving LED lights and 1,080 solar panels. To conserve water, facilities such as sinks, wall faucets, and showers feature auto-stop functions. Wastewater from these facilities will be reused for irrigating plants and the field's grass, including for flushing toilets. With a zero runoff system, rainwater will be stored in a Ground Water Tank after filtration for reuse. JIS also uses the first carbon-neutral certified exterior paint in Indonesia, MowilexWeathercoat Supreme, on its facade and interior paint for the Training Field.





Application of 9R

Rethink (R1), Reduce (R2) Reuse (R3)

Source: Bappenas. 2022. The Future is Circular: Langkah Nyatalnisiatif Ekonomi Sirkular di Indonesia. Accessed in https://lcdi-indonesia.id/wp-content/uploads/2022/08/The-Future-is-Circular.pdf

REBRICKS

Environmentally Friendly Building Materials from Rejected Plastic Waste

Rebricks processes low-value plastic waste such as soft plastic packaging, multilayer sachets, plastic bags, drink labels, and bubble wrap. These wastes are transformed into paving blocks, concrete bricks, and vents used as raw materials for high-quality building materials. As of May 2022, over 17,500 kg of plastic waste has been collected and processed into environmentally friendly construction materials.





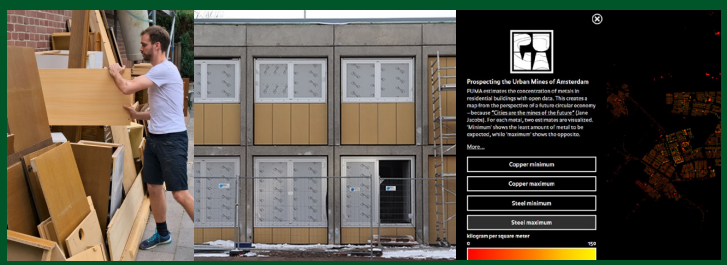
Application of 9R

Repurpose (R7)

Box 3.10 **Circular Economy Ecosystem in the Construction Sector in the European Union**

Initiative for Buildings and Structures as Material Banks

Buildings and structures contain many valuable materials that can be continuously utilized before they become waste or scrap. To address this, the European Union has initiated the concept of Buildings as Materials Banks (BAMB). BAMB evaluates the benefits of buildings not only based on their current use but also their future potential. Buildings contain materials that can be repurposed, and construction practices that consider BAMB principles ensure that materials from dismantled buildings can be reused.BAMB is implemented through the use of material passports, which track and store materials used in construction. These passports record which materials are used and which are best positioned for recovery and reuse, particularly identifying high-value areas of the building, and documenting quality and maintenance. By recording what materials are used and where, the deconstruction process is streamlined.The BAMB Stakeholder Network brings together various actors along the value chain, including building material manufacturers and suppliers, construction companies, property developers, owners and facility managers, architects and engineers, logistics managers, real estate consultants, building owners, recycling and demolition companies, policymakers, and researchers. As part of BAMB's implementation, the city of Amsterdam has mapped urban mining potentials in buildings for copper and steel materials, which are considered for refurbishment, repurposing, and remanufacturing.



Source:

- Circular Economy Global Sector Best Practices Series https://institute.smartprosperity.ca/sites/default/files/Construction_Best%20Practices.pdf
- Building as Material Banks https://www.bamb2020.eu/topics/pilot-cases-in-bamb/retrofit-lab/
- Mining the mineral potential of Amsterdam https://code.waag.org/puma/#52.3627,4.8409,12

Milestones of Circular Economy in the Construction Sector

The milestones of circular economy roadmap for the construction sector is formulated based on Indonesia's National Long-Term Development Plan (RPJPN) for 2025 to 2045, divided into four periods. Each period has milestones that are developed into derivative action plans for the construction sector.

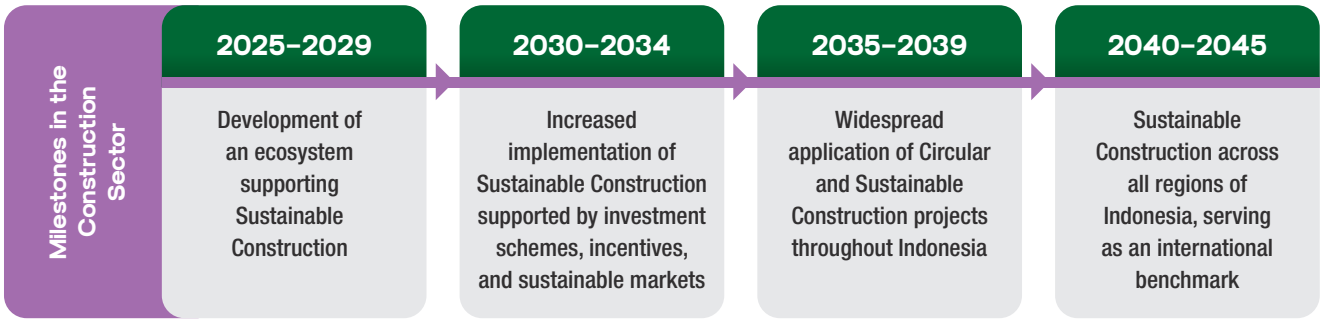


Figure 3.17 Milestones of Circular Economy in the Construction Sector

In the first phase, the development of a supporting ecosystem for circular economy will be carried out by drafting national policies for construction waste management, standardizing environmentally friendly products and green industries, and enhancing capacity building to support sustainable construction.

The implementation of Green Building/Sustainable Construction principles can be enhanced during the second period, supported by investment schemes and incentives targeted at Green Buildings and Sustainable Construction. Additionally, market strengthening and increased demand for environmentally friendly products can be achieved through public procurement and setting minimum criteria for the use of environmentally friendly products in construction projects.

The third period targets the widespread adoption of regulations on construction and demolition waste management, as well as the extensive implementation of incentive policies for the Green Rating System at the regional level. By the time of Indonesia's Golden Period, Sustainable Construction practices will have been largely realized and disseminated throughout Indonesia.

The implementation of a circular economy in the construction sector can reduce waste generation by 20% compared to the Business-as-Usual (BaU) scenario by 2030. Economically, a circular construction sector can generate a net economic impact of IDR 172.5 trillion (USD 12.1 billion), or 6.3% of the sector's GDP by 2030. Additionally, circular economy can also create 1.6 million net jobs by 2030, with 90% of these positions having the potential to employ women.[41]

Strategy & Action Plan for Circular Economy in the Construction Sector

The strategies outlined in this roadmap include **3 strategies and 10 national action plans**. To measure the progress of these action plans, each is equipped with sectoral indicators, baseline data (current conditions), and milestones (targets set for four periods up to 2045), which can be monitored and evaluated regularly. Circular economy strategies for the construction sector are as follows:

STRATEGY 1

Application of Sustainable Design and Work Methods

STRATEGY 2

Utilization of Waste and/or Residual Construction and Demolition Materials

STRATEGY 3

Use of Environmentally Friendly Products and Materials and Implementation of Green Buildings

[41] Bappenas. 2021. Buku Manfaat Ekonomi, Sosial, dan Lingkungan Ekonomi Sirkular di Indonesia. Accessed in https://lcdi-indonesia.id/wp-content/uploads/2021/09/The-Economic-Bahasa.pdf

Tabel 3.4 National Circular Economy Strategy and Action Plan for the Construction Sector

STRATEGY 1 – Application of Sustainable Design and Work Methods

Strategy 1 focuses on implementing circular economy principles in the design phase before construction, promoting the use of prefabricated materials and environmentally friendly materials in line with Sustainable Construction criteria. The use of Building Information Modeling (BIM) methods is also encouraged for precise, waste-minimizing, and efficient planning. In this regard, data collection is crucial for setting and calculating baselines, targets, and the benefits of circular economy. The Ministry of Public Works and Housing (PUPR), through its internal projects, should lead the implementation of Strategy 1, which will be necessary for both government and non-governmental construction projects..

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
1.1. Use of Prefabrication in Construction Projects	The use of prefabricated materials in construction projects can: 1. Reduce the generation of construction waste 2. Increase the amount of construction waste that is recycled, refurbished, remanufactured, and repurposed 3. Improve the efficiency of water, energy, and material use 4. Decrease greenhouse gas emissions Target: construction stakeholders (developers, contractors, government, building owners, property managers, etc.)	1.1.a. Percentage of prefabricated product use in large construction projects	• Ministry of Public Works and Public Housing has already used 90% prefabricated components in the construction of Simple Rental Apartments (Ministry of Public Works and Public Housing, 2023) • There are 30 companies in the prefabricated and prestressed concrete industry registered as members of AP3I (AP3I, 2023) • There is currently no integrated and publicly accessible data on the percentage of prefabricated product use	Prefabricated product usage of ≥1-5% in recorded large construction projects	Prefabricated product usage of >5-15% in recorded large construction projects	Prefabricated product usage of >15-25% in recorded large construction projects	Prefabricated product usage of ≥25% in recorded large construction projects	Ministry of Public Works and Public Housing, Ministry of Transportation, Subnational Governments
		1.1.b. Availability of data on the percentage of prefabricated product use in large construction projects		Data collection on the percentage of prefabricated product use in large construction projects				
1.2. Effective and Efficient Application of BIM (Building Information Modeling) Methods	The effective and efficient application of BIM methods can encourage: • More efficient use of water, energy, and materials • Reduction in greenhouse gas emissions	1.2.a. Percentage of National Strategic Projects (PSN) and PUPR projects using BIM	• 37 BIM Packages – Ministry of Public Works and Public Housing BIM Dashboard 2023 (https://bim.pu.go.id/) • As of July 2023, 87 National Strategic Projects (PSN) have been completed, with 42.5% using BIM	55% of Ministry of Public Works and Public Housing projects using BIM	65% of Ministry of Public Works and Public Housing projects using BIM	75% of Ministry of Public Works and Public Housing projects using BIM	All Ministry of Public Works and Public Housing projects using BIM	Ministry of Public Works and Public Housing, Ministry of Transportation, Ministry of State-Owned Enterprises
		1.2.b. Percentage of government (other ministries/ agencies) and/or private projects using BIM	44 construction projects by PT. PP (Persero) Tbk are using BIM	Baseline study of the number of government (other ministries/ agencies) or private projects using BIM	5% of government (other ministries/ agencies) or private projects using BIM	15% of government (other ministries/ agencies) and private projects using BIM	30% of government (other ministries/ agencies) and private projects using BIM	

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
1.3. Implementation of Sustainable Construction Principles	Meeting Sustainable Construction criteria ensures: • Reduction in construction waste generation • Increase in construction waste that is recycled, refurbished, and repurposed • More efficient use of water, energy, and materials	1.3.a. Number of constructions meeting Sustainable Construction criteria	Sustainable Construction has not yet become a mandatory requirement for government infrastructure development and public-private partnerships (KPBU)	Baseline study of the number of projects meeting Sustainable Construction criteria				National Development Planning Agency, Ministry of Finance, Ministry of Public Works and Public Housing, Ministry of State-Owned Enterprises

STRATEGY 2 – Utilization of Waste and/or Residual Construction and Demolition Materials

Government Regulation No. 27 of 2020 specifies that demolition debris falls under the category of regulated specific waste. However, construction waste is not only generated from demolition but also from raw material production, construction, maintenance, and deconstruction. This strategy aims to encourage comprehensive regulations on construction waste management, including the documentation and utilization of construction waste by all construction stakeholders.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
2.1. Development of Regulations on the Management of Waste and/or Residual Construction and Demolition Debris (Hazardous and Non-Hazardous)	The establishment of regulations for the management of waste and/or residual construction and demolition debris (hazardous and non-hazardous) can lead to: • A reduction in the generation of construction waste • An increase in the recycling, refurbishment, and repurposing of construction waste • More efficient use of water, energy, and materials • A decrease in greenhouse gas emissions	2.1.a. Availability of regulations for the management of waste and/or residual construction and demolition debris (hazardous and non-hazardous)	• Currently, there are no regulations specifically for the management of waste and/or residual construction and demolition debris (hazardous and non-hazardous) • The management of building demolition debris is regulated under PP 27/2020 and PermenPUPR 18/2021	Regulatory framework review for the management of waste and/or residual construction and demolition debris (hazardous and non-hazardous) Issuance of 1 National Regulation				Ministry of Public Works and Public Housing, Ministry of Environment and Forestry
2.2. Management of Waste and/or Residual Construction and Demolition Debris (Hazardous and Non-Hazardous)	Effective management of waste and/or residual construction and demolition debris (hazardous and non-hazardous) can contribute to: • A reduction in the amount of construction waste sent to TPAs • An increase in the recycling, refurbishment, and repurposing of construction waste • More efficient use of water, energy, and materials • A decrease in greenhouse gas emissions	2.2.a. Percentage of waste and/or residual construction and demolition debris (hazardous and non-hazardous) managed and utilized by the government and private sector (repurposing, refurbishment, and recycling)	Collection rate: 95% Repurposing rate: 40% Recycling rate: 25% Data source: survey of 8 stakeholders in the construction sector (primarily contractors)	Comprehensive baseline study on the utilization and recycling of waste and/or residual construction and demolition debris (hazardous and non-hazardous)	50% recycling rate in government construction projects and large private contractors	70% recycling rate pada proyek konstruksi pemerintah dan kontraktor swasta besar	90% recycling rate in government construction projects and large private contractors	Ministry of Public Works and Public Housing, Ministry of Environment and Forestry, Ministry of State-Owned Enterprises

STRATEGY 3 – Use of Environmentally Friendly Products & Materials and Implementation of Green Buildings

Resource and energy efficiency in circular economy of the construction sector is achieved through the use of environmentally friendly and certified materials. Meanwhile, emissions reduction can be enhanced by optimizing the use of energy, water, and materials, as outlined in sustainability reports. The adoption of net zero or low carbon building concepts for buildings and structures is also a strategic step. These efforts can encourage construction actors to obtain certification from the Green Rating System, as evidence that they have taken measures to reduce construction waste, achieve water, energy, and material efficiency, and reduce greenhouse gas (GRK) emissions.

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
3.1. Implementation of Environmentally Labeled Products in Construction Projects	The implementation of environmentally labeled products in construction projects can contribute to: • More efficient use of water, energy, and materials • A reduction in greenhouse gas emissions	3.1.a. Number of environmentally certified products (Type I, II, III, and/ or others) available on the market	The total number of environmentally labeled products is 15, consisting of: • 8 products with eco-label certification (5 sheet glass products and 3 ready-mix mortar/ concrete products) • 9 products with Environmental Product Declaration (EPD) certification Source: Ministry of Environment and Forestry (2023), EPD Southeast Asia (2023), Accessed in EPD List | EPD Southeast Asia (epd-southeastasia.com)	10 Products (cement, fine and coarse aggregates, iron, and precast concrete)	15 Products (asphalt and structural fillers)	20 Products used in large volumes in construction	25 Products used in large volumes in construction	Ministry of Environment and Forestry, Ministry of Public Works and Public Housing, Ministry of Transportation, Subnational Governments
		3.1.b. % of minimum criteria for environmentally labeled products used in projects Note: Can be integrated into the Sustainable Construction criteria	There are currently no minimum percentage criteria for the use of environmentally labeled products in projects	Establish minimum criteria for the use of environmentally labeled products in projects under the Sustainable Construction criteria	10% of project products	15% of project products	25% of project products	
		3.1.c. % of environmentally labeled construction products listed in National Public Procurement Agency Construction Catalog	No information is available on environmentally labeled products in the Government Public Procurement Agency's catalog	Introduce regulations related to the use of environmentally labeled products in National Public Procurement Agency	20% of environmentally labeled construction products listed in National Public Procurement Agency Construction Catalog	30% of environmentally labeled construction products listed in National Public Procurement Agency Construction Catalog	50% of environmentally labeled construction products listed in National Public Procurement Agency Construction Catalog	

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
3.2. Implementation of Green Standards for Construction Materials	The adoption of green-certified construction material industries can support: • More efficient use of water, energy, and materials • A reduction in greenhouse gas emissions	3.2.a Number of Green Industry Standards (SIH) in the construction sector	10 Green Industry Standards across 6 Indonesia Standard Industrial Classification (KBLI) categories: • The total number of categories within KBLI 4663 (Wholesale Trade of Building Materials and Supplies) is 9 categories. • 4 products are under the development of SIH: Cement (review), glass (review), sheet steel, and profile/ pipeline steel.	50% SIH compliance for products within KBLI 46631 (metal goods for construction) or 46634 (cement, lime, sand, and stone)	100% SIH compliance for products within Indonesia Standard Industrial Classification (KBLI) 46631 (metal goods for construction) or 46634 (cement, lime, sand, and stone)	50% SIH compliance for products within Indonesia Standard Industrial Classification (KBLI) 46632 (glass), 46633 (tiles, bricks, tiles, and similar products), and/or 46636 (wood)	100% SIH compliance for products within Indonesia Standard Industrial Classification (KBLI) 46632 (glass), 46633 (tiles, bricks, tiles, and similar products), and/or 46636 (wood) and 50% compliance for other KBLI categories (paint, porcelain, etc.)	Ministry of Industry, Ministry of State-Owned Enterprises, National Research and Innovation Agency
		3.2.b. Number of construction material producers certified with SIH	In general, there are 44 producers certified with SIH (including construction material producers).	100 certified producers of construction materials with SIH	150 certified producers of construction materials with SIH	200 certified producers of construction materials with SIH	All companies listed by the Ministry of Industry	
		3.2.c. Number of research studies related to sustainable construction materials	N/A	2 research studies per year (total of 8 studies)	2 research studies per year (total of 8 studies)	2 research studies per year (total of 8 studies)	2 research studies per year (total of 8 studies)	
3.3. Optimization of Energy, Water, and Material Use in Carbon-Intensive and Non-Carbon-Intensive Materials	Optimizing the use of energy, water, and materials can support: • More efficient use of water, energy, and materials • A reduction in greenhouse gas emissions	3.3.a. Energy intensity used in the production of construction materials	Carbon-Intensive Products: • Iron and Steel: 3.13 GJ/ton (PT. Gunung Raja Paksi, Tbk, 2023) • Cement: 2.81 GJ/ton (PT. Semen Indonesia Tbk, 2023) Non-Carbon-Intensive Products: • Plywood: 8.79 GJ/m³ (PT. Indonesia Fibreboard Industry Tbk, 2023) • Paint: 1.09 GJ/ton (PT. Avia Avian Tbk, 2023)	• Baseline studies and targets related to energy intensity for all construction materials • 100 producers meeting the energy intensity limits according to standards				Ministry of Industry, Ministry of Energy and Mineral Resources, Ministry of Environment and Forestry
		3.3.b. Water intensity used in the production of construction materials	Carbon-Intensive Products: • Iron and Steel:0.95 m³/ton • Cement: 0.23 m³/ton Non-Carbon-Intensive Products: • Plywood:4.18 m³/ton • Paint: 0.64 m³/ton *(Data sources same as energy intensity baseline)*	• Baseline studies and targets related to water intensity for all construction materials • 100 producers meeting the water intensity limits according to standards				

Action Plan	Objectives	Indicators	Baseline Data	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
		3.3.c. Content of recycled or alternative materials used in the production of construction materials	Carbon-Intensive Products: • Iron and Steel: 77% or 0.71 kg/ton • Cement: 8% or 50.35 kg/ton *(Sumber data sama dengan baseline intensitas energi)*	Baseline studies on recycled material content in all construction materials	10% recycled material content in all construction materials	30% recycled material content in all construction materials	50% recycled material content in all construction materials	Ministry of Industry, Ministry of Energy and Mineral Resources, Ministry of Environment and Forestry
		3.3.d. Availability of data on energy intensity, water intensity, and recycled material content in construction materials	Currently, there is no integrated and publicly accessible data	Data collection on energy intensity, water intensity, and recycled material content in construction materials				
3.4. Implementation of Net Zero or Low Carbon Buildings	The establishment of net zero or low carbon buildings can support: • More efficient use of water, energy, and materials • Reduction in greenhouse gas emissions	3.4.a. Area of buildings certified under the Green Rating System* in the implementation of zero or low carbon buildings **EDGE or other certifications that include embedded carbon*	Total area of net zero and low carbon buildings: 891,326 m^2 0.024% of the 3.717 billion m^2 total building area in Indonesia in 2023 (Directorate General of New, Renewable Energy and Energy Conservation, Ministry of Energy and Mineral Resources), with details: • 2,432 m^2 (EDGE - Net Zero Carbon) • 888,894 m^2 (Low Carbon – EDGE Advanced and Regular Certification)	1.115.190 m^2 (0,03%)	1.858.650 m^2 (0,05%)	2.602.110 m^2 (0,07%)	3.717.300 m^2 (0,10%)	Ministry of Public Works and Public Housing, GBCI
3.5. Implementation of Green Rating System for Construction Projects	The implementation of a Green Rating System for Sustainable Construction in construction projects can support: • Slowing the deterioration of buildings/ infrastructure • More efficient use of water, energy, and materials • Reduction of greenhouse gas emissions	3.5.a. Area of new and existing buildings that have received certification from the Green Rating System* **Note:* *This includes Greenship, BGH, or other certifications*	Total certified building area under the Green Rating System (GBCI andMinistry of Public Works and Public Housing): 240,321 m^2 0.06% of the total 3.717 billion m^2 of building area in Indonesia in 2023 (Ministry of Energy and Mineral Resources)	3.717.300 m^2 (0,1%)	18.586.501 m^2 (0,5%)	37.173.002 m^2 (1%)	185.865.011 m^2 (5%)	Ministry of Public Works and Public Housing, Ministry of State-Owned Enterprises, GBCI
		3.5.b. Availability of integrated data on the implementation of the Green Rating System	There is no integrated data collection yet from the implementation of the Green Rating System by theMinistry of Public Works and Public Housing (BGH), GBCI (Greenship), and other certifications (Ministry of Energy and Mineral Resources). Integrated data collection on the implementation of the Green Rating System is needed	Integrated data collection on the implementation of the Green Rating System				

Textile Sector



Existing Condition of Circularity in Textile Sector

The textile sector contributed 1.3% to Indonesia's GDP in 2019[42]. In 2023, circular economy in the textile sector achieved a circular material input rate of 2% and a recycling rate of 12%. Currently, the Durability Rate in the textile sector cannot be measured due to limitations in data and methodology.

Policy Directives	Key Indicators	Baseline
Reduction in Resource Use	Circular Input Rate	2%
Extension of Product and Material Use	Usage Rate	-
Enhancement of Recycling and Utilization of Post-Production and Consumption Waste	Recycling Rate	12%

The implementation of a circular economy in Indonesia's textile sector faces several challenges, including:

1 Limited demand for sustainable textile

The low demand for sustainable textile products has hindered industry efforts to transition to circular economy-based textiles. To date, several textile companies in Indonesia, such as PT Pan Brothers and PT Asia Pacific Rayon, have conducted trials using 10-20% recycled materials in the production of more environmentally friendly textiles. Government support through the procurement of goods and services for eco-friendly textile products, facilitated by the National Public Procurement Agency (LKPP), can increase industry interest and motivation to shift toward more sustainable production. The phased increase in the percentage of circular materials used in textile products should be accompanied by efforts to condition the market for consuming circular textile products.

[42] BPS, 2019.

2 Inadequate textile waste management ecosystem

The absence of a comprehensive textile waste management ecosystem involving all stakeholders in the textile value chain is a significant barrier to developing circular economy practices in this industry. According to the SIPSN data, post-consumer textile waste is estimated to reach approximately 462,000 tons, or about 2.6% of the total waste generated in Indonesia, and this figure will continue to rise without structured interventions. Without an integrated system—from raw material producers, processors, and distributors, to consumers and waste processors—it is challenging to create an effective closed-loop system for recycling and reusing existing resources. This situation not only hampers the implementation of reduction, reuse, and recycling concepts but also slows progress toward the circular economy agenda. Collaboration between the government, industry, and civil society is needed to establish the necessary infrastructure and promote policies that support these efforts, thereby improving the effectiveness of textile waste management and advancing circular economy initiatives within the textile industry.

3 Limited national data on circular economy practices in the textile sector

The scarcity of national information and data reflecting circular economy practices within the textile sector hinders the understanding and measurement of the progress and effectiveness of implemented initiatives. The absence of detailed and integrated information on resource usage, waste management, and the application of recycling strategies in the textile industry complicates the development of appropriate policies and programs that could enhance the involvement of all stakeholders within the textile value chain. Currently, data related to circular economy activities in the textile sector are dispersed across various institutions, with differing data standards and measurement processes.

4 Variations in industry scale across the textile value chain (upstream-downstream) pose challenges for formulating and implementing circular economy policies

In the upstream sector, the textile industry is divided into 43 fiber manufacturing industries and 294 spinning industries. In the midstream sector (weaving, knitting, dyeing, printing, and finishing), the industry consists of 1,540 large and medium-sized industries (IBS) and around 130,000 micro and small industries (IMK). The downstream sector includes 2,995 IBS and approximately 407,000 IMK in the garment industry, as well as 765 industries in other textile sectors.

The principles of circular economy have begun to be applied in Indonesia's textile industry through the concepts of reuse, repurpose, recycle, and recovery, but these efforts are voluntary and limited to pilot projects, resulting in minimal impact on emission reduction and resource efficiency. Currently, 88% of post-consumer textile waste ends up in Final Disposal Sites or is incinerated, with only 12% being recycled. If this trend continues, textile waste is expected to increase to 3.5 million tons by 2030.

Similarly, the management of pre-consumer textile waste within the industry has not been adequately addressed. This issue is influenced by the aging production machinery in Indonesia's textile industry, which has begun to show reduced efficiency and effectiveness in resource usage. For example, the garment industry generates an average of 10-20% pre-consumer waste. Only a small portion of this waste is utilized by third parties for reuse as raw materials or as fuel for production processes under the Waste to Energy (WTE) principle.

Green Industry Standards (SIH) related to the textile sector have been established through Minister of Industry Regulation No. 37 on Green Industry Standards for the Weaving Industry Using Power Looms, and Minister of Industry Regulation No. 40 of 2022 on Green Industry Standards for the Textile Finishing and Textile Printing Industries. However, these policies still require further enhancement, as by 2023, only eight industries have registered to obtain SIH.

On the other hand, awareness of sustainable textile products is growing, as evidenced by the emergence of startups innovating with environmentally friendly products. The circular economy in the textile sector has the potential to contribute IDR 19.3 trillion or 5.5% of the sector's GDP by 2030. Therefore, the development of a circular economy business ecosystem that supports collaboration within the textile value chain is crucial for the future of this industry.

Some policies related to sustainable construction principles in the textile sector include:



Figure 3.18 Policies relevant to circular economy in the electronics sector

Transition from Linear to Circular in the Textile Sector

In a linear value chain, all raw materials and products eventually end up in TPAs, contributing to environmental pollution. Textile waste that ends up in disposal sites can be reduced by recycling it into new products or converting it into value-added products. This waste management approach is known as cradle to cradle (C2C) or a closed-loop circular economy approach. This method serves as an alternative to the traditional open-loop approach (production, use, and disposal), helping to keep resources in use for as long as possible, extracting maximum value for reuse, and then recycling and recovering products and materials at the end of their lifecycle. The principle of transitioning from a linear to a circular economy is illustrated in **Figure 3.19**.

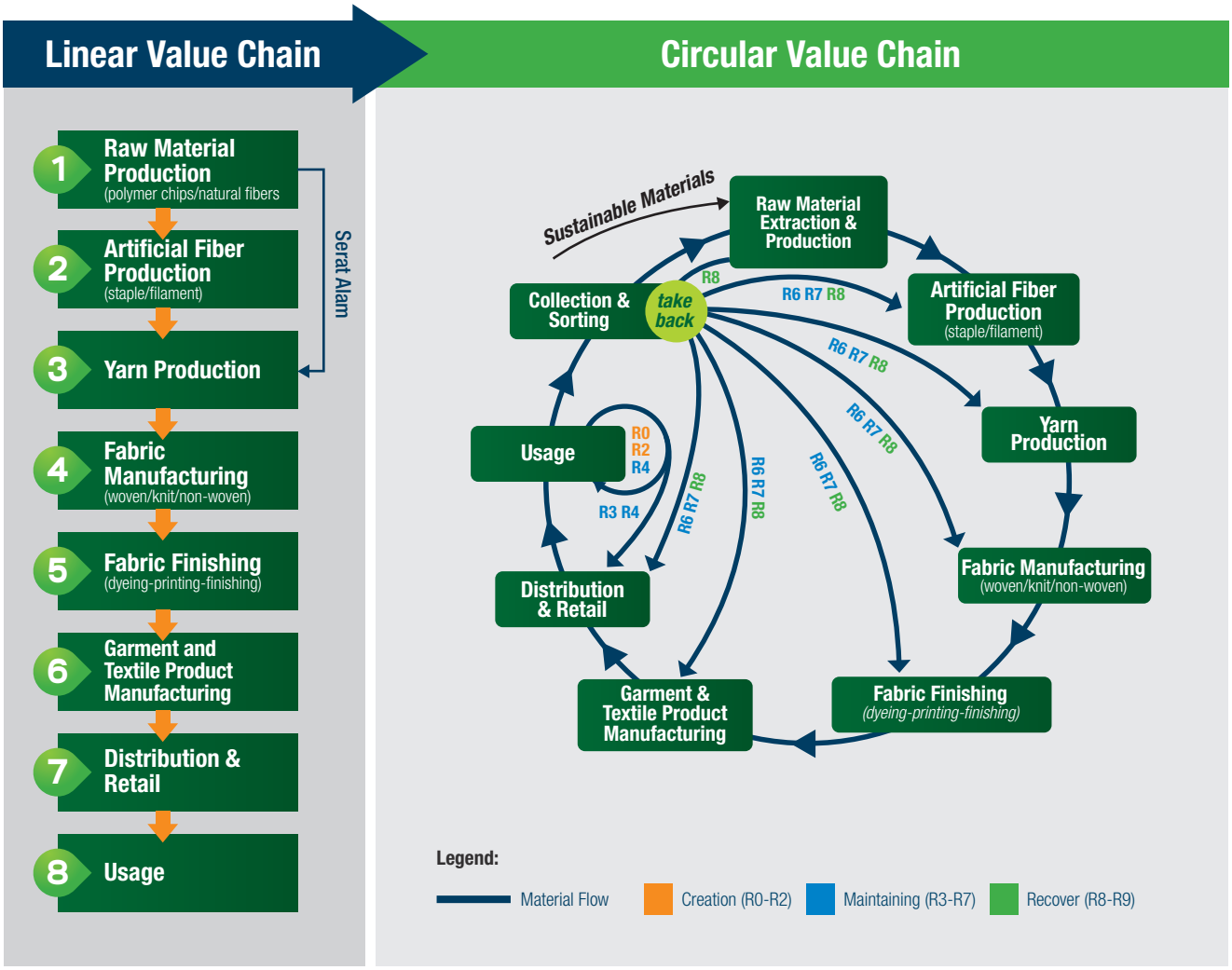
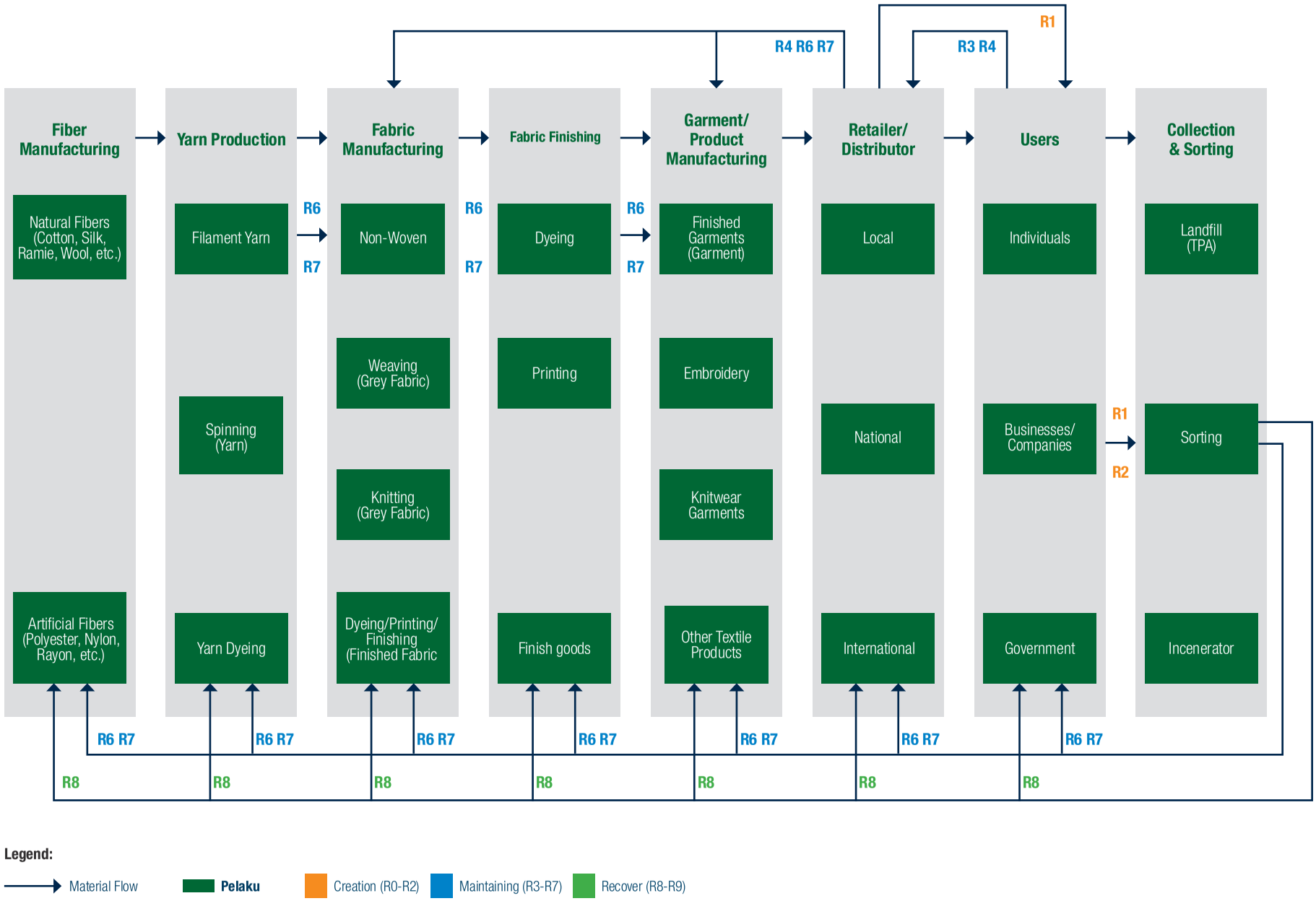


Figure 3.19 Comparison of Linear and Circular Value Chains in the Textile Sector

Circular Economy Ecosystem in the Textile Sector

In a circular economy ecosystem, the actors within the textile sector's value chain can be classified into eight main groups: fiber producers, yarn manufacturers, fabric makers, fabric finishers, garment and finished goods manufacturers, retailers, consumers, and waste collection and recovery entities. The ideal condition for the textile sector's ecosystem is expected to include activities that extend the lifespan of products and materials (R3, R4, R5, R6, R7), as well as the recycling and utilization of production and consumption residues (R8 and R9) that are integrated within each main group. Circular economy ecosystem in the textile sector can operate effectively if the processes of waste collection and sorting, both pre- and post-consumption, are well-executed. Therefore, the presence of facilities or infrastructure, such as sorting and processing centers, becomes a fundamental component in advancing the circular economy agenda within the textile sector. Developing these facilities enables the systematic and efficient separation and processing of textile waste, considering the high diversity of textile products and industry players in Indonesia.



Legend:

Material Flow | **Pelaku** | Creation (R0-R2) | Maintaining (R3-R7) | Recover (R8-R9)

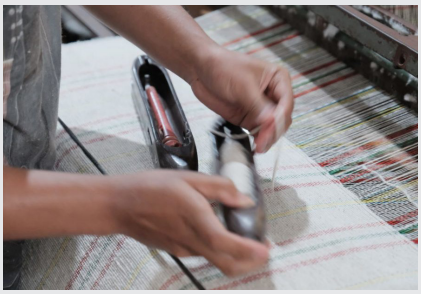
Figure 3.20 Circular Economy Ecosystem in the Textile Sector

Box 3.11 Best Practices in Implementing Circular Economy in the Textile Sector

Pable

Pable is a circular business focused on textile-to-textile recycling, specializing in the collection of textile waste to be recycled into recycled fabric, which serves as raw material for garment production. Pable sorts fabric waste by color, thereby avoiding the dyeing process and excessive water usage. This approach not only reduces textile waste but also conserves natural resources, making Pable a tangible example of applying circular economy principles in the textile industry.

The recycled raw materials used by Pable are sourced from various channels, including manufacturing fabric scraps, post-consumer waste dropboxes, and retired uniform management programs. By collecting and recycling this textile waste, Pable not only decreases the amount of waste that ends up in final disposal sites but also adds value to the waste by creating new economically valuable products. This initiative reflects Pable's commitment to sustainability and environmental responsibility within the textile industry.



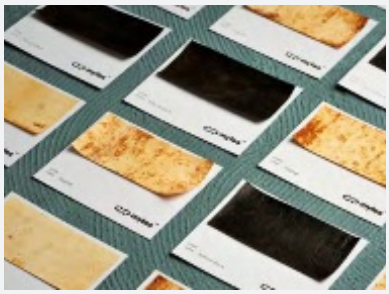
Application of 9R

Rethink (R1), Reduce (R2), Recycle (R8)

MYCL

MYCL is a circular start-up focused on providing eco-friendly alternative raw materials. They utilize materials from renewable energy sources or recyclable materials to produce sustainable products. By processing agricultural waste such as empty oil palm bunches, wood dust, and sugarcane bagasse fibers, MYCL creates alternative textile materials that not only reduce waste but also lessen the dependence on non-renewable natural resources.

MYCL's production process involves the use of basidiomycete fungi as a binding agent, transforming agricultural waste into strong and durable textile materials. This innovation enables MYCL to offer sustainable and environmentally friendly raw material solutions to the textile industry. With a focus on circularity and sustainability, MYCL not only helps reduce the carbon footprint of the textile industry but also promotes more responsible and innovative production practices.



Application of 9R

Reduce (R2), Repurpose (R7), Recycle (R8)

SUPERBTEX

PT. Superbtex processes textile waste into insulation materials for the automotive and construction industries.

The company, established in 1973, began focusing on textile waste processing in 2010. Initially working with pre-consumer waste, PT. Superbtex expanded to collect post-consumer waste with the help of communities and non-governmental organizations.

By maintaining the quality of its recycled products, PT. Superbtex has managed to sustain and compete with conventional products.



Application of 9R

Repurpose (R7)

Sumber: National Development Planning Agency Field Visit with Pable. 2024. National Development Planning Agency. 2022. The Future is Circular: Langkah Nyatalnisiatif Ekonomi Sirkular di Indonesia.Accessed in https://lcdi-indonesia.id/wp-content/uploads/2022/08/The-Future-is-Circular.pdf Superbtex. 2024. Accessed in https://www.superbtex.com

Box 3.12 **Implementation of Circular Textile Policies in Other Countries**

Extended Producer Responsibility (EPR) Policy for Textiles in the Netherlands[43]

In July 2023, the Netherlands established an Extended Producer Responsibility (EPR) scheme for the textile sector, which outlines the responsibilities of producers and importers in managing the lifecycle of their textile products. This scheme requires producers and importers to set up systems for reuse and recycling, as well as manage and finance separate collection systems for textile waste. Under this scheme, producers and importers are fully accountable for the management of the textile waste they generate, from the production stage to final disposal.

Producers and importers are also required to report their production volumes, the collection schemes they have implemented, the targets they aim to achieve, and the financial aspects related to textile waste management to the UPV Textile Foundation, an organization that facilitates stakeholders in the transition to circularity. This reporting ensures transparency and accountability in the implementation of the EPR scheme. Through this policy, the Netherlands aims to increase the rates of textile reuse and recycling, reduce the amount of waste sent to final disposal sites, and promote more sustainable production practices within the textile industry.



[43] https://www.stichtingupvtextiel.nl/en/implementatie/

Phases of Circular Economy in the Textile Sector

The phased transition to a circular economy in the textile sector aims to reduce environmental impact by minimizing textile waste through the use of appropriate industry practices, restructuring textile industry machinery, increasing consumer awareness, and implementing the Extended Producer Responsibility (EPR) concept. The phases of this transition are outlined in **Figure 3.21**

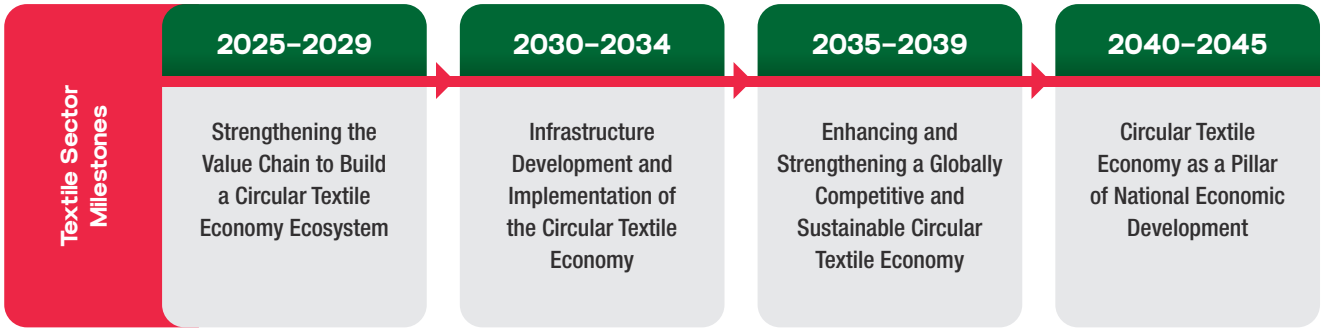


Figure 3.21 Circular Textile Economy Roadmap Indonesia 2025-2045

During the first phase, strengthening the value chain will focus on building a circular economy ecosystem in the textile sector. This includes the formulation of EPR regulations and the development of collaboration schemes among stakeholders. The second phase will prioritize the development of infrastructure and the implementation of circular economy within the textile sector. This includes the adoption of zero-waste technology in most garment industries, enforcement of Green Industry Standards (SIH), incorporation of recycled content, eco-design, eco-labeling, machinery restructuring, utilization of new and renewable energy (EBT), and enhancement of research and development in textile industry technologies. Following this, the goal is to enhance and strengthen a globally competitive and sustainable circular economy in the textile sector. In the final phase, the textile sector, having fully implemented circular principles, can become a key pillar of national economic development.

The implementation of circular economy principles in Indonesia's textile sector is projected to generate a net economic impact of IDR 19.3 trillion, or 5.5% of the sector's GDP by 2030. The adoption of these principles in the textile industry is also expected to create an additional 164,000 jobs by 2030, with 89% of these positions being filled by women. Moreover, circular economy is anticipated to support the reduction of emissions by up to 16.4 million tons of CO_2e and save 1.2 billion cubic meters of water compared to the Business As Usual (BAU) scenario in 2030.[44]

Strategy & Action Plan for Circular Economy in the Textile Sector

Circular economy roadmap for the textile sector consists of **4 strategies and 13 action plans**, each equipped with supporting indicators, baseline data, and phased milestones based on the targets for each period. The strategies for circular economy in the textile sector are as follows:

STRATEGY 1

Development of Infrastructure and Strengthening of the National Circular Economy Ecosystem for Textiles and Implementation of EPR Policies for Textile Products

STRATEGY 2

Reduction of Textile Waste

STRATEGY 3

Enhancement of Resource Efficiency in Textile Production Processes

[44] Bappenas. 2021. Buku Manfaat Ekonomi, Sosial, dan Lingkungan Ekonomi Sirkular di Indonesia. Accessed in https://lcdi-indonesia.id/wp-content/uploads/2021/09/The-Economic-Bahasa_.pdf

Table 3.5 National Strategy and Action Plan for Circular Economy in the Textile Sector

STRATEGY 1: Development of Infrastructure and Strengthening of the National Circular Economy Ecosystem for Textiles and Implementation of EPR Policies for Textile Products

Strategy 1 focuses on developing a circular textile ecosystem through EPR regulations, fostering industry collaboration, and providing infrastructure for textile waste collection. General policies on EPR in Indonesia can be found in Law No. 18 of 2008 on Waste Management, Government Regulation No. 81 of 2012 on Household Waste and Similar Household Waste, Presidential Regulation No. 97 of 2017 on the National Household Waste and Similar Household Waste Management Strategy, and Ministerial Regulation No. 75 of 2019 on the Waste Reduction Roadmap. Currently, Indonesia does not have specific regulations and technical directives governing textile products.

Action Plan	Objectives	Supporting Indicators	Baseline Data (Data 2023)	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
1.1. Implementation of EPR for brands and/or priority industries	1. Increase the number of brands and/or priority industries implementing EPR 2. Reduce the use of new (virgin) materials and non-renewable resources 3. Decrease textile waste generation	1.1.a.Availability of policies and regulations, along with cross-ministerial technical directives on EPR specifically for the textile sector	N/A* **Regulations related to Textile EPR*	Government Regulation for the Implementation of Textile EPR Established				Ministry of Industry, Ministry of Environment and Forestry, Ministry of Trade
		1.1.b. Availability of implementing regulations/ technical directives on textile EPR for upstream and downstream sectors	N/A* **Brands that have implemented EPR*		Technical Directive for the Implementation of Textile EPR for Companies and/ or Brands			
		1.1.c. Number of local and global brands associated with companies in Indonesia that implement EPR	N/A* **Local and global brands that have implemented EPR* *Note:* *APR began a pilot project for the use of Recycled VSF for raw material production in 2023*	0	0	5	10	
1.2. Development of collaboration models/ schemes between the textile industry, distributors, and resellers to foster a textile product reuse ecosystem	1. Reduce the use of new (virgin) materials and non-renewable resources 2. Increase the ratio of recycled materials used in textile production 3. Extend the lifespan of textile and fashion products	1.2.a. Number of pilot projects or business partnerships realized within the ecosystem	N/A	5 pilot projects implemented	10 partnerships implemented	15 partnerships implemented	20 partnerships implemented	Coordinating Ministry for Economic Affairs, Ministry of Industry, Ministry of Environment and Forestry, Ministry of Trade

Action Plan	Objectives	Supporting Indicators	Baseline Data (Data 2023)	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
1.3. Provision of infrastructure for the collection and recycling of textile waste	1. Enhance the capacity for post-consumer textile waste (clothing and non-clothing) recycling and reuse 2. Increase the amount of post-consumer textile waste that is recycled and reused	1.3.a. Number of collecting points and textile waste processing units (sorting, selecting, and separating)	APR: 3 locations in collaboration with Matahari, 1 location with Uniqlo, 1 location with Shell in collaboration with Ecotouch (Potential: Matahari 155 stores, 209 Shell gas stations, 64 Uniqlo stores)	100 collecting point units	200 collecting point units	300 collecting point units	400 collecting point units	Ministry of Environment and Forestry, Ministry of Industry, Ministry of Trade, Environmental Agency (Subnational Government) Kemendagri, Subnational Environmental Agency
		1.3.b. Number of textile waste processing centers	N/A* **Centralized management*	2 management centers	4 management centers	6 management centers	8 management centers	
		1.3.c. Percentage of waste processed for recycling, reuse, repurposing	Total waste generated in Indonesia in 2023: 17.7 million tons (2.6% fabric = 462 thousand tons) 12% of textile waste recycled	10% of textile waste can be used as raw material for production	20% timbulan limbah tekstil dapat digunakan kembali	30% timbulan limbah tekstil dapat digunakan kembali	40% timbulan limbah tekstil dapat digunakan kembali	
1.4 Strengthening and integrating circular economy-based startups and/or textile MSMEs within the textile circular economy ecosystem	Build and strengthen circular economy-based businesses	1.4.a Number of startups and MSMEs (reuse, repurpose, recycle) integrated into the textile circular economy ecosystem	N/A* **Number of textile businesses and MSMEs based on circular economy*	20% of textile waste can be used as raw material for production	10% growth in the number of textile businesses based on circular economy	15% growth in the number of textile businesses based on circular economy	20% growth in the number of textile businesses based on circular economy	Ministry of Industry, Ministry of Cooperatives, Ministry of Trade
		1.4.b. Number of products reused, repurposed, recycled	Note: The potential of CE to generate a net economic impact of IDR 19.3 trillion, or 5.5% of the sector's GDP by 2030	30% of textile waste can be used as raw material for production	40% of textile waste can be used as raw material for production	10% increase in the number of circular-based textile products	15% increase in the number of circular-based textile products	
		1.4.c. Percentage of economic contribution to GDP	TPT contribution: 0.98%	0.2% growth in the economic contribution of circular-based textile companies	0.4% growth in the economic contribution of circular-based textile companies	0.6% growth in the economic contribution of circular-based textile companies	0.8% growth in the economic contribution of circular-based textile companies	

STRATEGY 2: Reduction of Textile Waste

Through Ministerial Regulations No. 37 and 40 of 2022 related to SIH, the Government indirectly mandates the reuse of pre-consumer and post-consumer textile waste, as well as efficiency in the use of raw materials, energy, and water. Unfortunately, the implementation of SIH remains voluntary, so the process of waste reduction across the textile value chain still requires policy support and incentives in various forms.

Action Plan	Objectives	Supporting Indicators	Baseline Data (Data 2023)	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
2.1. Implementation of Zero Waste Technology in the Garment Industry	Pre-consumer textile waste generation decreases	2.1.a. Percentage of garment companies (Large, Medium, Small based on Ministry of Industry data) that use Computer-Aided Design (CAD) and other zero waste cutting systems	N/A* *2,995 Large and Medium Industries and approximately 407,000 Small Industries*	15% of Large Industries	25% of Large Industries, 10% of Medium Industries	50% of Large Industries, 15% of Medium Industries, 10% of Small Industries	75% of Large Industries, 15% of Medium Industries, 15% of Small Industries	Ministry of Industry
		2.1.b. Percentage of small industries with access to CAD and	N/A* **data on small industries with access to CAD and other zero waste technologies*	15% of the total registered industries	25% of the total registered industries	50% of the total registered industries	75% of the total registered industries	
		2.1.c. Percentage of waste generation	N/A* **Garment industry waste averages 10-20%[2]*	Average textile waste percentage: 15% of total production	Average textile waste percentage: 10% of total production	Average textile waste percentage: 5% of total production	Average textile waste percentage: 2% of total production	
2.2. Enforcement of Green Industry Certification (SIH) in the Textile Industry	1. Greenhouse Gas (GRK) emissions and water usage decrease 2. Efficiency in water, energy, and material usage increases 3. Textile waste generation decreases 4. The ratio of recycled content in textile production increasest	2.2.a. Number of companies that meet and receive the Green Industry Certificate	Ministry of Industry data: 8 companies registered for Green Industry Certification in 2023. Green Industry Certification targets a minimum raw material usage ratio of 93%, so the maximum waste can be assumed to be 7%	40 companies implement Green Industry Certification (10 companies/year)	80 companies implement Green Industry Certification (10 companies/ year)	120 companies implement Green Industry Certification (10 companies/ year)	160 companies implement Green Industry Certification (10 companies/ year)	Ministry of Industry
2.3. Increase in Recycled Content in the Textile Industry	1. Textile waste generation decreases 2. The ratio of recycled content in textile production increases	2.3.a. Number of textile waste reused (recycled content)	• The use of Recycled VSF at APR is still in the R&D stage and there is no baseline data available • Pan Brothers uses sustainable materials up to 18.4%	Average recycled content: 10%	Average recycled content: 15%	Average recycled content: 20%	Average recycled content: 25%	Ministry of Environment and Forestry, Ministry of Industry
2.4. Application of Eco-design in Textile Products	1. GHG emissions and water usage decrease 2. Textile waste generation decreases	2.4.a. Product lifespan increases	• Product lifespan (product durability/ longevity) = 2.6 years[3] • *Lifespan can reach 5.2 years[3]* *N/A traceability data for textile products in Indonesia*	3.5 years	6 years	8 years	10 years	Ministry of Industry, Ministry of Tourism and Creative Economy
		2.4.b. Technical lifespan or durability increases		7 years	12 years	16 years	20 years	
		2.4.c. Percentage of products with manufacturing date information (traceability)		Baseline study on data and potential products that can apply eco-design standards in Indonesia				

STRATEGY 3: Enhancement of Resource Efficiency in Textile Production Processes

Most production machinery in the textile industry is outdated and requires renewal and revitalization. This presents a significant challenge in applying circular economy principles to the textile sector, as it affects the performance of each machine and the effectiveness and efficiency of raw material, energy, and water use. This strategy aims to emphasize efforts to promote resource efficiency throughout the textile industry's value chain, which is closely linked to the high consumption of energy and water.

Action Plan	Objectives	Supporting Indicators	Baseline Data (Data 2023)	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
3.1. Standardization of eco-design for textile products, including material types, ease of recycling, material substitution, etc.	1. The use of new (virgin) materials and non-renewable resources decreases 2. The ratio of recycled materials used in textile production increases	3.1.a. Availability of eco-design standards for the textile industry	• At least 20 companies in Indonesia have obtained OEKO-TEX® certification (Textile FGD, 2023) • SIH requires the use of 2% recycled materials, 1% renewable energy, and 1-2.5% recycled water	Ecodesign standards available				Ministry of Industry, National Standardization Agency, National Research and Innovation Agency
		3.1.b. Number of textile industries implementing eco-design standards		5% of textile companies/ industries registered with the Ministry of Industry	10% of textile companies/ industries registered with the Ministry of Industry	15% of textile companies/ industries registered with the Ministry of Industry	20% of textile companies/ industries registered with the Ministry of Industry	
		3.1.c. Percentage of textile products that meet eco-label standards	N/A* **Ecolabel standard products*		5% of total products meet ecolabel standards	10% of total products meet ecolabel standards	15% of total products meet ecolabel standards	
3.2. Development and implementation of industry standards (eco-labels) incorporating eco-design principles	1. The use of new (virgin) materials and non-renewable resources decreases 2. The ratio of recycled materials used in textile production increases	3.2.a. Number of eco-label standards with eco-design principles for textile products	N/A standards being developed Note: SNI 7188.4:2019: Ecolabel Criteria – Part 4: Textile and Textile Product Categories is already available as a reference, although the substance does not yet fully	2	4	6	8	Ministry of Environment and Forestry, National Standardization Agency, Ministry of Industry, Ministry of Trade
		3.2.b. Number of eco-label standards related to durability information		2	4	6	8	
3.3. Restructuring of textile dyeing and finishing machinery	1. Greenhouse gas (GRK) emissions decrease 2. Water consumption decreases	3.3.a. Number of companies implementing restructuring programs	8 companies participated in the machinery restructuring program in 2021, achieving an average energy efficiency of 16.7%[1] From 6 large companies, the average energy use is 28.4 GJ/ton of product, and water consumption is 73.7 m³/ton of product	10 companies implement machinery restructuring	20 companies implement machinery restructuring	30 companies implement machinery restructuring	40 companies implement machinery restructuring	Ministry of Industry, Bappenas, Ministry of Environment and Forestry
		3.3.b. Reduction in energy consumption		Energy usage reduced by 30%	Energy usage reduced by 40%	Energy usage reduced by 50%	Energy usage reduced by 60%	
		3.3.c. Reduction in new (fresh) water consumption		Freshwater usage reduced by 20%	Freshwater usage reduced by 30%	Freshwater usage reduced by 40%	Freshwater usage reduced by 50%	

Action Plan	Objectives	Supporting Indicators	Baseline Data (Data 2023)	Milestones				K/L
				2025-2029	2030-2034	2035-2039	2040-2045	
3.4. Acceleration of the use of renewable energy (RE) for the textile industry	GHG emissions decrease	3.4.a. Percentage of renewable energy usage	Permenperin No. 40 and No. 37 of 2022 require at least 1% use of renewable energy for the textile industry By 2025, Kahatex aims to achieve 90% biomass usage and 12% renewable electricity, while Pan Brothers targets a 16% energy efficiency improvement from solar panels. The CO_2 emission intensity is projected at 1.49 tons of CO_2 per ton of woven/knitted fabric, and 6.33 tons of CO_2 per ton of finished fabric	At least 5% renewable energy mix in the textile industry	At least 10% renewable energy mix in the textile industry	At least 15% renewable energy mix in the textile industry	At least 20% renewable energy mix in the textile industry	Ministry of Industry, Ministry of Energy and Mineral Resources
		3.4.b. Number of partnerships for the provision of energy and water-efficient technologies for the textile industry		15% of large-scale textile companies/ industries	20% of large-scale textile companies/ industries	25% of large-scale textile companies/ industries	30% of large-scale textile companies/ industries	
		3.4.c. Number of textile industries adopting renewable energy-efficient technologies		Average emissions from companies reduced by 30%	Average emissions from companies reduced by 35%	Average emissions from companies reduced by 40%	Average emissions from companies reduced by 45%	
3.5. Enhancement of research and technology development	Resource efficiency in energy, materials, and water usage increases	3.5.a. Number of technology research activities related to the 9R circular economy for textiles that are published	1 riset Reuse Technology and Scheme oleh Asia Pacific Rayon (APR)	2 appropriate technology research projects per year (total of 8 research projects)	2 appropriate technology research projects per year (total of 8 research projects) Granting of 2 patents from applied technology research	2 appropriate technology research projects per year (total of 8 research projects) Granting of 2 patents from applied technology research	2 appropriate technology research projects per year (total of 8 research projects) Granting of 2 patents from applied technology research	National Research and Innovation Agency, Ministry of Education, Culture, Research and Technology, Ministry of Industry
		3.5.b. Number of research results and patents related to the 9R circular economy for textiles applied in the industry	1 research on Reuse Technology and Scheme by Asia Pacific Rayon (APR)	Increase in patent applications by 5%	Increase in patent applications by 10%	Increase in patent applications by 20%	Increase in patent applications by 35%	
		3.5.c. Number of research publications	528 articles found using Google Scholar with the keyword “textile circular economy,” covering a wide range of topics	50% increase in research on reuse and recycling topics	60% increase in research on reuse and recycling topics. 10% increase in research on refuse, rethink, and reduce topics.	70% increase in research on reuse and recycling topics. 20% increase in research on refuse, rethink, and reduce topics.	100% increase in research on reuse and recycling topics. 30% increase in research on refuse, rethink, and reduce topics.	




NATIONAL ROADMAP
& ACTION PLAN
CIRCULAR
ECONOMY
INDONESIA
2025-2045



4

GOVERNANCE OF CIRCULAR ECONOMY ECOSYSTEM

Circular economy governance is a key enabler that can accelerate the achievement of targets and the transition toward a circular economy. Circular economy governance includes Institutional and Regulatory Frameworks, Incentives, Data Management, Communication, Funding, and Implementation at the subnational level.

Governance plays a crucial role in establishing a supportive and inclusive foundation for circular economy ecosystem across all stakeholders. Therefore, implementing action plans related to governance should be prioritized during the first 10-year period, from 2025 to 2034.

A circular economy can be effectively implemented if there is a strong governance system in place. Organizing the 12 main dimensions of governance (see **Figure 4.1)** provides guidance for promoting, facilitating, and implementing circular economy at various regional levels. These dimensions are divided into three complementary groups that contribute to the establishment of circular economy governance: promoters, facilitators, and enablers.

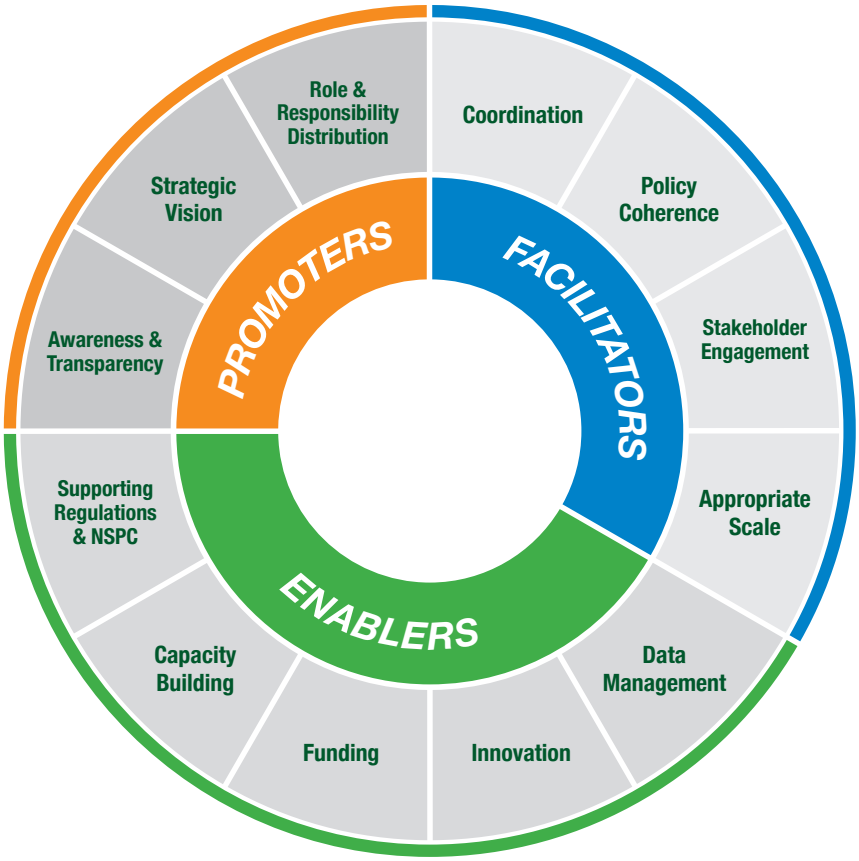


Figure 4.1 Governance structure supporting the implementation of circular economy action plan

Institutional Framework and Regulations

Institutional and regulatory governance encompasses the structures, systems, and processes designed to ensure accountability, resource allocation, control, oversight, transparency, and broad participation, including the enhancement of efficiency in implementing circular economy at both the national and subnational levels. Effective institutions provide the necessary framework, policies, and regulatory environment to encourage and support this transition. An overview of the institutional roles in implementing circular economy can be seen in **Figure 4.1.**[45]

[45] Syntesis Report The Circular Economy in Cities and Regions (OECD, 2020)

Sector	Relevant K/L
	**Key K/L (Promoters):** National Development Planning Agency, National Food Agency, Ministry of Agriculture, Ministry of Maritime Affairs and Fisheries, Ministry of Industry, Ministry of Environment and Forestry **Implementing and Supporting K/L (Facilitators and Enablers):** National Development Planning Agency, Indonesian Food and Drug Authority (BPOM), Ministry of Environment and Forestry, Ministry of Industry, Ministry of Tourism and Creative Economy, and Ministry of Health
	**Key K/L (Promoters):** National Development Planning Agency, Ministry of Environment and Forestry, Ministry of Industry **Implementing and Supporting K/L (Facilitators and Enablers):** Ministry of Industry, Indonesian Food and Drug Authority (BPOM), Ministry of Cooperatives and SMEs, and National Public Procurement Agency
	**Key K/L (Promoters):** National Development Planning Agency, Ministry of Environment and Forestry, Ministry of Industry **Implementing and Supporting K/L (Facilitators and Enablers):** Ministry of Industry, Ministry of Energy and Mineral Resources, National Public Procurement Agency
	**Key K/L (Promoters):** National Development Planning Agency, Ministry of Public Works and Public Housing Dan Ministry of Environment and Forestry **Implementing and Supporting K/L (Facilitators and Enablers):** Ministry of Industry, Ministry of Transportation, Ministry of State-Owned Enterprises, Ministry of Energy and Mineral Resources, and National Public Procurement Agency
	**Key K/L (Promoters):** National Development Planning Agency, Ministry of Industry, and Ministry of Environment and Forestry **Implementing and Supporting K/L (Facilitators and Enablers):** Ministry of Industry, Ministry of Tourism and Creative Economy, Ministry of Cooperatives and Smes, and National Public Procurement Agency
Supporting Aspects (Incentives, Funding, Communication, Data)	Ministry of Finance, Ministry of Communication and Informatics, Ministry of Manpower, Ministry of Research and Technology, Ministry of Law and Human Rights, Ministry of Health, Ministry of Trade, National Public Procurement Agency, Financial Services Authority, Environmental Fund Management Agency, Central Statistics Agency, National Standardization Agency, National Research and Innovation Agency, Investment Coordinating Board, Coordinating Ministry for Maritime Affairs and Investment, Coordinating Ministry for Economic Affairs, Ministry of Coordinating for Human Development and Culture

In implementing circular economy, Indonesia possesses several key modalities, including:



Government Policies

There are several existing regulations, programs, and policies developed by the national government that support circular economy practices and the development of the green economy.



Circular Economy Practice Initiatives

Various circular economy initiatives are already underway in Indonesia. At least 36 initiatives have been summarized in the book The Future is Circular: Uncovering Circular Economy Initiatives in Indonesia, published by Bappenas (2022).



Public Awareness

There is a growing public awareness of the importance of wise resource use and environmentally friendly purchasing choices, along with the development of business model approaches and partnerships between the government, industry, and society to promote circular economy practices.

In practice, circular economy actions are not solely implemented by the government; the role of other stakeholders is also highly significant. Each stakeholder has its own role and responsibility in promoting, implementing, and supporting circular economy in Indonesia. The key stakeholders in circular economy include:

1 Government

Plays a crucial role in creating policies, regulations, and enabling conditions, developing the necessary infrastructure, and facilitating cross-sector collaboration and partnerships.

2 Industry/Business & Associations

Enhance resource efficiency practices, implement sustainable business models, innovate products, reduce and manage production waste, expand recycling practices within the business supply chain, and develop other circular economy initiatives.

3 Academics & researchers

Conduct research and develop new technologies to support circular economy, promote environmentally friendly innovations, and disseminate the knowledge and insights needed to address challenges and identify future opportunities in circular economy.

4 Society

As consumers, society plays a vital role in driving the shift towards a circular economy through environmentally friendly purchasing decisions, reducing and sorting waste at home, and adopting sustainable living practices.

5 Media

Both print and digital media play a role in disseminating information about circular economy, serving as a platform for interaction and the implementation of circular economy initiatives, and providing a means to gather feedback from other stakeholders

6 Development partners & international organizations

Development partners and international organizations play a crucial role in developing circular economy ecosystem in Indonesia by providing funding, transferring technology, advocating policies, facilitating partnerships, conducting monitoring and evaluation, and collaborating with the government to formulate policies that support circular economy. Additionally, development partners can facilitate collaboration among various stakeholders and conduct educational campaigns to raise public awareness about the importance of circular economy, thereby creating a strong foundation for its ecosystem's development.

7 Non-Governmental Organizations

Non-governmental organizations (NGOs) play a significant role in developing circular economy ecosystem in Indonesia through policy advocacy, education, and awareness-raising. They collaborate with the government to promote regulations that support circular economy practices and educate both the public and businesses on the benefits and implementation of circular business models.

8 Youth

Young people hold a vital role as agents of change, innovators, and educators. With their creativity and openness to new technologies, they can develop innovative ideas and solutions to address circular economy challenges, such as through startups and sustainable projects. Through social media, campaigns, and educational programs, they can also raise public awareness about the importance of circular economy and encourage more responsible consumption and production practices.

Box 4.1 Youth Involvement in Developing Circular Business Ideas

In 2023, the National Development Planning Agency (Bappenas), in collaboration with UN-PAGE and UNDP, organized an IDEATHON as a national competition in the fields of Green and Circular Economy with the theme "Food Loss and Waste." This national competition was open to participants aged 18 to 35. The competition gathered up to 289 ideas and business plan simulations aimed at addressing food loss and waste issues in Indonesia. Business ideas that passed the selection stage were then given coaching sessions to refine the ideas and solutions for practical and sustainable implementation. Some of the applied ideas include:



- Collection and Processing of Used Cooking Oil into 100% Biodiesel (B-100) and products such as dish soap, vegetable-based aromatherapy candles, and essential oils from agricultural waste.
- Development of the Mobile Application 'Ngupahan' as a solution for managing food waste and supporting food security for urban families in Bogor District.

To support the transition to a circular economy, a National Action Plan has been formulated outlining the enabling conditions in terms of Institutional and Regulatory aspects for the five priority sectors, as detailed in **Table 4.1**.

Table 4.1 Action Plans for Institutional and Regulatory Structuring of Circular Economy

Action Plans	Objectives	Indicators	K/L
1.1. Definition of roles and responsibilities within circular economy institutions	1. Clarify coordination and decision-making mechanisms, resource allocation, control, oversight, accountability, and transparency in the implementation of circular economy at the national and regional levels. 2. Synchronize roles/ actions/ policies to avoid overlaps.	1.1.A. Availability of a role and responsibility mapping for all stakeholders, including the National Government, Subnational Governments, businesses, and consumers, within the governance of circular economy. 1.1.B. Availability of a governance mechanism for the implementation of circular economy that is established and agreed upon by all parties.	National Development Planning Agency, Ministry of Environment and Forestry, Ministry of Industry,Ministry of Administrative and Bureaucratic Reform
1.2. Development of a circular economy strategy with clear objectives and actions	1. Ensure a clearly defined and strategically aligned vision (outputs and outcomes) with national development goals. 2. Formulate a more measurable circular economy implementation strategy.	1.2.A. Integration of circular economy into the national development agenda. 1.2.B. Availability of a roadmap and action plan for the implementation of circular economy in Indonesia.	National Development Planning Agency
1.3. Increasing awareness and transparency in the implementation of circular economy	Promote awareness and acceptance among the public and businesses to adopt circular economy by: 1. Facilitating the adoption of voluntary standards such as ecolabels, Greenship, Green Building, or similar by businesses. 2. Increasing the number and capacity of public laboratories to test product compliance with voluntary standards related to circular economy. 3. Promoting Sustainable Public Procurement (SPP).	1.3.A. Number of businesses adopting voluntary standards (ecolabel, Greenship, Green Building, or similar). 1.3.B. Number and capacity of public laboratories for testing compliance with voluntary standards (ecolabel, etc.) that have been established. 1.3.C. Number of products included in the Sustainable Public Procurement (SPP) catalog.	National Development Planning Agency, Ministry of Environment and Forestry, Ministry of Industry, Ministry of Agriculture, Ministry of Public Works and Public Housing, Ministry of Trade, Government Public Procurement Agency

1.4. Formulation of regulations and supporting guidelines for the implementation of circular economy	1. Ensure the existence of a legal basis for governing the implementation of circular economy. 2. Provide accountability and transparency frameworks for circular economy performance at the levels of ministries/ agencies, subnational governments, businesses, and consumers.	1.4.A. Existence of regulations related to the governance of circular economy at the national and subnational levels. 1.4.B. Existence of allocation, oversight, and control schemes for resource use and circular material utilization. 1.4.C. Existence of accountability and transparency frameworks for circular economy performance in ministries/ agencies, subnational governments, businesses, and consumers.	National Development Planning Agency, Ministry of Law and Human Rights, Ministry of Environment and Forestry, Ministry of Industry
1.5. Enhancement of stakeholder involvement and capacity building	1. Develop training programs on circular economy involving all stakeholders. 2. Review and analyze the skills and capacities needed to carry out all activities related to the design, establishment, implementation, and monitoring of circular economy strategies. 3. Accelerate circular economy innovation.	1.5.A. Number of capacity-building activities for the implementation of circular economy. 1.5.B. Existence of matchmaking initiatives that can integrate economic activities within the value chain. 1.5.C. Existence of skill and capacity assessment studies to support the transition to a circular economy.	National Development Planning Agency, Ministry of Manpower, Ministry of Industry, Ministry of Environment and Forestry
1.6. Development of funding governance	1. Facilitate the inflow of funds to support the development of circular economy at national and subnational levels. 2. Attract funding institutions (donor countries, agencies, donors, investors) to actively support circular economy.	1.6.A. Existence of a funding governance scheme for circular economy through the development of institutional and regulatory frameworks. 1.6.B. Amount of increased funding related to circular economy at the national and subnational levels.	Ministry of Finance, National Development Planning Agency, Financial Services Authority, Ministry of Home Affairs
1.7. Development of appropriate incentive governance	1. Provide an incentive governance framework. 2. Increase the number of incentives for users of voluntary standards.	1.7.A. Availability of regulations and incentive schemes. 1.7.B. Number of incentives provided to voluntary standard adopters.	Ministry of Environment and Forestry, Ministry of Public Works and Public Housing, Ministry of Finance

Financing

Sustainable financing components play a crucial role in supporting stakeholders in realizing the principles of a circular economy. For the government, this component is used to create a circular economy ecosystem through the provision of facilities and enabling conditions. For large companies, sustainable financing is expected to drive the transition from Business as Usual (BaU) practices to circular ones, while for start-ups, this component is necessary to support operations in implementing a circular business model. In 2021, the Ministry of National Development Planning/ National Development Planning Agency and UNDP reported that implementing a circular economy in five priority industrial sectors could add IDR 593-638 trillion to Indonesia's GDP by 2030. However, this effort requires an annual investment injection of IDR 308 trillion to build infrastructure and create business opportunities in circular economy[46].

Sustainable funding sources for circular economy activities can be obtained through several schemes, including domestic and international funding options[47] such as:

Domestic Financing Schemes[48]



State Budget (APBN)

Funding from the APBN for climate resilience activities can come from domestic sources, such as taxes, Non-Tax State Revenue (PNBP), cooperation between the government and business entities, as well as other domestic funding sources. Additionally, funding can also be obtained from international sources in the form of grants and planned loans. The allocation of the APBN for climate resilience in government work plans is managed through activity tagging mechanisms.



Public-Private Partnerships (KPBU)

The KPBU scheme is focused on infrastructure financing. The implementation and utilization of KPBU refer to Presidential Regulation No. 38 of 2015 on Cooperation between the Government and Business Entities in the Provision of Infrastructure and Natural Resources, as well as Minister of National Development Planning/Head of National Development Planning Agency Regulation No. 2 of 2020, which amends Minister of National Development Planning/Head of National Development Planning Agency Regulation No. 4 of 2015 concerning Procedures for Implementing Government Cooperation with Business Entities in Infrastructure Provision.

---

[46] Kementerian Perencanaan Pembangunan Nasional. 2022. Langkah Nyata Inisiatif Ekonomi Sirkular di Indonesia. https://www.undp.org/sites/g/files/zskgke326/files/2022-08/INS-The-Future-is-Circular-for%20upload.pdf accessed on 10 May 2024

[47] Kementerian Perencanaan Pembangunan Nasional. 2021. Pendanaan Ketahanan Iklim. https://lcdi-indonesia.id/wp-content/uploads/2021/04/Buku-4_Pendanaan-Ketahanan-Iklim.pdf accessed on 10 May 2024

[48] *Ibid*

Foreign Financing Schemes[49]



Foreign Loans

Foreign loans are essentially financing obtained from international financial institutions, foreign governments, or multilateral organizations to support projects aimed at enhancing sustainability and resource efficiency within bilateral or multilateral frameworks. Foreign loans may include:

1. **Multilateral Loans** — Provided by international organizations such as the World Bank, the Asian Development Bank, or the Islamic Development Bank. These loans often support large projects aimed at reducing waste and enhancing reuse and recycling.

2. **Bilateral Loans** — Provided by the governments of other countries through agencies such as the Japan International Cooperation Agency (JICA), the German Development Bank (KfW), and the Economic Development Cooperation Fund (EDCF) of Korea. These loans typically focus on specific projects agreed upon between the borrowing country and the lender.

3. **Green Loans** — Offered by financial institutions that focus on financing environmentally friendly projects. These loans support initiatives that reduce environmental impacts, such as improved waste management and resource efficiency.

4. **Green Bonds** — Bonds issued by governments or companies to fund projects with environmental benefits. The proceeds from these bonds are used to support various circular economy initiatives, such as the development of recycling technologies or waste management infrastructure.



Direct and Planned Grants

Direct grants are funds provided by development partners and can be requested by Echelon I Work Units from the Minister through the Secretary of the Ministry of National Development Planning/National Development Planning Agency. In contrast, planned grants are funds administered through a planning mechanism. All proposed activities to be financed by these grants are listed in the Grant Activity Plan List (DRKH). The DRKH is prepared by the Ministry of National Development Planning/National Development Planning Agency for a one-year period and includes the planned activities proposed for grant funding. These proposals can come from proposing instrumentalities (K/L) for activities to be carried out by K/L or by subnational governments. Examples of such funding have been conducted through the Adaptation Fund (AF), Green Climate Fund (GCF), and Global Environment Facility (GEF).

[49] Kementerian Perencanaan Pembangunan Nasional. 2021. Pendanaan Ketahanan Iklim. https://lcdi-indonesia.id/wp-content/uploads/2021/04/Buku-4_Pendanaan-Ketahanan-Iklim.pdf accessed on 10 May 2024

In practice, these various funding instruments can also be implemented through several innovative funding schemes. Some examples of innovative funding schemes include:

1 Blended Finance

is a financing approach that combines public and private funding sources to mitigate investment risks in sustainable development projects. Its goal is to attract private sector investment into projects that are typically considered too risky. Thus, Blended Finance leverages public funds to mobilize large-scale private investment[50]

2 Faith-based Finance

on the other hand, is a form of investment that aligns with religious principles. For example, in Islamic finance, it includes financial products such as murabaha (buying and selling with profit), sukuk (Islamic bonds), and mudharabah (business partnerships).[51]

3 Impact Investment

refers to investments made with the intention of generating positive social and environmental impacts alongside financial returns. Impact investors seek opportunities to fund projects that provide measurable social or environmental benefits, such as improving community welfare or environmental conservation.[52]

4 Plastic Credits

are a market mechanism specifically targeting the plastic sector, allowing companies to support plastic waste reduction or management by purchasing plastic credits from projects that reduce or clean up plastic waste.[53]

5 Eco-modulation Tariffs

are an approach to tariff setting based on the environmental impact of products or services. In waste management, eco-modulation encourages producers to create more environmentally friendly products by offering lower tariffs for products with reduced environmental impacts.[54]

Box 4.2

Blended Finance for the Development and Revitalization of Micro-Hydro Power Plants in Jambi Province[55]

The Ministry of Energy and Mineral Resources, in collaboration with UNDP and supported by the Jambi Provincial Government and the National Zakat Agency, has developed a project for the development and revitalization of Micro-Hydro Power Plants (MHPP) using a blended finance scheme. This scheme combines funding sources from Bank Jambi's CSR funds, amounting to approximately 3.76 billion rupiahs, with zakat funds totaling 4.8 billion rupiahs. The project focuses on the utilization of New Renewable Energy (NRE) to support poverty alleviation and community welfare by improving access to energy. The development and revitalization of these MHPPs have provided benefits in terms of electricity access for households, schools, places of worship, and Integrated Health Service Posts (posyandu).

---

[50] Pereira, J. Blended Finance, What It Is, How It Works And How It Is Used. 2017. https://oxfamilibrary.openrepository.com/bitstream/handle/10546/620186/rr-blended-finance-130217-en.pdf?sequence=1, accessed on 10 May 2024.

[51] Fizi, F., Kusuma, A., Widodo, P. 2024. Islamic Green Finance: Mapping The Climate Funding Landscape In Indonesia. https://www.researchgate.net/profile/Faizi-Faizi/publication/378942603_Islamic_green_finance_mapping_the_climate_funding_landscape_in_Indonesia/links/65f2d4dfc05fd2688010ab5d/Islamic-green-finance-mapping-the-climate-funding-landscape-in-Indonesia.pdf, accessed on 10 May 2024

[52] Agrawal, A., & Hockerts, K. 2021. Impact Investing: Review and Research Agenda. Journal of Small Business and Entrepreneurship, 33(2), 153-181. https://research-api.cbs.dk/ws/portalfiles/portal/61429775/anirudh_agrawal_et_al_impact_investing_acceptedversion.pdf, accessed on 10 May 2024

[53] Zhang, Xiaoshui., Liu, Chao., Meda, F. 2021. A Smart-Contract-Aided Plastic Credit Scheme. https://discovery.ucl.ac.uk/id/eprint/10157589/1/A_Smart-Contract-Aided_Plastic_Credit_Scheme.pdf, accessed on 10 May 2024

[54] Joltreau, Eugénie. 2019. Pricing products' negative externalities at end-of-life using eco-modulation: Discussion from case studies. https://www.researchgate.net/publication/331428667_Pricing_products%27_negative_externalities_at_end-of-life_using_eco-modulation_Discussion_from_case_studies, accessed on 10 May 2024.

[55] https://mtre3.id/backend/uploads/project/doc/7f3c802f82fcb7d6a18236aadaca401f.pdf

Various funding schemes and instruments mentioned above have been implemented and used to support sustainability agendas in Indonesia. However, these schemes and instruments are still considered underutilized for circular economy activities. Therefore, an action plan for Funding Enablers has been developed to accelerate the transformation towards a circular economy (see **Table 4.2**).

Table 4.2 Action Plan for Governance Aspects: Funding

Action Plans	Objectives	Indicators	K/L
6.1. Mapping of instruments and funding schemes	1. Facilitating access to funding sources for the government, private sector, and the public to finance all activities related to circular economy 2. Expanding financing access for companies and businesses adopting circular business models 3. Encouraging studies on the implementation of funding allocation to reward the application of circularity requirements in products 4. Promoting the establishment of regulations for Blended Finance schemes to support circular economy	6.1.A. Number of circular economy funding instruments and schemes 6.1.B. Number of sectors that can access funding 6.1.C. Amount of circular/ ESG-based funding distributed 6.1.D. Number of blended finance and innovative financing schemes established	National Development Planning Agency, Ministry of Finance, Financial Services Authority
6.2. Allocation of the State Budget (APBN) for supporting circular economy facilities	1. Increasing the allocation of the APBN for subsidies on organic fertilizers, composting facilities, and cold storage 2. Enhancing the allocation of the APBN for integrated waste processing infrastructure and research and development facilities for technology 3. Boosting the allocation of the APBN for the revitalization/ development of net zero carbon buildings	6.2.A. Mapping of existing APBN allocations to support circular economy 6.2.B. Increased APBN allocation for circular economy support facilities	National Development Planning Agency, Ministry of Finance
6.3. Allocation of grant instruments by the government or non-governmental organizations	1. Expanding funding opportunities for industrial companies, start-ups, NGOs, and MSMEs 2. Fostering local business innovation and entrepreneurial activities while raising awareness about circular economy 3. Promoting additional investments in sustainable energy production, energy efficiency, or circular economy projects	Amount of grant funds distributed by the government or non-government entities	National Development Planning Agency, Ministry of Finance, Financial Services Authority
6.4. Provision of low-interest credit by the government or non-governmental organizations for the development of circular economy businesses	1. Enhancing existing circular economy businesses for entrepreneurs and MSMEs 2. Increasing investment opportunities in circular businesses for entrepreneurs and MSMEs 3. Enhancing grant funding or revolving funds with low interest rates and long-term tenors for circular economy businesses	Amount of allocated low-interest credit distribution	National Development Planning Agency, Ministry of Finance, Financial Services Authority

Considering the diversity of efforts and initiatives in Indonesia, the following table categorizes relevant business activities and funding sources within the context of circular economy. This table aims to facilitate the development of future investment schemes and is expected to provide a comprehensive overview of the industry scale and viable initiatives for funding through sustainable financing instruments, for both investors and other stakeholders interested in contributing to circular economy agenda in Indonesia.

Table 4.3 Business Grouping and Financing in Circular Economy

Aspect	Micro	Small	Medium	Large
Employment	<10 people	10-50 people	5-200 people	>200 people
Annual Revenue	Max. IDR 2 billion	IDR 2 to 15 billion	IDR 15 to 50 billion	> IDR 50 billion
Capital (excluding land and buildings)	Max. IDR 1 billion	IDR 1 to 10 billion	IDR 1 to 10 billion	> IDR 10 billion
Ownership	Family/ individual ownership	Individual, family, or group ownership	Family, partnership, or private company ownership	Publicly traded shares or ownership by a company or conglomerate
Fund Providers	National Government/ K/L, Subnational Government, State-Owned Enterprises (BUMN), Financing Institutions (BPDLH, LPMUKP, PIP, ICCTF), Cooperatives, Religious Institutions, Corporate Social and Environmental Responsibility (TJSL) Programs	National Government/ K/L, Subnational Government, State-Owned Enterprises (BUMN), Financing Institutions (BPDLH, LPMUKP, PIP, ICCTF, etc.), Cooperatives, Religious Funds, TJSL Programs, Fintech, Impact Investors	State-Owned Enterprises (BUMN), Banks, Impact Investors	PT. SMI, IIF, Conglomerates
Fund Recipients	Informal sector, individuals, groups, cooperatives	Informal sector, home industries	Companies, cooperatives, start-up companies	Companies, conglomerates
Funding Instruments or Mechanisms	UMi, KUR, Grants, Fintech, Crowdfunding and Peer-to-Peer Lending, Religious Funds, Government Loans (Multi and Bilateral), Philanthropic Funds, TJSL Funds	Government Bonds, Commercial Loans (Banks/ Cooperatives), Religious Funds, Corporate Social Funds, Crowdfunding, Blended Finance	Sovereign Wealth Fund (SWF), Government Bonds, Matching Funds, Foreign Direct Investment (FDI), Blended Finance	Corporate Bonds, Sovereign Wealth Fund (SWF), Private Bonds, Pension Funds, Capital Markets, Matching Fund, Foreign Direct Investment (FDI)

Source: Compiled from various sources, 2024

Incentives

The implementation of incentives and disincentives in Indonesia has not yet specifically targeted circular economy initiatives. Fiscal incentives intersect with funding schemes, where an institution or organization may apply for funding support or tax reductions if certain criteria are met. Non-fiscal incentives include awards for good performance or facilitation of licensing processes. In general, the incentive policies that incorporate circular economy principles have been mapped as follows.

Table 4.4 Existing Incentive Policies

Incentive/ Disincentive Policies	Type of Incentive*	Description	Target
Subnational Incentive Funds (DID)	Fiscal	Fiscal transfer between the National Government and Subnational Governments that meet certain criteria, aimed at rewarding improvements or achievements in specific areas of subnational financial management, public service delivery, basic public services, and community welfare. However, waste management/circular economy topics have not yet been included in its implementation.	Subnational Governments
Provision of Tax and Customs Facilities for Renewable Energy Utilization Activities	Non-Fiscal: Market-based instruments (charge system)	Regulated by the Minister of Finance Regulation Number 21/ PMK.011/2010, renewable energy utilization activities can receive tax facilities such as income tax (PPh), value-added tax (PPN), import duties, and government-borne taxes.	Distributors, Retailers, and Business Operators
Awards, publications, and/or promotion of good performance	Non-Fiscal: Non-market-based instruments	Subnational Development Award (PPD): A creative evaluation to motivate and appreciate subnational governments that produce high-quality and consistent planning and performance within the framework of the Musrenbang (Development Planning Meeting). In 2023 and 2024, circular economy is one of the criteria for this award.	Subnational Governments
		SDGs Award: An appreciation event for all stakeholders who have supported the implementation of TPB/SDGs in Indonesia, with assessments based on the commitment of institutions/organizations to SDGs implementation and performance according to the specified theme.[56]	Provincial Governments, Large Companies, Cooperatives, MSMEs, Start-ups, Organizations, Civil Society, Philanthropy, Higher Education Institutions

[56] https://sdgs-awards.bappenas.go.id/

		PROPER (Ministry of Environment and Forestry): Performance evaluation of businesses and/or activities in the field of environmental management, including efforts in resource efficiency and 3R implementation.	Business Operators
		Green Industry Award (Ministry of Industry): An award for industrial companies that have implemented green industry principles in their production processes.	Business Operators
		Incentives/ disincentives for producers who have reduced waste according to the established roadmap. This provision is regulated in the Ministry of Environment and Forestry Regulation Number P.75/MENLHK/SETJEN/KUM.1/10 of 2019 on the Roadmap for Waste Reduction by Producers.	Manufacturing Producers; Food and Beverage Services; and Retail, Associations, and Area Managers
		Regulated by DKI Jakarta Governor Regulation Number 60 of 2022, which provides recognition for Green Building initiatives.	Building Owners
	Non-Fiscal: Initiated by non-government entities	Tempo Circular Economy Award (TCEA): An award program given to companies or organizations in Indonesia that have taken initiatives to implement circular economy practices in their business activities.	Large Companies and MSMEs
		Lestari Award: An award initiated by Kompas Media to appreciate company initiatives that accelerate the achievement of SDGs in Indonesia.	Companies
Additional Floor Area Ratio (FAR) without additional taxes	Non-Fiscal: Non-market-based instruments	Regulated by Bandung Mayor Regulation Number 1023 of 2016.	Area Managers and Building Owners

Incentives are necessary to stimulate the transition from a linear to a circular economy by altering the business-as-usual (BaU) market, which has yet to incorporate environmental externalities into commodity prices. This is often reflected in the higher cost of recycled products compared to virgin raw materials, making the linear economy more profitable in the absence of policy and market transformation. Incentives can be temporary (to stimulate new business models or support circular business actors) or permanent (as a transformation of BaU integrated into policies/ standards) and can be categorized into fiscal and non-fiscal instruments.

Fiscal Instruments[57]

Fiscal instruments are incentives in the form of funding designed to create and encourage markets to shift from BaU to markets that implement circular economy business models. Essentially, the economic, environmental, and social benefits generated from the application of incentives should ideally exceed the costs within a certain timeframe. The implementation of incentives requires several considerations, such as the expected outcomes, potential trade-offs that may arise, and the local context of a country.

Table 4.5 Fiscal Incentive Instruments

Incentive Needs	Market Conditions	Incentive Instruments
High Incentives	• Market not yet established • Financing schemes not yet available	**Instruments to prioritize market** • CAPEX grants based on NPV • Interest rate subsidies • Extended tenors or grace periods
Medium Incentives	• Market creation (piloting and demonstration) • Financing schemes available only on a limited basis or at very high costs	**Instruments to accelerate market** • Partial guarantees with no cost (first loss) • Low-intensity CAPEX grants • CAPEX grants guaranteed based on generated impact • Guaranteed residual value
Low Incentives	• Market acceleration (scale-up) • Financing schemes available but with inherent risks and risk perceptions	**Instruments to reduce market risk** • Partial concessional co-financing • Concessional/waiver fees • Guarantees below market price • Deferred payments (performance-based fees) • Interest rates guaranteed based on generated impact
No Incentives	• Mature market with available financing schemes and risk assessments	**Instruments targeted for research, innovation development, and priority activities:** • Risk capital • CAPEX grants integrated with concessional guarantees/ loans

Explanation

- Concessional Fee[58] refers to financing provided below market interest rates by major financial institutions, such as development banks and multilateral funds, to developing countries in order to accelerate development goals.
- Waiver Fee[59] is a legally binding provision in which one party in a contract voluntarily agrees to waive a claim or debt without the other party being obligated to make payment.
- Risk Capital refers to funds allocated for investments that carry high risk but have the potential to yield high rewards.

[57] European Commission. (2021). Incentives to boost the Circular Economy: A Guide for Public Authorities. Accessed in Incentives to boost the circular economy: A guide for public authorities – Circulars (iclei.org)

[58] World Bank. (2021). What You Need to Know About Concessional Finance for Climate Action. Accessed in Climate Explainer: Concessional Finance (worldbank.org)

[59] Investopedia. (2023). What Is a Waiver? Definition, Uses, Examples, and Types. Diakses pada tautan What Is a Waiver? Definition, Uses, Examples, and Types (investopedia.com)

Non-Fiscal Instruments

The government can regulate and develop non-fiscal incentives, including policy development, standardization, awarding recognition, raising awareness, and removing normative barriers that hinder the acceleration of circular economy transition.

Table 4.6 Non-Fiscal Incentive Instruments

Type of Incentive	Description	Examples [60, 61]
Non-market based	Through policy development, product standardization and labeling, awarding recognitions, and capacity building enhancement	• Regulations for reducing single-use plastic bags • Standardizing product design to increase circular material input, recyclability, and standardizing off-grade food infrastructure • Certification and standardization of Green Industry and Ecolabel • Awards for circular instrumentalities/ products • Integrating circular economy criteria into public procurement/ tenders (Green/ Sustainable Public Procurement) • Supporting engagement and awareness for green products with industry, associations, and consumers • Voluntary agreements to increase resource efficiency and circular material input in industries
Reduction of normative barriers	Adjusting policies that hinder the transition to a circular economy	• Adjusting waste criteria: some electronic waste in the EU can be categorized as non-hazardous (non-B3) waste as long as it has a recycling partner • Adjusting technical product requirements for non-priority products to encourage the use of recycled materials

In addition to fiscal and non-fiscal incentives, there are also market-based incentives established based on the economic value of the environment (emissions, energy, natural resources, etc.) to stimulate the market and encourage circular value chains. Market-based incentives can include[57]:

1. Charge systems:
carbon taxes, polluter-pays principle for waste management, deposit refund systems (DRS), tax reductions for green products and businesses

2. Tradable permits:
cap and trade system (carbon market with emission level limits), plastic credits

3. Reducing market barriers:
creating demand for green products

4. Reducing government subsidies for carbon-intensive activities/products and increasing subsidies for circular/green products

[60] GIZ. 2023. Economic and Fiscal Measures for Single-Use Plastic Reduction and Packaging Prevention in Indonesia. Accessed in https://greentechknowledgehub.de/publications/economic-and-fiscal-measures-single-use-plastic-reduction-and-packaging-prevention

[61] Brears, R.C. (2018). Circular Economy: Fiscal and Non-Fiscal Tools. In: Natural Resource Management and the Circular Economy. Palgrave Studies in Natural Resource Management . Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-319-71888-0_2

Incentives and disincentives that can be implemented to support circular economy include the development of subsidy schemes, tax adjustments, waste credit schemes, Ecological Fiscal Transfer (EFT) mechanisms, as well as the enhancement of non-fiscal incentives such as awards for circular economy actors, streamlined permitting processes, etc. To impose penalties on instrumentalities that have not adopted circular economy, disincentive schemes can be developed, including increased taxes on virgin raw materials (if alternatives are available) and graduated taxes.

The Action Plan on Governance Aspects for Incentives and Disincentives for circular economy can be found in **Table 4.7.**

Table 4.7 Action Plan for Governance Aspects: Incentives and Disincentives

Action Plans	Objectives	Indicators	K/L
Fiscal Incentives			
2.1 Development of interest rate subsidy schemes for investments or activities related to circular products	1. Increase financial capacity for businesses to develop and innovate circular economy products 2. Share financial risks in circular economy financing	2.1.A/ Availability of an interest rate subsidy incentive scheme 2.1.B. Amount of APBN (state budget) allocation for interest rate subsidies 2.1.C. Number of businesses receiving interest rate subsidies 2.1.D. Amount of investment funds allocated for circular economy projects/ activities/ businesses	Ministry of Finance, Financial Services Authority, National Development Planning Agency
2.2. Development of tax reduction incentive schemes for businesses that implement circular economy principles	1. Increase the number of businesses that apply one of the 9R principles in their core operations 2. Increase the number of businesses that can reduce FLW (waste processing fees) or use certified superior seeds 3. Increase the number of buildings certified under the Green Rating System	2.2.A. Availability of tax reduction incentive schemes for the application of circular economy principles 2.2.B. Number of businesses receiving tax reductions 2.2.C. Number of Green Rating System certified buildings receiving tax relief (e.g., Property Tax – PBB)	Ministry of Finance, Financial Services Authority

2.3. Allocation of incentive funds for subnational governments that implement circular economy practices	Increase the number of subnational governments implementing circular economy through the establishment of local regulations, execution, supervision, and monitoring	2.4.A. Availability of incentive mechanisms for subnational circular economy initiatives 2.4.B. Number of subnational governments implementing circular economy practices 2.4.C. Amount of incentive funds allocated to subnational regions implementing circular economy practices.	Ministry of Finance, Ministry of Home Affairs, Subnational Governments
Non-Fiscal Incentives			
2.4. Development of non-fiscal incentive schemes for businesses that implement circular economy practices	1. Facilitate investment for circular economy businesses 2. Increase patents for technologies supporting circular economy	2.5.A. Availability of non-fiscal incentive schemes 2.5.C. Number of businesses awarded Circular Economy Award 2.5.D. Number of individuals/ organizations holding patents for circular economy technologies	Ministry of Trade, Ministry of Industry, Ministry of Environment and Forestry, National Development Planning Agency, National Research and Innovation Agency
2.5. Development of incentives for sustainable construction at the subnational level	Increase the application of sustainable construction at the subnational level	Number of bylaws (Perda) related to incentives for sustainable construction applications Subnational regions that already have bylaws: DKI Jakarta, Bandung, Semarang, and Samarinda.	Ministry of Public Works and Public Housing, Ministry of Home Affairs
Sustainable Goods/Services Procurement			
2.6. Development of market-based incentives	Increase the demand for circular products/ services	2.3.A. Availability of market-based incentive schemes to increase demand for circular products/ services (e.g., Green Public Procurement, Recycled Component Level - TKDU) 2.3.B. Number of businesses receiving incentives	Ministry of Environment and Forestry, Ministry of Industry, Ministry of Finance, Financial Services Authority

2.7. Implementation of Eco-friendly Public Procurement for Goods and Services	1. Reduction in water intensity, energy, and other materials 2. Prolong lifetime of electronics products	2.7.A. Availability of criteria for ecolabel and lifetime in government procurement of goods and services (LKPP) for electronic products	National Public Procurement Agency
Disincentives			
2.8. Implementation of disincentives for businesses that do not adopt circular economy practices	Enhancing compliance in the implementation of circular economy	2.6.A Identification of disincentive schemes to encourage circular economy implementation (e.g., implementation of an eco-modulation fee, where producers not meeting eco-design standards will be subject to higher fees/taxes than Business as Usual - BaU)	National Development Planning Agency, Ministry of Finance

Box 4.3

Sustainable Procurement Actions in the National Medium-Term Development Plan (RPJMN)

In the draft RPJMN 2025-2029, the development of Government Procurement of Goods and Services has been integrated as a form of incentive for circular products. Implementation indicators are evaluated based on the number of environmentally friendly products, the number of draft regulations, and the number of ministries/agencies (K/L) and subnational governments (Pemda) engaged in sustainable procurement.

Development Projects	RPJMN Indicators	Baseline	Target (2029)	K/L
Development of Government Procurement of Goods and Services with Sustainable Principles	Number of Environmentally Friendly/ Sustainable Products Included in the Government Procurement System	5 products	25 products	National Public Procurement Agency
	Number of Draft Regulations	1 Draft Regulation	11 Draft Regulations	National Public Procurement Agency
	Number of K/L/Pemda Implementing Environmentally Friendly/ Sustainable Products in Government Procurement	5 K/L/ Pemda	30 K/L/ Pemda	National Public Procurement Agency

Data Management

Data management is essential for planning, measuring progress, and evaluating the implementation of circular economy policies and actions. It encompasses resource tracking, Life Cycle Assessment (LCA), supply chain transparency, product design and eco-design, waste management optimization, consumer behavior analysis, performance monitoring, decision-making support, innovation and research, and regulatory compliance.

Currently, the availability of supporting data for the implementation of circular economy in Indonesia is still very limited. Availability implies that the required data has not yet been measured or mapped. Moreover, there is no comprehensive data integration among data providers, whether government, private sector, or the public. Another issue is the verification and validation mechanisms for data, which also pose challenges in obtaining high-quality data.

To obtain a holistic view of circular economy implementation, comprehensive data is required on materials, spanning from upstream to downstream. Without complete and accurate data, it is challenging to plan and execute circular economy strategies in a comprehensive and measurable manner. Currently, data availability is still heavily focused on downstream data collection, particularly in waste management.

There are at least 11 government information systems related to circular economy, namely:

Table 4.8 Existing Data Information and Management Systems

No	Nama *Platform*	Pengelola	Deskripsi
1	**SIINAS (National Industry Information System)**	Ministry of Industry	Industrial Data System: Designed by the Ministry of Industry of the Republic of Indonesia to collect primary data from every industrial business operator.
2	**OJK Sustainability Report**	Financial Services Authority	Sustainability Report: A report made public that contains the economic, financial, social, and environmental performance of a financial institution, issuer, and publicly listed company in conducting sustainable business.
3	**SIPSN (National Waste Management Information System)**	Ministry of Environment and Forestry	A web-based application accessible to the public, providing data and information on national waste management with a database from districts and cities. SIPSN provides user access (user accounts) for district/city governments, provinces, and the national government, each with different roles in data management.

4	**SIMBA (Waste Bank Management Information System)**	Ministry of Environment and Forestry	A web-based application accessible to the public that displays information about central waste banks and unit waste banks throughout Indonesia. SIMBA provides user accounts for managing and updating waste bank data.
5	**SI INSAN (Sanitation Information System)**	Ministry of Public Works and Public Housing	Collects data on infrastructure and general sanitation, including waste management, domestic wastewater, and urban drainage. SI INSAN is only accessible to users designated for data entry (district/ city governments) and for data verification and validation (BPPW and the national government).
6	**SIMBG**	Ministry of Public Works and Public Housing	An electronic web-based system used for processing Building Approval, Certificate of Feasibility for Function, Building Ownership Certificate, Technical Demolition Plan, and Data Collection, along with information related to building management.
7	**SIMPK**	Ministry of Public Works and Public Housing	Through SIMPK, it collects data on environmentally friendly material categories (ecolabel). Validation of these environmentally friendly materials is conducted monthly.
8	**AKSARA (Construction Materials and Equipment Information System)**	Ministry of National Development Planning/ National Development Planning Agency	A platform for recording low-carbon and climate-resilient development actions that is transparent and integrated, providing a system for collecting and reporting on collaborative cross-sectoral low-carbon and climate-resilient development actions, including national and subnational governments.
9	**NAWASIS (National Water and Sanitation Information Services)**	Ministry of National Development Planning/ National Development Planning Agency	A collaboration platform in the housing, settlement, drinking water, and sanitation sectors. This platform includes three components: Data, Information, and Capacity Building.
10	**SibarjaSiramling**	Ministry of Environment and Forestry	A site that provides information related to ecolabels.
11	**SIRAJA**	Ministry of Environment and Forestry	Data system for waste and electronic waste from companies and industries.

The current reporting system relies on the availability of data and the commitment of data owners. For example, SIPSN depends on data from subnational governments, while SIRAJA and SIINAS rely on data availability from companies or industries. Although regulations related to data reporting policies are already in place (e.g., Ministry of Industry Regulation No. 2 of 2019), there needs to be an incentive/disincentive mechanism for reporting among stakeholders. Additionally, to accelerate circular economy in this sector, alignment between databases across Ministries/ Agencies is necessary to avoid disparities and overlaps in data collection and management.

In order to strengthen data management, an action plan has been mapped out to expedite the transition towards a circular economy, as outlined in **Table 4.9**.

Table 4.9 Action Plan for Governance Aspect: Data Management

Action Plan	Objectives	Indicators	K/L
3.1. Integrated collection of circular economy data by relevant stakeholders	1. Establish standards for collecting circular economy (CE) data that facilitate performance analysis and are understandable to relevant stakeholders. 2. Improve data collection quality through standardization, verification, and automation. 3. Increase the quantity of data reported by relevant stakeholders.	3.1.A. Availability of technical guidelines related to definitions, data collection methods, and indicator calculation methods (e.g., metadata). 3.1.B. Number of subnational governments/ industry players/ ministries or agencies reporting data to existing information systems.	National Development Planning Agency,Central Statistics Agency, Ministry of Environment and Forestry, Ministry of Industry
3.2. Development of a circular economy data and information platform	1. Enhance the collection of data for measuring CE indicators. 2. Systematically map information systems to integrate data and information. 3. Improve the accessibility of data and insights from implemented circular economy programs.	3.2.A. Identification of data components that need to be collected for CE indicator calculation. 3.2.B. Availability of a circular economy platform integrated with existing information systems.	National Development Planning Agency, Central Statistics Agency



Communication

The concept and knowledge related to the implementation of circular economy need to be disseminated evenly across Indonesia. Communication regarding circular economy practices involves processes that include information delivery, education, and active stakeholder engagement to build a broad understanding of the principles, benefits, and practices of circular economy[62]. The objectives of communication as a supporting factor for circular economy practices in Indonesia are divided into several components[63] namely:

1. Raising awareness and understanding
2. Increasing stakeholder support and engagement
3. Education and capacity building
4. Adoption of business practices and innovation
5. Building transparency and trust

[62] Kementerian Perencanaan Pembangunan Nasional. 2022. Langkah Nyata Inisiatif Ekonomi Sirkular di Indonesia. https://www.undp.org/sites/g/files/zskgke326/files/2022-08/INS-The-Future-is-Circular-for%20upload.pdf accessed on May 2024

[63] European Investment Bank. 2020. The EIB Circular Economy Guide: Supporting the circular transition. https://www.eib.org/attachments/thematic/circular_economy_guide_en.pdf accessed on May 2024

The communication strategy to support the implementation of the Circular Economy Roadmap and National Action Plan is as follows:

1 The establishment of a national multi-stakeholder forum

A national multi-stakeholder forum can serve as an initial step in raising awareness and understanding, as well as gaining broader support and engagement from various stakeholders. This is particularly important for communities and local government institutions that may not yet be familiar with circular economy practices. Additionally, such a forum can help align targets and advocate for policies to achieve circular economy goals. Forms of communication like annual discussion forums, outreach programs, conferences, and government associations, supported by existing intergovernmental collaborations, are potential resources for addressing urgent issues. Key stakeholders involved include the National Development Planning Agency (Bappenas), the Ministry of Industry (Kemenperin), and the Ministry of Environment and Forestry (KLHK) as coordinators, along with other ministries and subnational government institutions such as the Subnational Development Planning Agency (Bappeda), environmental agencies (DLH), and community organizations.

2 Capacity building

Capacity building aims to enhance the skills and capabilities of those engaged in circular economy practices, considering the rapid advancements in technology and circular innovations. This effort supports the transition to green jobs in line with green economy initiatives. Capacity building can be implemented through training and education of professionals in areas such as design, management, waste, or value chain management. Related certifications are also necessary to gain recognition and to facilitate broader training in circular economy. The relevant stakeholders include the Ministry of Manpower as the coordinator, along with other related ministries/agencies, subnational government institutions, business associations, and certification bodies. National Development Planning Agency (Bappenas), the Ministry of Environment and Forestry (KLHK), and the Ministry of Industry (Kemenperin) are responsible as substance coordinators for capacity building.

3 Campaigns and education

Circular economy campaigns and education efforts can generally target various groups. To enhance public engagement, potential resources include communication media such as print and social media, public service announcements, educational curricula, and non-governmental organizations, which can serve as platforms for educating the public about circular economy practices in a more general and integrated manner in everyday life. Furthermore, these campaigns and educational efforts can advocate for new business models, including promoting creative innovations that emphasize adaptation to local conditions in Indonesia. Relevant stakeholders include the Ministry of Communication and Informatics as the coordinator, supported by other ministries/agencies, business associations, educational institutions, and community organizations. The National Development Planning Agency (Bappenas), the Ministry of Environment and Forestry (KLHK), and the Ministry of Industry (Kemenperin) are responsible for coordinating substance related to capacity building.

4 Development of a circular economy communication platform

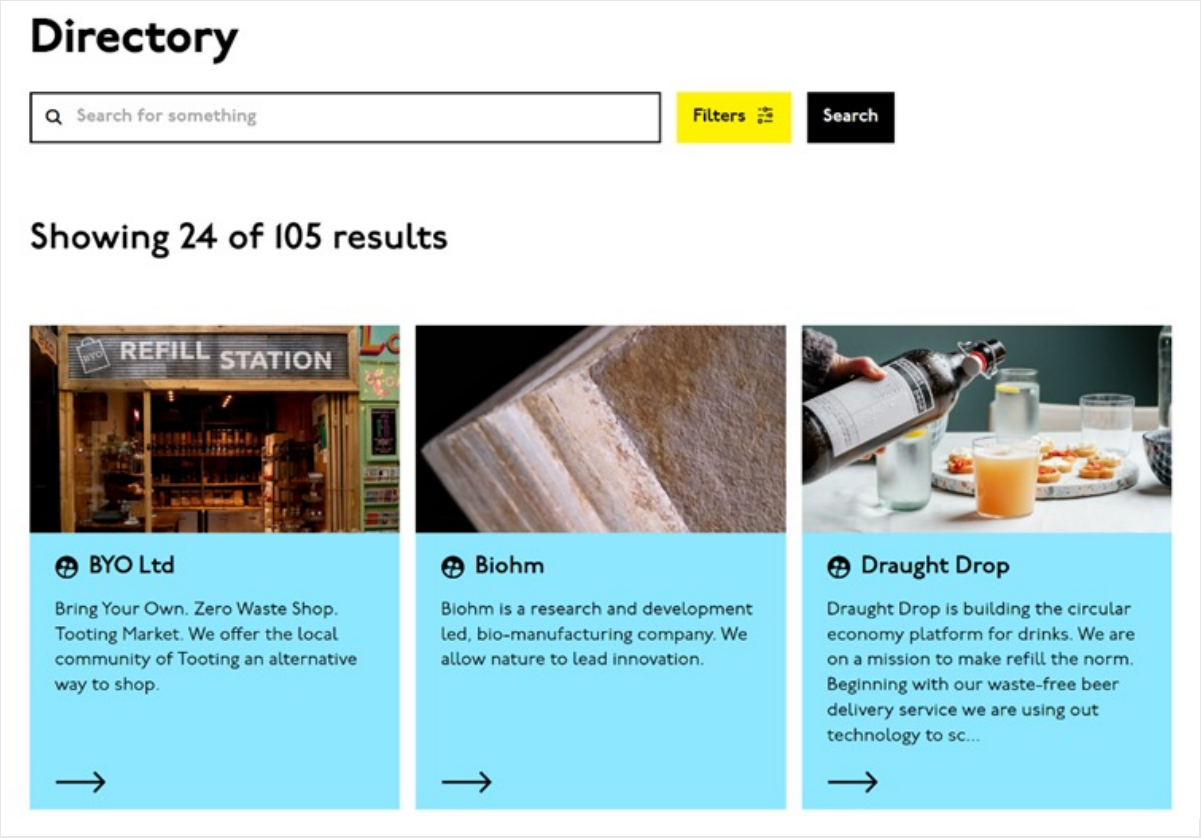
Effective dissemination of circular economy information requires transparent and comprehensive communication channels. A potential resource is the creation of official information websites related to the implementation of circular economy in each region of Indonesia, particularly for measuring progress in the five priority sectors, using mechanisms like the National Waste Management Information System (SIPSN) managed by the Ministry of Environment and Forestry (KLHK). These communication platforms can also serve as learning hubs or discussion forums for various stakeholders involved in circular economy practices across different scopes and aspects. Additionally, having such information dissemination channels can promote more structured and integrated data collection, thereby facilitating monitoring and evaluation activities related to the progress of circular economy practice implementation. Relevant stakeholders include the National Development Planning Agency (Bappenas), the Ministry of Industry (Kemenperin), and KLHK as coordinators, supported by other relevant ministries/agencies and subnational government institutions.

Box 4.4 **Best Practices in Circular Economy Platforms**

ReLondon: Circular Economy Initiative Matchmaking Platform

ReLondon is a digital platform that connects SMEs with investors to accelerate the implementation of circular business models in London, England. The platform also includes experts in the field of Circular Economy (CE) who provide guidance to SMEs on product design and business activities, validate circular business models, and amplify the business impact of SMEs by expanding their network through the platform.

The ReLondon platform provides a directory of potential circular businesses that can be funded by investors. Each circular initiative listed on the platform includes details about the business activities, and if investors are interested, they can engage in further discussions supported by ReLondon. The ReLondon platform has successfully supported over 300 SMEs in London in implementing circular business practices.



Directory View of Circular SMEs on the ReLondon Matchmaking Platform

Table 4.10 Action Plan on Governance Aspect: Communication

Action Plans	Objectives	Indicators	K/L
4.1. Establishment of a national multi-stakeholder communication forum	1. Establish multi-stakeholder communication and collaboration channels involving experts, business actors, research institutions and universities, and technology innovation agencies in the transition to a circular economy. 2. Establish joint targets for circular economy, agreed upon in writing by representative stakeholders from each sector. 3. Involve and connect various parties in circular economy projects/ activities.	4.1.A Formation of a multi-stakeholder communication forum 4.1.B Number of stakeholder participants in the forum 4.1.C Existence of a written agreement containing circular economy targets for each sector	**Coordinator:** National Development Planning Agency **Action Implementers:** Ministry of Environment and Forestry, Ministry of Industry, Ministry of Agriculture, Indonesian Food and Drug Authority (BPOM), Ministry of Public Works and Public Housing, Ministry of Communication and Informatics
4.2. Capacity building for human resources related to circular economy	1. Define curriculum topics related to circular economy practices targeting educational institutions and certification bodies. 2. Develop a learning hub with concepts, implementation examples, and best practices of circular economy for various sectors based on the product and service life cycle. 3. Organize workshops and training sessions to support businesses in accessing funding and improving business governance.	4.2.A Establishment of a learning hub containing concepts and case studies on circular economy for various sectors and value chains 4.2.B Inclusion of circular economy content in the Curriculum Merdeka activities at high schools and universities 4.2.C Number of ministries/ agencies and companies conducting workshops and training sessions 4.2.D Number of participants in workshops and training sessions 4.2.E Number of sectoral workers who have attended training and/ or workshops	**Coordinator:** Ministry of Manpower **Substance Coordinators:** National Development Planning Agency, Ministry of Environment and Forestry, Ministry of Industry **Action Implementers:** Ministry of Agriculture, Indonesian Food and Drug Authority (BPOM), Ministry of Environment and Forestry, Ministry of Public Works and Public Housing Ministry of Communication and Informatics, Ministry of Education and Culture

4.3. Campaigns and education	1. Enhance knowledge and awareness among government, business actors, and the public regarding the implementation of circular economy. 2. Increase the number of campaigns and public education efforts in formal settings such as talk shows, seminars, and public education programs by government, private sector, and institutions. 3. Develop non-formal campaigns in mass media/ social media regarding the concepts and implementation of circular economy.	4.3.A. Number of ministries/ agencies, business institutions, and other organizations conducting circular economy campaigns	**Coordinator**: Ministry of Communication and Informatics **Substance Coordinators:** National Development Planning Agency, Ministry of Environment and Forestry, Ministry of Industry **Action Implementers:** Ministry of Agriculture, Indonesian Food and Drug Authority (BPOM), Ministry of Environment and Forestry, Ministry of Public Works and Public Housing
4.4. Development of circular economy platforms	1. Circular Economy Platform: Create a single circular economy platform as a communication hub for each sector, ministries/agencies, and business actors to showcase all circular economy activities. 2. Education and Learning Features: Develop education and learning features on circular economy platform to enhance public knowledge and awareness. 3. Idea Development Hub: Serve as a platform for the development of circular economy ideas accessible to all layers of society. 4. Information Repository: Provide information related to sectors and supporting conditions that can facilitate businesses in developing circular economy. 5. Business Matching: Facilitate business matching between business actors and consumers concerning information on circular economy products and services. 6. Supportive Features: Develop features to support the design and implementation of circular economy, such as calculators for environmental impact of products using Life Cycle Assessment (LCA), Material Flow Analysis (MFA), Product Environmental Footprint (PEF), design and material modeling, or lists of circular suppliers.	4.4.A Establishment of a national platform for communicating circular economy 4.4.B Availability of an education and learning hub accessible to the public 4.4.C Amount of information regarding circular economy products/ services and performance available 4.4.D Intensity of communication among stakeholders 4.4.E Number of ministries/ agencies, business actors, and consumers utilizing circular economy communication platform 4.4.F Availability of features measuring the implementation of circular economy	**Coordinator:** Ministry of Environment and Forestry National Development Planning Agency **Action Implementers:** Ministry of Industry, Ministry of Agriculture, Indonesian Food and Drug Authority (BPOM), Ministry of Environment and Forestry, Ministry of Public Works and Public Housing Ministry of Communication and Informatics

4.5. Peningkatan kesadaran dan transparansi penerapan ekonomi sirkular	Mendorong kesadaran masyarakat dan pelaku usaha untuk menerapkan ekonomi sirkular dengan: 1. Mempermudah pelaku usaha menerapkan standar sukarela seperti ekolabel, greenship, *green building* atau sejenisnya 2. Meningkatkan jumlah dan kapasitas laboratorium publik untuk pengujian kesesuaian produk dengan standar sukarela terkait ekonomi sirkular 3. Mendorong *Sustainable Public Procurement* (SPP)	4.5.A. Jumlah pelaku usaha yang mengadopsi standar sukarela (ekolabel, greenship, *green building* atau sejenisnya) 4.5.B. Jumlah dan kapasitas laboratorium publik uji kesesuaian standar sukarela (ekolabel, dll) yang terbangun 4.6.C. Jumlah produk yang masuk dalam katalog *Sustainable Public Procurement* (SPP)	Bappenas, KLHK, Kemenperin, Kementan, PUPR, BRIN, LKPP x1x1
4.6. Peningkatan pelibatan pemangku kepentingan dan peningkatan kapasitas	1. Mengembangkan program pelatihan tentang ekonomi sirkular melibatkan seluruh pemangku kepentingan 2. Meninjau dan menganalisis keterampilan dan kapasitas yang diperlukan untuk melaksanakan semua aktivitas yang terkait dengan perancangan, penetapan, penerapan, dan pemantauan strategi ekonomi sirkular 3. Mengakselerasi inovasi ekonomi sirkular	4.6.A. Jumlah kegiatan peningkatan kapasitas penerapan ekonomi sirkular 4.6.B. Adanya inisiatif *matchmaking* yang dapat mengintegrasikan kegiatan ekonomi di rantai nilai 4.6.C. Adanya kajian kebutuhan keterampilan dan kapasitas untuk mendukung transisi ekonomi sirkular	Bappenas, Kemenaker Kemenperin, KLHK

Subnational Implementation

The Circular Economy Roadmap and Action Plan have detailed the institutional roles, particularly of Ministries and Agencies, in carrying out actions that strengthen the transition to a circular economy in Indonesia. In supporting the comprehensive implementation of circular economy, the role of subnational governments is highly significant, as they hold specific authority over the management of industries and businesses within their jurisdictions.

The implementation of a circular economy in Indonesia requires integration that starts from planning documents at the national level down to the subnational level. Therefore, coordination among the national government must be well-integrated to ensure that circular economy policies issued by the national government can be effectively implemented by subnational governments. Subnational governments are expected to carry out actions that support the achievement of national circular economy targets and indicators.

Several challenges that may arise in the implementation of a circular economy at the subnational level include:



Organizational Paradigm and Culture

The implementation of a circular economy requires a shift in the organizational paradigm and culture at the subnational government level. Acceptance of new concepts and the willingness to change established ways of working can be challenging in adopting circular economy practices.



Public Awareness and Education

The implementation of a circular economy requires active participation from the public. A critical challenge lies in raising public awareness and understanding of the importance of circular economy practices, as well as in changing consumer and producer behaviors.



Resource and Capacity Constraints

Subnational governments face limitations in human resources, financial capacity, and technical expertise, which restrict their ability to design, implement, and monitor circular economy programs. A lack of capacity in waste management and natural resource management also poses significant challenges.



Infrastructure Development

Developing infrastructure that supports circular economy, such as recycling facilities, waste management centers, and environmentally friendly transportation systems, requires significant investment and support from subnational governments. The challenge of developing adequate infrastructure can be a major barrier to the implementation of a circular economy



Inconsistent Policies and Regulations

The absence of consistent policies and regulations, along with a lack of coordination between subnational and national governments, can hinder the implementation of circular economy. An unclear or conflicting regulatory framework may discourage businesses from investing in circular economy practices.

The level of challenges in implementing a circular economy will vary across subnational regions. Given the vast differences in geographic and demographic characteristics across Indonesia, the implementation of a circular economy cannot be uniformly applied, whether in the phases of application or in specific circular economy activities/ projects. The alignment phase between national development plans and subnational planning is carried out gradually, in accordance with the context of each subnational region. The integration of circular economy into the Subnational Medium-Term Development Plan (RPJMD) and Strategic Plans (Renstra) is a key factor for accelerating the transformation to a circular economy.

The following is the action plan for supporting aspects of implementation at the subnational level as outlined in **Table 4.11**:

Table 4.11 Action Plan for Subnational Implementation

Action Plans	Objectives	Indicators	K/L
5.1. Strengthening subnational government capacity	Providing training and education to subnational government employees on the concepts, principles, and practices of circular economy. This can include technical training on waste management, natural resource management, renewable energy use, and the development of sustainable policies.	5.1 Number of capacity-building activities for subnational governments	National Development Planning Agency, Ministry of Home Affairs
5.2 Development of circular economy governance at the provincial and district/ city levels	1. Establishing priority sectors and circular economy action plans at the Subnational Bureaucratic Organization (OPD) level 2. Attracting businesses to engage in Circular Economy activities 3. Monitoring and evaluating Circular Economy stakeholders at the subnational level 4. Establishing Circular Economy infrastructure in subnational regions 5. Attracting/ facilitating the entry of subnational circular economy funding 6. Facilitating collaboration among subnational circular economy stakeholders	5.1.A Existence of circular economy governance schemes at the provincial and district/ city levels 5.1.B Inclusion of Circular Economy in Provincial and District/City Medium-Term Development Plans (RPJMD) 5.1.C Amount of Circular Economy funding at the provincial and district/city levels	National Development Planning Agency, Ministry of Home Affairs, Subnational Government
5.3. Implementation of pilot projects at the subnational level	Providing avenues for the development of circular economy activities that can be mainstreamed into subnational development.		National Development Planning Agency, Subnational Government
5.4. Development of supporting circular economy regulations in subnational region	Encouraging the development of regulations on circular initiatives, including waste management, fiscal incentives for sustainable practices, and restrictions on the use of hazardous materials.	Number of regulations and policies supporting the implementation of circular economy in subnational regions	Subnational Government

5.5. Public awareness campaign	Conducting educational and awareness campaigns to enhance public understanding of the importance of circular economy and how they can contribute to sustainable practices. This can be done through outreach programs, social media campaigns, and community participation in environmental activities.		Subnational Government
5.6. Utilization of eco-friendly facilities and infrastructure, and promotion of sustainable tourism activities (regenerative tourism)	Supporting the implementation of Bio-Green-Circular-Economy principles in tourism areas.	5.6.A Total area of restored degraded ecosystems on land and water (hectares) 5.6.B Value of Non-Tax State Revenue (PNBP) from the utilization of environmental services in natural tourism areas within conservation zones (billion rupiah)	Ministry of Tourism and Creative Economy, Subnational Government
5.7. Development of eco-industrial park policies in industrial areas	Building a circular ecosystem in industrial areas through collaborative material utilization.	5.7.A Number of eco-industrial park areas	Ministry of Industry, Subnational Government

Furthermore, the development of monitoring and evaluation schemes at the subnational government level is a crucial component for implementing circular economy in Indonesia. The internalization of action plans and supporting conditions for circular economy within the RPJMD (Subnational Medium-Term Development Plan) will encourage each Subnational Bureaucratic Organization (OPD) to create Work Plans and Budgets (RKA) that align with national circular economy targets. Subnational stakeholders, including business actors, the community, NGOs, the media, academics, and philanthropists, must also be involved in its implementation. The monitoring and evaluation at the subnational level are illustrated in **Figure 4.2**.

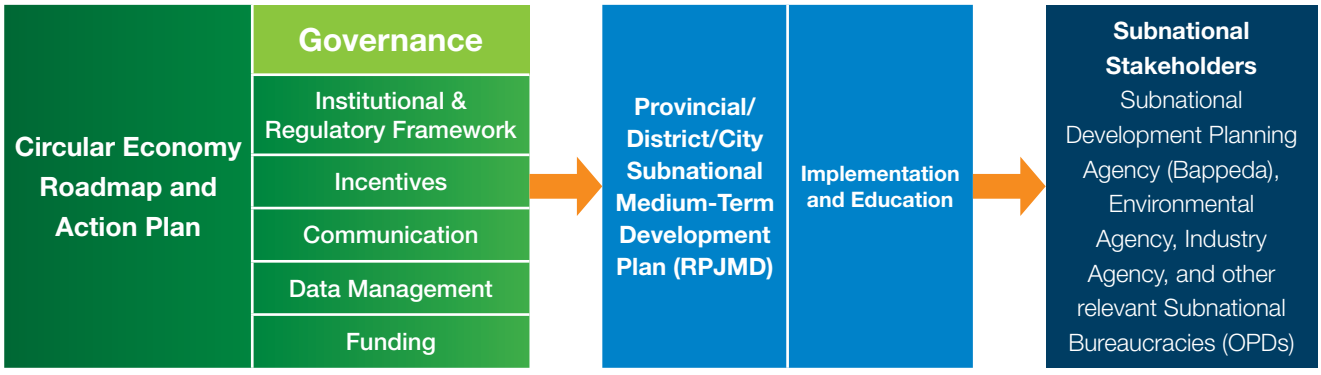


Figure 4.2 Monitoring and Evaluation of Subnational Government Circular Economy



NATIONAL ROADMAP
& ACTION PLAN

CIRCULAR ECONOMY INDONESIA 2025-2045



5

MONITORING, EVALUATION, AND REPORTING OF CIRCULAR ECONOMY WITHIN THE NATIONAL DEVELOPMENT PLANNING FRAMEWORK

According to the mandate of Law Number 25 of 2004 concerning the National Development Planning System (SPPN) and Government Regulation Number 39 of 2006 concerning Procedures for Controlling and Evaluating the Implementation of Development Plans, the national development planning cycle consists of four stages, beginning with: (1) Planning Preparation, (2) Plan Determination, (3) Plan Implementation Control, and (4) Plan Implementation Evaluation.

Specifically, the control, evaluation, and reporting (PEP) of national development are aimed at ensuring that any program or activity is implemented according to the established plan through monitoring and supervision activities. Government Regulation Number 39 of 2006 concerning Procedures for Controlling and Evaluating the Implementation of Development Plans mandates the Ministry of National Development Planning/ National Development Planning Agency to monitor the implementation of development programs/ activities that represent national government interventions through Renja-K/L (Ministry/Agency Work Plans).

Circular economy has been integrated into the draft RPJPN (National Long-Term Development Plan) 2025-2045 and the draft RPJMN (National Medium-Term Development Plan) 2025-2029, encompassing activities by Ministries/ Agencies (K/L) and Subnational Governments, which will be adopted into the Strategic Plan documents of K/L and subnational planning documents. The RPJPN and RPJMN also serve as references for non-government stakeholders, such as the private sector and civil society organizations. Therefore, to ensure proper planning and implementation, continuous monitoring and evaluation must be conducted. A monitoring, evaluation, and reporting mechanism must be developed to enhance the efficiency and effectiveness of resource allocation, as well as to improve the transparency and accountability of circular economy progress.

Coordination Framework for Monitoring, Evaluation, and Reporting on Circular Economy Implementation

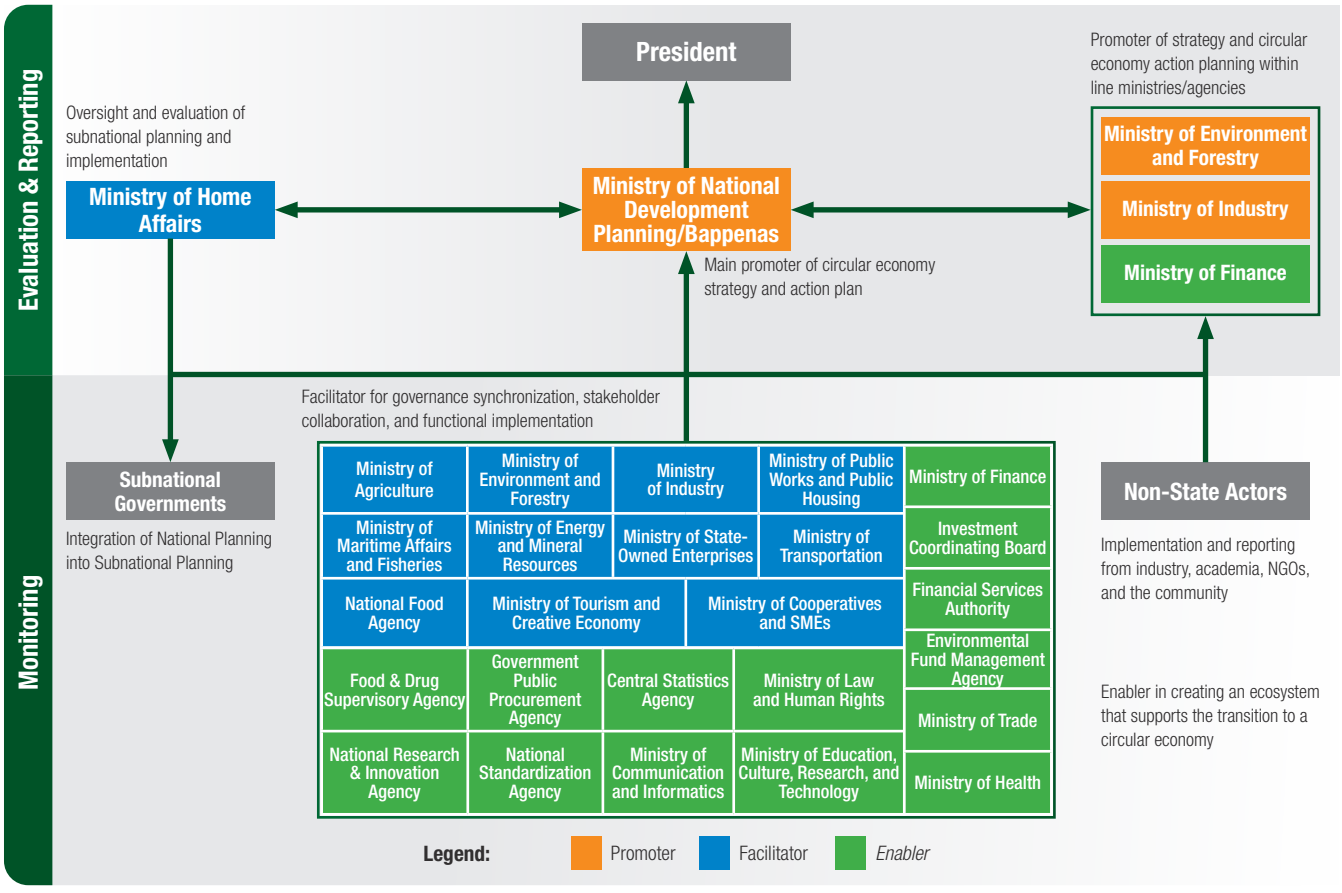


Figure 5.1 Implementation Mechanism for Circular Economy Monitoring and Evaluation

With the integration of circular economy action plan into the RPJPN 2025-2045, circular economy programs and initiatives will become a priority in national development. In achieving the National Long-Term Development Plan (RPJPN) targets, these circular economy programs and initiatives are designed with reference to this action plan document and will be implemented within the Industrial Circular Economy Priority Program in the RPJMN document.

As part of the National Medium-Term Development Plan (RPJMN), the monitoring and evaluation of circular economy actions/ programs will be carried out through coordination among ministries/ agencies. Referring to Government Regulation No. 39 of 2006 (PP 39/2006), there are two institutional roles in the implementation of circular economy actions: the Implementer and Monitor of Circular Economy Actions, and the Implementer of Evaluation Results and Reporting of Circular Economy Actions. Aligned with the governance aspects supporting the implementation of circular economy, the roles among Ministries/Agencies are divided into Promoter, Facilitator, and Enabler.

1 Implementer & Monitor of Circular Economy Actions

The Implementer plays a role in planning and implementing circular economy action plan with regular oversight to ensure that the objectives and targets are achieved through monitoring and supervision activities. Monitoring involves observing the progress of the circular economy development plan's implementation, identifying, and anticipating potential issues that require follow-up actions. This includes tracking the progress of fund utilization, the realization of output targets, and the challenges encountered.

In the implementation and monitoring activities, the Implementer is expected to collect technical data and analyze monitoring reports to assess progress against circular economy indicators. Monitoring is conducted by Ministries/ Agencies/ Subnational Bureaucratic Work Units (SKPD) according to their respective duties and authorities. The Implementers and Monitors can be categorized based on the following priority sectors.

The role of the implementer and monitor is highly significant in planning and implementing circular economy actions according to their respective actions and indicators. In principle, Ministries/ Agencies categorized as enablers can support the transition to a circular economy across all sectors. The monitoring of circular economy actions is carried out through the Monitoring, Evaluation, and Reporting (PEP) system, following the policies set by the evaluation and reporting implementers.

2 Implementer of Evaluation & Reporting of Circular Economy Actions

Evaluation is a series of activities designed to compare the realization of inputs, outputs, and outcomes against the established action plans and indicators. The role of the Implementer of Evaluation and Reporting will be coordinated by the Ministry of National Development Planning/ National Development Planning Agency and the Ministry of Finance. These two ministries are responsible for evaluating and reporting on the progress of circular economy actions within national development planning by assessing the success of a program/ activity based on performance indicators and targets. The assessment includes evaluating the efficiency, effectiveness, benefits, impact, and sustainability of a program.

In general, the monitoring of implementation progress will be conducted annually, in line with the progress reporting of the National Medium-Term Development Plan (RPJMN). The results of circular economy monitoring and evaluation will be used as follows

- Regularly tracking circular economy progress: Measuring progress in achieving national circular economy targets as set out in the National Medium-Term Development Plan (RPJMN). With the establishment of annual targets, the RPJMN enables the evaluation of circular programs and initiatives implemented.
- Strengthening policies: Enhancing and refining circular economy policies and programs based on data and evidence.
- Improving accountability and transparency: By reporting data and circular economy progress across stakeholders, accountability and transparency in the implementation of circular economy policies are reinforced

The list and components of the roadmap and action plan will be evaluated based on feedback and lessons learned from the implementation of actions by stakeholders. Thus, the development and adjustment of the action plan content can be carried out to enhance the progress of circular economy in Indonesia, including the development of strategies and action plans for other sectors.



NATIONAL ROADMAP
& ACTION PLAN

CIRCULAR ECONOMY INDONESIA 2025-2045



APPENDIX

Implementation of 9R

Food Sector

9R Principles		Value Chain					
		Production	Post-Harvest	Industry	Distribution & Marketing	Consumption	Post-Consumption
***Refuse* (R0)**	Avoid redundancy in product creation by delegating product functions or offering the same functionality using different products	Use compost made from organic materials such as plant residues, animal manure, and other organic waste as an alternative to chemical compost.	-	Utilize biomass as an alternative energy source for production machinery	-	-	-
***Rethink* (R1)**	Use products more intensively	• Use certified superior seeds/ seedlings • Use alternative high-protein feed and fertilizer • Recycle wastewater	-	-	-	-	Implement scheduled and segregated waste collection
***Reduce* (R2)**	Increase production efficiency by using fewer materials	• Use organic fertilizers containing macro and microelements instead of synthetic fertilizers • Use alternative feed materials containing at least 30% protein compared to soybean • Implement drip irrigation methods	-	-	-	-	-
***Reuse* (R3)**	Reuse products that are still functional	-	-	-	-	Leverage surplus food through donations/ food banks	-
***Repair* (R4)**	Repair products that are damaged	No application of Repair (R4) for food					

9R Principles		Value Chain					
		Production	Post-Harvest	Industry	Distribution & Marketing	Consumption	Post-Consumption
***Remanu-facture* (R5)**	Restore products, typically older ones, to make them functional again	No application of Remanufacture (R5) for food					
***Refurbish* (R6)**	Utilize parts from old, non-functional products in new products with the same function	No application of Refurbish (R6) for food					
***Repurpose* (R7)**	Using parts of old products that are no longer functional in new products with different functions	Utilizing harvest waste as fertilizer	Utilizing post-harvest processing waste as animal feed	Utilizing waste as fertilizer/ feed	-	-	Utilizing waste as fertilizer/ feed
***Recycle* (R8)**	Processing materials to produce the same material (with the same or lower quality)	-	Processing off-grade products into consumable processed products (e.g., corn into animal feed)	Processing off-grade products into consumable processed products (e.g., fruit into jam)	-	-	-
***Recover* (R9)**	The process of converting materials to extract energy	Utilizing harvest waste as RDF	Utilizing post-harvest waste as RDF	-	-	-	Utilizing SSP as RDF

Implementation of 9R

Retail Sector (Focus on Plastic Packaging)

9R Principles		Value Chain					
		Production	Distribution	Marketing	Consumption	Collection	Recycling
Refuse (R0)	Avoiding redundancy in product manufacturing by delegating the functions of products or offering the same functions using different products	• Removal of labels and plastic seals from commercial bottled drinking water packaging • Innovation in enhancing the durability of long-lasting plastic packaging for reusable containers	Avoiding the use of single-use packaging	Provision of refill stations/ bulk stores	Use of tumblers, bamboo/ stainless straws, reusable bags	-	-
Rethink (R1)	Using products more intensively	-	Marketing B2B (HORECA) commodities that have already implemented a reuse system	Using reusable containers for refill stations	• Manufacturers/ distributors collecting and reusing packaging that has been used by consumers (e.g., homecare product jugs, refillable water gallons) • Provision of reusable containers by canteens/ catering services at schools, food courts, and companies	Implementation of separated and scheduled waste collection	-
Reduce (R2)	Increasing production efficiency by using fewer materials	• Using less plastic material in the production process (e.g., making it thinner) • Innovation in material efficiency, minimal input maximum output	-	-	-	-	-
Reuse (R3)	Reusing products that are still usable	Provision of product packaging that can be refilled by consumers (e.g., The Body Shop's refill station program)	-	-	Purchasing products at bulk stores/ refill providers using reusable containers	-	-
Repair (R4)	Repairing damaged products	No application of Repair (R4) for plastic packaging					

9R Principles		Value Chain					
		Production	Distribution	Marketing	Consumption	Collection	Recycling
***Remanu-facture* (R5)**	Restoring products, typically older products, to make them functional again	No application of Remanufacture (R5) for plastic packaging					
***Refurbish* (R6)**	Using parts of old products that are no longer functional in new products with the same function	No application of Refurbish (R6) for plastic packaging					
***Repurpose* (R7)**	Using parts of old products that are no longer functional in new products with a different function	-	-	-	Reusing plastic for different functions (e.g., originally for drinking water packaging, repurposed as hydroponic plant containers or ecobricks), without processing (mechanical, thermal, chemical)	-	-
***Recycle* (R8)**	Processing materials to produce the same material (with the same or lower quality)	• Use of secondary raw materials (recycled content) in the production of plastic packaging products (e.g., PET water bottles) • Use of secondary raw materials in the production of other commodity products	-	Provision of take-back programs for used plastic packaging from consumers (EPR)	-	Collaboration with the informal sector to accelerate waste collection	• Recycling plastic packaging into secondary raw materials (plastic pellets/ flakes) • Recycling plastic packaging into raw materials for other products (furniture, bricks/ block)
***Recover* (R9)**	The process of converting materials to extract energy	-	-	-	-	-	Recovery of materials from plastic packaging (e.g., into oil, RDF, gas)

Implementation of 9R

Electronics Sector

9R Principles		Value Chain							
		Production	Manufacturing	Sales & Distribution	Consumption	Maintenance	Collection	Material Recovery Facilities	Electronic Waste Management
Refuse (R0)	Reducing the use of electronic devices	Avoiding the use of environmentally harmful materials	Choosing cleaner, more environmentally friendly technologies	-	-	Maintenance technicians using more energy-efficient equipment	Adopting well-organized and well-managed collection systems	Maximizing material recovery and reducing waste during the recycling process	Management supports recycling practices for components and materials with economic value
Rethink (R1)	Implementing rental systems and shared ownership of electronic devices to minimize the use of electronics and electricity	• Raw material producers and electronic manufacturers can opt to share production facilities • Encouraging manufacturers to design for circularity, allowing products to be dismantled and repaired	-	Sharing laundry and drying facilities in apartment buildings or residential areas	PLN redesigns smart metering systems to extend their lifespan, allowing meters to last over 10 years	Electronic companies can partner with local communities to establish collection stations	-	Building a network of smaller, decentralized electronic material recovery facilities in various regions	-
Reduce (R2)	Designing products or product components with longer lifespans to be used for multiple life cycles	-	-	-	Choosing long-lasting electronic products	-	-	Sorting valuable components or materials	-

9R Principles		Value Chain							
		Production	Manufacturing	Sales & Distribution	Consumption	Maintenance	Collection	Material Recovery Facilities	Electronic Waste Management
***Reuse* (R3)**	Encouraging the reuse of electronic products or components	Electronic manufacturers can reuse functional electronic components from old devices in the production of new devices	-	Selling used electronic goods	Purchasing used electronic goods	Maintenance technicians replacing damaged or worn-out parts with recycled components	-	-	-
***Repair* (R4)**	Repairing and remanufacturing (through disassembly and recovery) electronic products	Component manufacturers for repairs	Electronics companies establish official service centers	Collaborating with service centers	Repairing damaged electronic devices	-	-	-	-
***Refurbish* (R5)**	Reusing long-life components taken from previous products to be used in new products	Manufacturers use recycled raw materials	-	-	Consumers can restore classic electronic devices and sell them as collectible or retro items, such as film cameras or vinyl record players	Gotion replaces only the damaged cells without needing to replace the entire battery pack	Collection while ensuring quality standards	Sorting components that can be reused	-

9R Principles		Value Chain							
		Production	Manufacturing	Sales & Distribution	Consumption	Maintenance	Collection	Material Recovery Facilities	Electronic Waste Management
Remanu-facture (R6)	Using second-hand products by completely disassembling them to their core components. The components are cleaned, repaired, and the product is restored to a like-new condition	Manufacturers can buy back or collect their used electronic products, renovate them, and resell them as refurbished products at a more affordable price than new products	-	-	Remanufac-turing of Smart Meters has been carried out by PLN suppliers. Smart meters retrieved from customers (e.g., due to upgrades) are returned to the manufacturer, worn-out components are replaced, and then redistributed to PLN for use by customers	-	-	Electronic waste recycling companies can take used digital cameras, clean the image sensors, replace damaged components, update the firmware, and undergo quality testing before reselling them as remanufactured products	Using second-hand products by completely disassembling them to their core components. The components are cleaned, repaired, and the product is restored to a like-new condition
Repurpose (R7)	Using old parts from electronic equipment to create new electrical devices		Motors from unused electronic equipment, such as motors from washing machines or fans, can be used in new electrical devices	-	-	-	-	-	Electronic waste recycling companies can convert used smartphones with cameras into surveillance systems with the help of available surveillance applications

9R Principles		Value Chain							
		Production	Manufacturing	Sales & Distribution	Consumption	Maintenance	Collection	Material Recovery Facilities	Electronic Waste Management
Recycle (R8)	Recycling materials through better design and advanced technology to extract metals and minerals from electronic waste	Manufacturers use recycled raw materials	Manufacturers use recycled components/ parts	Distributors/ retailers sell electronic products that use recycled content	Returning unused electronic devices to dropbox centers	-	Subnational governments can set up collection centers for used electronics in strategic locations	Used electronic devices are sorted by type and condition, then disassembled to recover reusable components	Recycling electronic waste into plastic, glass, and aluminum raw materials PT HIT (Polytron) recycles plastic components from leftover production materials
Recover (R9)	Recovering energy from remaining electronic waste and materials using various waste-to-energy technologies	Manufacturers can recover or reclaim valuable resources from used electronic devices for reuse in the production of electronic components or new devices		-	-	-	-	-	Components that cannot be recycled will go through a recovery process, such as reclaiming copper and iron from electronic waste to be used as alternative raw materials (Alternative Material - AF) for cable or steel manufacturing.

Implementation of 9R

Construction Sector

9R Principles	Producer	Distribution	Contractor	Planning Consultant	Construction Management	Supplier	Estate/ Building Management	Tenant	Owner	Informal Sector	Incineration/ RDF/ TPA
Refuse (R0)	Creating modular/ precast concrete that can replace the function of formwork in the concrete casting process	-	Execution of the use of modular/ precast concrete in construction projects	Developing plans and designs for the use of modular systems in construction projects	Planning and supervising the implementation of modular/ precast concrete usage in construction projects	Supplying modular/ precast concrete in construction projects	Using modular/ precast concrete in construction projects	Using modular/ precast concrete in construction projects	Using modular/ precast concrete in construction projects		
Rethink (R1)		Providing transportation services for manufacturers/ contractors/ clients using more efficient and intensive (repeated) transportation methods	Renting heavy equipment or transport vehicles; renting scaffolding	Planning work methods that utilize more efficient and intensive (repeated) tools during the planning stage	Planning work methods that utilize more efficient and intensive (repeated) tools during the planning stage	Renting/ supplying heavy equipment or transport vehicles; scaffolding rental	Renting heavy equipment or transport vehicles; scaffolding rental	Renting heavy equipment or transport vehicles; scaffolding rental	Renting heavy equipment or transport vehicles; scaffolding rental		
Reduce (R2)	Using alternative materials from waste residues to improve production efficiency, such as using FABA in concrete mixtures		Using modular/ precast concrete to reduce on-site construction waste	Planning material efficiency in construction during the planning stage	Planning material efficiency in construction during the planning stage	Supplying modular/ precast concrete components in construction projects	Using modular/ precast concrete to reduce on-site construction waste	Using modular/ precast concrete to reduce on-site construction waste	Using modular/ precast concrete to reduce on-site construction waste		
Reuse (R3)			Using reclaimed roof tiles, asbestos, and zinc sheets	Designing plans that incorporate the reuse of functional products		Supplying the use of reclaimed roof tiles, asbestos, and zinc sheets				Using reclaimed roof tiles, asbestos, and zinc sheets	

9R Principles	Producer	Distribution	Contractor	Planning Consultant	Construction Management	Supplier	Estate/ Building Management	Tenant	Owner	Informal Sector	Incineration/ RDF/ TPA
Repair (R4)			Refinishing old door materials to make them look new and more modern							Refinishing old door materials to make them look new and more modern (Should be included in the R flow diagram)	
Remanu-facture (R5)		Arranging transportation for home/ building renovation projects	Building renovation	Creating renovation design plans	Supervising the implementation of building renovations	Supplying building renovation services	Building renovation	Building renovation	Building renovation		
Refurbish (R6)	No application of Remanufacture (R6) for construction										
Repurpose (R7)	Using sawdust to make particle board	Transporting leftover materials for reuse, such as using leftover bricks as land fill	Using leftover bricks as land fill	Designing plans using leftover materials, such as using leftover bricks as land fill	Supervising the use of leftover materials during implementation, such as using leftover bricks as land fill	Supplying leftover construction materials, such as bricks to be used as land fill	Using leftover construction materials, such as bricks to be used as land fill	Using leftover construction materials, such as bricks to be used as land fill	Using leftover construction materials, such as bricks to be used as land fill	Supplying leftover construction materials, such as bricks to be used as land fill	
Recycle (R8)	Recycling iron: refurbishing used light steel for reuse as construction material									Recycling iron for reuse as construction material	
Recover (R9)											Processing waste into raw energy materials

Implementation of 9R

Textile Sector

9R Principles		Value Chain					
		Production	Distribution	Marketing	Consumption	Collection	Recycling
***Refuse* (R0)**	Avoid redundancy in product manufacturing by reallocating the product's function or offering the same function using a different product	• Avoid the use of petroleum-based synthetic fibers and non-biodegradable materials • Avoid the use of natural fibers and regenerated cellulose that do not follow environmental sustainability principles in their production • Avoid the use of chemicals harmful to health and the environment (e.g., PFAS), especially in textile products • Enhance the durability of materials in terms of strength and appearance in textile products	Avoid the use of plastic packaging and other environmentally harmful and/ or hazardous materials in the distribution of textile and non-textile products	Avoid the use of plastic packaging and other environmentally harmful and/ or hazardous materials in the sale of textile and non-textile products	• Select textile products that are more durable and free from harmful chemicals to health and the environment • Avoid purchasing textile products made from non-biodegradable, petroleum-based synthetic fibers or natural and regenerated cellulose fibers that are not environmentally friendly in their production process	Adopt a well-organized and well-managed collection system	Management supports recycling practices for components and materials with economic value
***Rethink* (R1)**	Use products more intensively	• Use multifunctional production facilities • Manufacture products with dual functionality and/or greater durability • Manufacture products with versatile designs	Sales on commodities that have applied reuse system Building integrated system on textiles waste collection	Market textile and non-textile products through rental or sharing systems	• Utilize textile products, both apparel and non-apparel, through rental and/or sharing systems • Choose multifunctional items	Establish an integrated and comprehensive system for collecting used clothing and other textile waste	-

9R Principles		Value Chain					
		Production	Distribution	Marketing	Consumption	Collection	Recycling
***Reduce* (R2)**	Increase production efficiency by using fewer materials and natural resources	• Reduce the use of new raw materials and increase the use of raw materials from waste • Reduce energy consumption (electric and thermal) and freshwater usage	• Reduce the use of imported raw materials and/or materials sourced from distant locations • Increase the use of local raw materials • Enhance the capability of supplying local raw materials	• Reduce the use of plastic and other environmentally harmful materials as packaging for textile products • Minimize unnecessary or excessive packaging elements	• Reduce the consumption of textile materials and products, both apparel and non-apparel (slow fashion) • Reuse of used textiles products	• Improve the efficiency of sorting and segregating used clothing and textile waste • Reduce textile waste disposed of in TPAs	Increase the recycling rate of used clothing and textile waste through upcycling or downcycling processes
***Reuse* (R3)**	Reuse products that are still in good condition	-	-	Use packaging materials that can be returned to the manufacturer for reuse	Reuse wearable textile products, both apparel and non-apparel	-	-
***Repair* (R4)**	Repair damaged products	Manufacturers provide repair services for damaged products	-	Retail stores provide repair services for damaged products	Repair damaged products independently	-	-
***Remanufacture* (R5)**	Restore products, typically older ones, to make them functional again	No application of Remanufacture (R5) for textiles					

Prinsip 9R		Rantai Nilai *(Value Chain)*					
		Produksi	Distribusi	Pemasaran	Konsumsi	Pengumpulan	Daur Ulang
***Refurbish* (R6)**	Reuse parts from non-functional products in new products with the same function	No application of Refurbish (R6) for textiles					
***Repurpose* (R7)**	Reuse parts from non-functional products in new products with a different function	Use fabric or textile materials from non-functional products as components in new textile products, such as quilts made from fabric scraps	-	-	Repurpose materials from unusable clothing and other non-functional textile products into new products with different functions, such as converting clothing into rags or table covers	-	-
***Recycle* (R8)**	Process materials to produce the same material (with the same or lower quality)	• Use textile waste materials as raw materials for new products, such as converting cellulose in cotton-based products into pulp for rayon production • Use fibers from shredded textile waste and textile products to produce new yarn and fabric	-	Provide a collection program for used clothing and other textile products	-	• Sorting & collecting textile waste • Implement take-back (EPR) programs • Collaborate with the informal sector to accelerate textile waste collection	Recycle textile waste into new products through upcycling or downcycling
***Recover* (R9)**	Convert materials to extract energy	-	-	-	-	-	Recover materials from textiles as an alternative energy source



GLOSSARY & LIST OF ABBREVIATIONS

Food Sector

Cold storage	A room/ warehouse specifically designed to maintain certain temperature conditions and used to store various types of products, particularly perishable goods, with the aim of preserving their freshness.
Good Processed Food Production Practices (CPPOB)	Guidelines that outline how to produce Processed Food to ensure it is safe, of high quality, and suitable for consumption.
Date marking	The practice of date marking on food packaging to provide information related to the production date, expiration date, or best-before date. There are two main types of date marking commonly used: “best before date” and “use by date.” The “best before date” indicates when the product reaches its peak quality, while the “use by date” signifies the last recommended date for consumption without compromising food safety. This practice is crucial for helping consumers make informed decisions about food consumption and assists producers and retailers in stock management and inventory control.
Downstream processing	Activities aimed at optimizing all processes such as production and improving product targets, maximizing product output with minimal costs.
Food Loss	A reduction in the quantity of food resulting from decisions and actions by food suppliers within the food chain, excluding retail, food service providers, and consumers.
Food Waste	A reduction in the quantity of food resulting from decisions and actions by retailers, food service providers, and consumers.
Foodbank	An organization or institution aimed at collecting, storing, and distributing food to those in need, particularly those experiencing hunger or economic hardship. They collaborate with various agencies, food stores, food producers, and individuals to gather food donations, which are then distributed to those in need through an extensive distribution network.
Good Handling Practice (GHP)	Good Postharvest Handling practices that involve the application of technology and the use of available facilities and infrastructure.

Food labeling	Any information about food in the form of images, text, a combination of both, or other forms included with the food, placed inside, affixed to, or as part of the food packaging. For producers, labels serve as a means of communicating with consumers.
Off-grade food products	Off-grade food products are food items that do not meet the established quality standards for that product but are still safe for consumption. This can occur due to various reasons, such as cosmetic defects, uneven size, or minor damage that does not affect the overall safety or nutritional quality of the product.
Rice Milling Unit (RMU)	A facility or processing unit specifically designed to mill paddy into rice.
National Waste Management Information System (SIPSN)	A network system that manages data sourced from several integrated basic data points into a comprehensive Waste Management information set.
Soybean	Protein extracted from soybeans, nutrient-rich plant seeds.
Resources	Refers to fruits, vegetables, or other foods that have an imperfect or unusual physical appearance. This can include oddly shaped fruits, unevenly sized vegetables, or foods that look unusual due to cosmetic defects.
Ugly food	Although these foods often have the same nutritional value as more “attractive” foods, they are frequently overlooked or discarded by producers, retailers, or consumers due to their unappealing appearance.

Retail Sector (focused on Plastic Packaging)

Waste Bank	Community-based initiatives and facilities that collect and sort waste, where incentives such as rewards or money are provided to encourage sorting and collection activities.
Biodegradable	Materials or substances that can be naturally decomposed by microorganisms in specific environments, thereby leaving no harmful residues and helping to reduce waste issues.
D4R	*Design for Recycling: a study that compares the compatibility of polymers with high circularity for recycling feedstock or facilitates the recycling process of plastic waste.*
High Value Plastic Packaging	Plastic packaging with high economic value, which is easily recyclable and supported by the presence of recycling facilities and stable demand.
Home Care	A category of products that includes various household items used for cleaning, maintaining, or ensuring the cleanliness and comfort of indoor environments, such as detergents, floor cleaners, and air fresheners.
Low Value Plastic Packaging	Plastic packaging with low economic value due to its difficulty in being recycled and tendency to contaminate the recycling process. This is exacerbated by the limitations and distribution of recycling facilities for this type of packaging.
Personal Care and Comestics (PCC)	A category of products encompassing a range of personal care items, including cosmetics, skincare, haircare, and body care products, as well as personal health products such as body wash, shampoo, and lotion, designed to improve individual health and physical appearance.
RDF	*Refuse-Derived Fuel: an alternative fuel produced from the processing of non-hazardous solid waste, where organic and inorganic materials are separated, with the inorganic materials used as fuel for energy generation, reducing dependence on fossil fuels and providing an alternative solution for waste management.*

Recycled Content	The percentage or proportion of raw materials in a product that come from recycled materials, indicating the contribution to waste reduction and sustainable use of natural resources.
Recycling Rate	The percentage or proportion of waste that is successfully recycled from the total waste generated in a region or system, reflecting the efficiency of the recycling program.
Recovery Rate	The percentage or proportion of waste that is successfully processed into energy or alternative raw materials through processes such as recycling, composting, or the use of refuse-derived fuel (RDF), helping to reduce environmental impacts from waste disposal.
TPS	Landfills: Designated locations for the collection, sorting, and regular disposal of waste.
TPS 3R	Landfills that implement the principles of the 3Rs—Reduce, Reuse, and Recycle—in efforts to minimize the environmental impact of waste disposal.
TPST	Integrated Waste Processing Facilities: Locations equipped with processing facilities such as incinerators, composters, or other treatment installations to manage waste efficiently.
TPA	Final Disposal Sites: Areas used as the final destination for waste, typically after undergoing processing and sorting at earlier stages.



Electronics Sector

Critical Raw Materials – CRMs	Vital components contained in electronic products, consisting of minerals that are crucial for national economic and defense purposes, and that have potential supply disruption risks without viable alternative materials.
Dropbox e-Waste	Electronic waste dropbox: A designated container for the collection of electronic waste.
Ecolabel	Accurate and non-misleading environmental information: A means of providing consumers with accurate, verifiable, and non-deceptive information about the environmental aspects of a product (goods or services), its components, or packaging.
Ekodesain	Eco-design framework: A set of guidelines defining the eco-design requirements for environmental parameters that factories must meet for their products to carry the CE (Circular Economy) mark.
Electronic Waste (E-Waste)	Electronic items that are discarded because they are no longer functional or usable.
Extended Producer Responsibility (EPR)	A program aimed at making producers responsible for the environmental impact of their products throughout the product lifecycle, from design to consumer disposal.
Battery Electric Vehicles (KBLBB)	Vehicles powered by electric motors, receiving their power supply from batteries either directly on the vehicle or from external sources.
Indonesia Standard Industrial Classification (KBLI)	The classification of Indonesian economic activities that produce goods or services, based on business sectors, to provide consistency in concepts, definitions, and classifications of business fields amidst economic development and shifts in Indonesia.
Hazardous and Toxic Waste (B3)	A type of waste that contains substances in concentrations that are toxic and hazardous, capable of causing direct or indirect harm to the environment, threatening human health, and endangering the survival of other organisms.

Material Recovery Facility	A facility designed for the sorting and processing of waste.
Printed Circuit Board (PCB)	A board on which electronic components are arranged to form an electronic circuit, connecting the components without the use of wires.
Producer Responsibility Organization (PRO)	An organization that acts on behalf of producers to fully comply with the EPR scheme, managing the costs associated with EPR implementation, supporting producers, and contracting with waste management operators.
Renewable energy	Energy derived from “sustainable natural processes,” such as solar power, wind energy, water currents, biological processes, and geothermal heat.
Product Lifetime	The period during which an electronic product is expected to function as intended. Measured in years of use, a product reaches the end of its lifespan when it can no longer serve its intended purpose, its spare parts are no longer functional, or it is no longer used by its owner.

Construction Sector

Green Rating System	A system that assesses buildings based on sustainability and environmental criteria, assigning scores based on factors such as energy efficiency, environmentally friendly materials, water management, indoor air quality, and other environmental impacts.
Bangunan Gedung Hijau (BGH)	Green Building: A building that meets technical standards and demonstrates significantly measurable performance in energy, water, and resource conservation through the application of Green Building principles according to its function and classification at every stage of its implementation.
Greenship Certification	An official recognition granted by the Green Building Council Indonesia (GBCI) to buildings that meet specific standards and criteria for sustainability and energy efficiency, indicating compliance with environmentally friendly practices set by GBCI.
Excellence in Design for Greater Efficiencies (EDGE) Certification	A recognition awarded to buildings that meet certain standards for energy efficiency and environmental impact reduction. This certification, issued by the International Finance Corporation (IFC), focuses on reducing energy, water, and material consumption, signifying that the building has been designed with sustainability principles to minimize environmental impact.
Building Information Modelling (BIM)	A digital process that involves creating and managing a three-dimensional (3D) model, including both geometric and non-geometric information such as schedules, costs, and material specifications, used in the construction industry to comprehensively manage structured information about a building or infrastructure throughout its lifecycle.
Construction and Demolition (C&D) Waste	Waste generated from the construction, renovation, and demolition of buildings, including materials that are no longer needed once a construction project is completed or a building is demolished.
Prefabrication	A construction technology that produces building components in a factory, which are then transported to the project site for assembly. Prefabrication technology can be applied to various types of buildings, such as homes, office buildings, bridges, and even industrial structures. Prefabricated products can also be modular, with an ex-situ installation system or in-situ assembly with minimal waste.

Carbon-Intensive Products	Construction materials that require substantial fossil energy during production: These often involve the combustion of fossil fuels, leading to increased greenhouse gas emissions and contributing to a higher carbon footprint in construction projects.
Non-Carbon-Intensive Products	Building materials with low fossil energy requirements during production: These materials have low greenhouse gas emissions, helping to reduce the carbon footprint of construction projects.
Eco-Friendly Label	Voluntary methods for environmental performance certification and labeling worldwide: Eco-labels identify products or services that have been proven to be environmentally friendly within specific product or service categories.
Green Industry Standards	Standards for promoting sustainable industrial practices: These standards prioritize efficiency and effectiveness in resource use throughout production processes, aligning industrial development with environmental sustainability and benefiting society.
Low Carbon Building	Buildings that consider energy and material efficiency: These structures minimize greenhouse gas emissions throughout their lifecycle, including the use of eco-friendly materials and technologies.
Net Zero Building	Energy-efficient and resource-efficient buildings: These buildings produce as much energy as they consume, leaving no greenhouse gas emissions, and rely on their own renewable energy sources.
Embedded Carbon	Total greenhouse gas emissions from a product's lifecycle: This includes emissions from production, transportation, use, and disposal, encompassing all emissions associated with material production, manufacturing, energy use, and waste disposal.
Technical Assistant	Technical and administrative support: Assistance provided in completing tasks requiring technical expertise, such as research, data collection, and technical support in specific projects.
Sustainable Construction	Sustainable construction practices: These practices minimize negative environmental, economic, and social impacts by using eco-friendly materials, energy-efficient designs, and reducing the carbon footprint.

Textile Sector

Textiles and Textile Products (TPT)	Fiber, filament yarn, fabric sheets, and products that use fabric sheets as raw or auxiliary materials.
Pre-Consumer Waste	Waste that never reaches consumers or enters the hands of consumers. This waste is directly produced by factories or manufacturers.
Post-Consumer Waste	Waste generated by consumers, typically consisting of textile waste in the form of products that are no longer used and are ready to be discarded.
Cradle to Grave (C2G)	The linear economy principle in the textile sector, explaining that all textile waste is directly disposed of in landfills without undergoing any processing. This is also referred to as an open-loop approach.
Cradle to Cradle (C2C)	The circular economy principle in the textile sector, describing every effort to recycle textile waste, leading to a closed-loop approach.
Fiber to Fiber	The process of recycling used textile materials to produce new fibers that can be used in the manufacture of other textile products.
Liquor Ratio (LR)	The ratio of the volume of water used in the dyeing or washing process to the weight of the textile material being processed.
Viscose Staple Fibers (VSF)	Man-made fibers derived from natural cellulose, typically produced from wood pulp. Viscose fibers fall under the category of rayon, which is a type of regenerated fiber. Viscose staple fibers share similar characteristics with natural fibers like cotton but are created through a chemical process that transforms cellulose into fibers that can be used to make various textile products.

Abbreviations

3R	Reduce, Reuse, Recycle
3RproMar	Reduce, Reuse, Recycle to Protect the Marine Environment and Coral Reefs
9R	Refuse, Rethink, Reduce, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle, Recover

A

AC	Air Conditioner
AKSARA	Application for Planning Development of Low Carbon & Climate-Resilient Actions in Indonesia
AMDAL	Environmental Impact Analysis
AMDK	Packaged Drinking Water
APBD	Subnational Budget
APBN	State Budget
APR	Asia Pasific Rayon

B

B2B	Business-to-Business
B2C	Business-to-Consumer
B3	Hazardous and Toxic Substances
Bappenas	National Development Planning Agency
BaU	Business-as-usual
BBM	Fuel Oil
BGH	Green Building
BIM	Building Information Modelling
BKPM	Investment Coordinating Board
BPDLH	Environmental Fund Management Agency
BPOM	Indonesian Food and Drug Authority (BPOM)
BRIN	National Research and Innovation Agency
BSF	Black Soldier Fly
BSI	Central Waste Bank
BUMN	State-Owned Enterprises

C

C2C	Cradle to Cradle
C2G	Cradle to Grave
CAD	Computer-Aided Design
CAGR	Compound Annual Growth Rate
CAP SEA	Collaborative Actions for the Prevention of Single-Use Plastics in South-East Asia
CCEP	Coca-Cola Europacific Partners Indonesia
CE	Circular Economy
CH_4	Methane
CO_2	Carbon Dioxide
COCs	Chemicals of Concerns
COMDEV	Community Development
CPPOB	Good Processed Food Manufacturing Practices
CRC	Cold Rolled Coil
CRMs	Critical Raw Materials
C&D	Construction and Demolition
C-to-C	Cumulative to Cumulative

D

D4R	Design for Recycle
DCA	Divers Clean Action
DLH	Environmental Agency
DRAM	Mitigation Action Plan Document

E

EBT	New and Renewable Energy
EDGE	Excellence in Design for Greater Efficiencies
EFT	Ecological Fiscal Transfer
EPD	Environmental Product Declaration
EPPO	Energy for Organic Feed Production (MJ/Ton)
EPPO	Energy for Organic Fertilizer Production (MJ/Ton)
EPPS	Energy for Feed Production (MJ/Ton)
EPPS	Energy for Synthetic Fertilizer Production (MJ/Ton)
EPR	Extended Producer Responsibility
ESDM	Ministry of Energy and Mineral Resources
EV	Electric Vehicle

F

FABA	Fly Ash dan Bottom Ash
FDI	Foreign Direct Investment
FGD	Focus Group Discussion
FLW	Food Loss and Waste
FMCG	Fast-Moving Consumer Goods

G

GAPMMI	Association of Indonesian Food and Beverage Producers
GBCI	Green Building Council Indonesia
GDP	Gross domestic product
GGP	Great Giant Pineapple
GHP	Good Handling Practice
GIZ	Deutsche Gesellschaft fur Internationale Zusammenarbeit
GPAP	Global Plastic Action Partnership
GRK	Greenhouse Gases

H

HAKI	Intellectual Property Rights
HDPE	High Density Polyethylene
HOREKA	Hotel, Restaurant, and Café
HPk	Average Commodity Yield (Ton/Season)
HRC	Hot Rolled Coil

I

IBS	Large and Medium Industries
ICCTF	Indonesia Climate Change Trust Fund
IKBI	Indonesian Sustainable Finance Initiative
IMK	Micro and Small Industries
INAPLAS	Indonesian Plastics Industry Association
IPCC	Intergovernmental Panel on Climate Change
ISO	International Organization for Standardization

J

JAKSTRANAS	National Policy and Strategy
JD	Number of Downstream (3-Year Durability) Processing
JFB	Number of Food Banks
JH	Number of Intellectual Property Rights
JKD	Total Amount of Edible Food Saved
JIS	Jakarta International Stadium
JP	Total Funding
JP	Population (Individuals)
JP	Amount of Synthetic Fertilizer Used (Ton of Fertilizer/Ha)
JPBNU	Amount of Synthetic Fertilizer for Non-Superior Seeds (Ton/Ha)
JPBU	Amount of Synthetic Fertilizer for Superior Seeds (Ton/Ha)
JPT	Livestock Production (Heads)

JS	Number of Composting Centers
JS	Number of Startups Receiving Grants
JSP	Number of Integrated Processing Centers (Warehouse, Drying Machines)
Juknis	Technical Directive

K

KBLI	Standard Classification of Indonesian Business Fields
Kemendagri	Ministry of Home Affairs
Kemenkomarves	Coordinating Ministry for Maritime Affairs and Investment
Kemenkop UKM	Ministry of Cooperatives and Small and Medium Enterprises
Kemenperin	Ministry of Industry
Kementan	Ministry of Agriculture
KKP	Ministry of Marine Affairs and Fisheries
KLB	Building Floor Coefficient
KLHK	Ministry of the Environment and Forestry
KOMINFO	Ministry of Communication and Informatics
KPBU	Public-Private Partnership
KPO	Average Organic Waste Processing Capacity (Ton/Day)
KPO	Organic Feed Requirement (Ton/Ha)
KPO	Organic Fertilizer Requirement (Ton/Ha)
KPS	Feed Requirement (Ton/Head)
KPS	Synthetic Fertilizer Requirement (Ton/Ha)
KSO	Organic Waste Processing Capacity (Ton/Day)
KUR	People's Business Credit
K/L	Ministries/Agencies

L

LCA	Life Cycle Assessment
LDPE	Low Density Polyethylene
LED	Light Emitting Diode
LKO	Area of Conventional Land Converted to Organic (Ha)
LKPP	National Public Procurement Agency
LL	National Land Area (Ha)
LLO	Organic Land Area (Ha)
LPMUKP	Marine and Fisheries Business Capital Management Agency

M

MBM	Meat Bone Meal
MEP	Mechanical, Electrical and Plumbing
MLP	Multi-Layered Plastic
MRF	Materials Recovery Facility
MTOE	Million Ton Oil Equivalent
MYCL	Mycotech Lab

N

NEK	Carbon Economic Value
Non OPC	Non Ordinary Portland Cement
NPAP	National Plastic Action Partnership
NZE	Net Zero Emission
N/A	Not Applicable, Not Available or No Answer

O

OEKO-TEX	International Association for Research and Testing in the Field of Textile and Leather Ecology
OJK	Financial Services Authority
OSS	Online Single Submission

P

PBB	Land and Building Tax
PBNU	Average Productivity of Non-Superior Seeds (Ton/Ha)
PBU	Average Productivity of Superior Seeds (Ton/Ha)
PCB	Printed Circuit Board
PCC	Personal Care & Cosmetics
PDB	Gross Domestic Product
PDRB	Gross Regional Domestic Product
PDU	Recycling Center
Pemda	Subnational Government
PEP	Energy from Alternative Feed Production Avoided (MJ)
PEP	Fertilizer Energy Reduction (MJ)
Permen	Ministerial Regulation
Permenkeu	Minister of Finance Regulation
PermenLHK	Minister of Environment and Forestry Regulation
Permenperin	Minister of Industry Regulation
Perpres	Presidential Regulation
PET	Polyethylene terephthalate
PETG	Polyethylene terephthalate glycol
PIH	Green Industry Center
PIM	Amount of Synthetic Fertilizer Input Avoided (Ton/Season)
PIP	Government Investment Center
PLN	State Electricity Company
PLTS	Solar Power Plant
PLTSa	Waste-to-Energy Power Plant
PMA	Foreign Investment
PMDN	Domestic Investment
PNU	Use of Non-Superior Seeds (%)
Pokja	Working Group
POPs	Persistent Organic Pollutants
PP	Government Regulation
PP	Polypropylene
PPBN	National Clean Production Center
PPPP	Protein Material Use in Feed Avoided (Ton)
PPPS	Synthetic Fertilizer Use Avoided (Ton)
PPS	Independent Agricultural Extension Workers
PPSI	Number of Participants Implementing SNI 22000, SNI CPPOB, CPPOB
PRK	Low Carbon Development
PRUS	Change in Resources Use Intensity with the Use of Superior Seeds (Ton of Fertilizer/Ton of Harvest)
PS	Polystyrene
PSN	National Strategic Project
PU	Use of Superior Seeds (%)
PUPR	Ministry of Public Works and Housing
PUSFASTER	Center for Facilitation of Environmental and Forestry Standards Implementation
PVC	Polyvinyl chloride

Q

QOQ	Quarter-to-Quarter

R

RAN	National Action Plan
RAN-ES	National Circular Economy Action Plan
RDF	Refuse Derived Fuel
RDT	Date Marking Regulation
RPJMN	National Medium-Term Development Plan
RPJPN	National Long-Term Development Plan
RR	Recycling Rate (%)
R&D	Research and Development

S

SCM	Supply Change Management
SDGs	Sustainable Development Goals
SDA	Natural Resources
SDM	Human Resources
SEEC	Specific Electrical Energy Consumption
SIG	PT Semen Indonesia (Persero) Tbk
SIH	Green Industry Standards
SIINAS	National Industrial Information System
SIMBG	Building Management Information System
SIMPK	Construction Materials and Equipment Information System
SIPSN	National Waste Management Information System
SIRAJA	Hazardous Waste Management Performance Reporting Application
SKK	Work Competency Certificate
SMK	Vocational High School
SMT	Surface Mount Technology
SNI	Indonesian National Standard
SUP	Single Use Plastics
SVLK	Timber Legality Verification System
SWF	Sovereign Wealth Funds

T

TKDN	Domestic Capability Level
TPA	Final Disposal Site
TPO	Option-portion Participation Rate
TPO	Organic Waste Generation (Ton/Day)
TPP	Participation Rate in Alternative Feed Contribution
TPS 3R	Reduce, Reuse, Recycle-Based Waste Processing Site
TPS	Temporary Waste Storage
TPST	Integrated Waste Processing Site
TPT	Textiles, Apparel, and Leather
TSJ	Waste Generation (Kg/Capita/Day)
TV	Television

U

UMi	Ultra Micro Financing
UMKM	Micro, Small, and Medium Enterprises
UNPAGE	United Nations - Partnership for Action on Green Economy
UU	Law

V

VSF	Viscose Staple Fibers

W

WIKA	Wijaya Karya
WTE	Waste to Energy

Y

YoY	Year-on-Year

NATIONAL ROADMAP
& ACTION PLAN

CIRCULAR ECONOMY INDONESIA 2025-2045





Ministry of National
Development Planning/Bappenas
Republic of Indonesia

NATIONAL ROADMAP
& ACTION PLAN

CIRCULAR ECONOMY INDONESIA 2025–2045

Ministry of National Development Planning/Bappenas ©2024