Chapter 17

The Circular Economy in Viet Nam

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1. Introduction

The circular economy is becoming an inevitable global trend, meeting the requirements of sustainable development in the context of increasingly degraded natural resources, a polluted environment, and biodiversity loss due to climate change. Viet Nam has the potential to become a leader in terms of a circular economy in the Association of Southeast Asian Nations (ASEAN).

Prior to 2020, the principle of a circular economy was integrated into some of Viet Nam's economic models, typically those in the agricultural sector, ecological economic models, and waste-recycling craft villages. [1] After 2020, the concept was considered a key orientation for national socio-economic development. Indeed, in the *National Socio-Economic Development Strategy, 2021–2030, with a Vision to 2045,* the circular economy is emphasised as a solution for reconciling the relationship between economic development and natural resources consumption. Provisions for a circular economy were thus promulgated in the Law on Environmental Protection 2020.

This chapter evaluates policy tools that have an important role to play in promoting circular economy adoption in Viet Nam, such as environmental protection taxes and charges, green public procurement, expansion of manufacturer responsibility, and recycling markets. A SWOT analysis looks at current conditions under which a transition to a circular economy can occur, considering three national strategic breakthroughs related to institutions, technology, and infrastructure. These results help assess the success of circular economy models into priority sectors. Furthermore, a national road map for priority sectors, fields, and areas regarding a circular economy is detailed.

2. Overview of a Circular Economy

A circular economy is an industrial system that is restored and regenerated, based on conservation and enhancement of natural capital, optimising resource productivity and promoting system efficiency (Morl, 2015). The value of products, materials, and resources is maintained in the economy for as long as possible, and the economy works to produce minimal waste (EC, 2018). A linear economic model is only concerned with resource extraction, production, and disposal after consumption,

[1] According to Government Decree No. 52/2018/ND-CP dated 12 April 2018 on the development of rural crafts, a 'craft village' refers to one or many residential areas in hamlets, wards, or the equivalent that practices rural craft(s) activities as follows: (i) agro–forestry–fishery product processing and preservation; (ii) production of handicraft products; (iii) processing and preparation of ingredients and materials serving rural crafts; (iv) production of woodwork, straw, ceramic, glass, textile, embroidery, or minor mechanical engineering; (v) production and sale of ornamental animals; (vi) salt production; and (vii) other services serving production and livelihood of rural inhabitants. Moreover, Article 56 of the Law on Environmental Protection 2020 stipulates the requirements for environmental protection in these craft villages. Every craft village must have an environmental protection plan, an autonomous environmental protection organisation, and environmental protection infrastructure. Manufacturing establishments and households in a craft village must seek and implement environmental protection measures as prescribed by law; implement measures for noise, vibration, light, dust, heat radiation, emissions, and wastewater reduction, and in situ pollution remediation; and collect, classify, store, and treat solid waste as prescribed by law.

often leading to the creation of large amounts of waste. In contrast, the circular economy model focusses on resource management and recycling in a closed loop to avoid generating waste. The Law on Environmental Protection 2020 defines a circular economy as an economic model that encompasses the design, production, consumption, and services activities aimed at reducing raw materials, extending product life, reducing waste generation, and minimising adverse impacts on the environment.

Conversion from a linear economic model to a circular economy is a practical approach to solving the fraught relationship between the economy and environment, creating long-term resilience and economic opportunities as well as providing environmental and social benefits.

A circular economy has five components: (i) a design to create green products and to increase repairability, recovery, recycling, and reuse of products and components; (ii) application of cleaner production measures, emission reduction, and the circularisation of materials in the production stage; (iii) more thoughtful consumption through the provision of better services, increasing the responsibility of consumers towards the ecological environment; (iv) better waste management by segregation, end-of-life collection, and waste recycling; and (v) from waste back to resources, including waste recycling and resource reuse (Morl, 2015).

In a circular economy, the value of products, materials, and natural resources are maintained in the economy for longer periods of time, minimising waste generation. Measures to implement a circular economy are diverse, such as refusing to use products harmful to the environment or applying various measures to repair, reuse, remanufacture, and recycle to achieve the goal of reducing the consumption of raw materials and fuel. Enterprises adopt strategies such as (i) closing the loop through design to eliminate waste, pollution, and extraction of materials; (ii) slowing the loop to keep materials in use for longer periods of time; and (iii) narrowing the loop, by using fewer raw materials and for more purposes (Bocken, Miller, Evans, 2016). Based on solutions and strategies for the circular economy, the potential for new business models – such as a circular supply model, recovery model, long-life extension model, and sharing model – will appear (Table 17.1).[2]

[2] Waste Reduction Week in Canada, Five Business Models of Circularity, https://wrwcanada.com/en/get-involved/resources/circular-economy-themed-resources/five-business-models-circularity

Table 17.1. Value Motivations of a Circular Economy and Benefits for Consumers

Value Driver	Method
Extending the length of an asset's use cycle	Designed to last a long time Designed for easy recyclability Designed for easy repair and upgrade Includes clear guidance for maintenance
Increasing the utilisation of an asset or resource	Increases the sharing of assets Increases resource productivity Limits negative externalities
Looping or cascading an asset through additional use cycles	Reuses material Recycles used material for use as raw material Refurbishes the assets
Regenerating natural capital	Returns biological nutrients back to the land Avoids topsoil erosion Regenerates the nutrients of the soil Maintains the marine ecosystem

Source: Anbumozhi and Kimura (2018).

A circular economy also helps address co-benefits related to social inequality and ecological crises. With social equity in mind, a circular economy helps reduce social inequality and works towards inclusive management to achieve decoupling between gross domestic product (GDP) growth and the level of resource use and waste generation into the environment. It requires the participation of all stakeholders from the public sector, mining and raw material enterprises, processors, manufacturers, distributors, retailers, consumers, and garbage collectors. In particular, the public sector plays an important role in creating and promoting a circular ecosystem.

Today, digital technological developments are occurring rapidly, such as those related to cyber-physical systems, internet of things (IoT), simulation, advanced data analytics, robots, augmented reality, and intelligent tools for the support of human resources. New digital technologies can

promote the implementation of a circular economy, including mobile technology, machine-to-machine communication, cloud computing, social media for business, big data analytics, modular designing technology, advanced recycling technology, life and material science technology, trace and return systems, and 3D printing (Anbumozhi, 2022).

Indeed, IoT and the circular economy should be considered as two closely linked components, as IoT helps form and operate digital technology, creating a driving force to promote the application of a circular economy. The parallel development of these two components will create synergies to achieve ambitious economic growth goals while effectively using natural resources and reducing waste generation and adverse environmental impacts. Each level of the circular economy model can apply digital technology (Table 17.2).

Table 17.2. Application of Digital Technology in Business and Waste Management

	Micro (single business model)	**Meso** (industrial symbolism)	**Macro** (governance)
Production areas	Cleaner production, eco-design	Industrial park	Industrial network, regional linkage
Consumption areas	Green procurement	Environmentally friendly industrial park, eco-industrial park	Rental services, design services, repair services
Waste management	Recycle system, waste manufacturing	Market for waste and secondary material, second-hand goods	Industrial symbolism, waste collection system
Other support	Policies and legal framework, information foundation, capacity building, digital infrastructure		

Source: Anbumozhi (2022).

There are several potential evolving goods and services that support a transition to a circular economy, such as eco-design services, design for recycling and reuse, refurbishment and repair services, markets for raw and secondary materials, and technologies and products supporting the application of a circular economy. Standards and technical regulations should be set up for these potential goods and services; ensuring appropriate market openness and trade facilitation in circular goods and services is also crucial.

3. Barriers to and Conditions for Implementing a Circular Economy

At the government level, the Organisation for Economic Co-operation and Development (OECD, 2018) identified 13 barriers for countries to transition to a circular economy. In particular, barriers in culture, regulations, finance, and vision are challenges, specifically financial resources, regulatory uncertainty, financial risk, perception, human resources, private sector involvement, political readiness, and technology solutions. From the perspective of a business enterprise, Bianchini, Rossi, and Pellerini (2019) highlighted five groups of internal and external barriers to circular business models: organisational capabilities required, efforts in terms of business definition and corporate structure, technical barriers including expertise, the absence of a legal framework to guide the transition, and financial factors associated with the degree of long-term investment and cost.

In addition, legislation needs to consider factors that play a role in promoting this transition on a national scale. A circular economy platform must be developed by governments synchronously with enough resources to support change. Development strategies and plans play a fundamental role, contributing to stimulating the circular economy process at various scales through a systematic approach similar to the ecological industry approach (i.e. analysis of the flow and possible coordination from near space). To do this, governments must first focus on institutions, because institutions are both barriers to and promoters of the compliance economy. Good governance is also key and can be promoted through equality, participation, consensus, transparency, accountability, and the rule of law in an effective, efficient, and lasting manner.

Lastly, culture is often a major barrier to the launch of a circular economy platform. Culture governs the behaviour of businesses and consumers in dealing with nature; in the economic and efficient use of natural resources; and in waste classification, recycling, and reuse. Economic, social, and environmental benefits should be made clear as well as the desire to improve the quality of life. A circular economy focusses on materials and energy flows to prolong the use of resources and waste management. It helps infrastructure be designed and built in modular and flexible ways and energy systems become resilient and renewable, reducing costs and creating positive impacts on the environment.

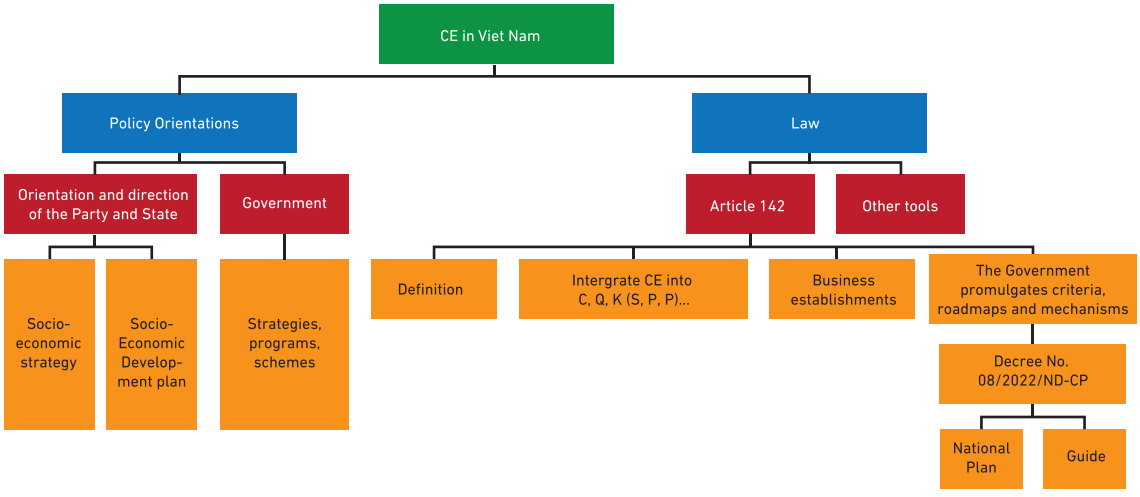
4. Policy and Legal Framework Related to the Circular Economy in Viet Nam

As shown in Figure 17.1, Viet Nam's policy and legal framework to develop a circular economy consist of two main groups:

i. policies of the Communist Party and government, reflecting national orientations of the circular economy (e.g. resolutions of the Central Committee, Committee Secretary, National Assembly, and government; socio-economic development strategies and development strategies of various sectors; and national schemes promulgated by the Prime Minister); and

ii. legal provisions prescribed in existing laws and bylaws (e.g. environmental protection and investment laws and regulations on taxes and incentives).

Figure 17.1. Policy and Legal Framework for the Development of the Circular Economy in Viet Nam



CE = circular economy.
Source: Authors.

4.1. Policies of Communist Party and Government

Regarding the circular economy, the perspectives of the Communist Party and government can be divided as follows:

i. **Before the 12th National Congress.** Before 2016, the term 'circular economy' had not yet been mentioned in any policy, but there was some movement towards implementing a circular economy.
ii. **During the 12th National Congress.** From 2016 to 2020, the term 'circular economy' was indicated in several national plans, such as that for the energy sector and the *National Action Plan on Sustainable Production and Consumption, 2021–2030.*
iii. **During the 13th National Congress.** Since 2021, the concept of a circular economy has been integrated into the *Socio-Economic Development Strategy, 2021–2030, with a Vision to 2045* and *Socio-Economic Development Plan, 2021–2025*. It also has been mentioned in resolutions on agriculture, farmer and rural issues, and the collective economy. Other resolutions and strategies on economic restructuring and the development of industries feature mention of a circular economy. In June 2022, the Prime Minister issued Decision No. 687/QD-TTg, approving the scheme for circular economy development in Viet Nam. It aims to decrease greenhouse gas emissions per GDP by at least 15% compared to 2014; to reuse, recycle, and treat 85% of plastic waste; and to reduce 50% of plastic waste in the ocean by 2030 (Table 17.3).[3]

[3] Viet Nam Circular Economy, Decision No. 687/QD-TTg dated 7 June 2022 on Approving the Scheme for Circular Economy Development in Vietnam, https://vietnamcirculareconomy.vn/en/policy-library/decision-no-687-qd-ttg-dated-june-07-2022-on-approving-the-scheme-for-circular-economy-development-in-vietnam/#:~:text=Decision%20No.-,687%2FQD%2-DTTg%20dated%20June%2007%2C%202022%20on%20approving,circular%20economy%20development%20in%20Vietnam&text=On%20June%207%2C%202022%2C%20the,circular%20economy%20in%20Viet%20Nam.

Table 17.3. Orientations and Policies on the Circular Economy in Viet Nam

STT	Policy	Contents Related to the Circular Economy
I	**Before the 12th National Congress**	
1.1	Directive No. 36/1998/CT-TW dated 25 June 1998 on strengthening environmental protection in the period of promoting industrialisation and modernisation	- No mention of the term 'circular economy' nor basic solutions of the circular economy, such as recycling and reuse. - Indicated some orientation related to the circular economy: *'Continue to promote mass movements for environmental protection such as Green–Clean–Beautiful Environment, VAC system, VACR system, Clean Water and Environmental Sanitation Week for schools and households' and 'use clean technologies that generate low emissions and consume less material and energy'.*
1.2	Resolution No. 41-NQ/TW dated 15 January 2004 on environmental protection in the period of promoting industrialisation and modernisation	- No mention of the term 'circular economy' but emphasised solutions and models related to the circular economy: *'encourage economic use of resources and energy; produce and use clean energy, renewable energy, products and product packaging that are not harmful or less harmful to the environment; recycle and use recycled products' and 'collect and treat all domestic and industrial waste with appropriate methods; priority given to reuse and recycling of waste, minimising landfills, especially in urban areas which do not have enough space for landfills.'*

STT	Policy	Contents Related to the Circular Economy
I	**Before the 12th National Congress**	
1.3	Resolution No. 24-NQ/TW dated 3 June 2013 on proactively responding to climate change, strengthening natural resources management, and protecting the environment	- No mention of the term 'circular economy', but emphasised solutions and models related to the circular economy: *'promote reuse, recycling and production and recovery of energy from waste'.*
II	**During the 12th National Congress**	
2.1	Resolution No. 55-NQ/TW dated 11 February 2020 on the orientation of Viet Nam's *National Energy Development Strategy to 2030 and Vision toward 2045*	- Implemented environmental protection policies in the energy sector in association with the goals of reducing greenhouse gas emissions, promoting the circular economy, and sustainable development. - Developed and implemented the scheme to integrate circular economy models into the development strategy of energy enterprises.
2.2	Conclusion No. 56-KL/TW on continuing to implement the resolution of the 7th Party Central Committee, term XI, on proactively responding to climate change, strengthening natural resources management, and protecting the environment	- Placed requirements on natural disaster prevention and control, response to climate change, resource management, and environmental protection to be at the centre of all development decisions. - Focussed on handling environmental pollution after 2020, especially in urban areas. - Classified waste at source, especially domestic waste.

STT	Policy	Contents Related to the Circular Economy
II	**During the 12th National Congress**	
2.3	*National Action Plan on Sustainable Production and Consumption for 2021–2030*	- Promoted the circular economy and sustainable development. - Supported the development and application of popularisation and replication of circular economy models of resources, fuel, and materials in production and consumption activities. - Promoted the application of circular economy models in waste management. - Promoted the application, popularisation, and replication of models of classification, collection, reuse, and recycling of waste and scrap; and developed training documents on circular economy models for waste management in agriculture, fisheries, electronics, chemicals, thermal power, plastic, paper, construction materials, and other economic sectors. - Promoted the supply–demand connection, developing markets for environmental products and technologies, recycling products and technologies, and low-carbon technologies. - Gradually built and applied circular economic models in the field of consumption, encouraging the transition from consumption and ownership of goods to consumption and use of services.

STT	Policy	Contents Related to the Circular Economy
III	**During the 13th National Congress**	
3.1	**Documents of the 13th National Congress**	
3.1.1	*National Socio-Economic Development Strategy, 2021–2030 with a Vision to 2045*	Encourage the development of a circular economy model for integrated and efficient use of the outputs of the production process.
3.1.2	Report on the *Socio-Economic Plan, 2016–2020* and Resolution No. 16/2021/QH15 dated 27 July 2021 on the *Socio-Economic Development Plan, 2021–2025*	Develop road maps, mechanisms, policies, and regulations to build and to implement models of green economy, circular economy, and low-carbon economy.
3.2	**Resolutions and Directives of the Party and Government**	
3.2.1	Resolution No. 19-NQ/TW dated 16 June 2022 on agriculture, farmers, and rural areas to 2030, with a vision to 2045	- Encourage the development of green, organic, and circular agriculture. - Encourage the development of circular agriculture; reuse of by-products; and application of new, advanced, and environmentally friendly technologies, attracting enterprises to invest in wastewater and solid waste treatment in villages, industrial and service clusters, and concentrated waste treatment zones.
3.2.2	Resolution No. 20-NQ/TW dated 16 June 2022 on continuing to innovate, develop, and improve the efficiency of the collective economy	- Prioritise the development of collective economic organisations associated with the development of green economy, circular economy, and knowledge economy. - Issue synchronised policies to attract resources; apply science and technology; develop a circular

STT	Policy	Contents Related to the Circular Economy
		economy, green economy, and organic agriculture; adapt to climate change and digital transformation; and expand the market for the collective economy.
3.2.3	Resolution No. 43/2022/QH15 on fiscal and monetary policies supporting economic recovery and development programme	Build breakthrough policies, giving priority to encouraging innovation, digital transformation, digital economy, green economy, and circular economy associated with sustainable development.
3.2.4	Resolution No. 11/NQ-CP dated 30 January 2022 on the socio-economic recovery and development programme and implementation of Resolution No. 43/2022/QH15 on fiscal and monetary policies to support the programme	Continue to research and implement breakthrough solutions; encourage innovation; promote digital transformation; and develop the digital economy, green economy, and circular economy associated with sustainable development.
3.3	**Decisions of the Prime Minister**	
3.3.1	Decision No. 1520/QD-TTg dated 6 October 2020 approving an animal husbandry development strategy for 2021–2030 with a vision to 2045	Promote the expansion of animal husbandry in a closed chain following circular economy models.
3.3.2	Decision No. 450/QD-TTg dated 13 April 2022 approving the *National Environmental Protection Strategy until 2030, with a Vision to 2050*	Prevent the increasing trend of environmental pollution and degradation; deal with pressing environmental issues; gradually improve the environment; prevent the loss of biodiversity; improve climate change response capacity; ensure environmental security;

STT	Policy	Contents Related to the Circular Economy
		develop and build circular economy, green economy, and low-carbon economy models; and aim to achieve 2030 sustainable development objectives.
3.3.3	Decision No. 1658/QD-TTg dated 1 October 2021 approving the *National Green Growth Strategy, 2021–2030, with a Vision to 2050*	Transform the growth model in a manner towards 'greenification' of economic sectors, apply the circular economic model through the efficient extraction and use of natural resources and energy that are based on science and technology, apply digital technology and digital transformation, develop sustainable infrastructure facilities to enhance the quality of growth, promote competitive advantages, and reduce adverse impacts on the environment.
3.3.4	Decision No. 493/QD-TTg dated 19 April 2022 approving the *Strategy for Merchandise Exports and Imports to 2030*	Promote in-depth restructuring of export goods; accelerate industrialisation and modernisation; increase the proportion of exports of products with added value, and green, circular economy, eco-friendly products.
3.3.5	Decision No. 687/QD-TTg dated 7 June 2022 approving the scheme for circular economy development in Viet Nam	- Contribute to the goal of reducing greenhouse gas emissions. - Raise awareness and concerns of enterprises and investors in Viet Nam regarding the circular economy, and promote the application of the circular economy model to promote the green transition of economic sectors.

STT	Policy	Contents Related to the Circular Economy
		- By 2025, circular economy projects are essential in the implementation phase and reaping economic, social, technological, and environmental effectiveness; contribute towards restoration of renewable resources, reduction of energy consumption, and increase of the ratio of renewable energy over total energy supply, forest cover, waste recycling rates, import substitution rates of agricultural, forestry, fishery, and export products. - By 2030, circular economy projects become a primary drive in reducing energy consumption with major or total autonomy in energy demand by utilising renewable energy and in increasing forest cover. - Circular economy models assist the development of green living, encourage waste segregation, and promote sustainable consumption. - By 2025, reuse, recycle, and treat 85% of plastic waste produced; reduce 50% of plastic waste in the ocean compared to the prior period; and gradually reduce production and use of non-biodegradable nylon bags and disposable plastic products. Drastically increase organic waste-recycling capacity in urban and rural areas. Raise awareness regarding the production, consumption, and disposal of plastic waste, non-biodegradable nylon bags, and disposable plastic waste. - By 2030, collect and treat 50% of urban municipal solid waste to standards and regulations

STT	Policy	Contents Related to the Circular Economy
		via circular economy models; recycle 100% of organic waste in urban areas and 70% of organic waste in rural areas; no longer bury municipal solid waste within circular economy models in urban areas; maximise the collection and treatment of urban wastewater to standards and regulations. - The circular economy model plays a vital role in improving the quality of life and resistance of the public to climate change and ensuring equality in conditions and opportunities to improve the capacity, productivity, and income of workers from a circular economy.

Note: A VAC system (*vuon, ao, chuong*) refers to a garden/pond/livestock pen, while a VACR system (*vuon, ao, chuong, rung*) denotes a garden/pond/livestock pen/forest.
Source: Authors.

4.2. Regulations on the Circular Economy in Viet Nam

In 2020, the concept of the circular economy was regulated in the Law on Environmental Protection.[4] Following Clause 11, Article 5 of this law, the government affirmed its commitment to incorporate and to promote a circular and green economy in the formulation and implementation of its socio-economic development strategies, plans, programmes, and projects. Article 142 of the law promulgates a circular economy.

According to the law, a circular economy is officially defined as an economic model that encompasses design, production, consumption, and services activities aimed at reducing raw materials, extending product life, reducing waste generation, and minimising adverse impacts on the environment. The law also assigns responsibilities for a circular economy to relevant government agencies and stakeholders. Ministries, ministerial agencies, and provincial people's committees must incorporate circular economy principles when formulating development strategies; planning a programme or project; and managing, reusing, and recycling waste. Every business must also establish a

[4] The Law on Environmental Protection 2020 replaced the Law on Environmental Protection 2014; it took effect 1 January 2022.

management system and take measures to reduce the extraction of natural resources, reduce waste, and increase waste recycling and reuse from setting up a project to designing a product or goods for production and distribution.

In addition, the government is required to detail criteria, road maps, and mechanisms for encouraging the implementation of a circular economy in conformity with national socio-economic conditions. The government has built a relatively strong legal and policy foundation to promote a circular economy in various sectors, through policies on waste segregation at the source, green public procurement, extended manufacturer liability, recycling markets, various preferential and supportive measures, development of environmental industry, environmental services, green purchase, green credit, and green bonds.

Based on the concept outlined under the law, Decree No. 08/2022/ND-CP dated 10 January 2022 provides more detailed regulations on the criteria, road maps, and incentive mechanisms for the implementation of a circular economy in Viet Nam. It identifies three groups of criteria for a circular economy:

i. reduce the exploitation and use of non-renewable and water resources; increase the efficiency in the use of resources, raw materials, and materials; and save energy;
ii. extend the useful life of materials, equipment, products, goods, and parts; and
iii. reduce waste generated, and minimise adverse impacts on the environment, including by reducing solid waste, wastewater, and emissions; reducing the use of toxic chemicals; recycling waste, and recovering energy; reducing disposable products; and developing green purchasing habits.

To achieve these objectives, the decree suggests measures for businesses outlined below:

i. owners of production, business, and service establishments should take one or more measures in the following order of priority: (a) restrict the use of non-eco-friendly products; make the best use of equipment and products; and increase efficiency in product manufacturing or efficiently use natural resources, raw materials, and materials; (b) extend the life cycle of products and their parts through reuse, repair, refurbishment, remanufacture, or repurpose; and (c) reduce waste generated by recycling waste or incineration of waste with energy recovery; and
ii. owners of investment projects; businesses; dedicated areas for production, business operations, and service provision; and industrial

clusters should undertake one or more of these measures: (a) design an optimal master plan that establishes a connection between investment projects and businesses to improve efficiency in the use and reduction of the consumption of soil, water, minerals, and energy; increase the recycling rate; and reduce the total amount of waste generated; (b) develop and use clean and renewable energy as prescribed by law; (c) collect and store rainwater for reuse; and collect, treat, and reuse wastewater; and (d) carry out industrial symbiosis activities in accordance with the law on the management of industrial parks and economic zones.

Secondly, the decree stipulates that the Ministry of Natural Resources and Environment (MNRE) must preside over and cooperate with ministries, ministerial agencies, and provincial people's committees in formulating and submitting to the Prime Minister a national action plan on the circular economy before 31 December 2023; build and operate a platform for sharing data on the application of the circular economy model; and establish and introduce a methodological framework for assessment of the implementation of the circular economy. Ministries and ministerial agencies must formulate and approve action plans for implementation of a circular economy; organise the dissemination of laws and provision of training on the circular economy; incorporate specific criteria for implementation of the circular economy in development strategies, plans, programmes, and projects and in the management, reuse, and recycling of waste; manage information on the implementation of the circular economy and integrate it with MNRE's information system; and organise pilot applications of the circular economy in the energy, fuel, and waste industries according to the action plans. Provincial people's committees must formulate provincial action plans for implementation in conformity with the national action plan and organise pilot applications of the circular economy to the energy, fuel, and waste industries according to the action plans.

The decree requires three kinds of action plans for the circular economy: a national action plan; provincial action plans; and action plans for various industries, fields, and products. Owners of investment projects and businesses – as well as investors in construction and commercial operations of infrastructure in dedicated areas for production, business operations and service provision, and industrial clusters – are encouraged to apply the circular economy model earlier than the road map specified in action plans as prescribed.

Mechanisms and incentives to encourage the implementation of a circular economy have also been regulated in law. According to Decree No. 08/2022/ND-CP, the government is prioritising the development of a circular economy by conducting scientific research, developing

applications, transferring technologies, producing equipment, and training personnel to implement a circular economy; and providing a platform for connecting information and sharing data on the circular economy. In addition, the government is encouraging the following activities for the development of a circular economy:

i. developing technologies and technical solutions, and providing circular economy assessment, design, and consulting services as prescribed by law;
ii. developing models for connecting and sharing the circular use of products and waste; establishing cooperative recycling groups, unions and alliances, and models for regional and rural–urban connections to carry out investment, manufacturing, and business activities, thereby meeting circular economy criteria;
iii. adopting industrial symbiosis measures in accordance with regulations of law on the management of industrial parks and economic zones;
iv. developing discarded product reuse and waste-recycling markets;
v. mobilising social resources for the implementation of a circular economy as prescribed by law; and
vi. developing international cooperation, exchanging experience, knowledge, and technologies in relation to the circular economy as prescribed by law.

Furthermore, organisations or individuals that carry out activities or have projects applying the circular economy model are entitled to incentives or assistance in environmental protection. Incentives and assistance include exemption and reduction of land levies and rents; incentives from the Viet Nam Environmental Protection Fund, provincial environmental protection funds, and Vietnam Development Bank; corporate income tax incentives; and subsidies for environmental protection products and services. Moreover, organisations and individuals implementing circular economy models are entitled to incentive policies on green credit and green bonds.[5]

5. Practical Application of a Circular Economy in Viet Nam

In Viet Nam, many industries and localities have models that include manifestations of a circular economy, such as eco-industrial parks, cleaner production models, waste-recycling craft villages, or circulation initiatives of enterprises (Table 17.4). However, some initiatives have been unsustainable and even caused significant impacts on environmental protection objectives.

[5] Article 154, Article 155, Article 156, and Article 157 of Decree No. 08/2022/ND-CP.

Table 17.4. Models Embedding the Principles of the Circular Economy in Viet Nam

Category	Circular Economy-Related Principles
Production	
Agriculture, forestry, and fisheries	Several circular models exist in many provinces (e.g. VAC and VACR models to make use of biomass; models of collecting agricultural waste such as tree trunks, straw, and rice husks; a bioaquatic model; and an organic farming model). In cultivation, the by-products of peanut shells, corn stalks, rice straw, cassava stalks, soybean hulls, firewood from perennial plants, and firewood from annual plants are used. Straw is also used as food for cattle, biological padding, mushroom cultivation, and for composting as traditional organic fertilizer and burning. Regarding livestock, by-products are used in traditional composting, biogas production, microbial manufacturing biological padding and for commercial purposes such as earthworm farming. In aquaculture, the collection rate is more than 90%; by-products are used for the extraction process of biological compounds; food products, such as fish oil; and producing organic fertilizer.
Mining	Mining activities have the potential to apply the principles of the circular economy to make efficient use of waste from mining, minimising adverse impacts on the environment.
Manufacturing and processing	Circulation of water, raw materials, and materials in production and business establishments has been applied (e.g. in the pulp and paper industry and metallurgy).
Water supply, management, and treatment	Waste collection, classification, and treatment units act as intermediaries in promoting recycling, reuse, and waste reduction. There are models of

Category	Circular Economy-Related Principles
Production	
	plastic waste treatment, composting, and energy recovery from waste as well.
Construction	Waste generated from construction activities, such as rocks, bricks, tiles, mortar, concrete, and adhesive materials, are used, reused, and recycled.
Transport	The model of transforming from products to services, such as leasing batteries and sharing models, is popular.
Repair and trade of second-hand goods	Repair and refurbishment are quite common in Viet Nam.
Energy	There are current waste-to-energy models and renewable energy models in Hau Giang, Ha Noi, and some localities.
Other services	Consulting services on evaluating and providing technologies, equipment, and solutions related to a circular economy – as well as training on the circular economy – have been deployed by many universities.
Meso Level	
Industrial parks, industrial clusters	Some eco-industrial parks have applied industrial symbiosis and circularity initiatives within their limits (e.g. Nam Cau Kien Industrial Park).
Urban areas, residential areas	Some pilot activities in residential clusters have begun, such as wrapping vegetables and fruits with banana leaves, using glass bottles and bamboo or paper straws, and using paper cups instead of plastic cups and cloth bags instead of plastic bags.

Category	Circular Economy-Related Principles
Consumption	
Intermediate consumption	The market for raw materials and fuels for the recycling and reuse of products has been formed.
Governmental consumption	Legal regulations on green public procurement have been finalised; the government and private sector aim to integrate environmental criteria into the procurement process.
Household consumption	By promoting the consumption of eco-labelled, energy-saving products, renewable energy tends to increase.
Waste Management	
Solid waste	Some models demonstrating the circular economy approach in the field of waste recycling include recycling iron, aluminium, copper, zinc, glass, paper, and plastic from scrap in large, medium, and small-scale industrial production or craft villages; plants producing micro-organic fertilizers from domestic waste, and clean soil from dredging sludge and sewage sludge collected from domestic wastewater treatment plants; establishments using agricultural waste to grow mushrooms and produce livestock feed; plants producing building materials from ash, slag, and gypsum generated from coal-fired thermal power, fertilizer, and chemical plants; plants producing refuse-derived fuel and refuse, derived paper, and plastic densified fuel from domestic industrial waste; energy recovery and electricity from waste incineration plants; and hazardous waste recycling plants.
Wastewater	Wastewater circulation in some industrial zones (e.g. Nam Cau Kien Industrial Park); wastewater treatment stations with reverse osmosis technology to provide treated wastewater

Category	Circular Economy-Related Principles
Waste Management	
	for production; and wastewater treatment to meet the requirements of watering plants and aquaculture.
Emissions	Emissions treatment systems use cloth-bag dust filtration technology to recover products. Plants are recovering carbon dioxide (e.g. breweries) and sulphur dioxide (e.g. thermal power plants).

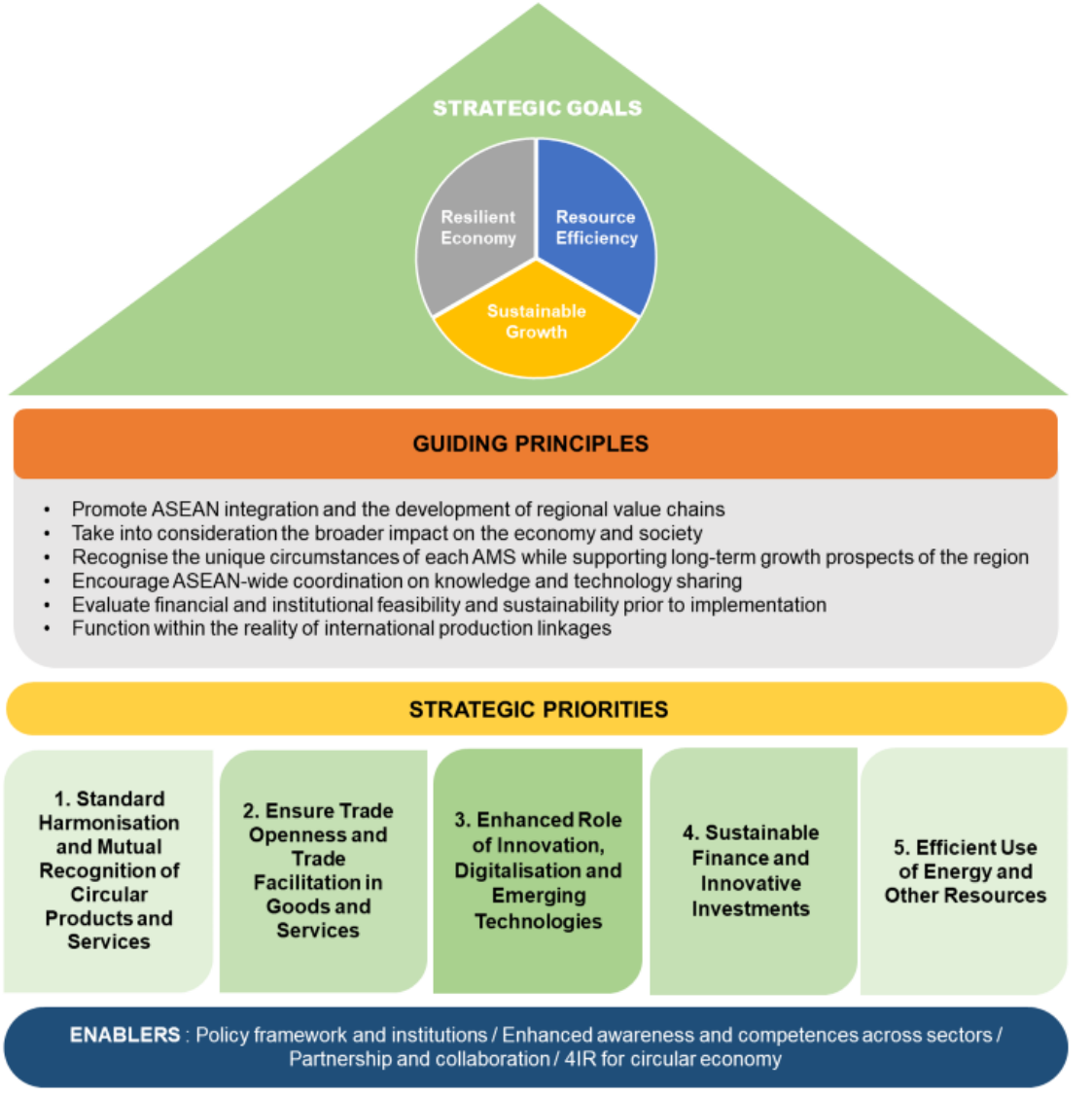
Note: A VAC system (*vuon, ao, chuong*) refers to a garden/pond/livestock pen, while a VACR system (*vuon, ao, chuong, rung*) denotes a garden/pond/livestock pen/forest.
Source: Authors.

6. The Circular Economy in ASEAN and Japan: Requirements and Opportunities for Viet Nam

6.1. Framework for a Circular Economy in the ASEAN Economic Community

The transformation from a linear economy model to a circular economy model is happening in ASEAN as several ASEAN Member States (AMSs) have issued strategies, policies, and road maps to address the sustainability challenges of resource depletion, plastic waste, and climate change. In 2021, ASEAN adopted the *Framework for Circular Economy for the ASEAN Economic Community* (Figure 17.2). It sets up a long-term vision for a circular economy based on existing initiatives and identifies focus areas for action (ERIA, 2021). It has three strategic goals: a resilient economy, resource economic efficiency, and sustainable and inclusive growth. To create a common context for circular economy initiatives for AMSs, the framework provides six guiding principles: (i) promote ASEAN integration and the development of regional value chains; (ii) consider broader impacts on the economy, sectors, and society; (iii) recognise the unique economy of each AMS whilst supporting long-term growth prospects of the region; (iv) encourage ASEAN-wide coordination on knowledge, technology transfer, and capacity building; (v) evaluate financial and institutional feasibility and sustainability; and (vi) aim to function within the reality of international production networks and linkages prior to implementation.

Figure 17.2. Framework for a Circular Economy for the ASEAN Economic Community



AMS = ASEAN Member State, ASEAN = Association of Southeast Asian Nations.

Source: ERIA (2021).

According to the framework, five strategic priorities are key for the transition to a circular economy:

i. **Strategic Priority 1.** Harmonise standards, and mutually recognise circular products and services.
ii. **Strategic Priority 2.** Encourage trade openness and trade facilitation in circular goods and services.
iii. **Strategic Priority 3.** Enhance the role of innovation, digitalisation, and emerging/green technologies.
iv. **Strategic Priority 4.** Foster competitive sustainable finance and innovative environmental, social, and governance (ESG) investments.
v. **Strategic Priority 5.** Use energy and other resources efficiently.

Despite the many initiatives undertaken, they have been fragmented, with insufficient collective targets and a lack of a synergetic approach. Indeed, the transition to a circular economy at the regional level demands cooperation amongst sectoral bodies; collaboration amongst the public and private sector and communities; as well as preservation of the efforts with commitment. The process must be built upon emerging best practices at the national level and tips for those AMSs devising their own road maps to facilitate an ASEAN-wide transition to a circular economy.

6.2. Legislation and Policy Framework for a Circular Economy in Japan

Japan's approach to a circular economy is a typical example at the national level. Since 1991, it has implemented a circular economy by formulating legal provisions to transform the country into a recycling-based society. The legal core is the Basic Law for Establishing a Recycling-Based Society, which entered into force in 2002, and set out quantitative targets for recycling in the long term. As a result, Japan quickly achieved the highest recycling rate in the world. In 2007, only 5% of Japan's waste went to landfills, compared with 48% of that of the United Kingdom in 2008. Since 2010, the recycling rate for metals in Japan reached 98% (MOE, 2010). Its recycling law for electrical home appliances ensures that over 50% of electronic products are recycled, compared with 30%–40% in Europe (METI, 1998; Hotta, Santo, Tasaki, 2014). About 74%–89% of the materials contained in these devices have been recovered to produce similar products, helping save costs and reduce dependence on mining resources (WEEEForum, 2012).

At the national level, the implementation of a circular economy is examined by using (i) a resource productivity indicator that measures material use as a proportion of GDP; (ii) an indicator for the cyclical use rate of materials in the economy, measured by the material reused as a proportion of total material used by the economy; and (iii) an output indicator, measuring how much waste is buried in landfills. These indicators are associated with specific targets.

The legislation and policies on the circular economy in Japan have been collected, examined, and summarised in Table 17.5.

Table 17.5. Overview of Legislation and Policy on the Circular Economy in Japan

Name	Year	Overview
Legislation		
Basic Act on Establishing a Sound Material-Cycle Society	2000 (Revised in 2013)	Promotes policies for establishing a sound material-cycle society and formulating the *Fundamental Plan for Establishing a Sound Material-Cycle Society.*
Waste Disposal and Public Cleansing Act	1970 (Revised in 2017)	Preserves the living environment and improves public health through the restriction of waste discharge; appropriate sorting, storage, collection, transport, recycling, disposal, and clarification of waste; and conservation of a clean environment.
Act on the Promotion of Effective Utilisation of Resources	1991 (Revised in 2001)	Ensures the effective use of resources, reduces the generation of used products and by-products, and promotes the utilisation of recyclable resources and reusable parts to contribute to waste reduction and environmental preservation.
Act on Recycling Home Electrical Appliances	1998	Regarding specified post-consumer home appliances, stipulates the roles of each player: collection from consumers by retailers, recycling by manufacturers or importers as well as payment of fees for collection, and transport and recycling by consumers when they discard those appliances.
Act on Recycling of End-of-Life Automobiles	2002	Promotes recycling and proper disposal of end-of-life vehicles by clarifying the roles of car owners, collection operators, fluorocarbon-recovery operators, dismantling operators, shredding, and sorting operators, and vehicle manufacturers and importers.

Name	Year	Overview
Legislation		
Act on Promotion of Sorted Collection and Recycling of Containers and Packaging	1995	Promotes the reduction of waste containers and packaging discharged and the sorted collection thereof as well as the recycling of waste containers and packaging that are obtained through the sorted collection that conform to sorting standards to ensure proper management of waste and effective use of resources through reduction of municipal solid waste and adequate use of recyclable resources.
Act on Promotion of Resource Recycling on Plastics	2022 (Scheduled to be enacted)	Promotes the circulation of plastics in a comprehensive manner.
Act on Promotion of Recycling of Small Electrical and Electronic Equipment	2012	Considering circumstances where a considerable portion of metals or other useful materials used in electrical and electronic equipment is disposed of without being recovered, promotes the recycling of small electrical and electronic equipment, thereby ensuring proper disposal of waste and effective use of resources.
Act on the Recycling of Construction and Demolition Waste	2000	Requires contractors to sort and to recycle waste generated in construction and demolition work.

Name	Year	Overview
Visions and plans		
Circular Economy Vision 1999	1999 (developed and published by METI)	Consists of four chapters: (i) the way forward to a circular economy, (ii) reconstruction of waste management and recycling measures towards the establishment of a circular economy, (iii) future challenges and policy responses towards the establishment of a circular economy, and (iv) status and issues in individual areas. Priority sectors include containers and packaging, home appliances and batteries, automobiles and bicycles, construction material, general industrial waste, and others (waste oil, gas and oil equipment, and aerosol cans).
Circular Economy Vision 2020	2020 (developed and published by METI)	To demonstrate the strengths that Japanese companies have developed through their 3R efforts in the global market and to strengthen industrial competitiveness in the medium and long term, shows the basic direction of Japan's circular economy policy from three perspectives: (i) the transition towards more circular business models, (ii) appropriate evaluation from the market and society, and (iii) early establishment of a resilient resource circulation system. Priority sectors include plastics, textiles, carbon fibre reinforced polymers, batteries, and photovoltaic panels.
First Fundamental Plan for Establishing a Sound Material-Cycle Society	2003	Accelerates the transition to sustainable production and consumption models through (i) conservation of nature and enhancement of a virtuous socio-economic cycle, (ii) shift in consciousness and behaviours in daily life, (iii) shift in consciousness and behaviours toward manufacturing, (iv) activation of various entities' activities for establishing a sound material-cycle society,

Name	Year	Overview
Visions and plans		
		and (v) enhancement of systems for proper circulation and disposal of waste. Priority sectors include biomass, appropriate circulation and disposal of waste, treatment of waste containing hazardous substances, and monitoring of illegal dumping of waste.
Second Fundamental Plan for Establishing a Sound Material-Cycle Society	2008	Formulated in consideration of the results of past efforts, progress in achieving targets, and changes in socio-economic conditions such as global resource constraints and the need to cope with environmental issues such as global warming. The main directions were (i) conserving nature and enhancing a virtuous socio-economic cycle; (ii) realising a circular society based on the characteristics of each region; (iii) establishing a socio-economic system with minimal resource consumption and high energy efficiency; (iv) establishing a lifestyle based on the concept of *Mottainai*, and accelerating partnerships amongst related entities; (v) promoting the 3R concept in economic activities such as manufacturing; and (vi) enhancing the system for appropriate circulation and disposal of waste. Priority sectors include biomass, appropriate circulation and disposal of waste, appropriate treatment of waste containing hazardous substances, and monitoring of illegal dumping of waste.
Third Fundamental Plan for Establishing a Sound Material-Cycle Society	2013	Formulated to cope with various changes and to implement the formation of a sound material-cycle society in Japan and abroad in an integrated manner in cooperation with various actors, including the promotion of the 3Rs, based on the premise of environmental conservation and in cooperation with

Name	Year	Overview
Visions and plans		
		the various entities constituting society. The main directions included (i) a society where circulation in the environment and circulation in the economy are harmonised, (ii) establishment of a concept of a 3R lifestyle and a regional circular sphere, (iii) establishment of a socio-economic system with high resource efficiency, (iv) realisation of safety and security, and (v) international initiatives. Priority sectors included plastics; biomass; household food loss; base metals, rare metals, and other metals; appropriate treatment of waste containing hazardous substances, mercury, waste containing mercury, and agricultural chemicals stored underground; monitoring of illegal dumping of waste; and strengthening waste management systems in case of disaster.
Fourth Fundamental Plan for Establishing a Sound Material-Cycle Society	2018	Aims for the integrated improvement of environmental, economic, and social aspects. A vision, indicators, and planned measures have been set for seven pillars: (i) integrated measures towards a sustainable society, (ii) regional circular and ecological sphere, (iii) resource circulation throughout the entire life cycle, (iv) proper waste management and environmental restoration, (v) disaster waste management systems, (vi) international resource circulation, and (vii) sustaining fundamentals for 3R and waste management. Priority sectors include plastics; biomass; base metals, rare metals, and other metals; earth and rocks; construction materials; products and materials introduced widely as a measure against global warming and

Name	Year	Overview
Visions and plans		
		other environmental problems, lithium-ion batteries, and carbon fibre-reinforced plastics; POPs, mercury, waste containing mercury, and agricultural chemicals stored underground; waste electronic substrates; and household food loss.

3R = reduce, reuse, recycle; METI = Ministry of Economy, Trade and Industry.
Source: Nippon Koei Vietnam International (2022).

Japan has developed several well-known circular models in urban and rural areas, including eco-towns and eco-villages. Kawasaki is one eco-town where resources are reused and recycled. During Japan's era of high economic growth (i.e. 1950s to 1970s), Kawasaki was a leading industrial city that suffered from air and water pollution as well as poor waste disposal. The local government joined with residents to solve this environmental contamination by signing agreements with companies over air pollution control. Today, Kawasaki is building an economy and society based on circulating resources, taking advantage of its expertise in promoting environmental industries and recycling. *The Fundamental Strategy of the Kawasaki Sustainable-Energy City Plan* was thus developed. It consists of four pillars:

i. Companies contribute to improving their green credentials through the construction of advanced recycling facilities and processes of eliminating factory effluent and industrial discharge.
ii. Companies develop sustainable, environmentally friendly districts through research on energy savings and recycling, management plans, and promotion of research and development of the industry.
iii. Business alignment encourages the area's ecology with the construction of the Kawasaki Zero-Emission Industrial Complex, hybrid cars, and synergic recycling activity in the area.
iv. Companies announce their achievements and convey their ideas to society and developing countries by constructing an eco-town centre, implementing ecology studies and sharing information on achievements and ideas. The model also contributes to local employment and effective land utilisation by attracting businesses to eco-town areas, branding the area and overall industrial promotion and regional revitalisation (GEC, 2005).

Another related circular model in rural areas is an eco-village (Ogata, 2014). *Satoyama* – areas between foothills and arable land – is a production ecosystem featuring secondary forests, farmlands, irrigation ponds, grasslands, and human settlements. Humans create such areas to produce food and fuel, conserve land and headwaters, and provide places for leisure. The initiative intends harmony with nature, comprising human communities where the maintenance and development of socio-economic activities align with natural processes. The initiative is based on five ecological

and socio-economic perspectives: (i) resource use within the carrying capacity and resilience of the environment; (ii) cyclic use of natural resources; (iii) recognition of the value and importance of local traditions and cultures; (iv) multi-stakeholder participation and collaboration in sustainable and multi-functional management of natural resources and ecosystem services; and (v) contributions to sustainable socio-economies including poverty reduction, food security, sustainable livelihoods, and local community empowerment (Matsuya, 2013).

To promote a transition to a circular economy, innovation also plays an important role. Japan is a world leader in eco-innovation, and the environmental market in Japan has been rapidly expanding since the second half of the 1990s. The Ministry of the Environment; Ministry of Economy, Trade and Industry; Ministry of Education, Culture, Sports, Science and Technology; and Council for Science and Technology Policy are major contributors to eco-innovation in Japan. The main policies include Economic and Fiscal Reform (2007), Economic Growth Initiative (2007), *Becoming a Leading Environmental Nation in the 21st Century: Japan's Strategy for a Sustainable Society* (2007), *Keys to Create Innovation and Promote Eco-Innovation (*2007), Cool Earth Innovation Energy Technology Program (2008), *Third Science and Technology Basic Plan* (2013), and Intellectual Property Strategic Program (various years). Many policy instruments, such as mobilisation of financing, have already been mentioned, including the Industrial Cluster Policy, which illustrates how public support can be used to access market and private financial resources; eco-town projects, which demonstrate how central government initiatives can generate local action; market-based instruments that focus on subsidies and public support schemes for renewables; the Japan Voluntary Emissions Trading Scheme; green public procurement, which became mandatory in 2001; and awareness raising and training (Leflaive, 2008).

6.3. Requirements and Opportunities for Viet Nam's Circular Economy

Based on the case study of Japan and *The Framework for Circular Economy for the ASEAN Economic Community*, several requirements and opportunities for Viet Nam to promote a circular economy model are suggested:

i. A legal system should be established, which specifies the objectives and tasks to be performed, measures and incentives, and responsibilities and coordination amongst stakeholders to develop a circular economy. It is necessary to consider revising and supplementing other modes as well, such as the environmental protection tax and laws on consumer protection and public investment.
ii. A national action plan and implementation road map should be detailed to transition from a linear to a circular economy. Specific actions and tasks should be aligned with implementing a circular economy, such as product design, manufacturing, consumption, disposal, waste management, secondary material management, investment innovation, and initiatives.
iii. Businesses should play a central role in implementing a circular economy. They can enjoy relevant preferential policies and incentives from the government, as well as voluntarily re-innovate their businesses towards protecting the environment, saving resources, and improving competitiveness.
iv. All stakeholders should be engaged in the transition to a circular economy since it is considered

a systemic change – requiring all stakeholders from the public and private sectors, citizens, knowledge institutions, and non-governmental organisations to play roles. Accordingly, formal stakeholder engagement mechanisms are essential to inform circular economy policymaking. For example, forums and websites that are certified by the government should provide knowledge and services as well as undertake public consultation on circular economy issues.

v. A monitoring framework should be built to show progress towards predefined circular economy targets. The data collected allow policymakers to monitor progress towards the achievement of targets to evaluate and to adjust circular economy policies. Furthermore, the framework could promote transparency by allowing all interested stakeholders to monitor the progress towards achieving a circular economy.

vi. A national circular economy information system should be established to monitor and to adjust policy. Collecting and analysing data related to the circular economy inform policymakers, assessing the effectiveness of circular economy policies and adjusting them when needed. To enhance policymaking based on robust evidence and data, local governments and relevant stakeholders should actively harmonise and streamline data collection, ensuring better data quality and timeliness. This also encourages data sharing from the private sector to enable comprehensive assessment and projections on waste, resources, and socio-economic and environmental impacts caused by economic activities.

vii. Japan and Viet Nam should work together to share experiences and best practices in the adoption and monitoring of circular economy implementation, especially in waste management, digital technologies, eco-cities and eco-villages, and trade promotion of environmental goods.

7. SWOT Analysis of Implementation of a Circular Economy in Viet Nam

A SWOT analysis provides insights for policymakers to take advantage of opportunities by employing strengths and avoiding threats by correcting weaknesses. The following SWOT analysis was conducted based on comprehensive research on the national context and consultation with relevant experts. This section summarises the strengths and opportunities for the implementation of a circular economy in Viet Nam, followed by an analysis of weaknesses and threats. It examined regulations, the market, culture, entrepreneurship support, financing and capital, industry, and technology.

7.1. Strengths and Opportunities

The main strengths and opportunities for Viet Nam to transit to a circular economy include the following.

i. The development of a circular economy has been affirmed in key documents of the 13th National Congress, especially in the Strategy for Socio-Economic Development, 2021–2030. Laws and bylaws regulate requirements and methods for implementing a circular economy as well. The legal system has been gradually revised with a market-based approach, and the development of legal documents is increasingly consistent and synchronised, respecting the principles and laws of a market economy.

ii. The rapid development of science and technology, particularly the Fourth Industrial Revolution and the internet, have contributed to the formation of new solutions and business models that exploit resources more efficiently.
iii. Greener financial capital continues to grow. Over the last 20 years, green credit and bonds have become important tools to raise capital for projects that benefit the environment, respond to climate change, and support sustainable development goals and the Paris Agreement. Viet Nam's green capital market has great potential to attract domestic and international investors in renewable energy, waste management, green agriculture, low-carbon transport, and water management.[6]
iv. The awareness and demand of domestic consumers have been a considerable driving force for innovation in the manufacturing and services sectors. Accordingly, this requires cleaner production and supply of more environmentally friendly goods and services.
v. The international integration and implementation of trade commitments in new-generation free trade agreements have created transformational pressures on the manufacturing and business sectors, since standards and technical regulations on products and goods are associated with promoting recycling, reuse, and compliance with environmental regulations.
vi. In Viet Nam, many new markets have been formed, such for environmental goods and services, secondary materials, environmentally friendly products, and green bonds and green credits.
vii. The transition to a circular economy has occurred in many countries, including developed and developing countries. Lessons from such transitions provide valuable experience for Viet Nam in formulating and implementing a circular economy model.

7.2. Weaknesses and Threats

Viet Nam still has many challenges and obstacles that need to be overcome, including the following.

i. A systematic approach to governance, as well as in economic activities, has not been recognised. A holistic approach that cuts across sectoral policies is key to a circular economy. It also requires shared responsibility across levels of government and stakeholders. Viet Nam shows a lack of synchronisation in developing and implementing strategies, master plans, and plans. There has been ineffective coordination amongst all levels and sectors as well as limited cross-sectoral and inter-regional perspectives in formulating and approving development master plans and plans.
ii. The effectiveness and enforcement of legal provisions are still limited. Although Viet Nam has built up a comprehensive system of policy tools to promote the transition to a circular economy, the implementation of such regulations has been low.
iii. Some sectors still take short-term profit goals without considering long-term and sustainable benefits from environmental protection and circular production. For example, some enterprises have violated environmental regulations to reduce their costs for handling pollution. Others intend to implement a circular economy, but their motivation comes from enjoying the incentives and support of the government instead of their social responsibility.

[6] From 2016 to 2030, Viet Nam could attract about $753 billion of investment in climate, with the majority (about $571 billion) for transport infrastructure construction. Investment in renewable energy could attract $59 billion, of which more than half ($31 billion) is in solar projects, and $19 billion is in small hydro projects. About $80 billion will be invested in the green building sector (IFC, 2016).

iv. The markets for environmental goods and services, environmentally friendly products, and recycled products are not a focus and do not operate in line with international markets. One of the reasons is that there has not been a complete set of standards and technical regulations on environmentally friendly and recycled products in Viet Nam.

v. The government has not taken a prominent role in supporting the development and regulation of the markets and the behaviour of actors towards the goal of efficient use of natural resources and promoting production and consumption of environmental goods and services and environmentally friendly products.

vi. Some policy tools, such as public investment, consumer rights, the value-added tax, and environmental protection tax, have not been synchronised to ensure transparency, fairness, and sustainability in using natural resources. Also, these have not created the financial pressure and motivation to promote technological innovation, improving the social responsibility of businesses and consumers to realise circular economy goals.

vii. The apparatus, information and data system, and mechanism for monitoring the implementation of a circular economy have not yet been formed. At present, many ministries, line ministries, associations, universities, and research institutes have engaged in the development of a circular economy in Viet Nam, but there is still a lack of an agency guiding and coordinating the overall activities related to the circular economy.

viii. The production and consumption of environmentally friendly products and services have not been popular. Clean production and consumption and sustainable consumption are recognised as concepts in policy and legal documents rather than widely applied in practice. There has been low awareness and responsibility for the efficient exploitation, use, and management of natural resources, as well as the collection, classification, recycling, and reuse of waste in economical and daily activities.

ix. Financial resources for the implementation of the transition to a circular economy are estimated to be huge. However, their mobilisation has not been effective. For instance, mechanisms and policies for investment incentives in solid waste treatment have been institutionalised, but access to loans has been limited, failing to attract different economic stakeholders.

x. The existing infrastructure has not satisfied the practical requirements for environmental management. It lacks synchronisation in technologies of waste collection, treatment, recycling, and reuse. Viet Nam's position in terms of readiness for the Fourth Industrial Revolution compared to other countries is low. In addition, the small and fragmented scale of production and business has not been proportionate to the high technology investment. The linkages between production and business are still weak.

Table 17.6. Viet Nam and Other Countries in Promoting Implementation of a Circular Economy

	GDP		Global Innovation Index	Governance Indicator		Environmental Performance Index	
	Total ($ million)	Rank		Score	Rank	Score	Rank
ASEAN							
Singapore	396,987	35	8	57.8	8	58.1	39
Malaysia	372,701	37	36	41.9	36	47.9	68
Thailand	505,982	24	43	37.2	43	45.4	80
Viet Nam	**362,638**	**39**	**44**	**37.0**	**44**	**34.4**	**141**
Indonesia	1,186,093	16	87	27.1	87	37.8	117
Philippines	394,086	36	51	35.3	51	38.4	111
Cambodia	26,961	106	109	22.8	109	33.6	139
Lao PDR	18,827	118	117	20.2	117	34.8	130
Myanmar	65,068	80	127	18.4	127	25.1	179
Brunei Darussalam	14,007	133	82	28.2	82	54.8	46

ASEAN = Association of Southeast Asian Nations, GDP = gross domestic product, Lao PDR = Lao People's Democratic Republic.
Sources: World Bank, GDP (current US$), https://data.worldbank.org/indicator/NY.GDP.MKTP.CD (accessed 15 June 2022); World Bank, Worldwide Governance Indicators, https://databank.worldbank.org/source/worldwide-governance-indicators (accessed 15 June 2022); WIPO (2022); Wolf et al. (2022).

8. Solutions and Road Map for Promoting a Circular Economy in Viet Nam

Viet Nam is considered a leader in ASEAN that has a strong legal basis for a transition to a circular economy. Implementing a circular economy requires a road map and development priorities based on market and social demands. It is essential that specific goals and targets be defined with feasible actions/measures.

8.1. National Circular Economy Criteria

Shifting to a circular economy requires the government and stakeholders to make collective efforts. Referring to international experience, a market-based approach to the transition is best. The development of policies and regulations on the circular economy in Viet Nam has been in line with the positive trend of the region and the world.

In compliance with the identification of three groups of common criteria in Decree No. 08/2022/ND-CP guiding the implementation of Law on Environmental Protection 2020, specific indicators are proposed to measure the progress of the transition to a circular economy at the macro level in Viet Nam (Table 17.7).

Table 17.7. Criteria and Indicators for the Implementation of a Circular Economy in Viet Nam

Criteria		Indicator
A	**Reduce the exploitation and use of non-renewable resources and water resources; increase efficiency in the use of resources, raw materials, and materials; save energy**	
A1	**Reduce the exploitation and use of non-renewable resources and water resources; increase efficiency in the use of resources, raw materials, and materials**	
1	Minerals	- Consumption norms of mineral resources - Consumption efficiency of mineral resources
2	Fossil fuels	- Consumption norms of fossil fuels - Consumption efficiency of fossil fuels
3	Consumption of raw materials, fuel, and materials	- Consumption rate of raw materials, fuel, and materials of some main production industries
4	Water resources	- Consumption norms of water resources - Consumption efficiency of water resources

Criteria		Indicator
A2		
5	Mineral resources use efficiency	
6	Water use efficiency	Amount of water consumed per unit of GDP Amount of water consumed per unit of industrial value added Amount of water consumed per unit of output of main industries
A3	**Energy savings**	
7	Energy use	Primary energy consumption per GDP
8	Energy savings	Primary energy consumption per average GDP
9	Exploiting and using renewable energy	Ratio of renewable energy sources in total primary energy supply (%)
B	**Extend the useful life of materials, equipment, products, goods, parts**	
10	Eco-friendly products	Number of eco-friendly products certified with eco-labels
11	Recovery and recycling of discarded products	Percentage of discarded products that are recovered and recycled
12	Recovery and recycling of material	Rate of recycling metal, non-metal, paper, plastic, rubber, and food waste
13	Water reuse	Rate of reused wastewater meeting the requirements
C **C1**	**Reduce waste generated, and minimise adverse impacts on the environment** **Reduce solid waste, wastewater, and emissions**	
14	Solid waste	- Amount of hazardous solid waste collected, transported, and handled that meets environmental protection requirements - Amount of municipal solid waste collected, stored, transported, and handled that meets environmental protection requirements - Percentage of municipal solid waste that goes to landfills

Criteria		Indicator
		- Amount of ordinary industrial solid waste collected, reused, recycled, and handled that meets environmental protection requirements - Average per capita municipal waste generation
15	Wastewater	Percentage of wastewater collected and handled that meets national technical regulations
16	Emissions	Emissions causing air pollution and spatial distribution of emissions
C2	**Reduce the use of toxic chemicals**	
17	Good management of the life cycle of chemicals and waste according to signed international commitments	Number of production and business establishments applying the environmental management system according to ISO 14000 standards
18	Use of inorganic fertilisers, chemical pesticides, and antibiotics in cultivation, animal husbandry, and aquaculture	Amount of inorganic fertilisers, chemical plant protection products, and antibiotics
C3	**Waste recycling, energy recovery, and reducing greenhouse gas emissions**	
19	Waste recycling, energy recovery	- Amount of waste recycled, reused, and treated combined with energy recovery - Amount of waste recycled, reused, and treated combined with composting
20	Reduce greenhouse gas emission	Intensity of greenhouse gas emissions per GDP
C4	**Reduce single-use products, green shopping**	
21	Reduce single-use products	Amount of single-use plastic products, non-biodegradable plastic packaging and products and goods containing microplastics produced and imported
22	Green shopping	Percentage of public investment works and projects that apply green economic standards

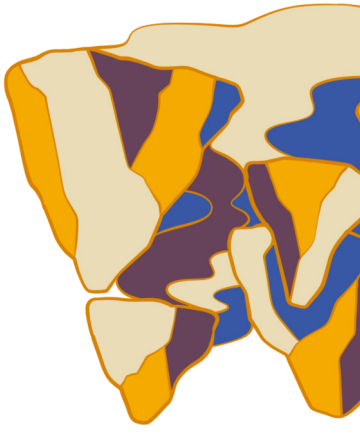
GDP = gross domestic product.
Source: Article 138 of Decree No. 08/2022/ND-CP guiding details of the implementation of the Law on Environmental Protection 2020.

8.2. Specific Solutions for Promoting Implementation

Viet Nam aims to shift from a linear economy towards a circular economy, targeting sustainable economic development for a more competitive economy. To realise that goal, a range of solutions are suggested based on governance, institutions, and infrastructure in Viet Nam.

Institutionalisation of the circular economy. Policy approaches for the transition to a circular economy may include key categories of policies: market-based policies, regulatory policies, and information policies. Regarding the market-based approach, it is important to promote the institutionalisation of market principles and the polluter-pays principle so that environmental costs are incorporated into the pricing for environmental pollution remedies and environmental rehabilitation. Also, it should use existing economic tools and financial mechanisms to regulate and to enhance the transition to the circular economy.

The use of regulatory instruments is central to circular economy policymaking in Viet Nam. Accordingly, it is necessary to enforce relevant provisions on the circular economy as prescribed in Law on Environmental Protection 2020, particularly the development of a national action plan; provincial action plans; and action plans for implementation of the circular economy in industries, fields, and products; and the establishment of criteria for assessment of progress on the transition to a circular economy. Also, ministries, ministerial agencies, and provincial people's committees must incorporate a circular economy immediately when creating a development strategy, plan, programme, or project.



At the same time, the government may take appropriate steps to enforce other policies supporting the transition to the circular economy, including green public procurement, green credit, green bonds, environment industries, and environmental services. Furthermore, it needs to revise the current environmental protection tax, value-added tax, consumer protection, and public investment.

The circular economy is a shared responsibility across levels of government and stakeholders. The government is both a management entity – creating a legal corridor for the formation and operation of markets and playing fields for all economic actors participating in the circular economy – and the entity engaging in market relations. It is vital for Viet Nam to formulate a national road map and to develop an inter-sectoral coordinating agency to integrate the relevant goals and strategies of the implementation of the circular economy into the strategies and action plans of various sectors and industries.

Promote material recovery, and minimise non-recyclable waste. In the circular economy, material recovery is crucial. There are three main ways to promote material recovery – segregating waste at the source, expanding producer responsibility, and enhancing the development of new markets (e.g. recovery and recycling markets of plastic, paper, and metal, and the market for recycled products). Public procurement has an impact on such markets since it can direct the production and consumption of recycled products.

Along with material recovery, the government should consider the restriction of non-recyclable waste, particularly single-use plastic products. It is necessary to formulate and implement policies to promote the development of a circular economy in the field of production and consumption of plastic products, regulating the recycling responsibilities of manufacturers and importers of plastic products and plastic packaging. MNRE could take primary responsibility to develop a circular economy in line with the net-zero emissions target. It could use modern technologies to produce plastic products; optimise the use of raw materials and fuel in the production of plastic products; recycle plastic waste into raw materials and fuel for industrial and domestic use; support the construction and formation of the waste-recycling market; and build and update the plastic management database and integrate it into the national environmental database.

Apply science and technology, and strengthen international cooperation in the transition to a circular economy. Institutes, universities, and professional associations are encouraged to participate in researching, consulting, and evaluating the implementation of the circular economy. It is also recommended to implement technological innovations, gradually applying clean and environmentally friendly technologies and building a road map to eliminate outdated technologies causing environmental pollution, especially in the industries that pose a high risk of contamination like textiles, footwear, paper, and detergents. To promote the formation of linkage mechanisms based on science and technology, models of eco-industrial parks, urban ecological areas, and circular cities (green cities) should be developed.

Research and cooperation in science and technology transfer can be strengthened to develop appropriate measures and solutions for the implementation of a circular economy, giving priority to the economic and efficient use of resources and prolonging the lifespan of materials and equipment. The cooperation could be enhanced between Viet Nam and countries that share the common goal of developing a circular economy, particularly AMSs. Viet Nam could actively take advantage of capacity building and training, research cooperation, and science and technology transfer for the implementation of the circular economy.

MNRE can cooperate with the Ministry of Science and Technology in developing and providing technical guidance on the application of the best available techniques. Also, MNRE can review, update, and supplement the list of best available techniques in a manner that is relevant to the current situation and level of science and technology development, providing technical guidance on the application of the best available techniques for each type of production, business, or service causing environmental pollution.

Raising awareness on the circular economy. Transitioning to a circular economy requires awareness and behavioural changes from all sectors of society. Positive practices and behaviours need to be promoted, while negative habits that are built up over many years need to be discouraged or prohibited. In a circular economy, traditional consumption patterns need to be replaced by reuse, repair, and exchange models. The government plays an important role in effective communications in the drive to implement such behavioural change.

Enterprises, consumers, and their behaviours play a major role in the transformation process to the circular economy. Production and consumer awareness and knowledge are important factors determining responsible consumption and production behaviours. Additionally, raising awareness is key to accelerate the implementation of circular economy strategies at the national, regional, and community levels and to allow stakeholders to provide their feedback on circular economy-related issues.

Communicating, educating, and raising awareness about policies and legal regulations on the circular economy target not only governmental officials at national and local levels but also enterprises and communities. Accordingly, it is necessary to develop and to implement communication programmes with appropriate content and forms for each target group in society. When doing this, it needs to strike a balance between effective communication and avoiding information overload.

In Viet Nam, the communication and dissemination of knowledge and laws relating to the circular economy could be carried out regularly and widely. MNRE could preside over and cooperate with other ministries, ministerial agencies, socio-political organisations, communication agencies, and press agencies in communicating and disseminating knowledge and laws relating to a circular economy to ensure the delivery of a consistent and continuous national message.

The government could issue a mix of incentivisation and enforcement to increase good behaviours as well. The benefits of changed behaviours must be emphasised and encouraged. The requirements and standards

of labelling in providing information to consumers need to be regulated so that the products carry a message on their environmental impacts and how they are dealt with at the end of their lives. At the same time, the government should continue to consult and to engage with the public, industries, and other stakeholders when designing new policies and interventions on the circular economy to ensure their effectiveness.

In the long term, educational programmes can include knowledge of the circular economy. The government could give priority to human resources for circular economy development; invest in the training of officials, managers, and technical personnel in charge of the application of circular economy; and encourage entities to train human resources for the circular economy. The Ministry of Education and Training can have primary responsibility and cooperate with MNRE in providing educational content and developing human resources for the circular economy.

Develop technical infrastructure and information and data systems. In Viet Nam, the circular economy transition is centred around the 10R principles as prescribed in Decree No. 08/2022/ND-CP, including (i) restriction of the use of non-eco-friendly products; (ii) best use of equipment and products; (iii) increased efficiency in product manufacturing or use of natural resources, raw materials, and materials; (iv) reuse by another consumer; (v) repair or maintenance of a product to prolong life; (vi) refurbishment by restoring an old product; (vii) remanufacture by using parts of the discarded product in a new product with the same function; (viii) repurpose by using a discarded product or its parts in a new product with a different function; (ix) reduction of waste generated, including recycling waste; and (x) incineration of waste with energy recovery.

To support circular economy activities, it is crucial to improve existing infrastructure and to invest in new assets such as recycling facilities, sharing networks, reverse logistics, and marketplaces. One of the priorities in Viet Nam is to improve the system of waste collection, classification, and treatment infrastructures. MNRE could submit to the Prime Minister for consideration and approval a national master plan on environmental protection that includes master plans for concentrated waste treatment zones at the regional and national levels. The Ministry of Construction could strengthen its management of the technical infrastructure of waste collection points, transfer stations, and treatment facilities.

There are many opportunities for Viet Nam to provide infrastructure that enhances the transition to a circular economy. For example, conventional infrastructure can be replaced with green, climate-resilient, and nature-based solutions. The new infrastructure can be more efficiently

designed and planned to reduce the demand for materials and environmental impacts. Regarding infrastructure for waste management, waste collection and sorting infrastructure needs to be in place to enable the reuse, repair, refurbishment, and recycling of materials.

Digital infrastructure is an emerging solution to enable connectivity and optimisation of the value chain in the circular economy. Digital platforms can connect resource suppliers with the demand for secondary materials. Furthermore, building comprehensive and accessible data systems is key to informing circular economy policymaking, assessing the effectiveness of circular economy policies, and adjusting them when needed. In Viet Nam, the General Statistics Office of Viet Nam is assigned to conduct statistical activities and to provide social and economic information domestically and internationally. It could coordinate with MNRE to undertake data collection, monitoring, and sharing on the circular economy. MNRE could provide additional data and analytical insights on national circular economy indicators.

In the long term, a national circular economy information system should be built to centralise the data required to assess and to fully inform circular economy policymakers. Data collection is not only limited to waste-related, environmental, economic, and social data but also covers economic–social dimensions such as value added and employment. More importantly, monitoring the achievements of the implementation of a circular economy requires a standardised set of indicators feeding into the national circular economy information system. This emphasises the necessity of issuance of national circular economy criteria for Viet Nam.

Financing the transition to a circular economy. The transition to a circular economy needs both public and private investment. The government should allocate a budget to support the implementation of circular economy policy objectives, plans, and schemes. In particular, priority is given to restructuring public investment into greener investment. Governments at different levels could mobilise financial resources and allocate them efficiently, for example, by expanding access to financial opportunities. The government should develop mechanisms and incentives to encourage and support enterprises to innovate their manufacturing towards resource efficiency, energy savings, and environmental protection, particularly enterprises applying cleaner production and circular economy principles. It also prioritises supporting the production and supply of products and services that meet the criteria of the circular economy. To promote the consumption of such products and services, it can build up distribution systems and markets of environmentally friendly products and services.

The government can apply a mix of price-based tools to ensure a coherent set of incentives for the development of a circular economy, for instance, environment-related taxes, fees, and charges that increase the cost of polluting activities; and extended producer responsibility policy instruments.

In the transit to circular economy and the context of climate-change adaptation measures, Viet Nam should prepare for the shift in demand of resources. For example, to reduce greenhouse gas emissions, it is necessary to reduce the use of energy from fossil fuels and to increase the use of renewable energy. The effects of primary and secondary markets of resources and materials need to be considered.

At the same time, the government should foster private investment in developing a circular economy through various funding methods, including crowdfunding, leasing, equity participation, grants, loan guarantees, green bonds, and loans for circular economy projects and businesses. It should attract private investment in public–private partnerships for infrastructure development for green industries and eco-industrial parks, circular urban areas, organic agriculture, and environmental services.

To diversify capital sources, the government can also call for financial aid and foreign investment from other countries. The government should enhance the ability to attract official development assistance (ODA) and increase the investment rate for circular economy development from ODA. Localities can set up specific circular economy development projects in their provinces to attract ODA capital, supporting projects related to the efficient and economical use of natural resources and waste reduction.

Develop a road map. *The Framework for Circular Economy for the ASEAN Economic Community* sets out an ambitious long-term vision of the circular economy, building on the strengths of existing ASEAN initiatives, and identifies priority focus areas for action, along with enablers, to accelerate the realisation of a circular economy in ASEAN. It guides ASEAN in achieving its long-term goals of a resilient economy, resource efficiency, and sustainable and inclusive growth.

To set a pathway for the transition to a circular economy in line with the region, the government should consider the comprehensive integration of five strategic priorities in the framework into the relevant national policies, strategies, and action plans. The integration should focus on possible short-term, medium-term, and long-term initiatives in priority areas and refer to the potential funding, institutional coordination, and regulations to support the transition to the circular economy in Viet Nam. The government should call for the support of ASEAN in facilitating knowledge sharing, identifying areas for possible collaboration, and providing policy recommendations to integrate ASEAN's visions into the transition to the circular economy in Viet Nam.

8.3. Road Map for a Circular Economy in Viet Nam

Based on the analysis of the existing orientation, policies, and legal regulations in Viet Nam; consultation results with organisations and individuals in specific industries and fields; assessment of opportunities and challenges in application of a circular economy in specific industries and fields; the authors propose a road map with strategic measures to promote the transition to a circular economy in Viet Nam (Table 17.8).

Table 17.8. Proposed Plan for Priority Products, Sectors, and Fields in the Circular Economy Road Map for Viet Nam

No.	Area	Goal			Strategic Measure
		2025	2030	2045	
A	**Products**				
	Plastic	**x**			• Ban the use of single-use plastic products and non-biodegradable plastic packaging (including non-biodegradable plastic bags, Styrofoam containers for packaging and containing food) at shopping malls, supermarkets, hotels, and tourism areas, except for the products and goods containing non-biodegradable plastic packaging. • Gradually reduce the production and import of single-use plastic products (except for Vietnam Ecolabel certified products), non-biodegradable plastic packaging and products and goods containing microplastics. • Implement the regulations on responsibility for recycling and treatment of producers and importers of single-use plastic products and non-biodegradable plastic packaging. • Assign provincial people's committees to promulgate regulations on and to organise management of plastic waste, and organise inspections at establishments producing single-use plastic products and non-biodegradable plastic packaging within their provinces. • Reuse, recycle, and treat 85% of plastic wastes produced. • Reduce 50% of plastic waste in oceans compared to prior period. • Design circular economy models in Viet Nam with an orientation towards reducing the use of non-biodegradable disposable plastic products and plastic bags; increasing the reuse, recycling, and disposal of plastic waste; and encouraging reuse-refill models. • Develop technical regulations for secondary plastic raw materials. • Facilitate the development of secondary raw material markets. • Raise awareness of the production, consumption, and disposal of non-biodegradable plastic waste, plastic bags, and single-use plastic products in daily life amongst agencies, organisations, businesses, communities, and people.
	Paper	**x**			• Design master plans for areas supplying materials for pulp production. • Promote the paper-recycling industry. • Restructure small and medium-sized enterprises to replace poor-quality machines with modern and large-scale machines, technologies, and techniques to efficiently use raw materials, energy, waste, and chemicals and to reduce waste in paper production. • Support enterprises to invest in paper collection and recycling systems and to harmonise and to promulgate standards for wastepaper and secondary materials

No.	Area	Goal			Strategic Measure
		2025	2030	2045	
	Batteries				• Promote the application of circular business models and the model of turning products into services through leasing and applying extended producer responsibility tenets. • Expand extended producer responsibility in the retrieval and recycling of batteries.
	Timber	**x**			• Efficiently implement the schemes for sustainable forest management and forest certification. • Build and efficiently operate a national forest certification system to promote sustainable forest management and the issuance of forest certifications. • Foster cooperation and association models for the development of large timber forests granted sustainable forest management certification and associated with forest-product processing and consumption. • Encourage and create conditions for mechanisms and policies for enterprises to effectively use by-products generated in the production process. • Implement pilot models of the circular economy in the timber-processing industry.
	Biomass	**x**			• Prioritise resources to develop biomass energy sources to produce electricity, biogas, and biomass pellets for direct use as fuel and liquid biofuel. • Apply technologies to promote a circular breeding industry (e.g. livestock waste treatment for organic fertiliser or aquaculture production). • Invest in the development of waste-to-energy plants. • Design master plans for areas supplying raw materials. • Issue incentives to support the production and export of wood pellets, coconut fibre pellets, and pellets from sawdust. • Promote models to make use of agricultural, forestry, and fishery by-products, and biomass sources
	Electronic equipment	**x**			• Complete mechanisms and policies for e-waste management. • Create supporting conditions for the development of e-waste recycling. • Build a synchronous and transparent database system on e-waste. • Raise awareness and enhance engagement of the community, businesses, and society at large in e-waste management.
B	**Industry**				
	Agriculture		**x**		• Develop policies to create a legal corridor for the formation and development of a circular economy in agriculture and rural development. • Conduct research, and implement solutions for increasing recycling and reusing agricultural by-products and scraps. • Train and improve personnel for research and implementation of agricultural by-product and scrap-processing technology, research investment, and science and engineering transfer in processing agricultural scraps. • Develop and implement programmes and projects utilising the circular economy in developing primary agricultural value chains to increase competitiveness; create value; and effectively use land, water, and materials in reducing environmental degradation and pollution. • Promote the participation of private sector, nongovernmental organisations, and agricultural households in circular agricultural product chains. • Build models for increasing the effective use of water, land, and fisheries. • Develop and implement programmes for green agriculture and the circular economy in agriculture and rural development.

No.	Area	Goal			Strategic Measure
		2025	2030	2045	
	Construction		x		• Promote the implementation of plans for green urban development, schemes for urban areas adapting to climate change, and schemes for the development of smart urban areas. • Promote the development of environmentally friendly products and recycled products from construction waste. • Develop new environmentally friendly materials for construction. • Promulgate technical and regulations for green buildings. • Develop circular models in the construction industry.
	Transport	x			• Create regulations and policies for developing green traffic infrastructure; encourage vehicles utilising clean, efficient, effective energy and environmentally friendly technology; and encourage green traffic and traffic planning. • Prioritise resources for investment, completion, and extraction of green traffic infrastructure in a manner that guarantees economic effectiveness and environmental protection, reduces greenhouse gas, and increases resistance to climate change and rising sea levels. • Implement programmes for research and the application of science and technology that guarantees the effective use of construction materials and energy in implementation of projects for investment in public traffic infrastructure. • Adjust economic tools, such as environmental protection taxes and environmental incentives, to promote the use of low-carbon and green transport means. • Encourage the formation of circular business models in the field of transport such as sharing models, product-to-service models, and public transport. • Build a green transport infrastructure system, and promote intelligent traffic monitoring systems. • Create favourable conditions for localities and transport enterprises to access to green credits and green bonds. • Apply green public procurement in the field of transport.
	Energy	x			• Develop circular economy models to promote effective and efficient energy use. • Develop policies for energy transition in a manner that guarantees green, clean, sustainable energy. • Increase percentages of renewable energy and energy from waste, and reduce dependency on imported energy and fossil fuels. • Increase technological solutions for ensuring harmonious development of new energy and renewable energy, increase integration of renewable energy into the electrical grid, and reduce energy consumption. • Develop supporting infrastructure for renewable energy.
	Water and wastewater	x			• Make full use of the value of wastewater generated from production, business operations, service provision, and domestic activities by adopting measures in the following order of priority: (i) treat and reuse wastewater directly in production, business operation and service provision as prescribed by law, (ii) treat and transfer wastewater to reuse wastewater in production, business operations, and other services as prescribed by law, (iii) transfer wastewater to another unit for treatment and reuse as prescribed by law, and (iv) treat and discharge wastewater in accordance with environmental technical regulations.
	Chemicals		x		• Formulate and promulgate technical regulations on the environment in chemical industry to ensure sustainable development and environmental protection. • Refuse applications for investment licenses for chemical projects that apply obsolete technologies and have high levels of resource consumption. • Encourage and adopt incentives and support mechanisms/ policies for chemical projects that apply advanced, modern, and eco-friendly technologies. • Ensure that hazardous or toxic chemicals are not found in recycled products. • Promote chemical recycling (e.g. using chemicals in waste conversion and treatment).

No.	Area	Goal			Strategic Measure
		2025	2030	2045	
	Waste management	x			• Enhance the management of discarded products and solid waste to minimise the exploitation and use of natural resources and adverse impacts on the environment according to the circular economy criteria specified in laws. • Minimise waste generated by applying measures to improve efficiency in production or in using products. • Make full use of the value of discarded products and solid waste generated from production, business operations, service provision, and consumption by adopting measures in the following order of priority: (i) recycle discarded products; (ii) repair, maintain, or upgrade defective and old products to extend their useful life; (iii) make use of parts of discarded products; (iv) recycle solid waste to recover raw materials, fuel, and materials in service of manufacturing activities as prescribed by law; (v) treat solid waste in combination with recovering energy as prescribed by law; and (vi) bury solid waste as prescribed by law. • Apply digital transformation, and develop and apply platform-based business models to promote the minimisation, reuse, classification, collection, transport, recycling, and treatment of waste generated.
	Services	x			• Prioritise the development of eco-design services and design for circulation and reuse; and encourage the development of the environmental service industry, environmental industry, and opening of markets and facilitation of trade in environmental goods. • Develop policies related to warranties, insurance, and consumers' rights on repair and refurbishment. • Develop eco-design services. • Promote trade liberalisation for environmental services according to a road map consistent with international commitments. • Encourage investment in, research, and provide environmental services towards (i) collection, transport, recycling, and treatment of waste; (ii) environmental monitoring, analysis, and environmental impact assessments; (iii) improvement and remediation of the environment and ecosystems in polluted and degraded areas; (iv) consulting and transfer of environmentally friendly production technologies, energy-saving technologies, and production of clean and renewable energy; (v) environmental consulting and training, and provision of information about the environment; (vi) clean energy, renewable energy, and energy savings; (vii) environmental assessment for goods, machinery, equipment, and technologies; (viii) environmental and biodiversity damage assessments and assessments of pollutants that directly affect human health; and (ix) other environmental protection services as needed.
	Environmental industry	x			• Identify the potential types of technology, equipment, and products to support the circular economy transition. • Establish an effective coordination mechanism across ministries and agencies to implement environmental industry-related policies. • Implement a system for maintaining the relevance of environmental industry-related policies and monitoring their implementation. • Increase the proportion of domestically supplied environmental technology, equipment, and products for the local market. • Improve linkages with local manufacturers in the environmental sector. • Promote the export of environmental technology, equipment, and products. • Improve the capacity of local enterprises, their support environments, and their access to finance (with a focus on small and medium-sized enterprises). • Establish a road map for trade openness and trade facilitation for the environmental industry to support the green transition.

No.	Area	Goal			Strategic Measure
		2025	2030	2045	
C	**Locations**				
	Industrial parks, industrial clusters		x		• Encourage industrial parks to design optimal overall premises; promote linkages amongst production, business, and service establishments to improve the efficiency of use and to reduce the consumption of land, water, mineral, and energy resources; and improve the recycling rate and reduce the total amount of waste generated. • Develop and use clean energy and renewable energy bylaws. • Develop infrastructure for the collection and storage of rainwater and infrastructure for the collection, treatment, and reuse of wastewater. • Promulgate technical regulations to implement industrial symbiotic networks and the reuse of waste and wastewater. • Issue financial incentives for eco-industrial parks and eco-enterprises (e.g. tax exemptions and reductions). • Apply industrial symbiosis measures in accordance with the law on the management of industrial parks and economic zones.
	Urban areas, residential areas				• Build a platform to share information and data on application of the circular economy in cities. • • Enhance the development of zero-waste and smart cities. • Integrate the criteria of circular cities into master plans on urban development. • Design and build urban infrastructure, applying new and breakthrough technologies to develop smart and circular urban areas. • Promote urban waste management through the application of management measures to promote reuse and recycling of solid waste, particularly metal and plastic waste, e-waste, food waste, wastewater, and biomass. • Promote the development of circular business models in urban areas through solutions to support the development of raw material and secondary material markets, creating favourable conditions for symbiotic production, business and service activities, and urban–rural linkages.
D	**Consumption**				
	Intermediate consumption	x			• Develop standards on secondary raw materials. • Support the informal sector, and promote linkages between businesses and the informal sector. • Develop a road map to open and to facilitate trade for goods and services related to the circular economy. • Develop markets for the reuse of discarded products and waste recycling.
	Public consumption	x			• Complete a legal framework on green public procurement. • Apply pilot green public procurement to central procurement agencies. • Promote green shopping and eco-labelling programmes.
	Household consumption	x			• Strengthen communication and education to raise awareness and to change behaviours on sustainable consumption. • Create preferential policies for enterprises producing environmentally friendly products to encourage and to expand the scale of production and business of environmentally friendly products.

No.	Area	Goal			Strategic Measure
		2025	2030	2045	
E	Strengthening the role of micro, small, and medium-sized enterprises	x			• Promote productivity, technology, and innovation through measures to enhance micro, small, and medium-sized enterprise productivity by understanding key trends in productivity. • Promote innovation and disruptive technologies as a key competitive advantage through technology use and application to business and business academia linkages.
	Linkage models in production and business towards circular economy	x			• Develop linkage models, and share models in use of materials and waste. • Encourage the establishment of cooperative groups, cooperatives, unions of cooperatives, recycling alliances, regional linkage models, urban–rural linkages, and other models as prescribed by law that satisfy circular economy criteria.

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