2050 Taiwan Circular Economy Roadmap – Summary Report (Draft)



環境部資源循環署
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1. Global Trend

According to the UNEP report Global Resources Outlook 2024[1], global resource demand will continue to grow. Without urgent action, by 2060 the amount of extracted resources will increase by 60% compared to 2020, becoming a major driver of the triple planetary crisis of climate change, biodiversity loss, and pollution. Currently, about 55% of global greenhouse gas emissions are related to the extraction and processing of virgin resources. The Earth Overshoot Day has been arriving earlier each year, showing that humanity's demand for resources has exceeded the planet's regenerative capacity.

The circular economy is viewed as a key solution. By reducing waste generation, extending product lifespans, and promoting high-quality recycling and remanufacturing, it can effectively decrease dependence on virgin resources, cut carbon emissions and pollution, and help protect ecosystems. According to the UN Global Stocktake on National Circular Economy Roadmaps 2024, more than 40 countries have incorporated circular economy into their national strategies. Policy focus is also shifting from end-of-pipe waste management toward systemic transformation, covering product design, business models, consumption behavior, and resource reuse, and is

[1] UNEP, Global Resources Outlook 2024.

becoming increasingly integrated with climate policy.

However, the global circularity rate continues to decline — from 7.2% in 2018 to 6.9% in 2021 — indicating that the use of secondary materials is not keeping pace with total resource consumption[2]. To limit global warming to below 2°C, the global circularity rate must rise to 17% by 2032, and per capita virgin resource use must be kept within 6–8 tons per year to maintain the 2°C target. [3]

2. Progress and Challenges

Since the implementation of the Waste Disposal Act in 1974, Taiwan has gradually established a comprehensive system for waste and resource management. The country's approach has evolved from early-stage collection and landfill practices to the establishment of the "4-in-1 Recycling System" and the Resource Recycling Act, laying the institutional foundation for nationwide participation in recycling.

In 2016, Taiwan launched the "5+2 Industrial Innovation Plan," which included Smart Machinery, Asia-Silicon Valley, Green Energy Technology, Biomedical, National Defense Industry, New Agriculture, and Circular Economy — marking the first time that Circular Economy was incorporated into national

[2] Circle Economy, The circularity gap report 2025.
[3] UNEP, Decoupling Natural Resource Use and Environmental Impacts from Economic Growth, 2011.

industrial policy.

In response to Taiwan's 2050 Net-Zero Transition goals, the 2023 "Resource Recycling and Zero Waste" Key Strategic Action Plan officially integrated resource circulation into national carbon reduction policy. It set three major goals, four promotion strategies, and ten key actions, reflecting the twin policy directions of circularity and decarbonization. The details, relevant regulations, expected impacts or targets, and inter-ministerial division of responsibilities for these ten key actions are summarized in the annex, *"Resource Recycling and Zero Waste Key Strategic Action Plan — 10 Key Actions (Chinese only)."*

In 2024, the government announced the National Vision for Green Growth and 2050 Net-Zero Transition, and proposed a dual-axis strategy for digital and green industrial transformation, integrating circular economy principles into flagship decarbonization programs.

The Recycled Resource Recycling and Reuse Promotion Committee serves as an inter-ministerial coordination mechanism, composed of representatives from relevant government agencies, academic experts, and environmental organizations. The committee is responsible for regularly updating the National Resource Circulation Action Plan.

In terms of resource use, Taiwan consumes over 300 million

metric tons of raw materials each year, with imports accounting for about 75%, indicating a high dependence on international supply chains. In 2023, the country's Domestic Material Consumption (DMC) reached 242 million metric tons, or 10.37 tons per capita, with consumption concentrated in the construction, energy, and heavy industry sectors — reflecting a high-carbon and resource-intensive industrial structure. Regarding waste generation, the total amount in 2023 exceeded 41 million metric tons, including municipal, industrial, agricultural, and construction waste, as well as steel slag. Among these, 6.8 million tons were still treated through incineration or landfill. Although Taiwan's recycling system has achieved notable results — with an industrial waste reuse rate of 85%, a municipal waste recycling rate of 58%, and an overall outlet circularity rate of about 76% — the inlet circularity rate remains only 9.4% (calculated as recycled material input ÷ total processed material input × 100%), indicating that secondary materials still account for only a limited share in the overall raw material input structure.

However, the current legislation & regulatory frameworks still lack a clear legal basis for areas such as eco-design principles, circular procurement, and incentive mechanisms to support resource circulation industries. As a result, regulations on product

life-cycle management and the integration of recycled materials remain incomplete. At the same time, Taiwan's resource structure has long relied on imports, and the high proportion of resource- and energy-intensive sectors puts pressure on overall system resilience. In addition, inefficiencies in waste reduction and sorting at the consumer level further create structural challenges that limit the full potential of circularity.

3. Vision and Goals

Taiwan's circular economy vision aims to achieve net-zero emissions and a fully circular economy by 2050, centered on two core strategies: "Redefine" and "Redesign." These strategies promote resource decoupling, enhancement of circularity, and digitally enabled, intelligent governance, driving a comprehensive transformation from the current linear economic model toward a systemic circular economy framework that balances economic growth, resource efficiency, and environmental sustainability. This vision aligns with SDG 8 (Decent Work and Economic Growth) and SDG 12 (Responsible Consumption and Production). Through industrial transformation, innovative design, and digital traceability mechanisms, it not only achieves decoupling of resource use from economic growth, but also strengthens supply chain resilience, laying a sustainable

foundation for national development.

Details of the goals for the ten key initiatives can be found in the annex, *"Resource Recycling and Zero Waste Key Strategic Action Plan — 10 Key Actions (Chinese only)."*

Taiwan has set three major circular economy goals for 2050, compared to the 2020 baseline, to drive systemic transformation through the following directions:

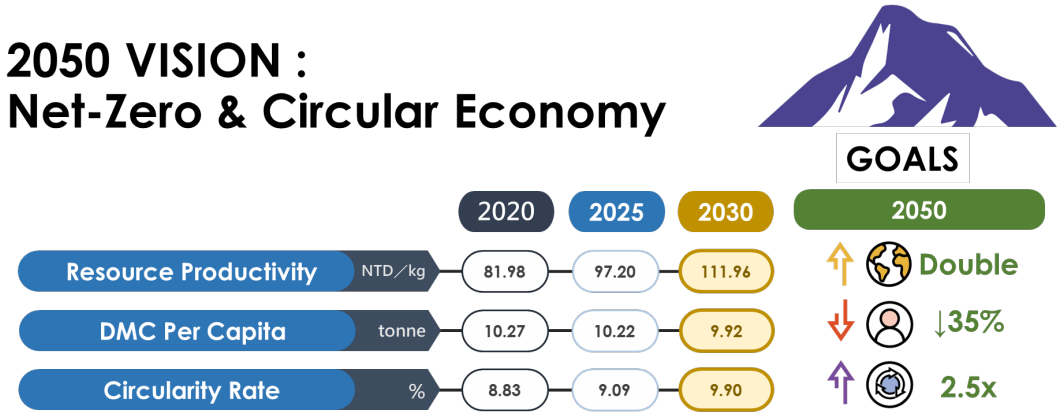
- Goal 1: Enhance the decoupling of economic growth and resource use

  Double the economic value generated per unit of resource input. Through circular design, technological innovation, and industrial upgrading, Taiwan aims to decouple economic growth from resource consumption, strengthening both competitiveness and sustainability.
- Goal 2: Reduce per capita resource consumption pressure

  Lower per capita material consumption to 6-7 tons per person by promoting source reduction, extending product lifespans, and optimizing consumption structures. This will reduce dependence on primary resources, ease environmental pressures, and enhance resource resilience.
- Goal 3: Increase the share of circular material use

  Raise the input-end circularity rate by 2.5 times through high-quality secondary material supply and design-oriented

approaches, expanding the scale of circular utilization.



*BASE ON 2020
*Circularity rate = (cyclical use/Processed material*100%)【Refer to Japan's methodology】

4. Cross-Sectoral Governance

Through a clear vision and well-defined targets, Taiwan seeks to build long-term consensus across sectors, strengthen life-cycle management, and address the systemic transformation challenges involved in transitioning to a circular economy.

To achieve this, it is essential to promote a nationwide circular economy through inter-ministerial collaboration, coordinating diverse governance approaches to support industrial circularization. The first step is the update and adjustment of legislation and regulatory frameworks to align with the latest international trends. This must be followed by comprehensive management across the entire material life cycle, including: Eco-design to drive source reduction, sustainable consumption to stimulate circular markets, and high-value resource and energy

efficiency improvements. At the same time, key supporting tools must be strengthened — such as economic instruments for financial support, promotion of technological innovation and application, and enhancement of education and talent development.

4.1 Legislation & Regulatory Frameworks

The promotion of the circular economy must be grounded in a legal and institutional framework. Taiwan is currently revising both the Waste Disposal Act and the Resource Recycling Act to establish a "Dual Circular Governance Framework."

Under this framework:

- The Resource Recycling Act will be revised into the Resource Circulation Promotion Act, aiming to strengthen incentives and market creation, promote inter-ministerial collaboration, and implement a National Resource Circulation Plan.
- The Waste Disposal Act will be enhanced to tighten regulatory control, cover emerging waste streams, and impose stricter penalties for illegal practices.

Looking ahead, Taiwan will introduce comprehensive life-cycle management, digital tracking, and extended producer responsibility, while guiding a society-wide transformation

through industrial support policies and public sector green procurement.

The key focuses of the Resource Circulation Promotion Act amendment include three major areas:

1. Establishing green design principles,
2. Prioritizing procurement of circular products and services, and
3. Providing guidance, incentives, and support to foster the growth of the resource circulation industry.

The Resource Circulation Promotion Act will treat materials and products not as waste but as resources, encouraging the development of circular pathways through the following measures:

- Establish a Sustainable Product Policy Framework that incorporates source reduction, eco-design, and requirements for the use of recycled materials.
- Formulate a National Resource Circulation Plan and establish a Resource Circulation Promotion Council to drive coordination from the central to local governments, mainstreaming the circular economy into national and local policies.
- Create circular markets through circular procurement, and stimulate the growth of the circular industry by mobilizing

financial investment and support mechanisms.

The Waste Disposal Act, in response to emerging waste types, will be strengthened to enhance proper management and expand producer responsibility, including:

- Unified management authority for reuse, and the addition of regulations on the flow control of construction surplus soil and rock.
- Tightened environmental penalties and strengthened environmental remediation responsibilities.
- Application of technological enforcement and electronic tracking systems to improve regulatory effectiveness.

4.2 Eco-Design & Upstream Reduction

The product design stage will become the key determinant of product durability and recyclability. Drawing reference from the EU Ecodesign for Sustainable Products Regulation (ESPR), Taiwan will gradually establish eco-design guidelines that cover minimization of virgin resource input, modularity, durability, and repairability. At the same time, the government will tighten restrictions on single-use products and promote reusable and circular alternatives.

Specific measures include:

- Gradually implementing eco-design guidelines in line with

legislative amendments, incorporating eco-design principles into both products and engineering projects. This includes using recyclable materials and secondary resources, and ensuring ease of disassembly and repair — beginning with voluntary adoption, followed by mandatory requirements in later stages.

- Applying the “3S1R” design principles (Single material, Simple color, Small label, and Recycled material) and introducing green tariffs to provide economic incentives.
- Encouraging the use of recycled materials and modular design in electrical and electronic products, and promoting repair, leasing, and refurbishment business models.
- Continuing to tighten controls on single-use products, and promoting the adoption of reusable cups, reusable bags, and alternative materials.

4.3 Sustainable Consumption & Circular Procurement

Taiwan will gradually integrate circular procurement into its existing government green procurement system, promoting product-as-a-service models, leasing instead of ownership, and remanufacturing approaches. Transparency will be enhanced through the introduction of a Circular Label and Digital Product Passports (DPPs), empowering consumers to make informed and

sustainable choices.

Collaboration between the public and private sectors will create demonstration sites to promote repair, reuse, and second-hand markets, shaping a new social norm of sustainable consumption. Additionally, Taiwan will develop information disclosure and product life-extension support systems to keep products in circulation and maximize their value.

Specific measures include:

- Establishing operational guidelines for circular procurement, expanding the scope of green procurement to include circular products and services.
- Integrating the Circular Label to improve consumer recognition, while building databases to enhance market transparency.
- Creating repair and reuse demonstration sites that encourage collaboration among ministries, local governments, and businesses, stimulating circular market development.
- Implementing Digital Product Passports (DPPs) to monitor product flows in the market, serving as the foundation for future urban mining initiatives.

4.4 Energy & Resource Efficiency

Given the increasing scarcity of natural resources, resource circulation will serve as the foundation for the future use of bulk materials. Taiwan will enhance the efficiency of resource recovery, introduce economic incentives, and establish a graded and categorized management framework to promote high-value regeneration of biomass, plastics, chemicals, and inorganic materials.

The waste management system will be transformed to focus on controlling high-risk substances that hinder circularity, preventing pollutants from entering the circular system and ensuring the quality and safety of secondary materials. High-risk wastes such as asbestos and products containing hazardous components could pose environmental and health risks if reintroduced into the circular economy. Therefore, future policies will emphasize design-stage regulations, information transparency, and safe treatment to ensure that the circular economy does not translate into new forms of pollution.

Specific measures include:

- Implementing four major material streams — biomass, organic chemicals, metals, and inorganic resources — to promote material recovery, energy recovery, and nutrient recovery (e.g., conversion into materials, fuels, and

fertilizers).

- Establishing four major material information platforms to support management and facilitate resource matching.
- Developing product design standards to gradually phase out or restrict high-risk substances.
- Developing standards and technologies for hazardous substance detection to improve sorting and recycling accuracy.
- Maintaining dedicated treatment facilities (such as incineration, solidification, and landfill) to ensure the necessary capacity for safe disposal.

4.5 Economic Instruments & Financing

Insufficient price signals and the low competitiveness of recycled materials remain structural barriers to advancing the circular economy. With the gradual introduction of carbon fee mechanisms and green finance frameworks, Taiwan has established an initial foundation for sustainable investment and financing. Moving forward, further efforts are needed to create a level playing field and promote circular investments and implementation through green financing, tax incentives, and funding support.

Specific measures include:

- Leveraging the Green Growth Fund and financial instruments to support recycled materials, high-value resource utilization, and circular technology infrastructure.
- Promoting loans, bonds, and transition guarantees dedicated to the circular economy, thereby reducing the upfront costs of industrial transformation.
- Enhancing information disclosure by incorporating circular performance and recycled material ratios into investment and financing evaluations.
- Gradually integrating circular economy indicators into public investment decisions and financial product design to ensure that capital flows align with resource sustainability.

4.6 Technology Innovation & Application

Taiwan has been implementing the Resource Circulation Innovation and R&D Program for over a decade, accumulating achievements in patents, industry–academia collaboration, and reuse performance. Moving forward, the program will adopt a technology readiness–oriented approach, focusing on critical gaps in the resource circulation industry. Through funding support, cross-sector collaboration, and digital tools, Taiwan aims to accelerate the deployment of resource circulation technologies, create demonstration projects, and drive upgrading across the

entire industrial value chain.

Specific measures include:

- Optimizing subsidy mechanisms by simplifying application procedures and introducing technology readiness assessments to enhance funding efficiency and application effectiveness.
- Promoting R&D of circular technologies with commercialization potential, strengthening collaboration across government, industry, academia, and research institutions.
- Integrating digital and intelligent tools, applying big data and AI to improve resource monitoring and circular efficiency.
- Focusing on key areas such as high-value utilization of secondary materials, low-carbon manufacturing processes, and recovery of critical and precious metals, to support technological breakthroughs and industrial upgrading.
- Developing resource circulation technologies as the foundation for the reuse and recycling of solar panels, wind turbines, and other renewable energy equipment.

4.7 Education & Training

Education is the cornerstone of fostering a circular culture.

Taiwan has already established an environmental education system and has gradually incorporated resource circulation concepts into school curricula. However, stronger connections with industry practices and national policies are still needed. Moving forward, Taiwan will promote diverse educational approaches, inter-ministerial collaboration, and platform-based mechanisms to cultivate green-collar talents equipped with circular economy knowledge.

Specific measures include:

- Developing teaching materials on resource circulation aligned with the 12-year national curriculum, integrating them into the five core themes of environmental education.
- Aligning with Ministry of Education policies (such as NEED and the Net-Zero Green Campus initiative) to strengthen circular practices in schools.
- Establishing a cross-grade educational resource platform to support teacher training, curriculum development, and school-based competitions.
- Encouraging universities and colleges to integrate industry case studies and career-oriented approaches, promoting hands-on learning, field visits, and applied courses.

5. Key Areas

Taiwan is densely populated and resource-scarce, with a high dependence on imported materials. However, its small land area means short transportation distances, making any environmental impacts or waste management issues immediately visible. As a result, the entire island functions as a shared circular zone, forming a unique foundation for resource circulation.

Taiwan also possesses a strong base of industrial and recycling technologies — spanning food processing, steel, cement, plastics, and textiles — and has achieved a certain level of development in secondary material recycling, forming a network for circular material supply.

What makes Taiwan particularly distinctive is its advanced high-tech industry, including semiconductors, electronics, and ICT manufacturing. This enables the integration of renewable energy, AI hardware production, and critical material utilization within local circular systems.

Based on economic potential, carbon reduction potential, and stakeholder engagement, Taiwan has identified six key sectors as priority industries for circular economy demonstration. These will serve as pilot areas for circular transition, combining cross-sector governance mechanisms to stimulate the broader transformation of other industries and achieve synergistic effects.

5.1 Biomass

Biomass is an important resource with significant carbon reduction — and even negative-carbon — potential, derived from diverse sources such as agriculture, industry, and households. In 2024, Taiwan generated approximately 16.57 million metric tons of biomass, primarily from household waste and agricultural residues. Current policy efforts focus on source reduction, graded utilization, industrial linkage, and technological advancement, promoting high-quality material recovery, feed production, fertilizer reuse, and energy recovery.

Specific measures include:

- Establishing food supply chain loss management systems to reduce kitchen and market waste.
- Developing graded reuse guidelines to improve processing efficiency.
- Expanding the promotion and logistics systems for organic fertilizers to reduce dependence on chemical fertilizers.
- Promoting co-digestion and anaerobic treatment to increase renewable energy generation.
- Fostering regional energy-resource centers to demonstrate cross-industry circular collaboration models.

5.2 Plastics & Packaging

Taiwan has a high demand for plastics, yet the recycling rate remains at only about 30%. Influenced by convenience-driven lifestyles and consumption habits, single-use plastic products are still widely used. Moreover, the diversity and complexity of plastic types and compositions limit both recycling quality and market scalability. Moving forward, Taiwan must strengthen regulatory frameworks and technical standards, encourage enterprises to use more recycled plastics in manufacturing, and increase demand for high-quality secondary plastics.

Specific measures include:

- Gradually banning or restricting single-use plastic products, such as plastic bags, disposable tableware, beverage cups, and e-commerce packaging.
- Promoting reusable cup and tableware leasing systems and reusable business models.
- Encouraging single-material product design to enhance plastic recycling efficiency.
- Expanding applications of recycled plastics by establishing market certification systems and green tariff mechanisms.
- Preventing microplastic and fishing gear leakage through monitoring systems and international cooperation initiatives.

5.3 Textiles

Taiwan's textile industry has a well-developed supply chain and mature technology, with an annual output value exceeding NT$15 billion. However, the circular utilization of textiles faces several structural challenges. Most used clothing is exported for reuse, resulting in a low rate of domestic circularity. Blended fabrics and complex designs increase the difficulty of disassembly and remanufacturing. Sorting facilities are still not widely available, leading to an unstable supply of recycled fibers. Moreover, brands and garment manufacturers generally lack life-cycle responsibility, and circular design thinking has not yet been fully integrated at the design stage.

Taiwan has already launched initiatives such as the "Eco-Design Guidelines for Apparel," circular procurement standards, and used clothing recycling guidelines, and will gradually integrate sustainable design and circular utilization into the textile sector.

Specific measures include:

- Promoting sustainable design, including single-material composition, easy disassembly, and integration of recycled fibers.
- Establishing collection and recycling systems in

collaboration with brands and department stores, and developing second-hand clothing markets.

- Encouraging public institutions and enterprises to procure circular textiles.
- Supporting the adoption of smart sorting and recycled fiber technologies by textile companies.
- Introducing international traceability systems (such as the Global Recycled Standard, GRS) and developing digital product passports for textile products.

5.4 High-tech & Electronics

The recycling of electronic products has increased year by year, yet linear consumption patterns still dominate, and circular business models as well as the competitiveness of recycled material markets remain insufficient. The recycling rate of electronic waste (e-waste) is relatively low, while repair, refurbishment, and leasing systems are not yet widespread.

Taiwan has already implemented several initiatives, including the “Eco-Design Guidelines for Electronic Products,” Circular Procurement Guidelines, Mobile Phone Recycling Month, and eco-modulation fees mechanisms. The government is also developing a Repairability Index and Digital Product Passports (DPPs) to progressively guide industries toward eco-

design and high-value circular utilization.

Specific measures include:

- Establishing Eco-Design Guidelines for Electronic Products, focusing on modularity, repairability, and ease of disassembly.
- Promoting the Repairability Index and Digital Product Passports to enhance product transparency and circularity.
- Expanding the scope of recyclable items and raising collection rates for regulated e-waste categories.
- Providing incentives for leasing, repair, and refurbishment to extend product lifespans.
- Developing a lithium battery recycling chain to ensure critical metals such as black mass remain within Taiwan.
- Implementing differentiated subsidy schemes and streamlining battery management, to improve material purity and promote high-value recycling and reuse.

5.5 Architecture & Construction

Construction and industrial by-products—such as fly ash, bottom ash, slag, and construction waste—have strong potential to substitute natural resources. In 2024, their total output reached nearly 17 million metric tons, yet reuse remains largely limited to land reclamation, with high-value applications still

underdeveloped. Policy direction now emphasizes “fit-for-purpose” utilization and regional material flow management, while promoting the development of standards, quality control mechanisms, and material banks to expand the use of circular construction materials across the market.

Specific measures include:

- Establishing environmental safety and engineering application standards for recycled aggregates.
- Developing end-to-end tracking and quality control systems for by-product management.
- Promoting the use of recycled and green construction materials, including through certification schemes and public works projects.
- Creating material banks and information platforms to improve market transparency.
- Encouraging cross-industry collaboration to foster the development of the circular construction materials market.

5.6 Energy & Critical Materials

With the rapid growth of renewable energy, the decommissioning of solar panels and wind turbine blades is increasing sharply, posing growing challenges for recycling and reuse. Meanwhile, semiconductor and high-tech industries

remain highly dependent on critical metals, with limited circularity. Taiwan's policy direction focuses on enhancing circular design, establishing demonstration recycling systems, and improving the reuse of critical materials to build a resilient supply chain.

Specific measures include:

- Solar panels: Incorporate them into the Extended Producer Responsibility (EPR) system; promote green design, recycling subsidies, and stronger linkages between manufacturing and recycling sectors.
- Wind turbine blades: Introduce material code management, support the expansion of recycling capacity, and promote high-value reuse, such as carbon fiber and resin recovery.
- Critical materials: Develop a national roadmap for rare earth recycling, promote policies for the use of recycled magnets, assess export control measures, and establish a national-level industrial alliance for critical materials recycling and reuse.

6. Public-Private Partnership

To promote the growth of the resource circulation industry, the Ministry of Environment (MoEnv) has launched the "8+N Resource Circulation Alliance," connecting eight key sectors —

food, plastics, textiles, electronics, construction, inorganic materials, industrial promotion, and climate & health — while continuing to expand into additional industries.

The alliance operates through a government-led model combined with an MGM (Member-Get-Member) recruitment mechanism, integrating financial incentives, regulatory measures, and digital tools to foster collaboration between upstream (arterial) and downstream (venous) industries, enhance resource-matching efficiency, and strengthen international competitiveness. At the same time, by mapping industrial needs and local practices, the Ministry of Environment (MOE) is developing Climate-Tech Circular Parks to bridge gaps in the circular value chain and reinforce industrial symbiosis.

In parallel, the MOE has also partnered with the Ministry of Culture to establish Taiwan's first Circular Re-Design Center. Guided by re-design thinking, the center aims to connect industries with society, promote innovation incubation, circular product showcases and sales, and upcycling initiatives. It also links circular brands with exhibition and marketing platforms, creating innovative business models that combine economic and social value.

Through circular design, cross-sector collaboration, and market promotion, the center will serve as a flagship hub for

circular demonstration and exchange, driving the development of Taiwan's green brands and accelerating the implementation of the circular economy.

7. International Collaboration

The linear economy has deepened the divide between the Global North and South, while the circular economy offers a pathway to bridge this structural gap. Taiwan uniquely combines the technological strength of the Global North with the resource constraints of the Global South — bearing the responsibility for carbon reduction on one hand, while also being capable of supporting developing economies on the other.

As Southeast Asia is projected to become the world's fourth-largest economy, Taiwan can serve as a bridge between North and South, advancing plastic circularity and low-carbon, plastic reduction strategies through international trade and standard setting, and expanding markets for circular products and services.

On the multilateral cooperation front, Taiwan has hosted the Asia-Pacific Circular Economy Forum since 2018 and will organize the Asia-Pacific Circular Economy Roundtable & Hotspot 2025, deepening regional perspectives and cross-border collaboration. Taiwan also continues to promote Taiwan–EU industrial dialogues, focusing on the marketization of secondary

materials, cross-border supply chains, and policy incentive design to enhance resource circulation and industrial cooperation. In addition, Taiwan actively participates in international platforms such as APEC, the OECD Green Growth and Circular Economy meetings, International E-Waste Management Network (IEMN), and the Global Plastics Treaty process, fostering deeper topic-specific collaboration.

In terms of technology and governance, Taiwan possesses advanced high-value recycling capabilities and leverages digital governance tools — including Digital Product Passports (DPPs) — to strengthen traceability and transparency. Looking ahead, Taiwan can help Asia-Pacific countries develop circular systems and digital governance frameworks, promote data standards and cross-border traceability, and reinforce its role as a regional hub for the global circular economy.

8. Monitoring & Evaluation

To ensure the effective implementation of circular economy policies, Taiwan is planning to establish the “Resource Circulation Cloud” Platform as a national-level resource data platform. This platform will integrate cross-ministerial data on resource use and waste flows, providing a real-time, transparent, and traceable data foundation to support policy adjustment and

public participation.

The Resource Circulation Cloud will focus on four core functions:

- Circular Intelligence tracking: Establish circular indicators and material flow monitoring, visualized through interactive dashboards.
- Regular Performance Monitoring: Track policy performance, provide early warnings for anomalies, and identify gaps and potential risks.
- Circular Potential Analysis: Map material, industrial, and waste flow patterns to identify reuse potential and critical nodes in the value chain.
- AI-Enabled Decision Support: Use data analytics and scenario simulations to support risk management and strategic foresight planning.

The platform will deliver four major benefits: provide a comprehensive overview of policy outcomes; enable continuous policy improvement; strengthen risk management; and promote cross-sectoral collaboration.

In the future, the Resource Circulation Cloud will not only serve as a government governance tool, but also as a foundation for industrial innovation and enhanced social transparency and participation, supporting Taiwan’s transition toward a high-efficiency, low-dependence circular society.

Annex:

Resource Recycling and Zero Waste Strategy Action Plan —10 key actions summary (Draft) (Only available in Chinese)

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壹、 前言

本署訂定 2050 淨零轉型「資源循環零廢棄」關鍵戰略行動計畫，以永續消費與生產、提升資源使用效率、加值化處理廢棄物為三大策略目標，優先推動**塑膠、紡織品、無機材料及粒料、生物質、廢棄物能源化及生質能、化學品、電器與電子產品、儲能及電動車用電池、太陽能光電板及風力葉片，以及產品數位護照等 10 項關鍵項目**，以共同實現國家淨零排放之願景。

一、生物質

我國由農林漁牧、加工製造與民生生活所產生的廢棄生物質，每年將近 1,400 萬公噸，回收再利用以材料化、肥料化和農地使用為大宗，回收率約 80%。廢棄生物質為天然產出有機資源，具多元應用發展性，經由最適化再利用方式，以充分利用有限資源。

從生產供應鏈及消費端減少廢棄物產生，依照生物質特性分類分級採取高值化、飼料化、肥料化及能源化等再利用方式，提升廢料價值，強化生物質循環上下游產業鏈結，精進能資源化處理技術及高值化應用，本署將透過下列方式，推動生物質資源循環：

- 輔導廠商降低生產供應鏈上生物質物料損失，減少廢棄物產出。
- 依生物質特性規劃分級應用推動方向，**建置「生物質料源分類分級指引」**，促進物料適材適所。
- **編撰「生物質循環利用—再利用設施設置指引」**，針對不同產業，整合相關法規並依據不同情境訂定適用之設置指引，以供產業參考應用

- **建置生物質資源循環資訊平台**，整合跨部會資訊公開揭露與交流，開發料源地圖，促進產業媒合利用。
- **彙編生物質循環示範案例手冊**，加強推廣。

本署將與各部會(農業部、經濟部及內政部等)合作，輔導產業，以暢通生物質資源循環與多元利用管道。

二、塑膠

我國塑膠資源年需求約 1,300 萬公噸，約 341 萬公噸在國內使用。使用後之塑膠製品則以物料及能源回收為主，推估採取物料回收再利用量約 104 萬噸，回收率約 40%；其餘廢塑膠約 162.1 萬公噸，採能源回收約 153.5 萬公噸。

為因應塑膠廢棄物問題，我國針對促進塑膠源頭減量、循環利用陸續提出管理作法並訂定目標。我國參照聯合國塑膠公約內容及國際經驗，**制定塑膠資源循環推動策略與國家計畫**，期能提升能源自主性、減少塑膠污染並逐步邁向資源循環目標。推動策略包含以下面向：

- **源頭採取減量與替代作法**，減少原生塑膠需求、減少有問題和可避免的塑膠產品，推動塑膠產品再使用、再填充和維修
- **產品設計確保後端可回收性**，減少使用對人體健康或環境有不利影響之化學品或聚合物
- 透過物理和化學回收作法再利用塑膠，針對特定塑膠產品制定最低再生塑膠成分要求
- **執行生產者延伸責任制度**以提高回收率，並採取措施防止塑膠洩漏至環境，確保塑膠廢棄物處置之安全性，減緩塑膠廢棄物累積污染問題，以及促進公正轉型

本署透過以下措施推動各個重點管理面向：

- 令人關切的化學品和聚合物：依**毒性及關注化學物質管理法**，進行分級管制
- 有問題和可避免的塑膠產品：**持續辦理限塑政策**，以法令引導消費者行為改變，降低需求
- 產品設計和性能：**導入綠色設計作法，使用替代材質，**考量原料來源永續性、可再生性
- 塑膠和塑膠產品的減少、再利用、再填充和維修：透過**創新商業模式**，提供**產品重複使用服務**
- 再生塑膠成分的使用：推廣使用再生料，建置**塑膠再生商品審查制度**與**使用誘因**
- 生產者延伸責任：依法規範塑膠產品生產者需負擔的回收責任機制，引導永續生產

除了前述推動措施外，本署將持續關注國際趨勢、釐清國內現況，**訂定國家計畫草案(包含聯合國塑膠公約要求 12 項要素)**，包括塑膠整體生命週期之管理作法，使國內管理現況與國際接軌。

三、無機資源及營建

（一）無機資源

產業、營建工程或生活垃圾所產生的無機廢棄物，主要種類包含煉鋼業爐碴、工廠汙泥、營造業磚瓦、焚化廠底渣飛灰等可分為 8 大類 59 項，每年將近 1,800 萬噸，占我國年度廢棄物產生量 50%以上。無機廢棄物經資源化成為無機資源，可作為再生材(粒)料供工程使用，減少天然砂石取用，也降低掩埋需求。

目前無機資源每年循環使用於「陸域工程」占 54%、「水泥業」占 11.8%、「港區填築」占 9.8%，在確保循環過程環境安全、管理嚴謹、技術可行，使不同工程特

性無機資源分流應用，提升無機資源產品價值，訂定適宜法規與制度，本署將透過下列方式，推動無機資源循環：

- **訂定「無機再生粒料使用標準規範及流向追蹤管理要點」**，包含粒料品質、使用地點(項目)限制、環境監測項目及全程流向追蹤等加以稽核認證，完善無機再生粒料使用前、中、後追蹤管理機制。
- **訂定「使用無機再生粒料認驗證及供料履歷要點」**，導入第三方機構認證，建置供料履歷資料庫，逐步推動無機再生粒料產製之再生產品綠色履歷。
- **彙編無機再生粒料「施工綱要規範」與「工程應用手冊」**，讓工程單位依循。
- 將無機再生粒料之使用納入公共採購，推動公共工程強制使用一定比率再生粒料，結合無機再生粒料使用管理機制與工程發包制度，設定階段目標，建立使用者信心。
- **建立無機再生粒料供需平台**，依粒料特性分流應用於「陸域工程」、「水泥業」、「港區填築」，並持續進行社會溝通，建立夥伴關係。

（二）營建

營造業素有火車頭工業之稱，全球有 50% 以上的天然資源皆用於建築業，其溫室氣體排放占全球的37%[4]。包含大宗物料使用(鋼筋、水泥、混凝土粒料)、一次性消耗使用(假設工程材料、裝修建材)、無差別建築物拆除模式，造成大量資源耗用與營建材料循環利用率偏低，造成環境重大負荷。

[4] 資料來源：循環台灣基金會 https://circular-taiwan.org/industry/built_and_construction/

為了提升建築生命週期各階段資源循環率，應從材料取用、工法選擇結合營造業循環網絡商業模式，從低碳材料取用來降低鋼鐵業、水泥業生產過程天然物料耗用，預鑄化、模組化工法讓部分物件可重複使用、有系統地進行建築物拆除及分類收集提升後端循環利用率，本署將透過下列方式，推動營建資源循環：

- 揭露鋼筋、水泥、混凝土粒料三大物料使用再生材料減碳數據，引導營造業選用低碳材料。
- **訂定「一定規模以上建築物拆除現場分類及施工方法選用原則」**，結合「事業廢棄物清理計畫書審查作業參考指引」，限制營建廢棄物最高產出比率。
- **推動選用「綠建材標章」、「環保標章」、「資源再生綠色產品」**等具循環再利用之建材。
- 輔導營造業整合建材供應(上游)、現地施工(中游)、建物拆除(下游)等對象，建立跨區域、跨產業之商業模式。

此外，與主管機關合作，對於「建築相關法規」在設計、施工、使用等階段，導入延長構件使用度的綠色設計理念、減少耗損的施工方式，建立重複使用的商業模式，逐步建置適用於我國的建物循環度評估制度。

四、化學品

我國化學品資源年需求約 5 千萬噸，以化學材料及肥料製造業、用水供應業及電子零組件製造業為主。經統計國內列管機構化學品廢液申報量每年達 154 萬公噸，以科學園區最多。化學品廢液以材料化、燃料化及焚化為主要處理途徑，87%可材料化再製成再生化學品或其他化學物質，11%因混合廢液或殘餘物採焚化方式妥善處理、2%將

富有高熱值溶劑燃料化產製蒸氣能源循環使用。

國內化學品循環現階段多以降階使用為主，經純化機構稀釋、去除雜質後製成產品。為提升化學品資源生命週期各階段之循環利用率，推動自源頭管理至後端回收技術之提升，本署將透過下列方式，推動化學品之資源循環：

- 源頭減量，**優化製程改善、輔導產業化學品廢液分類**、分管、**分儲回收增進循環價值**，減少化學品廢液焚化量。
- 與國科會、經濟部跨部會合作，建立科學園區區域型循環模式，提升園區區域內部化學品循環純化及高值化化學品產能。
- **建構化學品資源循環體系及金屬化學品循環查詢平台**，產業媒合、跨區域資源鏈結及化學品租賃。
- 技術研發，提升回收再製純化技術，以延長化學品使用週期，導入化學品替代措施，降低能耗，例如建構低濃度氟化鈣污泥轉化為高值化酸級氟化鈣產品。

五、紡織品

紡織品是初級原料和水使用之第四大環境壓力類別，為全球最主要的產業之一，僅次於食品、住房和交通，在溫室氣體排放方面排名第五。**依據麥肯錫(McKinsey & Company)研究顯示，時尚業於 2018 年排放了約 21 億噸溫室氣體，約占全球總量的 4%**。據估計，全世界只有不到 1% 的紡織品被回收製成新紡織品。

臺灣紡織業上下游供應鏈約有 4 千多家，成衣工廠家數約 1,152 家，紡織技術已發展 60 年，極為成熟，每年平均產值約 150.5 億新臺幣，銷售值約 203.2 億元，內銷

約占 8 成，外銷約占 2 成。近年亦積極發展再生纖維與紡織循環技術。分析我國紡織品循環面臨之挑戰，需全面提升舊衣等紡織品循環再利用管道與技術。**我國舊衣回收量約 7.6 萬噸，來源包含清潔隊、社區、學校及機關團體。去化管道以做二手衣（主要以出口為主）比例最高，約占 44%**，再利用作為工業用抹布或再生纖維約占 33%，作為固體再生燃料或焚化處理約占 23%。

因應快時尚衍生過多舊衣產生問題，從生產面、使用面、回收面及循環面等四大面向，分別訂定相關推動指引，串聯我國紡織業供應鏈及學校，建構紡織品纖維到纖維循環，推動紡織品循環採購產品維修或回收服務新商業模式，促進我國紡織品循環永續，減少紡織品廢棄物的產生與對環境面的衝擊。

本署規劃透過一系列行動措施促進紡織品資源循環：

- **推動紡織品綠色設計**，考量紡織品生產、製造、使用、回收等全生命週期減少原生材料及資源消耗，減少使用有害物質及廢棄物產生，材質及原料儘可能單一化與使用再生料，使用後易於維修、重複使用、拆解、回收、分類或再利用，提升紡織品耐用性，可回收製成再生纖維再製成紡織品。
- 促進永續紡織品消費行為，邀集品牌服飾業與百貨零售業，**展示販售材質單一或使用再生料之永續紡織品、提供衣物維修或回收服務、設置二手衣專賣區**、結合活動推廣宣傳等措施，促進民間消費者選購永續紡織品及易取得維修服務。
- **推動公部門機關、學校與民間企業紡織品循環採購**，採購員工制服或活動服飾時，可儘量符合材質單一比率達 90%以上符合綠色設計之紡織品，並透過採

購規範請供應商提供舊衣回收、維修或保固等服務內容，促進紡織品逆向回收與循環。

- **輔導舊衣回收業、纖維再生業者設置智慧分選設施**，優化廢紡織材料定量鑑別設備及自動秤重模組，以及可移動式定量鑑別分選設備的開發，提升舊衣材質辨識及分選效率，暢通回收循環管道。
- 鼓勵紡織產業創新，研發紡織品循環技術及再生纖維產製技術；積極輔導產業提升紡織纖維材料回收技術，如：**人造纖維物理或化學法回收、物理解纖再生短纖維等技術開發**，並透過多元化設計應用，促進廢紡織纖維資源再利用最大化。

六、電器與電子產品

根據聯合國訓練研究所(UNITAR)、國際電信聯盟(ITU)發布《2024 年全球電子廢棄物監測報告》，2022 年電子廢棄物達 6,200 萬公噸，但全球回收機制與量能不足，僅 22.3%被妥善回收處理，並預估 2030 年電子廢棄物將增至 8,200 萬公噸；全球必須健全法規，並應投注更多資金在電子廢棄物處理、提高電器的維修與再利用，減少非法廢棄物運輸，有效提高廢棄回收與處理量能。

公告應回收電子電器及資訊物品回收成效自 2019 年 14 萬公噸成長至 2022 年 17.7 萬公噸 (約成長 26.4%)，再使用/再利用約達 93.9%，能源化使用約 5.5%，境外處理約 0.6%，估算電子廢棄物材料回收產值 2022 年約達 61.8 億元。

惟電子產品消費行為不斷增長、消費習慣尚未轉型為循環經濟模式、缺乏循環設計標準及誘因、需增進再生材料使用等問題與挑戰，本署規劃行動措施，以促進電器與

電子產品資源循環：

- 延長產品生命週期，**建立消費者維修權，揭露維修管道資訊，推動商品維修度指數，鼓勵消費者重複維修與使用**，長期推動耐用度指數標示制度。
- **建構多元回收制度與模式建立循環商業服務**，建立綠色消費模式，推動產品租賃共享模式及案例，提升回收成效，暢通回收處理管道。
- 促進產品循環綠色設計，**建立綠色差別費率**藉由經濟誘因，**提升電子產品物料循環利用**。

七、儲能及電動車用電池

二次鋰電池具高能量密度、快速充放電及可長時間循環等優勢，近年多作為 3C、電動車及儲能系統電能來源。現行國內 2 家廢電池處理廠及 4 家輸出境外處理，共可處理廢二次鋰電池量能為 8,886 公噸/年，於 2030 年起將有近萬公噸之廢電池進入報廢回收體系，故需提前部署擴增回收處理量能。

另**國內處理係以破碎篩分處理**，為推動再生料高值化及提高資源回收再利用比率。資源循環署將透過下列措施，以推動儲能及電動車用電池之資源循環：

- **輔導設置廢乾電池處理廠並擴充現有處理廠產線**，以充足回收處理量能。
- **推動儲能及車用電池與一般消費性電池分流管理**，透過差別補貼強化物料純化，促進高值循環利用。
- 補助產學研投入創新開發貴重金屬回收技術及再生料提純技術，以**強化循環材料使用並降低碳排**。
- 鼓勵電池上中下游產業形成回收循環鏈，並輔導大型事業群自體建立電池循環網絡，以**促成再生材料回用**

於電池製造。

- **與經濟部合作，訂定汰役電池降階相關安全使用標準**，以延長產品使用壽命，增加資源使用效益。

八、太陽光電模組及風力葉片

（一）太陽光電模組

國內太陽光電模組自 2000 年起開始裝設，**2012 年經濟部能源署推動「陽光屋頂百萬座」計畫**，更進一步增加裝設量。依據「臺灣 2050 淨零排放路徑及策略總說明」，預計 2025 年達到 20 GW 的目標，2050 年達到 40～80 GW 目標。

為因應所衍生之廢太陽光電模組回收去化問題，自 2019 年起推動廢太陽光電板回收處理體系，由能源署向光電設備設置者收取每 1,000 元/KW 的回收處理費；同時由本署建立相關處理體系、稽核查驗及回收工作。本署將透過下列方式，推動廢太陽光電模組之資源循環：

- **製造端導入源頭減量及綠色設計概念**，發展易拆解、易回收之太陽光電模組產品，並推廣使用。
- 提供誘因引導納入回收運作管理，透過補貼經濟誘因，引導廢太陽光電模組納入合法循環途徑。
- 建立循環模式，促進製造端與回收處理端合作，補助鼓勵技術創新，研發高效循環技術並導入應用，輔導業者提升回收技術，提高太陽光電模組循環比例。

後續將納入延伸生產者責任制度，將太陽光電模組公告應回收項目，並配合修法納入管制，使國內廢太陽光電模組回收資源化更為順暢。

（二）風力葉片

依據「臺灣 2050 淨零排放路徑及策略總說明」，再生能源發電占比將持續攀升，預計 2025 年風機發電設置量 6.9GW、139 年提升至 55GW，廢棄排出量亦將持續增加。

為提高廢風機葉片循環利用比率，**持續發展多元資源循環技術，降低焚化處理及掩埋需求**，並透過實廠技術驗證無衍生環境二次污染，發展高附加價值的產品應用方式。本署將透過下列方式，推動廢風力葉片之資源循環：

- 落實延伸生產者責任，**提供優惠費率引導業者採行綠色設計**，鼓勵業者自主開發易回收之材質，提高風機葉片循環比率。
- **建立回收處理示範計畫**，媒合水泥業者協同處理，將廢風力葉片做為水泥替代原(燃)料。
- **鼓勵業界研發風機複合材質回收解聚技術**，將回收材料（金屬、碳纖及玻纖）應用於各項高值化產品。

九、廢棄物能源化及生質能

因應國際減碳趨勢，參考歐洲、日本等先進國家發展趨勢，我國積極推動廢棄物能源化政策，將具有熱值且去除不適燃物之廢棄物，經由均值化等過程製成具有能源效益及符合品質標準之固體再生燃料(Solid recovered fuel, SRF)，作為工業鍋爐、汽電共生廠或水泥窯之替代燃料，提升能源轉化率及減少焚化量能負荷。

為妥善管理我國 SRF 的製造及使用，**本署訂定「固體再生燃料製造技術指引與品質規範」(下稱品質規範)**，建立 SRF 管理制度及標準，確保 SRF 燃料品質與使用妥善管理。2023 年 SRF 製造量約 29 萬公噸，SRF 使用量約

33 萬公噸。環境部將透過下列方式，推動廢棄物能源化：

- 訂定合宜法規，提升 SRF 審查及管理制度，**加強料源管制，加嚴 SRF 品質標準及產品分級制度，製造廠申請採三階段審查（書面、現勘、試運轉），中央與地方合作會審及稽查輔導**，並強化使用廠空污排放管理。
- **訂定「以固體再生燃料(SRF)替代煤炭在鍋爐及燃燒裝置產生熱能」**之減碳效益計算方法學，建立 SRF 之碳足跡計算方法。
- 與能源主管機關協商調整廢棄物能源化躉購費率，提高經濟誘因。

十、產品數位護照

現行的產品資訊流，無法讓消費者或管理者充分獲知產品使用材料情形、回收拆解再利用方式、對環境與資源循環永續影響等資訊與產品使用後之去向，導致資源無法有效回收再利用。

歐盟 2024 年通過產品永續生態化設計規章(Ecodesign for Sustainable Products Regulation, ESPR)**推動產品數位護照（Digital Product Passport）制度**建立智慧循環應用共同資料庫，業者應登載產品唯一識別碼、原料來源、材質、安全使用說明、拆卸、回收、報廢方式維修、耐用度、維修度、生命週期能資源消耗等重要資訊，促進產品資訊揭露以利市場監督，同時賦予消費者和公共採購者「知」的權利更易獲取產品對環境與資源永續相關資訊，以促進永續消費行為。**聯合國 2024 年規劃制定聯合國透明度協議(UN Transparency Protocol)串聯各國產品數位護照。**

為接軌國際產品數位資訊系統，協助我國產品輸出貿易，同時也提升對於國內販售使用之產品資源使用與流向追蹤管理，規劃參考歐盟建立我國產品數位護照管理制度及資訊，並**透過立法**，引導業者揭露產品使用材質及再生料添加比率、維修方式、耐用性、回收拆解再利用方式等資訊，**提升產品資源使用效率與建構循環模式**。執行措施如下：

- 研擬我國資訊揭露管理制度，**建置產品數位護照系統**，掌握產品之生產、販售、使用、維修、回收等各生命週期之歷程與資源流向，**促進產品資源循環模式建構與資訊揭露**。
- 擴大產品數位護照系統試行產品數量，擴充系統功能，加值運用產品資訊提升物質流向管理及減廢、減碳效益評估。**優先推動品項為資訊設備、電子電器產品、紡織品及電池產品**，並逐步盤點需建置數位履歷產品品項。
- **推動產品維修度指數評估方法及對消費者揭露**，提升消費者知悉產品的可維修性、耐用性及維修方式，選購維修度高之產品，促進永續消費行為。
- 推廣促進維修與建構完善維修體系，研訂獎勵措施與補貼機制，培訓我國維修人力及建構維修點位，**辦理維修咖啡館活動或巡迴維修車**，提升維修機動服務與便利性，促進我國維修風氣與維修產業興起。

貳、 結語

本署施政以聯合國 SDG 12 為核心，呼應淨零轉型，提高資源使用效率，建立資源永續利用之社會，達到資源循環零廢棄之願景目標，**透過修法**，以及**建構資源循環管**

理平台（循環雲）、提升創新技術並建立商業模式，營造有利循環環境，使廢棄物的管理，從廢棄物有效清理，過渡到資源循環利用，將**資源極大化**，**廢棄物極小化**，創造經濟誘因，促進資源永續循環。

本署按年規劃未來各關鍵項目工作重點及目標，將持續推動資源循環工作，發展數位轉型，整合資訊服務提升效率，深化資源循環思維，加強宣傳與國際合作，並**強化民生關注議題**，**多元化措施及法制作業**，**持續推動限塑政策**，達到減量成果，期望減少資源使用，提高資源生產力，同時降低人均物質消費量，**邁向資源循環零廢棄及淨零轉型目標**。

附錄一、10 項關鍵項目相關規範

10 項關鍵項目相關規範	日期
生物質	
生物質資源循環利用案例彙編	2024.08
生物質再利用-厭氧消化設施設置指引	2024.09
塑膠	
公告限制產品過度包裝	2005.07.01
網際網路購物包裝限制使用對象及實施方式	2023.02.16
網購包裝減量指引 2.0	2023.05
限制塑膠類托盤及包裝盒使用	2011.12.23
限制含塑膠微粒之化粧品與個人清潔用品製造、輸入及販賣	2017.08.03
購物用塑膠袋限制使用對象、實施方式及實施日期	2017.08.15
市場減塑推動作業指引	2024.06.25
一次用飲料杯限制使用對象及實施方式	2022.04.28
循環杯借用服務業者營運補助要點	2023.05.03
免洗餐具限制使用對象及實施方式	2023.06.29
行政機關、學校減少使用免洗餐具及包裝飲用水作業指引	2021.09.29
一次用旅宿用品限制使用對象及實施方式	2023.07.17
物品或其包裝容器及其應負回收清除處理責任之業者範圍	2023.05.19
供作食品容器具包裝製造使用之 PET 再製酯粒原料適宜性申請作業流程（衛福部）	2022.05.12
非填充食品之塑膠再生商品推動作業要點	2022.11.03
無機資源及營建	
一定規模以上建築物拆除現場分類及施工方法選用原則	2025
無機再生粒料使用標準規範及流向追蹤管理要點	2026
使用無機再生粒料認驗證及供料履歷要點	2027
化學品	

化學品租賃示範輔導要點	2024
紡織品	
民眾回收舊衣指引	2021.4.12
執行機關委託民間團體或業者設置舊衣回收箱管理指引	2022.4.12
服裝環保化設計指引	2022.9.29
連鎖品牌服飾業及百貨零售業紡織品循環指引	2023.12.18
機關及公民營單位服飾紡織品循環採購指引	2024.1.24
紡織品材質定量鑑別及智慧分選設施設置及運營捐助要點	2024
電器與電子產品	
物品或其包裝容器及其應負回收清除處理責任之業者範圍（修正電冰箱、洗衣機範圍）	2022.2.9
修正「物品回收清除處理費費率」（公告應回收之合規塑膠再生料物品）	2023.4.27
修正「應回收廢棄物品回收清除處理補貼費率（不含廢機動車輛類及廢照明光源類）」（公告應回收之廢液晶面板精進補貼）	2024.7
電子電器產品維修度指數評估作業指引	2024
公告實施「應標示分類回收標誌之行動電話製造、輸入業者範圍及其他應遵行事項」	2025.1.1
訂定產品綠色設計推動作業要點（自願性）	2025
訂定電子電器產品綠色設計準則	2025
訂定產品循環度揭露評估指引	2025
儲能及電動車用電池	
修正應回收廢乾電池回收清除處理補貼費率（調升鋰三元電池及鋰鐵電池補貼費率）	2021.05.26
物品或其包裝容器及其應負回收清除處理責任之業者範圍（預告 1 公斤以上二次鋰電池）	2023.03.06
修正應回收廢棄物回收清除處理稽核認證作業手冊（廢乾電池類）	2024.01.03
太陽光電板及風力葉片	

公告太陽光電模組納入應回收項目	2025
建立風力葉片回收技術示範計畫	2026
廢棄物能源化及生質能	
固體再生燃料製造技術指引與品質規範（修正）	2024.3.22
產品數位護照	
產品資訊揭露實施辦法	2026

附錄二、10 項關鍵項目預期效益或目標

指標			計算方式	單位	基準年	目標值	
					2020 年	2025 年	2030 年
塑膠	一次性塑膠包裝用量減少率		（目標年產量−基準年產量）÷基準年產量	%	-	-	5
	塑膠包裝、容器回收率		目標年回收量÷目標年投放至市場之塑膠產品量（容器及包材）	%	30	50	70
	塑膠包裝添加再生料比例		塑膠再生料添加量÷塑膠包裝產量	%	11	25	30
紡織品	提升紡織品回收量		紡織品回收量較基準年提高率	%	0	15	27
	物質化利用率		回收紡織品物質循環利用率	%	0	20	36
	能源化利用率		回收紡織品能源化利用率	%	0	13	18
無機材料及粒料	陸域工程再生粒料使用比例		無機再生資源（飛灰底渣、爐碴、土建廢料、廢淨水污泥 4 大類）陸域工程使用量÷無機再生資源產生量	%	53	55	57
	水泥業替代原(燃)料使用比例		全國水泥廠協處無機及其他資源總量÷無機再生資源產生量	%	9	10	12
	港區填築再生粒料使用比例		全國港區填築無機再生資源數量總和÷無機再生資源產生量	%	-	8	19
生物質	提升有機質肥料施用		有機質肥料施用量	萬公噸	18	30	42
	生物質投入生質能料源使用量		以發電性質計算各品項潛勢投入量能之總和	萬公噸	木質燃料 0 萬公噸 厭氧消化 51.9 萬公噸	木質 4.3 萬公噸 厭氧 107.3 萬公噸	木質 21.3 萬公噸 厭氧 126.0 萬公噸
廢棄物能源化及生質能	廢棄物燃料投入量		依廢棄物種類性質推估之總和	萬公噸	36.3	52	65
	廢棄生物	固態	以固態或氣態燃料之料源性質計算各品項	萬公噸	51.9	4.3	21.3

指標			計算方式	單位	基準年	目標值	
					2020 年	2025 年	2030 年
	質投入燃料使用量	氣態	潛勢投入量能之總和			107.3	126
化學品	化學品廢液回歸電子級量能		園區廢溶劑純化設施預計電子級再利用量能	萬公噸	2	15	20
電器與電子產品	使用再生材料產品數占比		綠色費率繳費數量÷總營業量	%	0	5	10
儲能及電動車用電池	使用再生材料占比		目標年回收電池量÷目標年投放至市場之產品量	%	0	3	5
太陽光電板及風力葉片	太陽光電板資源物回收率		依組成成分回收資源物質相加	%	10	84	95
	風力葉片循環回收率		全國水泥廠協處風力葉片總量÷全國風力葉片廢棄量	%	0	20	85

附錄三、10 項關鍵項目及措施部會分工

關鍵項目	推動措施	項次	項目	創新技術	分工
塑膠	1-1 源頭設計，淘汰非必要的塑膠包裝或產品、利於回收循環、提出替代作法	1	綠色生產，設計易循環產品及包裝，倡議環保設計和製造	導入優化製程技術、減廢產品開發	經濟部(主) 環境部(主) 農業部(協)
		2	使用替代材質，考量原料來源永續性、可再生性設計	高分子材料創新循環應用技術開發暨通路推廣計畫-產品易循環設計（經濟部產發署）	經濟部(主) 環境部(主) 農業部(協)
		3	不包裝或減少包裝	1.限制產品過度包裝、網購包裝減量等政策引導 2.產品供應鏈減少使用	環境部(主) 經濟部(協) 農業部(協)
	1-2 減少對塑膠需求，延長產品使用，鼓勵重複使用、商業模式創新	4	重複使用創新循環商業模式，維修延長使用壽命，提供產品服務與分享經濟	開發循環容器租賃設備	環境部(主) 經濟部(協)
		5	限塑政策，自備飲料杯享折扣	-	環境部(主) 經濟部(協)
	1-3 避免流入環境，有效收集處理，提升回收再利用量	6	適當建置店內/產業收集點之基礎設備，建立有效回收方法	透過物聯網技術，提高回收品質與效率	環境部(主) 國科會(主) 經濟部(協)
		7	智慧回收，強化基礎設施/分類技術	建立廢塑料智慧化自動分選暨智能回收技術平台	環境部(主) 國科會(協) 經濟部(協)
		8	透過產業串連形成區域型集中模式及廠內自行循環模式，建立整合循環網絡	開發纖維熱塑複材提升可循環回收技術	環境部(主) 國科會(主) 經濟部(協)
	1-4 驅動塑膠循	9	創造再生料需	建立溯源驗證資料平	環境部(主)

關鍵項目	推動措施	項次	項目	創新技術	分工
	環再生，創造再生料市場		求，塑膠包裝容器使用再生料	台	經濟部(協) 衛福部(協)
		10	導入創新技術，增加再生料循環與使用潛能	1.開發回收永續材料與評估化學回收創新循環技術 2.建置化學/物理材料改質技術平台 3.循環經濟創新領導計畫-PET/PU 化學解聚製程及應用開發（經濟部產業技術司）	環境部(主) 經濟部(主) 衛福部(協)
		11	輔導海廢再生聯盟建立產品碳足跡及建立產品經濟及環境效益評估模式	1.協助海廢再生聯盟業者建立產品碳足跡。 2.建立海廢再利用產品在經濟及環境效益之評估模式。 3.推動輔導再生聯盟業者盤點減碳效益，及對環境貢獻的貨幣價值	海委會(主)
紡織品	2-1 改善生產觀念，推動創新設計及永續性	12	推動紡織品生命週期評估及碳足跡盤查	1.建立紡織品生命週期評估及碳足跡盤查工具及典型數據 2.制定紡織品環保化設計指引	環境部(主) 經濟部(協)
		13	推動易循環紡織品產品設計及利於循環標示		環境部(主) 經濟部(協)
	2-2 創造綠色消費，推動共享經濟、再使用、綠色消費及綠色採購	14	推動公私部門綠色採購	1.制定公私部門綠色採購服飾指引 2.制定品牌及服飾業者循環服務指引	環境部(主)
		15	推廣品牌及服飾業者販售永續時尚產品		環境部(主) 經濟部(協)
		16	推廣品牌及服飾業者逆向回收服務示範機制		環境部(主) 經濟部(協)
		17	宣導溝通舊衣回	1.制定民眾回收舊衣	環境部(主)

關鍵項目	推動措施	項次	項目	創新技術	分工
	2-3 強化回收分類，推動多元化回收處理體系及材料回收分選		收觀念及做法	指引 2.研發廢紡織材料定量鑑別技術及建立作業模式	
		18	推動廢紡織品回收自動化分選		環境部(主)
	2-4 推動資源循環，開發循環技術及推動循環再生驗證	19	推動設置纖維再生設備	1.研發纖維材質再生技術及推動再生纖維廠商業化運行 2.研析制定物料回收二次料規範準則及作業指引	環境部(主) 經濟部(協)
		20	推廣二次料追蹤、驗證系統及標章制度		環境部(主) 經濟部(協)
無機材料及粒料	3-1 透過設計及源頭減量、現地分類等措施，減少廢棄物產生	21	提升建築與公共工程個案使用回收材料及構件比率；透過設計與製程改善，減少原料使用並提升使用永續性	1.開發使用回收材料之循環技術與產品 2.發展製程改善技術與減廢施工工法	內政部(主) 經濟部(協) 環境部(協) 工程會(協)
	3-2 建立區域性循環體系，藉由管制及誘因機制引導分流應用，替代天然原料	22	提升無機再生粒料品質，拓展應用於各縣市轄內道路及管溝工程	1.無機粒料海事工程與高值應用（環、經） 2.建立無機資源循環減碳效益評估方式（經、環）	環境部(主) 經濟部(主) 內政部(協) 交通部(協) 工程會(協)
		23	水泥業使用無機及其他資源作為替代原料及燃料		經濟部(主) 環境部(主)
		24	推廣使用無機再生粒料生產之再生建材及水泥製品		內政部(主) 環境部(協) 經濟部(協) 工程會(協)
		25	推動北中南港區填築使用再生粒料		環境部(主) 交通部(主) 經濟部(主) 內政部(主) 工程會(協)
		26	115 年建立無機	1.建立供需平台、認	環境部(主)

關鍵項目	推動措施	項次	項目	創新技術	分工
	3-3 研發新興技術及推動材料銀行，提升粒料品質及提供完整資訊		再生粒料整合平台及循環使用履歷	驗證與履歷制度（環、經） 2.研發高質化等循環利用技術（環、經）	經濟部(主) 內政部(協) 交通部(協) 工程會(協)
		27	建立無機廢棄物循環利用技術，提升粒料品質		
生物質	4-1 減少生產供應鏈糧食損失及消費端食物浪費	28	減少生產供應鏈糧食損失		經濟部(主) 農業部(主) 環境部(主)
		29	減少消費端食物浪費（部分於戰略9自然碳匯及戰略10淨零綠生活執行）		農業部(主) 環境部(主) 衛福部(主)
	4-2 提升廢料價值，以飼料化、肥料化、能源化及材料化分類分級推動	30	提升有機質肥料施用（已於戰略9自然碳匯執行）	1.建置生物質物質流分析系統（環-廢，2027） 2.以公私協力推動農業減碳循環產業（農，2026） 3.推動下水污泥再利用（內）	農業部(主) 環境部(協)
		31	生物質投入作為生質能料源使用		農業部(主) 經濟部(協) 環境部(協) 內政部(協)
	4-3 建置料源地圖，培植區域型能資源中心，強化產業鏈循環	32	建置生物質料源供需與再利用產品利用資訊平台	1.建置生物質料源供需與再利用產品資訊平台（環-廢，2026） 2.農業循環減碳產業場域輔導示範（農，2026） 3.建立下水污泥再利用資訊平台（內政部）	環境部(主) 農業部(協) 經濟部(協) 內政部(協)
	4-4 剩餘料源研發高值化應用，精進能資	33	食品及農業剩餘料開發為保健食品、動物飼料、包裝材、纖維料	1.開發動物與人類保健植源劑產品，發展植物性材料及其副產物之循環利用	環境部(主) 農業部(主) 中研院(主) 國科會(協)

關鍵項目	推動措施	項次	項目	創新技術	分工
	源化處理技術強化效能		源及寵物用品	技術（中，2024） 2.建構食品加工副產物高值化之創新應用與去化方法（環-廢，2026） 3.減碳技術研發與產業整合應用（農，2026）	
		34	研發能資源化處理技術，生物炭及沼渣沼液多元應用途徑	1.研發沼氣產能增加、沼氣純化與沼渣液處理應用技術（環-廢，2026） 2.開創新型低耗能、低碳排畜牧資源化再利用技術（環-水，2026） 3.研發沼氣產能增加、沼氣純化與沼渣液處理、共消化應用技術（內）	農業部(主) 環境部(主) 經濟部(主) 內政部(主) 國科會(協)
廢棄物能源化及生質能	5-1 優化料源收集系統及媒合後端處理管道	35	降低清運成本，增加經濟效益	建立生物質集運機制、進場品質及收費規範（環-農）	環境部(主) 農業部(主)
		36	媒合業者有效利用	1. 持續輔導 SRF 製造廠設置及料源媒合（環、經） 2. 輔導生物質料源媒合（環、農）	環境部(主) 農業部(主) 經濟部(主)
	5-2 提升操作技術及廢轉能創新技術	37	提升燃料品質標準及技術	1.研訂 SRF 品質採樣驗證作業指引、修正 SRF 品質規範（環） 2.建置厭氧發酵示範廠增加能源應用方式 3.蒐集及評估國內外具應用潛力可轉製	經濟部(主) 環境部(主) 農業部(主)
		38	建置厭氧消化及農剩料循環示範場域		經濟部(主) 環境部(主) 農業部(主)
		39	廢轉能低碳技術及廢轉氫能技術		經濟部(主) 環境部(主) 農業部(主)

關鍵項目	推動措施	項次	項目	創新技術	分工
				氫能之廢棄物或生物質料源及技術；評估廢棄物處理程序之碳捕捉技術（經、環、農）	
	5-3 促進衍生物之處理去化	40	協助鍋爐及專燒發電設備衍生灰渣順利去化	1.研提混燒灰渣處理再利用審查指引（環、經） 2.評估全燒木質顆粒衍生灰渣做為農地土壤改良使用之可行性（農、經、環） 3.電廠混燒 5%SRF 及混燒 10%木質顆粒之混燒灰渣視為煤灰處理（經、農、環） 4.推廣沼液農地澆灌及沼渣製成輔助燃料等應用用途（環、農） 5.發展沼液沼渣產業共生技術（環）	經濟部(主) 環境部(主) 農業部(主)
		41	沼渣沼液之多元應用		環境部(主) 農業部(主) 經濟部(協)
	5-4 誘因措施	42	提升業者能源化之意願	1.檢討調整躉購費率（經） 2.SRF 減碳方法學（環）、SRF 減碳效益驗證技術（環-檢） 3.碳費徵收及抵換專案（環） 4.生物炭之應用技術（農、經、環）	經濟部(主) 環境部(主) 農業部(主)
化學品	6-1 源頭減量，優化製程改善、分流回收增進循環價值	43	化學品進入循環體系達 9 成以上，減少化學品廢液焚化量		國科會(主) 經濟部(主) 環境部(協)

關鍵項目	推動措施	項次	項目	創新技術	分工
	6-2 建立科學園區區域型循環模式，提升高值化化學品產能	44	提升園區區域內部化學品循環純化量能	建立化學品溶劑純化設施與電子級產品再生技術（科）	國科會(主) 經濟部(協) 環境部(協)
	6-3 產業媒合、跨區域資源鏈結及化學品租賃	45	建構化學品資源循環體系，藉由跨產業合作，帶動企業轉型提升國際競爭力		環境部(主) 經濟部(主) 國科會(協)
	6-4 技術研發，提升回收再製純化技術，以延長化學品使用週期，導入化學品替代措施，降低能耗	46	提升化學品廢液高值化循環應用，如高純酸級氟化鈣（高於97%）	1.研發廢氫氟酸資源純化技術，產出高純酸級氟化鈣高值化產物（環） 2.開發金屬表面非磷酸拋光技術（經）	經濟部(主) 國科會(主) 環境部(主)
		47	建立金屬表面處理業低廢循環處理技術，降低耗水量與污泥量		經濟部(主) 國科會(主) 環境部(主)
電器與電子產品	7-1 建立商品維修度指數標示推動指引，鼓勵消費者重複維修與使用，延長產品使用週期	48	建立電器電子產品維修度指數標示，帶動製造商重新設計產品	1.建立維修度指數之評分工具、推動指引 2.建立維修資訊公開管道，宣傳維修技術、維修點與活動等相關資訊	環境部(主) 經濟部(協)
		49	揭露維修管道資訊，推動維修相關產業鏈發展		環境部(主) 經濟部(協)
	7-2 建構多元回收制度與模式，結合製造、輸入業者建立逆向回收服務	50	結合業者透過多元、逆向回收服務機制，提升回收成效，以暢通回收處理管道，達到資源循環再利用目的	1.配合節能家電補助政策結合四機業者逆向回收耗能家電。 2.推動業者自主回收模式或租賃服務。	環境部(主) 經濟部(協)
		51	結合品牌及通訊業者推動手機回收工作，訂定手		環境部(主) 經濟部(協)

關鍵項目	推動措施	項次	項目	創新技術	分工
			機製造販賣業者循環服務指引		
	7-3 建立經濟誘因機制，促進綠色設計，提升再利用技術及再生材料應用	52	促進綠色設計，生產循環電子產品，提升再生物料多元應用	1.訂定電子產品添加再生材料比例之差別費率，促進製造業者及產品使用再生料。 2.獎勵補貼廢物品循環再利用及高值化，提升再利用技術。	環境部(主)
		53	訂定差別費率，鼓勵資源循環利用及高值化		環境部(主)
儲能及電動車用電池	8-1 加強鋰電池源頭管理制度，推動標示正極材料及再生料使用平台	54	推動標示鋰電池材料，提升再利用效益	1.推動資源數位追蹤與產品數位護照建立（環） 2.輔導電池製造業者使用電池再生料（經） 3.推動建置再生料使用平台	環境部(主) 經濟部(協)
	8-2 強化循環材料使用，貴金屬回用到電池原料製造端	55	訂定差別費率標準	1.發展提取高純正極前驅物原料技術開發與驗證（環） 2.發展電池低碳回收處理及再利用技術（環） 3.研發電池自動化拆解及檢測分析技術（環） 4.依再生料使用訂定責任業者差別徵收費率（環）	環境部(主)
		56	推動再生料標章設置	1.訂定再生料使用比率及標章推動（環） 2.輔導電池製造業者使用電池再生料（經）	環境部(主) 經濟部(協)

關鍵項目	推動措施		項次	項目	創新技術	分工
	8-3 加速電池廢棄循環法規並運用經濟誘因機制，調控回收循環量能		57	推動大型事業群/集團自體建立電池循環網絡	1.輔導電池製造業者參與電池回收處理作業，促使電池產業自體循環（環、經） 2.電池上下游業者異業結盟，使用再生料生產電池（環、經） 3.導入自動化、智慧化及低碳化製造程序設備與技術（環）	環境部(主) 經濟部(主)
			58	輔導建置區域型資源化循環中心		
			59	建立汰役電池安全使用測試標準	汰役電池安全使用標準（經）	經濟部(主) 環境部(協)
	8-4 促進發展鋰電池創新及高值循環技術，輔導產業橋接使用		60	推動重新匹配電池模組及物料循環回用	1.汰役電池降階使用重組技術開發（經） 2.輔導業者降階使用堪用電池（經）	環境部(主) 經濟部(協)
			61	鋰電池循環回用之碳盤查驗證機制與排碳效益分析	建立鋰電池循環回用之碳盤查驗證機制與排碳效益分析	環境部(主)
太陽光電板及風力葉片	太陽光電板	9-1 投入易拆解太陽能板設計、生產者延伸責任	62	綠色設計理念，研發光電板易拆解模組	工業循環創新技術開發與應用計畫-開發易循環 PV 模組創新設計（技術處）	經濟部(主) 環境部(協)
		9-2 強化循環材料高值化利用給予差別補貼，帶動投資	63	訂定再利用產品差別補貼費率，引導資源物質多元應用	1.發展太陽光電板永續材料與評估分解技術 2.建立廢玻璃多元化資源應用	環境部(主) 經濟部(協)
	風力葉	9-3 鼓勵自主回收及開發易回收	64	引導業者發展可回收樹酯技術，減少廢葉片處理	發展簡易降解程序回收葉片複合材料及再利用技術	經濟部(主) 環境部(主)

關鍵項目	推動措施	項次	項目	創新技術	分工
	片 設計，規劃業者回收機制		需求		
	9-4 建立回收處理示範計畫	65	建立破碎、研磨及水泥窯投料再利用等參數資料	建置廢葉片粒徑破碎研磨程序、水泥窯最適投料條件參數測試	環境部(主)
	9-5 推動產業協作機制、媒合水泥業者使用	66	2025 年輔導建置風力葉片破碎管道，並媒合水泥業參與	建立纖維複材回收處理線循環產線（環）	環境部(主) 經濟部(協)
		67	2030 年風力葉片循環回收率達 85%		
產品數位護照	10-1 推動產品數位護照管理制度	68	參考歐盟推動我國產品數位護照法規制度	1.蒐整歐盟推動產品數位護照法規制度與關鍵標的推動期程，提出我國產品數位護照管理制度。 2.盤點產品數位護照管理制度部會資源分工，制定護照登載資訊通用格式，將產品生命週期資訊紀錄標準化。 3.建置產品數位護照系統，掌握特定產品環境足跡、關注材料回收成分、供應鏈資訊、來源、材質組成、維修手冊、拆解方式及安全性作業環境、再生料添加比率等。 4.建立產品識別與流向追蹤技術。 5.盤點評估納入產品	環境部(主) 經濟部(協)
		69	建立產品數位護照資訊系統與國際認證接軌		環境部(主) 經濟部(協)

關鍵項目	推動措施	項次	項目	創新技術	分工
				數位護照之關鍵產品品項，試行產品數位護照系統。 6.產品數位護照系統與國際認證接軌，建置國際認證或第三方驗證等機制。 7.評估產品數位護照推動效益，至少包含提升產品生命週期環境足跡、再生料添加比率等、減少產品廢棄數量或能資源消耗可達減碳效益評估。	
	10-2 提升關鍵標的產品流向追蹤及環境資訊揭露，完善關鍵標的產品資源循環體系	70	推動更多關鍵標的產品納入產品數位護照	1.完善產品數位護照系統管理運作，確保資訊安全維運作業。 2.逐步擴大關鍵標的產品納入產品數位系統件數，掌握產品資源循環度與環境資訊。 3.與產品製造生產業者研商持續推動產品綠色設計與使用再生料，提升產品可維修性與完善產品維修體系，延長產品使用壽命提升產品循環度，促進資源循環網絡。 4.建置產品環境資訊揭露app，提升消費者對產品環境友善與資源循環度認	環境部(主)
		71	鼓勵機關、企業與民眾循環採購資源循環產品或服務促進永續消費		環境部(主)
		72	開發個人永續性產品購買帳戶系統		環境部(主) 經濟部(協)

關鍵項目	推動措施	項次	項目	創新技術	分工
				知。 5.研析開發個人永續性產品購買帳戶系統，並回饋累點制度，刺激民眾永續消費。	