

Circular Economy Strategy and Action Plan



2021



BUILDING AN ENABLING ENVIRONMENT FOR SUSTAINABLE DEVELOPMENT

Implemented by:



Funded by:



ស៊ីឃៃត
Sverige



Editorial Team

Circular Economy Strategy and Action Plan is the result of the collaboration between, Department (DGE) of Green Economy of Secretariat General for Sustainable Development (GSSD), of National Council for Sustainable Development (NCSd) (also Ministry of Environment) and a team of policy's experts of UNDP and SIDA which support technical and fund within a Building Enabling Environment for sustainable Development project (BESD's project).

The contents of the Circular Economy Strategy and Action Plan were drafted and prepared by the policy team of UNDP and Verified the meaning, based on consultations with a broad range of stakeholders, such as the technical team of DGE, GSSD, MoE, Developed partner and Technical Working Group (Lined Ministry) of Sustainable Consumption and Production and also the Provincial Authority (Subnational Level).



The Strategy has incorporated all the comments received from key players and a national consultation meeting which was held in Siem Reap in September 2020, where all the members from the Sustainable Consumption and Production (SCP) working group and stakeholders participated.



Table of Contents

ACRONYMS.....	iii
FORWARD.....	vi
ACKNOWLEDGEMENT	vii
SUMMARY	viii
1. INTRODUCTION	1
2. VISION, MISSION and GOALS.....	3
3. GUIDING PRINCIPLES	3
4. STRATEGIC ANALYSIS	4
4.1 A Circular Economy and its Significance.....	4
4.2 A Circular Economy Approach and its Benefits for Cambodia.....	6
4.3 A Circular Economy Approach and Alignment with Existing Policies in Cambodia	9
5. MAINSTREAMING GENDER AND INCLUDING VULNERABLE GROUPS	11
6. CLIMATE CHANGE MITIGATION AND ADAPTATION	12
7. STRATEGIC OBJECTIVES (SOs) AND PRIORITY AREAS.....	13
7.1 Current Challenges to a Circular Economy	13
7.2 Strategic Objectives for a Circular Economy.....	19
8. FINANCING RESOURCES.....	38
9. MONITORING AND EVALUATION	39

List of Figures

Figure 1. A Visual Description of a Linear Economy	5
Figure 2. A Visual Description of a Circular Economy.....	5
Figure 3. Visual Description of a Circular Economy	14
Figure 4. Summary of Challenges to a Circular Economy	18
Figure 5. the waste management option	19
Figure 6. PAs and Value Chain Challenges.....	20
Figure 7. Implementation Timescales.....	20

List of Table

Table 1. Strategy objectives and priority actions.....	ix
Table 2. Initial analyses of private sector features related to linear economy (LE) and circular economy (CE) options for major sectors in Cambodia.....	7
Table 3. The potential funding source	39
Table 4. ANNEX I Proposed monitoring and evaluation framework (for discussion and further inputs).....	40

ACRONYMS

AD	Anaerobic digestion
ADB	Asian Development Bank
AFD	Agence Française de Développement
AFOLU	Agriculture forestry and other land use
ASEAN	Association of Southeast Asian Nations
BORDA	Bremen Overseas Research and Development Association
CCC	Cooperation Committee for Cambodia
CE	Circular Economy
CO ₂ e	Carbon dioxide equivalent
CCC	Cambodia Chamber of Commerce
CCCA	Cambodia Climate Change Alliance
CSARO	Community Sanitation and Recycling Organization
COMPED	Cambodian Education and Waste Management Organization
D&D	Deconcentration and Decentralization
EAC	Electricity Authority of Cambodia (EAC)
EDC	Electricité du Cambodge (EDC)
EIA	Environmental Impact Assessment
EPR	Extended Producer Responsibility
GDP	Gross Domestic Product
GERES	Group for the Environment, Renewable Energy and Solidarity
GGGI	Global Green Growth Institute
GPL	Greening Prey Lang
HBS	Heinrich Böll Stiftung
IFC	International Finance Corporation
IGES	Institute for Global Environmental Strategies
IPPU	Industrial processes and product use
ITC	Institute of Technology of Cambodia
JICA	Japanese International Cooperation Agency
KAS	Konrad Adenauer Stiftung
KOICA	Korea International Cooperation Agency
LE	Linear Economy
MAFF	Ministry of Agriculture Forestry and Fisheries
MEF	Ministry of Economy and Finance
MFAIC	Ministry of Foreign Affairs and International Cooperation
MME	Ministry of Mines and Energy
MISTI	Ministry of Industry Science Technology and Innovation

MLMUPC	Ministry of Land Management, Urban Planning, and Construction
MoC	Ministry of Commerce
MoE	Ministry of Environment
MoEYS	Ministry of Education Youth and Sport
MoH	Ministry of Health
MoLVT	Ministry of Labour and Vocational Training
MoI	Ministry of Interior
MoInf	Ministry of Information
MoPT	Ministry of Posts and Telecommunications
MoT	Ministry of Tourism
MRD	Ministry of Rural Development
MSME	Micro, small and medium enterprises
MSW	Municipal Solid Waste
MPWT	Ministry of Public Works and Transport
MoSVY	Ministry of Social Affairs, Veterans and Youth Rehabilitation
MUP	Multiple use plastic
NCSD	National Council for Sustainable Development
NCDDS	National Committee for Sub National Democratic Development
NDC	Nationally Determined Contribution
PIN	People In Need
RDF	Refuse Derived Fuel
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RGC	Royal Government of Cambodia
RUA	Royal University of Agriculture
RUPP	Royal University of Phnom Penh
SDG	Sustainable Development Goal
SEZ	Special Economic Zones
SME	Small and medium enterprises
SNAs	Subnational Administrations
Sida	Swedish International Development Cooperation
SUP	Single-use Plastic
TAF	The Asian Foundation
Tpa	Tonnes per annum
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
UNDP	United Nations Development Programme

USAID	United States Agency for International Development
WB	World Bank
WtE	Waste to Energy

GLOSSARY

Carbon Sequestration – is defined as the capture and secure storage of carbon that would otherwise be emitted to or remain in the atmosphere.

Construction and Demolition Waste – is defined as waste materials arising directly from construction and demolition coinciding with infrastructure developments.

Commercial and Industrial Waste – is broadly defined as the waste generated by businesses rather than individuals in consumption. Commercial waste is derived from businesses such as the service sector and industrial waste from operations such as manufacturing.

Municipal Solid Waste – includes waste material which is produced via households and public amenity sites. This includes waste discarded by the public and collected from sources including:

- Waste collected from households (separate homes)
- Waste collected from communal properties (apartments)
- Waste collected from on-street bins
- Waste collected from public amenity sites

Sustainable Production and Consumption – is defined as minimizing the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product.

Remanufacturing – is defined as returning a used product to at least its original performance with a warranty that is equivalent to or better than that of the newly manufactured product.

Reprocessor – is a business which converts waste into reusable raw materials for feedstock.

NOTES

USD in this report refers to US Dollars

One gigaton (Gt) = one billion metric tonnes

FOREWORD

Over the last two decades Cambodia has achieved remarkable development results in all sectors under the leadership of **Samdech Akka Moha Sena Padei Techo Hun Sen**, the Prime Minister of the Royal Government of Cambodia. Prior to the global pandemic, GDP expansion continued with over 7 percent annually, accompanied by significant improvements of life expectancy, income and education. Today, more people than ever have access to roads, energy, and public services. Notably, along with this rapid development, demands and consumption of materials and energy have increased substantially. Similar to other countries, this has created new challenges in sustainably managing natural resources, environment, energy and waste.

Aspiring to provide a win-win solution to the present challenges, the National Council for Sustainable Development and the Ministry of Environment have developed a Circular Economy (CE) Strategy and Action Plan. Instead of simply extracting, consuming, and disposing materials, the CE Strategy seeks to close the loop of the entire value chain and maintain the value of materials for as long as possible. This can be achieved, for example, through promoting sustainable production and consumption of natural resources and energy, and by effective management, reuse, and recycling of waste. Such efforts also contribute to significant reductions of Greenhouse Gases (GHG), as required by the Paris Agreement.

However, the benefits of CE go beyond environmental matters. By promoting more energy and material efficient business models, the CE model can reduce the costs of production and increase the competitiveness of businesses. Through creating a recycling economy, CE can generate new economic value and employment. CE can further help ensure the health, safety, and well-being of all Cambodians by minimizing any environmental hazards.

This CE strategy is fully aligned with the priorities set out under the Sustainable Development Goals (SDGs), Cambodian SDGs (CSDGs) and key national policies and strategies, all of which aim to attain prosperity and sustainable development for Cambodia. Yet, fundamental to the CE transition is collaboration across the value chain, including among public and private sectors, consumers, waste managers, academic institutions, civil societies, and development partners.

On behalf of the National Council for Sustainable Development and Ministry of Environment, I would like to express sincere thanks to relevant Ministries, the United Nations Development Programme, the Embassy of Sweden, Development Partners, and experts who have contributed to the development of this important document. I trust that an effective implementation of the CE Strategy will ensure a green, clean and safe future for all in Cambodia. *eamy sk*

Phnom Penh, 29 June 2021



Say Samal

Chair of the National Council for Sustainable Development
Minister of Environment

ACKNOWLEDGEMENT

This Circular Economy Strategy and Action Plan was developed with technical and financial support from United Nation of Development Program (UNDP) and Swedish International Development Agency (SIDA) through the project of a Building an Enabling Environment for Sustainable Development (BESD).

The Circular Economy strategy and action plan which is an involvement from all relevant stakeholders including public and private sectors to manage and use existing natural resources with sustainability and to enhance the usage of energy efficiency or renewable energy.

The work was led by department of green Economy of General Secretariat of National Council for Sustainable Development, coordinated by **H.E. Tin Ponlok** secretary of state and also a BESD's project director, with technical support by **Dr. Moeko Saito Jainson** who is a Policy expert of UNDP. The team of national and international consultants was led by **Mr. Taing Meng Eang** who is the lead author of this present CE strategy and action plan. The consultation meeting and workshop were conducted few times, among the technical staff of NCS and MoE and also the Technical Working Group of Sustainable Consumption and Production which is a lined ministries focal point.

SUMMARY

Cambodia's strong economy and increasing population has resulted in a sharp increase in the use of materials and energy and a surge in waste generation. This situation presents a significant challenge for resource and waste management, but it also offers new opportunities for Cambodia.

This Circular Economy (CE) Strategy and Action Plan outlines the key vision, mission, strategies, and roadmap for Cambodia to transition towards a circular economy. The overarching goal is to enable the country to achieve a prosperous economy, a thriving and inclusive society, and a healthy environment. This will be achieved through more efficient and sustainable use of energy and material resources, while maximizing resource value and creating new economic opportunities for the country.

A CE enables the improvement of many aspects of the economy and society. Wide adoption of CE models can significantly reduce the use of natural resources and energy, as well as decrease Greenhouse Gas (GHG) emissions, water and air pollution, and waste generation. Improved efficiency in material use and energy can reduce the costs of production and increase the competitiveness of businesses. Furthermore, a circular economy can generate new economic values and employment opportunities.

Cambodia is in a strong position to make significant long-term changes and move closer towards achieving sustainable development through a CE, building on robust economic growth and its increasing, young consumer base. A complete transition to a circular economy requires time as it encompasses almost all dimensions of the country's economy. This CE Strategy and Action Plan identifies entry points for critical actions and develops a roadmap to enable the country to shift from a linear to a circular system, primarily by focusing on resource use, energy, and waste management.

Across the value chain, there are barriers to achieving a circular economy. They fall into the following categories:

- Financial/Markets: limited economic incentives and economic benefits result in minimal changes to existing practices, leading to slow improvements in resource use efficiencies;
- Management Practices: the implementation of existing regulations are met with challenges because of insufficient clarity, understanding and implementation of roles and responsibilities, low levels of awareness and, in particular, inadequate waste and recycling related infrastructure;
- Regulatory: more enabling legislative and policy frameworks are required to support CE practices or innovations and improvements and transition to a CE;
- Infrastructure/Technology: limited CE aligned infrastructure and modern technologies prevents the required moves forward in the waste and resources sectors; and
- Information/Awareness: insufficient information and data inhibits investment and promulgates sub-optimal waste management practices, compounded by limited general awareness on waste and inadequate domestic skills base to meet CE requirements.

Introducing a CE approach in Cambodia requires overcoming significant barriers. To help achieve sustainable, widespread and long-term change, the CE vision, mission and goals are:

<p>Vision: Cambodia develops towards a circular economy, which strives to achieve a prosperous economy, a thriving and inclusive society, and a healthy environment.</p>	<p>Mission: To create an enabling environment for the public, private sector, academia, civil society, and development partners to drive the economic, social, and environmental transformations required to realise a circular economy.</p>
<p>Goals:</p> <ol style="list-style-type: none"> 1. Increase sustainable production and energy use 2. Increase sustainable consumption 3. Reduce waste generation at source 4. Improve effectiveness of waste collection, management, segregation and transport 5. Promote product reuse and repair 6. Increase recycling, composting and energy recovery 7. Ensure environmental controls at all waste management sites 8. Promote widespread environmental education and awareness raising 	

The following Five Strategic Objectives and associated Priority Actions will serve as the foundation to overcome the aforementioned barriers. This Plan presents a roadmap by identifying high priority actions over the next five years, before moving on to medium and long-term tasks necessary to the CE transition.

Table 1. Strategy objectives and priority actions

Strategic Objective (SO)s		Priority Actions
SO1	Increase Efficient Use of Raw Materials, and Promote Sustainable Design, Production, Remanufacturing and Distribution	<ol style="list-style-type: none"> 1.1 Promote use of sustainable energy and materials and energy efficiency 1.2 Promote production of alternatives to Single-Use Plastic (SUP) 1.3 Promote greening of the transport and distribution network 1.4 Develop and support markets for recycled feedstock in production 1.5 Develop Extended Producer Responsibility (EPR) schemes and plastic production standards 1.6 Develop eco-industrial parks
SO2	Promote Sustainable Consumption and Effective Reuse and Repair	<ol style="list-style-type: none"> 2.1 Reduce consumption of SUP and other single use materials 2.2 Promote reuse and repair business models
SO3	Enhance Waste and Collection Recycling	<ol style="list-style-type: none"> 3.1 Strengthen fee collection and effective waste collection 3.2 Improve waste segregation and recycling 3.3 Improve organic waste management 3.4 Provide effective business support for waste/resource sector

SO4	Ensure Effective Management of Residual Waste	4.1 Improve landfill disposal and operations 4.2 Support Waste to Energy for residual waste treatment
SO5	Enhance Crosscutting Stakeholder Engagement, Awareness and Capacity Building	5.1 Improve CE awareness and environmental education 5.2 Enhance capacity and skills and employment opportunities of all stakeholders 5.3 Promote private sector engagement for CE innovation and scaling up

A circular economy is a promising approach to maximize resource efficiency and values, while mitigating impacts from resource overuse and waste generation. In alignment with the economic, environmental and social development objectives set out in critical RGC policies, it supports a sustainable development approach and the UN Sustainable Development Goals (SDGs). This includes the Rectangular Strategy Phase IV of Cambodia, the National Strategic Development Plan (2019-2023), National Environmental Strategy and Action Plan and SDGs. Relevant SDGs include SDG 1 (No poverty), SDG 3 (Good health and wellbeing), SDG 4 (Quality education), SDG 5 (Gender equality), SDG 6 (Clean water and sanitation), SDG 7 (Affordable and clean energy), SDG 8 (Decent work and economic growth), SDG 9 (Industry innovation, and infrastructure), SDG 11 (Sustainable cities and communities), SDG 12 (Responsible consumption and production), SDG 13 (Climate action), SDG 14 (Life below water), SDG 15 (Life on land), and SDG 17 (Partnerships for the goals).

Fundamental to the CE transition is collaboration across the value chain, including among public and private sectors, consumers, waste managers, academic institutions, civil societies, and development partners. In particular, the Plan recognises the critical role of the private sector in driving and scaling up CE business innovation and solutions. This Plan further ensures mainstreaming of gender and vulnerability considerations into every aspect of planning and implementation, by promoting equal participation in decision-making processes, equal accrual of economic opportunities and benefits, and equal access to sustainable resources, clean energy, and clean environments for everyone involved.

1. INTRODUCTION

Cambodia's economy has shown strong growth over many years. GDP annual growth has been over 7% since 2011¹, with a GDP per capita increase from US\$882 in 2011 to nearly US\$1,510 in 2018². The rise in economic activity and consumption is fuelled by rapid population growth. The population has risen from 13.8 million in 2008 to 16.2 million in 2018, an increase of 2.4 million people in a decade.³ Much of the population increase is happening in the urban areas of secondary cities.

A growing economy and population have vastly increased the use of energy and materials and the amount of waste generated, putting significant additional pressure on Cambodia's valued and finite natural resources, and its environment.

On average, the total final energy consumption⁴ in Cambodia grew by 6.9% in the period 2010–2015. The increased demand was satisfied through petroleum products (50.5%), biomass (36.0%), electricity (13.1%), and coal (0.4%)⁵. The transport sector, which primarily relies on petroleum, accounts for 46% of total energy consumption. The two major sources of electricity production are hydropower and coal.

Between 2000 and 2015, Cambodia more than doubled its consumption of goods per capita⁶. During the same period, manufacturing, construction, and consumption gave rise to a sharp increase in both material use and waste.

Total waste generation in a business as usual scenario is expected to grow from 33 million tonnes per annum (tpa) in 2017 to 99 million tpa in 2050⁷. Municipal Solid Waste (MSW) from consumption alone is estimated to be 4 million tpa, 25% of which is generated in Phnom Penh⁸. Waste from industries pose another challenge. In 2017, commercial and industrial waste and construction and demolition waste contributed 16 million tonnes (48%) and 15 million tonnes (44%) respectively⁹.

Private sector industry is linked to both resource use and waste generation. Industry currently relies significantly on natural resources and energy inputs and generates both operational and post-consumer waste, which often arises in the household waste stream. The garment sector, the second largest sector in Cambodia, uses fuelwood as its primary energy source and produces large quantities of textile waste. The wholesale and retail trade use large amounts of cardboard or plastic film for packaging, the majority of which is disposed of in landfills or dumpsites. The accommodation and food service sector relies heavily on single-use materials such as single-use plastic straws, bottles, food packaging and bags disposed of by consumers. In the construction sector, some waste products are reused and do not enter the formal waste management system¹⁰, but many require disposal. The manufacturing of bricks and cement require high-energy inputs, which primarily come from fuelwood and coal.

¹ World Bank, National Accounts Data: <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=KH> accessed 25.03.20

² World Bank, National Accounts Data: <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD?locations=KH> accessed 17.04.20

³ World Bank, Population Data: <https://data.worldbank.org/indicator/SP.POP.TOTL?locations=KH&view=chart> accessed 25.03.20

⁴ Total final energy consumption is the total energy consumed by end users. In Cambodia common energy needs include transportation, cooking, and household appliances such as lighting.

⁵ ADB (2018) CAMBODIA Energy Sector Assessment Strategy and Road Map <https://www.adb.org/sites/default/files/institutional-document/479941/cambodia-energy-assessment-road-map.pdf>

⁶ ADB (2018) Key Indicators for Asia and the Pacific 2018. ADB Manila.

⁷ Ricardo (2018) for UNDP Solid Waste Management in Cambodia – National Context.

⁸ MoE, (2019). *Report on Environmental State*, Third publication. Department of Geographical Information System Service, Ministry of Environment, Phnom Penh

⁹ Ricardo (2018) for UNDP Solid Waste Management in Cambodia – National Context.

¹⁰ Ricardo (2018) for UNDP Waste Generation Technical Modelling Report.

The large and still rapidly growing amount of waste generates numerous concerns including GHG emissions, water and air pollution, and odour nuisances. At present, only around 7.3%, about 75,000 tonnes per year, of Cambodia's municipal waste is recycled. The rest is either disposed of at landfills or left uncollected. Uncollected waste is often disposed of improperly e.g. burned or buried, affecting the urban and rural environments, as well as public health.

The present moment is critical for Cambodia's transition to an upper middle-income country¹¹. If the transition is to be sustainable and inclusive, economic growth must be promoted in tandem with improved management of resources, energy and waste from production to recovery. Otherwise, the country may face ever-growing environmental challenges including natural resource degradation, energy shortages, increasing levels of air and soil pollution and GHG emissions, and unmanageable amounts of waste, all of which eventually amount to enormous economic costs.

To avoid such economic costs and to ensure environmental sustainability, improvements are required in several areas over different time spans:

- Promotion of the sustainable use of natural resources and use of sustainable and renewable energy.
- The improvement of efficiencies in material and energy use for production and manufacturing.
- The upgrading of production methodologies to reduce production losses and waste generation and to improve environmental and social impacts.
- Changes in consumer behaviour to minimize waste generation at source.
- The support and scaling up of new and existing innovations in waste collection, reuse and repair, and recycling to divert waste from landfills.
- The development and improvement of residual waste management operations including landfill, waste to energy (WtE) or alternative technology options.
- Awareness raising and capacity building in the private and public sector.

This CE Strategy and Action Plan represents a high-level strategic approach to the introduction of circular economy in Cambodia. The goal is to enable the country to eventually close the loop of the entire value chain, by minimizing resource and energy input as well as waste, while maximizing resource value and creating new economic opportunities for the country. This CE Strategy and Action Plan supports Cambodia's transition to a circular economy by identifying priority areas to enhance economic, environmental, and social outcomes. This will not only contribute to sustainable development in Cambodia but also to global goals for reducing plastic pollution and mitigating climate change.

¹¹ Royal Government of Cambodia (2018), Rectangular Strategy Phase IV. Phnom Penh.

2. VISION, MISSION and GOALS

VISION: Cambodia develops towards a circular economy which strives to achieve a prosperous economy, a thriving and inclusive society, and a healthy environment.

MISSION: To create an enabling environment for the public, private sector, academia, civil society, and development partners to drive the economic, social, and environmental transformations required to realise a circular economy.

The Mission will be achieved by the following **GOALS:**

1. Increase sustainable production and energy use
2. Increase sustainable consumption
3. Reduce waste generation at source
4. Improve effectiveness of waste collection, management, segregation and transport
5. Promote product reuse and repair
6. Increase recycling, composting and energy recovery
7. Ensure environmental controls at all waste management sites
8. Promote widespread environmental education and awareness raising

3. GUIDING PRINCIPLES

The following Guiding Principles will be used throughout the transition towards a circular economy.

A) Environmental Protection and Sustainability

A key aspect of a circular economy is its ability to promote economic growth while sustaining environmental and natural systems. A transition to a circular economy requires improvements in every part of the resource value chain from material extraction and product design to waste collection and management. Each strategic objective and priority action shall ensure long-term environmental protection and sustainability in tandem with economic growth.

B) Public Health and Safety

This Strategy and Action Plan will ensure that each action takes into account and maximizes the health, safety, and well-being of all throughout Cambodia. All including citizens, communities, civil societies, the government, and the private sector will be informed, educated, and empowered regarding public health impacts of any circular economy action. Appropriate measures should be in place to avoid and mitigate any public health risks while maximising health benefits.

C) Inclusive and Sustainable Economic Development

One major benefit of sustained strong economic growth is the increases in quality and well-paid jobs for people. A circular economy shall aim to create new economic opportunities and quality jobs for all that promote environmental sustainability and social equity. Specifically, for waste management, it is vital that the urban and rural poor, especially informal waste pickers who have played a crucial role in Cambodia's recycling sector, will benefit from formal employment opportunities under a circular economy. The goal of this strategy is to improve the livelihoods and well-being of all people in Cambodia through the promotion of a circular economy.

D) Non-Discrimination and Intersectional Approach

The CE Strategy and Action Plan will ensure that all, regardless of race, colour, gender, creed, religion, place of birth, age, health, education, ethnicity, and ability, have their rights respected, and have equal

access to participate in decision-making processes and benefit from economic opportunities, natural resources, environment and energy for their health and well-being. By recognizing the varied interests and needs of people of different genders, ethnicities, ages, and abilities, CE approaches shall be designed and implemented to reduce inequality and to support economic and social development for all.

E) Inclusive and Effective Participation

All concerned actors shall have the right and ability to participate freely in decision-making and in activities that affect them and their environment. While this is covered by the principle of inclusiveness, it will also positively contribute to reaching strategic goals, since it enables the CE approach to draw from the knowledge of participants who have first-hand experience with their own problems.

Enabling women and vulnerable groups to actively contribute to solve the issues they face is therefore also a way of building meaningful partnerships. Accordingly, special attention will be paid to the poor and marginalized, including women and girls, who are among the most vulnerable to environmental degradation and have limited access to economic opportunities.

Drawing on full consultations, the perspectives of all including the vulnerable shall be incorporated in designing and implementing activities, while enhancing their ability to benefit equitably from these activities.

F) Multi-Sectoral and Multi-Stakeholder Approach

This CE Strategy and Action Plan includes actions throughout the value chain, encompassing cross-cutting sectors including natural resource management, energy, manufacturing, transport, waste management and education. Intersectoral and ministerial collaboration shall be promoted to ensure the effectiveness and long-term impacts of this strategy.

This Plan shall further promote collaboration among the government, private sector, citizens, civil society, development partners, NGOs and academic institutions, based on the full recognition of their crucial roles in accelerating a shift towards a circular economy. For instance, **the government** has a role in creating an enabling environment by developing regulations and providing economic and financial incentives. It has also a role in raising awareness among citizens through education programs in collaboration with academic institutions. In addition to raising awareness, **academic institutions** have a role in enhancing knowledge and building capacities essential for adopting CE approaches. The **private sector** has a role in driving innovations, mobilising scalable investments, and adopting CE business models to promote sustainable production and businesses. **Citizens** have a role in adopting sustainable consumption and lifestyles, for instance, by making conscious choices for purchasing sustainable and green products and by reducing waste volume and supporting reuse and recycling of waste. Finally, technical and financial support from **NGOs and development partners** is conducive to the successful CE transition while ensuring all Guiding Principles are met.

4. STRATEGIC ANALYSIS

4.1 A Circular Economy and its Significance

At present, many countries are in the process of developing or implementing circular economy policies. The ambition is to transition from the linear economy approach, where raw materials are extracted and products are designed, produced, and distributed to consumers. These products are consumed and eventually collected for disposal at their end of life (Figure 1). Since this model relies on extraction of finite natural raw materials and the use of fossil fuels as the main energy sources for mass production and consumption, it has added enormous pressure not only on our environment but also on people's lives.



Figure 1. A Visual Description of a Linear Economy

According to the International Resource Panel¹², for example, approximately 90 billion tonnes of primary natural resources are extracted per year worldwide, and this vast amount is on track to double by 2050. The consequence is growing problems with waste and pollution, as well as ever increasing pressures on natural resources and biodiversity. This adversely affects people, especially the poor, who depend on natural resources and the environment for their livelihoods and well-being.

In 2018, the Intergovernmental Panel on Climate Change (IPCC)¹³ highlighted its prediction of the impacts of global warming reaching 1.5°C at a minimum. Temperature rise beyond this number is anticipated to lead to unprecedented climate disasters worldwide. To avoid this, the IPCC argued for the necessity of radical changes from “this take-make-dispose linear pattern of production and consumption” towards a more sustainable economy model that redefines how we use and consume our resources.

As an alternative approach and a crucial solution for today’s challenges, a circular economy seeks to decouple economic growth from adverse environmental impacts. Through closing the loop of the entire value chain, it maintains the value of products, materials and resources for as long as possible, and even creates new and additional values in the economy¹⁴ (Figure 2). To do so, it promotes the use of sustainable materials and clean renewable energy as inputs, improved efficiency in energy and material use for production, construction and transport, and sustainable consumption as well as reuse, repair and recycling of materials, and energy recovery from waste.



Figure 2. A Visual Description of a Circular Economy

¹² International Resource Panel (2017) ASSESSING GLOBAL RESOURCE USE A systems approach to resource efficiency and pollution reduction. UNEP

¹³ IPCC (2018) Special Report Global Warming of 1.5 °C, Summary for Policy Makers available at <https://www.ipcc.ch/sr15/>

¹⁴ Merli, R., Preziosi, M., & Acampora, A. (2018). How do scholars approach the circular economy? A systematic literature review. *Journal of Cleaner Production*, 178, 703-722.

A circular economy approach can be applied to numerous dimensions of an economy. Examples can be found for natural resource management¹⁵, smart city management¹⁶, transportation¹⁷, construction¹⁸ manufacturing¹⁹, and waste management.

Wide adoption of circular economy models can significantly reduce the use of natural resources and energy, as well as Greenhouse Gas (GHG) emissions, air pollution and waste generation. For instance, its application is estimated to reduce global GHG emissions by up to 9.3 Gt CO₂e²⁰ in 2050²¹ given 45 % of global GHG emissions are associated with the production of goods and materials. Reduction of waste volume through proper management, reuse, recycling, and energy recovery of waste can minimize not only environmental hazards such as polluted air and water but also public health risks from vermin, pests, and uncontrolled burning.

However, the benefits of a CE go beyond environmental and public health issues. Improving efficiency in material use and energy, for example, is also a way of reducing the costs of production and of increasing the competitiveness of businesses. Furthermore, a circular economy can also generate new economic value and employment. The International Labour Organization (ILO) estimates that a circular economy can create 6 million new jobs globally in the reuse, recycling, remanufacturing, and repair sectors²². The renewable energy sector employed 11 million people in 2018 growing by more than 6% since 2017²³. A circular economy has also created new formal employment opportunities for the informal waste sector²⁴ in recycling, a sector which was previously excluded or largely neglected.

4.2 A Circular Economy Approach and its Benefits for Cambodia

In the case of Cambodia, the country's strong economy and increasing population has resulted in a sharp increase in use of materials and energy and a surge in waste generation. This situation presents a significant challenge for the sustainable management of energy, resources and waste.

By promoting more efficient use of energy and material resources, a CE enables the improvement of many aspects of the economy and society for Cambodia and the attainment of environmental sustainability. Wide adoption of circular economy models can significantly reduce the use of natural resources and energy, as well as GHG emissions, water and air pollution, and waste generation. Improved efficiency in material use and energy can reduce the costs of production and increase the competitiveness of businesses. Such cost saving measures are crucially needed especially at the time of economic shocks such as the global COVID-19 pandemic in order for Cambodia to withstand and build back from these crises. Furthermore, a circular economy can generate new economic values and employment opportunities for the country, especially for informal waste pickers, women and vulnerable groups, who are often excluded from the formal economy.

¹⁵ Brears, R. C. (2018). *Natural Resource Management and the Circular Economy*. Palgrave Macmillan.

¹⁶ Prendeville, S., Cherimb, E., & Bockenb, N. (2018). Circular Cities: Mapping Six Cities in Transition. *Environmental Innovation and Societal Transitions*, 6, 171–194.

¹⁷ Turoń, K., & Czech, P. (2017). Circular Economy in the Transport Industry in Terms of Corporate Social Responsibility Concept. *Journal of Corporate Responsibility and Leadership*, 3(4), 83-94.

¹⁸ Ghisellinia, P., Ripabc, M., & Ulgiati, S. (2018). Exploring environmental and economic costs and benefits of a circular economy approach to the construction and demolition sector. A literature review. *Journal of Cleaner Production*, 178(20), 618-643.

¹⁹ Lieder, M., & Rashid, A. (2016). Towards circular economy implementation: a comprehensive review in context of manufacturing industry. *Journal of Cleaner Production*, 115(1), 36-51.

²⁰ Gt CO₂e stands for gigatonnes of equivalent carbon dioxide. It is a simplified way of measuring several greenhouse gases by their carbon dioxide equivalent. One gigatonne = one million tonnes

²¹ Ellen MacArthur Foundation. (2019). *Completing the Picture: How the Circular Economy Tackles Climate Change*.

²² ILO. (2018) World Employment Social Outlook 2018: Greening with jobs. Retrieved from ILO, https://www.ilo.org/weso-greening/documents/WESO_Greening_EN_web2.pdf

²³ IRENA. (2019) Renewable Energy and Jobs: Annual Review 2019. Retrieved from IRENA, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Jun/IRENA_RE_Jobs_2019-report.pdf

²⁴ Schröder, P. (2019) Promoting a Just Transition to an Inclusive Circular Economy. Chatham House

Critical to a successful CE approach is engagement of the private sector, on every scale, across all industries representing the entire value chain. Table 1 identifies private sector industries that are operating primarily on a linear economy model, with possible opportunities to transition towards a circular model.

Table 2. Initial analyses of private sector features related to linear economy (LE) and circular economy (CE) options for major sectors in Cambodia

No	Major sectors	GDP % ²⁵	Main features related to LE	CE opportunities
1	Agriculture, forestry, fishing	22.0%	<ul style="list-style-type: none"> • Use of natural resources as main input • Large volume of agriculture residual waste • Fishing net waste 	<ul style="list-style-type: none"> • Improved production efficiency requiring less natural resource input • Promoting sustainable production with minimal impacts on biodiversity and ecosystems • Increased use of biodigesters to convert agriculture waste into energy for household and business use • Recycling of fishing nets
2	Manufacturing (primarily garment sector)	16.3%	<ul style="list-style-type: none"> • Use of fuelwood as main energy source for steam boilers • Use of energy inefficient equipment and high usage of electricity • A large volume of textile waste including polyester • A large volume of daily single-use plastic usage by 750,000 garment workers through food and beverage consumption 	<ul style="list-style-type: none"> • Use of alternative sources to fuelwood for steam boilers • Improved energy efficiency and adoption of solar energy • Adoption of large-scale WtE options in cooperation with the cement industry to minimize waste and air pollution • Promotion of alternative sustainable products as well as use of reusable products for food and beverage consumption by workers
3	Construction	13.6%	<ul style="list-style-type: none"> • Bricks, cement, timber, glasses and metals as main input • Significant use of forest resources (fuelwood and timber for brick and construction) • Main use of coal for cement production • Main use of asphalt and concrete (sand, rocks, cement) for road construction 	<ul style="list-style-type: none"> • Promotion of environmentally sustainable and socially responsible production of fuelwood, timber, sand bricks, and cement • Adoption of large-scale WtE options to use waste as substitutes to coal for cement production to minimize waste and air pollution • Promotion of sustainable, recycled, and renewable material in road construction
4	Wholesale and retail trade; repair of motor vehicles and motorcycles	9.5%	<ul style="list-style-type: none"> • Prevalent use of single-use plastic and other single-use items through 1) import and production of products, 2) wholesale and retail of products, and 3) purchase of products by consumers 	<ul style="list-style-type: none"> • Greening distribution networks through 1) use of alternative environmentally friendly materials for packaging and distribution, and 2) promotion of EPR and reuse, refill and recycling business models
5	Transportation and storage	7.9%	<ul style="list-style-type: none"> • Main use of fossil fuel and prevalent use of energy inefficient used vehicles • Use of single-use plastic for distribution of products 	<ul style="list-style-type: none"> • Promotion of low emission vehicle use (hybrid or electronic vehicles) • Use of alternative environmentally friendly materials for packaging and distribution • Promotion of repair and remanufacturing of transportation vehicles
6	Real estate activities	7.2%	<ul style="list-style-type: none"> • Low occupancy rate of real estate sector leads to resource extraction without productive use of product 	<ul style="list-style-type: none"> • Promotion of efficient use of unoccupied offices and real estate
7	Accommodation and food service	4.4%	<ul style="list-style-type: none"> • Prevalent use of single-use items including plastic products (bottles, cups, straws, EPS, bags) 	<ul style="list-style-type: none"> • Promotion of alternative environmentally friendly materials and reusable products for food and beverage and hospitality sectors • Promotion of reusable products and sustainable packaging in food delivery services
8	Mining and quarrying	1.8%	<ul style="list-style-type: none"> • Loss of biodiversity and extractive field leads to environmental harm 	<ul style="list-style-type: none"> • Extending lifespan of mines and ensuring efficient extraction of resources

²⁵ ADB (2019) Key Indicators Database: <https://kidb.adb.org/kidb/sdbsCountryView>

			<ul style="list-style-type: none"> • Large amounts of waste generation and contamination of natural groundwater 	<ul style="list-style-type: none"> • Promotion of sustainable disposal of waste and minimize contamination of groundwater
9	Electricity, gas, steam, and air-conditioning supply	0.6%	<ul style="list-style-type: none"> • Increasing demand for cooling technology from a growing middle class with unsustainable management of coolants • Minimal standards for energy efficiency in air conditioners 	<ul style="list-style-type: none"> • Increasing sustainable management of coolants from air conditioners and similar items at their end of life

Among others, the garment and construction sectors are two key industries which can benefit significantly from CE approaches in Cambodia.

The garment sector utilises substantial amounts of energy, water, chemicals, and materials as inputs for producing textiles and packaging, and transporting goods. With fuelwood as the main energy source powering steam boilers, the energy supply leads to degradation of forest resources. Outputs from the sector include emissions to air from primarily wood-based energy sources, waste from material losses estimated at 10-30% of inputs,²⁶ and effluent from dyeing and laundering fabric. The construction sector also requires high energy inputs particularly for brick and cement manufacturing, currently reliant on fuelwood and coal respectively. The sector uses raw materials (e.g. timber, aggregates, and water) as inputs for construction material production, packaging materials and goods transport.

With regard to specific CE benefits for these industries, for instance, increasing the industry's access to efficient and lower cost renewable energy can significantly reduce high energy costs which are impeding textile industry development²⁷. Investments for efficiency have a relatively short payback period of 2.5 to 4.5 years on a firm level. Both on a firm and national economy wide level, the CE approach can bring about substantial environmental and social benefits due to avoidance of health costs, GHG emissions, environmental pollution and waste. This equates to an avoided cost of 51% of taxable income in the garment industry and 20% in the construction industry.²⁸ A cost benefit analysis of widespread efficiency investments shows 45% and 15% increases in GDP in the garment and construction sectors respectively by 2030 above a 'business as usual' baseline.²⁹

Successful transition to a circular economy also requires the engagement of Micro, Small and Medium Enterprises (MSMEs) which play a vital role in Cambodia's economy, contributing to economic and social progress.³⁰ The Government's Industrial Development Policy 2015-2025 sets out to develop and modernize Cambodia's MSMEs for instance, through support in expanding and strengthening MSMEs' manufacturing base, and by ensuring technology transfer and industrial linkages among MSMEs and other key players. In line with these aims, a CE approach can support MSMEs of any size through facilitating access to energy efficient technologies which reduce overhead costs or to financial support for expanding reuse and repair businesses which are dominated by MSMEs. Within the garment sector, there are many informal cottage garment factories subcontracting to the formal sector.³¹ These are MSMEs with 5 to 12 staff, mainly family members. Through careful and appropriate implementation of a CE approach, MSMEs in addition to larger formal garment factories will realise economic, environmental, and social benefits.

A circular economy can also contribute to ensuring effective service delivery and accountable governance under ongoing Deconcentration and Decentralisation (D&D) in Cambodia. Nationally adopted CE enabling legislation, policies or fiscal incentives will be applied in a manner that fully incorporates local issues and

²⁶ Reverse Resources (2016) How much does the Garment industry actually Waste? Retrieved from <https://reverseresources.net/news/how-much-does-garment-industry-actually-waste> 15-06-20

²⁷ Netherland Ministry of Foreign Affairs (2018) Garment industry in Cambodia

²⁸ Global Green Growth Institute (2018) The Economic, Social and Environmental Impacts of Greening the Industrial Sector in Cambodia

²⁹ Global Green Growth Institute (2018) The Economic, Social and Environmental Impacts of Greening the Industrial Sector in Cambodia

³⁰ Association of SouthEast Asian Nations: MSMEs, Key of Cambodia's Future Economic Success. Retrieved from <https://asean.org/msmes-key-cambodias-future-economic-success/> on 15-06-20

³¹ ACTIF (2010) Report on Cambodia Textile & Garment Industry

preferences to best fit the economic, social, and environmental needs of a district or city. The associated capacity building and skills development required for CE at the subnational level will support D&D through enhancing the effectiveness of public administration and providing further clarity on assignment of functions between Government tiers, both of which are identified as opportunities for improvement of D&D.³²

Overall, the circular economy presents a new opportunity for Cambodia to leapfrog many traditional stages of development and avoid their negative externalities, building on past successes. For example, Cambodia has achieved a near universal ownership of mobile phones with a rapid adoption of mobile payment options without previously having cumbersome methods of payments like cheques. Yet, pathways to a circular economy in Cambodia may differ from the circular economy strategies in Europe and other countries which already have resources, technology and infrastructure for CE implementation. Hence, this CE Strategy and Action Plan is formulated and will be implemented in a manner that fully addresses national circumstances, building on available resources, technology and infrastructure.

4.3 A Circular Economy Approach and Alignment with Existing Policies in Cambodia

This CE Strategy and Action Plan is fully aligned with the priorities set out under the Sustainable Development Goals (SDGs), Cambodian SDGs (CSDGs) and key national policies and strategies. As a circular economy involves the entire resource value chain, it encompasses the legal and institutional frameworks of nearly all sectors within the Cambodian economy. Thus, this Plan outlines the most relevant as follows.

This Plan contributes to the following SDG targets that Cambodia has set: **SDG 1** (No poverty), **SDG 3** (Good health and wellbeing), **SDG 4** (Quality education), **SDG 5** (Gender equality), **SDG 6** (Clean water and sanitation), **SDG 7** (Affordable and clean energy), **SDG 8** (Decent work and economic growth), **SDG 9** (Industry, innovation, and infrastructure), **SDG 11** (Sustainable cities and communities), **SDG 12** (Responsible consumption and production), **SDG 13** (Climate action), **SDG 14** (Life below water), **SDG 15** (Life on land), and **SDG 17** (Partnerships for the goals) and SDG 18 (Land mine in Cambodia) Cambodia also has SDGs in the form of CSDGs, defining “inclusive and sustainable development” as a priority area. Overall, this Plan addresses the CSDG’s goals to strengthen improved rural development, sustainable management of natural resources, improved management of urbanisation, and environmental sustainability including building climate resilience.

This Plan directly addresses the goals of Rectangular Strategy Phase IV of Cambodia, which sets the national vision and strategies to achieve sustainable development and poverty reduction. The strategy also aligns with the National Strategic Development Plan (2019-2023), which further emphasizes environmental sustainability and sustainable natural resource management as key priorities.

In addition to these high-level national strategies and internationally recognized goals, this Plan is governed by policies, laws, and regulations set out in the wide range of sectors this strategy seeks to transform. These include natural resource management and use, environment, energy, industry, construction, transport, and waste. The Strategic Objectives outlined in this strategy build on and are aligned with these policies, laws, and regulations and use them as a basis for identifying lead ministries for implementation and oversight.

National policies highly relevant for a CE include:

- Rectangular Strategy Phase IV of Cambodia
- National Strategic Development Plan 2019-2023
- National Environmental Strategy and Action Plan 2016-2023
- Cambodia Climate Change Strategy Plan 2014-2023
- Cambodia’s First (2002) and Second (2015) National Communication to the UNFCCC
- Cambodia’s First NDC and Second NDC (2020)

³² ADB (2011) Deconcentration and Decentralization Reforms in Cambodia.

- Cambodia National Strategic Plan on Green Growth 2013-2030
- Cambodia National REDD+ Strategy 2017-2026
- National Protected Area Strategic Management Plan 2017-2031
- National Forest Programme 2009-2029
- Production Forest Strategic Plan (draft)
- National Biodiversity Strategy and Action Plan (2016)
- Cambodia Industrial Development Policy 2015 – 2025
- National Sustainable Consumption and Production Roadmap (in preparation)
- National Energy Efficiency Policy (draft).
- The Intermodal Transport Master Plan (2021-2030, draft),

Cambodia's natural resources (e.g. protected areas, production forests, and water) are governed by the Ministry of Environment (MoE), the Ministry of Agriculture, Forestry, and Fisheries (MAFF), and the Ministry of Water Resources and Meteorology (MoWRAM) respectively. The recent Deconcentration & Decentralization (D&D) reform also allocates increased roles and responsibilities to subnational level authorities (e.g. the city, municipal and district authorities) for the management of natural resources. Relevant laws include the Law on Environmental Protection and Management of Natural Resources (1996), the Nature Protection Areas Law (2008), the Forestry Law (2002), the Fisheries Law (2006), the Law on Water Resources Management (2007), and the Land Law (2001). In addition, the Environment and Natural Resources Code is being drafted, which provides overarching principles and guidance for managing natural resources and environment in Cambodia.

The Ministry of Industry, Science, Technology and Innovation (MISTI) is the responsible ministry for industrial policy and innovations. These are outlined in the Cambodia Industrial Development Policy (2015 – 2025) and the National Strategic Plan on Green Growth (2013-2030). The National Sustainable Consumption and Production roadmap also seeks to develop a sustainable pathway for Cambodia's industrial production. There are also laws such as the Cambodian Labour Law which upholds the rights of employees throughout all sectors.

The energy sector is governed by the Electricity Law (2001). The Ministry of Mines and Energy (MIME) is responsible for developing and implementing energy policies, strategies and plans, and providing technical standards. The Electricity Authority of Cambodia (EAC), an autonomous agency, issues regulations, issues licenses to providers, and reviews costs of electricity. EAC also monitors, guides and coordinates operators in the power sector and consumers to follow the policy, guidelines and technical standards issued by the MME. Electricité du Cambodge (EDC) became a state limited liability company in 1996, responsible for producing, transmitting and distributing power mostly in the country's urban areas. The Rural Electricity Enterprises (REE) have to obtain licenses from EAC to buy electricity (mostly from EDC and neighbouring countries that generate electricity) and supply electricity within their boundary. Some of the REE have received subsidies from the Rural Electricity Fund to supply electricity to remote areas.

According to the Law on Environmental Protection and Natural Resource Management (1996), the MoE is the lead agency in formulating policies, issuing regulations and coordinating actions on waste management and pollution control. Sub-decree 113 (2015) assigns responsibilities for the planning and management of solid waste to the city, municipal, and district authorities. Other key waste management regulations include Sub-decree No. 36 on Solid Waste Management (1999) and Sub-decree 72 on the Environmental Impact Assessment Process (1999). Although Sub-decree 72 is not exclusive to waste management, it ensures that waste management projects mitigate any environmental risks. In addition, strategies for the management of waste include the Phnom Penh Waste Management Strategy and Action Plan (2018-2035)

As reflected in the Royal Government of Cambodia's Rectangular Strategy Phase IV and the National Strategic Development Plan, the cornerstones to achieving equitable sustainable development in Cambodia

include strengthening gender equity, promoting social inclusion, and increasing economic empowerment programming for the poor, women, ethnic minorities, and people with disabilities.

This CE Strategy and Action Plan recognizes the central social and economic importance of these vulnerable groups and ensures mainstreaming of gender and vulnerability considerations into every aspect of planning and implementation. The Plan will work to ensure equal participation in decision-making processes, equal accrual of economic opportunities and benefits, and equal access to sustainable resources, clean energy, and clean environments for everyone involved.

For reasons including insufficient economic opportunities, forms of education, and safety nets, women and the poor are particularly vulnerable to environmental hazards. They have limited access to productive land and clean energy, and they are subject to health hazards arising from the growing volume of waste and increasing water and air pollution.

Nevertheless, these vulnerable groups play a critical role in tackling environmental problems, including those that pertain to a circular economy. For example, the urban and rural poor are crucial actors in the informal recycling economy. Informal waste pickers collect materials from households, hotels, restaurants, and landfills for recycling. It is estimated that they contribute to the recycling of 7.3 % (75,000 tonnes) of the total municipal waste volume generated in Phnom Penh. Experiences from other countries indicate that the active engagement of the informal waste sector for recycling is conducive to scaling up CE interventions.

Within the general context of vulnerability, women face more severe socio-economic obstacles to social and economic opportunities and well-being than men. Despite being the backbone of the garment sector, the main contributor to Cambodia's economic growth,³³ ingrained social norms define women as primarily home carers, while disregarding the vital social and economic importance of their unpaid work. Meanwhile, women's position in the labour market is often precarious. For example, while men working in the informal waste sector are likely to have access to motorbikes or mechanized carts, women tend to be more dependent on push carts, which limits their ability to earn an adequate income.

To mainstream gender and equality issues, the Plan incorporates several strategies and actions aiming to ensure inclusion and involvement in relevant decision-making processes related to the transition towards a circular economy, and the equitable sharing of economic, environmental, and public health benefits. These strategies and actions will include:

1. Ensuring that CE measures reflect the cultural, socio-economic, and political aspects of local contexts, and the diverse types, needs, and interests among different groups and within each group;
2. Enabling involved actors to exercise the rights and ability to participate freely in making decisions and in implementing activities that affect them and their environment. Special attention will be paid to the poor and marginalized, including women and girls, who are among the most vulnerable;
3. Incorporating gender and vulnerability perspectives in the development of awareness and education materials, and in training and capacity-building activities (by including women and the physically disabled, as well as ethnic minorities and indigenous people);
4. Ensuring equal participation of both women and men in adopting sustainable CE options both at the household and workplace level (e.g. in promoting the use of sustainable energy, energy efficiency, reusable items, and recycling);
5. Ensuring fair compensation for increased labour associated with activities taking place at the household level;
6. Developing employment opportunities along with targeted capacity building support that recognize and enhance the capabilities and strengths of women and vulnerable groups as equal to other groups;
7. Developing business models and support mechanisms that address the needs and enhance the capability of women and vulnerable groups; and

³³ ILO (2018) Promoting Gender Quality: Gender Strategy 2017 – 2018, retrieved from <https://betterwork.org/wp-content/uploads/2018/02/Gender-Strategy-2017-18.pdf>

8. Establishing equity criteria and targets for monitoring progress in implementing the Strategic Objectives.

5. CLIMATE CHANGE MITIGATION AND ADAPTATION

In December, 2015, 196 countries including Cambodia adopted the Paris Agreement under the United Nations Framework Convention on Climate Change (UNFCCC). Its main goal is to limit global temperature warming to 1.5 to 2 °C above pre-industrial levels. At the core of the Agreement are climate action plans, known as Nationally Determined Contributions (NDCs), under which each country must determine and regularly report on the contribution that it will make to reduce national greenhouse gas (GHG) emissions and adapt to the impacts of climate change.

Cambodia is one of the most vulnerable countries to the impacts of climate change, due to frequent floods, droughts, windstorms, and other extreme weather events. Cambodia's NDC (2020) therefore identifies adaptation as one of the highest priorities for the country.

Compared to many other countries in the world, Cambodia is a relatively small GHG emitter, but GHG emissions are accelerating, due to the country's rapid economic growth. The Cambodia NDC (2020) identifies the following sectors as the major sources of GHG emissions, which are the focus areas for mitigation efforts: energy, industrial processes and product use (IPPU), agriculture forestry and other land use (AFOLU), and waste. Key mitigation measures include increasing forest cover through REDD+³⁴ and promoting energy efficiency and renewable energy to reduce emissions from waste in the energy and manufacturing industries and transport.

This CE Strategy and Action Plan fully aligns with key priorities set by Cambodia's NDCs and aspires to advance its national efforts for climate adaptation and mitigation.

Strategic Objective One (SO1) is aligned with AFOLU, energy and IPPU related mitigation and adaptation priorities. Proposed actions to promote energy and material efficiency and a shift from high GHG emitting energy sources towards more sustainable renewable energy will directly contribute to GHG emissions reduction. This will also lower local demand for timber and fuelwood, contributing to the national REDD+ efforts to reduce deforestation and forest degradation and to enhance carbon sequestration capacity. SO1 also entails greening of the distribution and transport networks by promoting electric and hybrid vehicles and sustainable packaging to reduce waste. By diversifying Cambodia's energy supply, SO1 will build climate resilience in the energy sector as an adaptation measure.

Strategic Objective Two (SO2) contributes to mitigation measures set for IPPU through promoting the use of multi-use items and alternatives to single-use plastic, and t repair and remanufacturing to extend the life of many products and reduce emissions from waste.

Strategic Objective Three (SO3) and Four (SO4) directly address mitigation and adaptation priorities related to waste. Waste is also a source of GHG emission (1.7% of the total). Unmanaged waste and landfills, which contain food and yard waste, are known to produce methane, one of the most potent GHGs. Open burning of waste (especially plastic) also releases toxic gases such as dioxin, furans, and mercury, harmful for the environment and public health. SO3 and SO4 promote the full collection of waste from households and businesses for appropriate treatments, thus significantly reducing the open burning of waste. Additionally, the separation of waste for recycling, composting, and waste to energy, as well as sanitary landfill management will minimize emission of methane and allow for its productive use through landfill gas extraction and anaerobic digestion. Effective waste collection also supports adaptation efforts to the

³⁴ REDD+ stands for reducing emissions from deforestation and forest degradation in developing countries, and the role of conservation, sustainable management of forests, and enhancement of forest carbon stocks in developing countries

increasing extreme rainfall events predicted for Cambodia³⁵ through ensuring canals and culverts are clear of waste accumulations, particularly in urban areas.

Finally, Strategic Objective Five (SO5) is linked to cross-cutting and cross-sectoral efforts for climate action. SO5 seeks to increase public awareness about climate and environmental threats and needed actions, enhance technical skills and knowledge, and ensure full engagement of all actors including the private sector to create a climate resilient circular economy.

6. STRATEGIC OBJECTIVES (SOs) AND PRIORITY AREAS

This CE Strategy and Action Plan set the priorities for policy development to remove current barriers to a circular economy. A successful transition from a linear to a circular economy requires a full understanding of the existing set of barriers across the value chain in transitioning towards a circular economy in Cambodia.

6.1 Current Challenges to a Circular Economy

Figure 3 presents a summary of key challenges which are found in one of five categories:

- **Financial/Markets:** limited economic incentives and economic benefits result in minimal changes to existing practices, leading to slow improvements in resource use efficiencies;
- **Management Practices:** while several supporting policies and regulations exist, their implementation is met with challenges because of insufficient clarity, understanding and implementation in roles and responsibilities, low levels of awareness and, in particular, inadequate waste and recycling related infrastructure;
- **Regulatory:** more enabling legislative and policy frameworks are required to support CE practices or innovations and improvements to transition to a CE;
- **Infrastructure/Technology:** limited CE-aligned infrastructure and modern technologies prevents the required moves forward in the waste and resources sectors; and
- **Information/Awareness:** insufficient information and data inhibits investment and promulgates suboptimal waste management practices, compounded by limited general awareness on waste and inadequate domestic skills base to meet CE requirements.

Below lists current existing challenges in shifting from a linear to circular economy for each section of the value chain as shown in Figure 4. (A. raw materials and design, B. production and distribution, C. consumption, reuse and repair, D. collection, E. recycling, and F. residual waste).

³⁵ UNFCCC Cambodia's Second Communication on Climate Change.



Figure 3. Visual Description of a Circular Economy

A. Raw Materials and Design

Forest resources such as timber and fuelwood are critical raw material inputs to many sectors in Cambodia, including the garment, brick and construction sectors where they are used as a significant energy source. There is limited development and use of alternative sustainable energy sources for these sectors, such as rice husk, leading to an overreliance on forest resources. There is a severely underdeveloped market for using recycled raw material as inputs for the production process. This is hindered by limited standards for recycled feedstock such as plastic flakes or crushed glass and limited manufacturing capacity to use recycled inputs.

B. Production Remanufacturing and Distribution

Application of energy efficiency measures, as well as clean sustainable energy (e.g. solar) for production, manufacturing and distribution, is emerging but remains on a limited scale. Wider application of these measures, for example, for the garment, brick, and construction industries, is constrained by limited awareness of their economic and environmental benefits, enabling regulations, pilot activities, and adequate finance and infrastructure for scaling up. Limited appropriate infrastructure also hinders application of new technology, and clean energy options such as hybrid and electronic vehicles for the transport sector.

The current capacity to close the product life loop is low due to limited infrastructure and circular economy networks such as Eco Industrial Parks, or recycling clusters which connect production, consumption, recycling, and reuse. There is no legislation currently available related to Extended Producer Responsibility (EPR), which mandates responsible producers of items such as product manufacturers, importers and sellers to be financially responsible for treating their products once they are discarded. Thus, the external costs of products, including plastic, are not reflected in the final product price. The pricing therefore hinders recycling of the products or covering the costs of the final treatment.

Economic incentives are lacking for the production and distribution of sustainable alternatives to disposable items in this part of the value chain, which are generally more expensive. This makes single-use products much more financially attractive for packaging and food and beverage industries, as well as for distribution.

For instance, e-commerce operations, including food delivery services, rely mainly on single-use plastic packaging for distribution.

C. Consumption, Reuse and Repair

Similar to many other countries, consumers rely heavily on single-use products and have increasingly adopted a throw-away culture as a part of their daily life. Additionally, many products used by consumers which could be repaired or reused are thrown away. Requirements for increasing recycling rates such as separating waste at source are not well known or enforced. Most consumers remain unaware of the adverse impacts of disposal of waste such as plastic on the environment, public health, and economy. They are also unaware of possible solutions to reduce, reuse, and recycle waste or the availability and importance of using alternative sustainable products.

Due to the absence of weight-based collection fees, households have limited incentive to reduce waste. This is compounded by a limited scale of businesses in the reuse and repair sector, limited regulations to minimize SUP use, and little economic incentive to expand markets for alternative products.

D. Collection

Waste collection service coverage in Cambodia varies greatly depending on location. Some rural areas have no access to formal collection services for waste, yet up to 80% coverage is reported in Phnom Penh³⁶. Uncollected waste is often burned or ends up on streets and in waterways, eventually carried to the ocean via rivers.

Fundamental challenges to effective collection include inadequate contractual economic incentives, constrained waste management budgets, high costs for transport and equipment, and limited collection of fee payment from the public. Impractical contracts with waste collection companies deter investment by the contracted companies. For example, if the contract duration is too short, investment will be discouraged. Unclear performance requirements and finance flows in contracts are also contractual challenges to effective waste collection. These challenges limit value for money and discourage new companies from entering the market, even when collection contracts are open for competitive bidding.

E. Recycling

At present, recycling in Cambodia is driven by the informal sector. It is estimated that about 7.3% of municipal waste in Phnom Penh, about 75,000 tonnes per year, is recycled informally³⁷. Informal waste pickers sell recyclables such as paper, plastic, aluminium, iron, and glass to a third party who bulks the materials for export to neighbouring countries. Yet, their participation in formal recycling operations has been limited. Examples from other countries suggest the successful transition to a circular economy depends on the effective participation of the informal sector in formal recycling models.

Most of the existing formal recycling industries such as plastic recycling and organics treatment are small scale, with the overall capacity to treat less than 1% of total waste generated in the country. The potential to recycle e-waste such as electronics and batteries has not been explored fully either.

The recycling sector in Cambodia faces various challenges in starting up, maintaining, and scaling up their business operations in Cambodia. Unsorted and uncollected waste are amongst the biggest challenges for recycling. Due to the absence of segregated waste collection from households or businesses, easily accessible community recycling collection points, bottle deposit systems or mechanisms to separately collect different waste streams, waste remains unsegregated in a mixture of organic, plastic, hazardous, and e-waste. This incurs additional health and economic costs for recyclers to sort the mixed waste enough to

³⁶ Ricardo (2018) for UNDP Report on Solid Waste Management in Cambodia – National Context.

³⁷ PPCA, IGES, Nexus, UN Environment, CCCA., (2018). Phnom Penh waste management Strategy and Action Plan 2018-2035. Phnom Penh, Cambodia.

ensure a low contamination and high-quality feedstock for reprocessing. Most recycling companies also face the challenge of irregular and insufficient supply of feedstock as they rely on waste delivery from waste collection companies.

Another challenge relates to the existing economic incentives for waste management and high costs of recycling. Since there are low or no landfill gate fees, waste collection companies have limited incentives to divert waste from landfills to be recycled. Conversely, when a gate fee is high it incentivises the diversion of waste from landfills towards recycling and WtE if the infrastructure for these alternatives is available. Operation costs of recycling industries remain high, due to costs associated with transport, purchase of land, recycling and treatment equipment, numerous requirements for permits, as well as administrative delays associated with Environmental Impact Assessments (EIAs).

Moreover, many of the existing recycling industries in Cambodia have limited production capacity and efficiency due to their prevalent use of inefficient low-tech machines and unskilled labour. For instance, the processing time of existing organic composting facilities in Cambodia is around 3-4 months.³⁸ Introducing modern and more efficient equipment can improve the production efficiency and significantly reduce the processing time. Markets for recycled products are undeveloped with limited use of recycled feedstock due to low trust for recycled products, including organic compost materials, and the unavailability of standards to ensure their quality and safety. No national guidelines are currently available to mitigate negative environmental impacts on air and water from reprocessing facilities. Other challenges include unclear roles and responsibilities of relevant institutions, numerous complex regulatory requirements, limited availability of data and markets for recycled products, and limited business and finance support for recycling industries.

F. Residual Waste Management

Most collected waste is currently disposed of at open dumpsites, susceptible to various hazards, such as leachate contamination of surface, ground water and soil, odour, disease vectors, accidental hazard caused by fire, and release of GHG emissions and air pollutants. A low or no landfill gate fee contributes to insufficient funds for sanitary landfill construction and proper management operations to control and minimize possible hazards. The current sites do not utilise proper operational plans and basic management functions.

For treatment of residual waste and energy recovery, Waste to Energy (WtE) has been used in many countries including Cambodia, though, on a limited scale. WtE takes various forms to convert waste into a fuel source, generating heat and electricity. In the case of Cambodia, there are plans to introduce centralized WtE processing facilities to convert waste to generate electricity for the grid. Besides this, there are several decentralized WtE initiatives. For example, some garment factories use on-site incinerators to burn textile waste to generate steam for production. A cement factory uses waste as a coal substitute to generate heat for cement production. An option is being explored to develop Refuse Derived Fuel (RDF) to convert municipal waste into energy, as well as a fuel for cement factories. WtE has also been used in rural areas through the use of biodigesters to convert agriculture residuals to generate energy for households and electricity for businesses.

Many of the challenges, which WtE related businesses (except for small-scale on-site incinerators for the garment industry and household-level biodigesters) face, are identical to those recycling operations face. These include unsorted waste, irregular and insufficient supply of feed waste, limited landfill gate fee, high costs of transportation and operations, and complex regulatory requirements. Additionally, costs for initial investment as well as operation are high, in part resulting from the significant environmental risks of WtE that require stringent environmental standards and monitoring mechanisms to be in place to minimise contamination of air, water, and soil and to prevent public health impacts. Another, but specific, barrier for centralised WtE operations relates to low feed-in-tariff. Subsidies are required to ensure the profitability of these WtE operations.

³⁸ COMPED Composting Facility, Battambang. <http://www.smallstepsproject.org/turning-waste-into-compost-in-battambang/>

In summary, as many of these challenges are interlinked across the entire value chain, overcoming certain barriers in isolation will not be sufficient to enable a successful transition to a circular economy. For example, even if source waste segregation is enforced to enable businesses to have greater access to feedstock for recycling, without economic incentives or markets for recycled products, a recycling business may not be financially viable. Similarly, raising the landfill gate fee without supporting other waste diversion mechanisms and businesses at the same time may give rise to an increase in illegally dumped waste. The following section presents a comprehensive set of priority areas as solutions for each of these challenges, enabling the transition to a circular economy (Figure 4).

Challenges are found throughout the value chain



	Raw Materials and Design	Production Remanufacturing and Distribution	Consumption Reuse and Repair	Collection	Recycling	Residual Waste		
Finance/ Markets	Underdeveloped markets for recyclables and organics	External costs of products not reflected in product prices	No economic incentives for the use of SUP alternatives	High costs of transport and equipment	Low landfill gate fee, disposal is cheaper than treatment	Low landfill gate fee, disposal is cheaper than treatment		
		Limited economic incentives for the production of SUP alternatives	No weight-based collection fee for household waste	Limited collection of fee payment	No economic incentives for investment / operational costs of recycling	Low feed in tariff for energy recovery		
Management Practices	Significant reliance on forest resources as input to industries		Mass consumption of single-use products including SUPs	Unsorted waste	Unclear institutional roles and responsibilities for recycling	Open dumping or disposal of waste on streets and waterways		
				No full collection of waste	Irregular and insufficient supply of feedstock for recycling or waste to energy (WTE)	Irregular and insufficient supply of feed waste for recycling or waste to energy (WTE)		
Regulatory		No Extended Producer Responsibility (EPR)	No regulation of SUP or support for CE business models	No enforcement of at source waste segregation	Administrative delays in obtaining EIAs	Administrative delays in obtaining EIAs		
				Limited enabling policies for energy efficiency or renewable energy			No communal recycling collection points	Limited environmental standards & guidelines
				Limited infrastructure for electric vehicles			No deposit system for recycling	No large-scale recycling or organic waste treatment infrastructure
Infrastructure & Technology		No Eco Industrial Parks or recycling clusters		No recycling clusters	No environmental standards or guidelines	Inadequate skilled domestic labour		
				Limited awareness on sustainable consumption			Limited knowledge of waste treatment options	Inefficient technologies
Information			Benefits to repair not promoted		Baseline data is not available to guide investment decisions			

Figure 4. Summary of Challenges to a Circular Economy

7.2 Strategic Objectives for a Circular Economy

A transition from a linear to a circular economy approach requires time as it encompasses almost all aspects of a country's economy to shift towards a more sustainable system. Thus, this CE Strategy and Action Plan identifies entry points of key actions and develops a roadmap to enable the country to shift from a linear to a circular system, primarily through the lens of resource use, energy, and waste management.

This Plan identifies waste management as a crucial entry point for a circular economy, highlighting the urgency to improve the capacity to handle rapidly increasing waste volumes. The below set of typical CE interventions for waste management follows the waste hierarchy. The waste hierarchy ranks waste management options from most preferred to least preferred from an environmental perspective. It gives priority to preventing waste in the first place, and lastly to (landfill) disposal which is the least preferable management option. In order of preference, the waste management options as shown in the Figure 5;

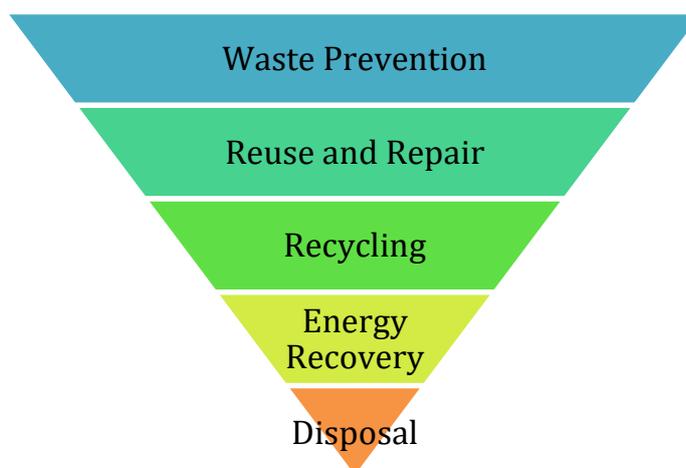


Figure 5. the waste management option

1. **Waste Prevention.** This includes practices such as using less material in design and production, keeping products in use for longer, and reducing use of hazardous substances. It also includes sustainable consumption to avoid waste generation at source.
2. **Reuse and Repair.** This encompasses all activities required to extend a product's life before it becomes waste, **and** includes practices such as designing for reuse, cleaning, repairing, or refurbishing products or their parts.
3. **Recycling.** When waste is generated, recycling is the recovery of resources through reprocessing waste materials into new products or raw materials. It also includes composting biodegradable organic waste, such as food or garden waste.
4. **Energy Recovery.** This includes practices such as incineration, anaerobic digestion gasification and pyrolysis, and specific refuse derived fuel or solid recovered fuel plants, which recover energy through thermal treatments. It also yields other materials such as digestate from organic waste treatment or ash from incineration, which requires disposal as hazardous waste.
5. **Disposal.** This is primarily landfilling residual waste and can include incineration without energy recovery.

This Plan consists of five Strategic Objectives (SOs), each of which comprises Priority Areas (PAs) and Actions as shown in Figure 6. These are:

- SO1:** Increase Efficient Use of Raw Materials, and Promote Sustainable Design, Production, Remanufacturing and Distribution;
- SO2:** Promote Sustainable Consumption and Effective Reuse and Repair;
- SO3:** Enhance Waste Collection and Recycling;
- SO4:** Ensure Effective Management of Residual Waste; and
- SO5:** Enhance Crosscutting Stakeholder Engagement, Awareness and Capacity Building

The PAs offer a comprehensive approach to addressing challenges through detailed Actions. PAs are identified across the value chain as summarized in Figure 5, which reflects Cambodia’s priorities and context:

Priority Areas to meet challenges throughout the value chain

Category of Challenge	Raw Materials and Design	Production Remanufacturing and Distribution	Consumption Reuse and Repair	Collection	Recycling	Residual Waste
Finance/ Markets [FM]		1.2 Promote production of alternatives to single use plastic (SUP) [FM, IT]				
Management Practices [MP]	1.1 Promote use of sustainable energy and materials and energy efficiency [MP, RE, IT]	1.3 Support greening the transport and distribution network [FM, IT, RE, MP]	2.1 Reduce consumption of SUP and other single use materials [MP]	3.1 Strengthen fee collection and effective waste collection [FM, MP, RE]	3.3 Improve organic waste management [FM, RE]	4.1 Improve landfill disposal and operations [FM, MP, RE]
Regulatory [RE]	1.4 Develop and support markets using recycled feedstock in production [FM, MP, IT]	1.5 Develop extended producer responsibility schemes and plastic production standards [RE, MP]	2.2 Promote reuse and repair business models [IA, FM]	3.2 Improve waste segregation and recycling [MP, RE, IT]	3.4 Provide effective business support for waste/resource sector [FM, RE, IA]	4.2 Support Waste to Energy for residual waste treatment [FM, IA, RE]
Infrastructure & Technology [IT]						
Information & Awareness [IA]		1.6 Develop eco-industrial parks [FM, MP, IT, IA]				
Cross-Cutting	5.1 Improve CE awareness and environmental education [IA] 5.2 Enhance capacity & skills & employment opportunities of all stakeholders [RE, IA, MP] 5.3 Promote Private Sector Engagement for CE innovation and scaling up [FM, MP, IT, IA]					

Figure 6. PAs and Value Chain Challenges

The following provides summary overviews of the SOs and their plans of action for implementation. Indicative timescales over 15 years are given, showing short-term, immediate PAs for the next five years, and medium and longer-term actions over the remaining years. Government Agencies and Development Partners (DPs) relevant to implementation are identified (Figure 7).

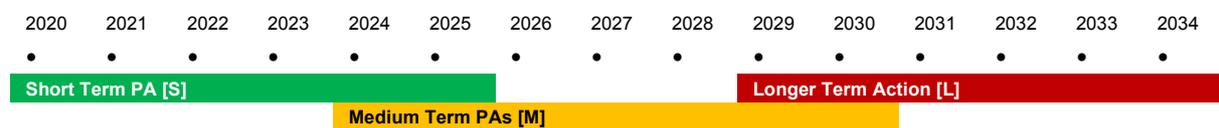


Figure 7. Implementation Timescales

SO1: Increase Efficient Use of Raw Materials and Promote Sustainable Design, Production, Remanufacturing, and Distribution

SO1 focuses on the early stages of the CE value chain. It mainly addresses issues around use of raw materials such as timber and fuelwood, sustainable energy and energy efficiencies, and sustainable

production and distribution. The expected outcomes are an efficient and more environmentally friendly manufacturing sector, a stimulated market for alternatives to products, and a diversified and sustainable material and energy supply. This SO does not consider remanufacturing³⁹ and product design as they are not prevalent in the country.

PA1.1 Promote use of sustainable energy and materials and energy efficiency

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Pilot initiatives/projects to develop benchmarks					
a. Sustainable energy and energy efficiency benchmarking for the garment sector				MME , MoE, MISTI, NCSD, MoT, , MEF, MOWRAM, MAFF, EDC, EAC, MoI MLMUPC, MRD, MoEYS,	EU, GERES, GGGI, Private Sectors, GMAC
b. Energy efficiency benchmarking for property and construction sectors					ADB, UNDP, JICA
c. Energy efficiency benchmarking for the hospitality sector					ASEAN Green Hotel Standard
d. National Grid Assessment					EU
e. Solar DC Micro Grid pilot					UNDP
f. Solar farms pilot					UNDP
g. Solar Water Pump pilot					UNDP
2. Draft and enact enabling regulations					
a. Draft National Energy Efficiency Policy (2018-2035)				MME , NCSD, MISTI, MEF, MOWRAM, MAFF, EDC, EAC, MLMUPC, MRD, MoEYS, MoI, MoT	ADB, Private Sectors
b. Sub-decree on energy efficiency					UNDP, CCCA
c. Prakas for energy efficiency for refrigerators					ADB, UNDP, CCCA
d. Prakas for energy efficiency for air conditioners					ADB, UNDP, CCCA
e. Technical guideline for Solar Home System					UNDP
f. Technical guideline for Solar Rooftop					UNDP
g. Guidelines and Certifications for green buildings					Mekong-ROK Cooperation Fund
3. Upscale use of sustainable energy and materials and energy efficiency interventions					
a. Market analysis to identify existing successful energy and material interventions including lessons learned from pilots				MME , MISTI, MEF, MAFF MOWRAM, , EDC, EAC, MLMUPC, MRD, MoEYS, MoI, MoC	UNIDO, Private Sectors,
b. Scale up proven, successful interventions (e.g. increase take up or scale)					

***Bolded text** designates lead Ministry or Agency

Economic growth has led to increased use of energy and materials, depending substantially on finite and non-renewable resources. Promoting energy and material efficiencies and renewable alternatives is essential for the country to continuously meet growing demands, as well as to sustain finite resources.

This PA requires collaboration/work with business sectors reliant on raw material and energy inputs such as the garment, hospitality, property and construction, and agriculture sectors, to develop benchmarks for sustainable and renewable energy and energy efficiency. The PA includes support for pilots to demonstrate the feasibility of possible approaches to shift towards alternative and sustainable materials, and to enable wider application of sustainable energy such as solar and energy improvements in these sectors. Replication as well as upscaling of proven measures will be supported through development of enabling legislative

³⁹ BS 8887-2:2009 Design for manufacture, assembly, disassembly and end-of-life processing (MADE) Terms and Definitions. Remanufacturing is defined by British Standard BS8887 Part 2 as : ‘returning a used product to at least its original performance with a warranty that is equivalent to or better than that of the newly manufactured product’

frameworks and policies related to energy efficiency and solar energy. Specific successful activities and interventions related to sustainable energy and materials and energy efficiency will be scaled up, following market analysis to identify the most successful approaches and their relevance to the CE context in Cambodia. Scaling up may include widening the implementation of the initiatives, for example encouraging more manufacturers to adopt CE approaches, or may include scaling up existing activities to increase their capacity to implement CE approaches for the entire operation.

PA1.2 Promote production of alternatives to single-use plastic (SUP)

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Increase production of multi-use plastic (MUP) and SUP alternatives					
a. Market analysis to define major SUPs, MUPs and sustainable alternatives in the country and region				MISTI, NCSD, MoE, MoC, MEF, MoEYS, MoT, MoI	WB, ASEAN, Private Sectors
b. Engage the private sector manufacturers in promoting production of MUP and alternatives					ASEAN
c. Improve public awareness to support the market					WB, UNDP
d. Develop specific SOP					
2. Draft and enact regulations on SUP items					
a. Update sub-decree 168 on plastic bags				MoE, NCSD, MEF, MoC, MoH, MoWA	EU Switch Asia UNDP, WB, ASEAN, Private Sectors
b. Sub-decree to regulate single-use plastic products (e.g. straws, expandable polystyrene) in draft already					
3. Provide economic incentives for alternative and sustainable products					
a. Identify necessary economic incentives (e.g. tax incentives and subsidies)				MEF, MoE, NCSD, MISTI	
b. Implement these incentives					

Urgent interventions are required to mitigate the harmful impacts of plastic, which does not biodegrade easily and stays in the environment for hundreds of years. In marine areas, many mammals, fish, and birds suffer from ingesting plastic or becoming entangled in plastic materials. More than 90% of all birds and fish are reported to have plastic particles, known as microplastic, in their stomachs. Microplastic accumulates and passes through the food chain to human bodies, while the actual impacts on public health from ingesting plastic remain unknown. Uncollected single-use plastics (SUP), such as plastic film bags, accumulate in urban drainage channels. This leads to flood risks and public health risks from stagnant water, for instance by resulting in the increase of mosquito breeding grounds.

This PA seeks to avoid and mitigate the adverse impacts from SUP. Following market analysis on the current market for SUP and alternatives, the PA develops appropriate regulatory measure to restrict the import, manufacture, and use of specific SUP items and to promote use of alternatives to SUPs.

Making use of existing resources in country to the extent possible, Cambodia can adopt a twin approach to supporting SUP alternatives including MUP. This entails first developing SUP alternatives through working with manufacturers (e.g. manufacturers of cardboard food containers or waxed paper food bags) and second, expanding the market through potential financial incentives such as tax breaks to alternative industries to encourage end users to switch to SUP alternatives. These actions are supported in tandem with PA 2.1.

This PA presents a crucial opportunity to increase the recycled content of locally made goods, through the use of recycled raw materials in the development of SUP alternatives. This can include the use of recycled plastic to make durable shopping baskets or recycled card in packaging.

PA1.3 Promote greening of the transport and distribution network

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Introduce financial incentives to increase low emission commercial vehicle use					
a. Identify incentives (e.g. import tax adjustments and plug-in grants for electric or hybrid vehicles)				MEF, NCSD, MoE, MPWT, MoC, MoI	CCCA
b. Introduce incentives and increase awareness of the incentives amongst commercial and private vehicle sector stakeholders to increase take-up of incentives					
c. Introduce fuel quality standards					
2. Develop electric vehicle infrastructure required for charging electric vehicles					
a. Research options and needs analysis including engagement of stakeholders regarding commercial electric vehicles and private vehicles including electric two-wheeled motorbikes				MPWT, MME, MoC, MoI, CDC, EDC, MoE,	CCCA GGGI, Private sector
b. Develop and implement infrastructure plan				MIST	
3. Increase reusable and sustainable packaging and reduce SUP packaging in the distribution and delivery services					
a. Market analysis and options assessment for increasing reusable /sustainable packaging				MISTI, MoE, MoC, MOI, MoT, MAFF, MPWT	Private sectors, DPs, UNDP,
b. Promote innovations for reusable and sustainable packaging through initial selected distribution private sector businesses.					UNEP, UNIDO, Research Institutes

The first priority is to introduce financial measures to promote low emission vehicle use (e.g. import tax adjustments and plug-in grants for electric or hybrid vehicles). This is in parallel with existing and ongoing Government initiatives to improve vehicle emissions standards and their enforcement for all fuel types. Moreover, fuel quality standards will be introduced to promote more efficient and clean burning fuels. These efforts will be further supported by development of infrastructure to enable uptake of electric or hybrid commercial vehicles, in line with the global shift from petrol and diesel vehicles; globally, electric ‘light commercial vehicles’ are anticipated to increase significantly from 3 million in 2020 to 27 million in 2030⁴⁰. In addition, the benefits of switching to electric two-wheeled motorbikes and scooters will be capitalised on, with efforts to introduce incentives for private vehicle users to move away from petrol motorbikes to electric. Two-wheeled motorised transport is the most common mode of private vehicle in Cambodia, with motorbikes offering a more affordable option than cars for the majority of people, in addition to increased flexibility in both urban and rural locations. In 2016 Cambodia had over 2.7 million motorbikes registered⁴¹ -and in 2019 alone, over half a million newly registered motorbikes were recorded by the Ministry of Public Works and Transport, as compared to 16,000 heavy vehicles (commercial) and 93,000 cars.¹²¹ Through encouraging a switch to electric vehicles for private use as well as commercial, GHG emission reduction and air quality benefits will be realised.

Packaging is essential for the containment and handling of goods from the point of manufacture to the point of use. This PA promotes innovative opportunities to increase reusable and sustainable packaging and reduce single-use plastic packaging in the distribution network and delivery services. For instance, measures to reduce waste may include encouraging alternatives to single-use plastic pallet wrap or plastic bags for bulk transport of goods such as biodegradable materials.

⁴⁰ IEA (2019) Global EV Outlook 2019: Scaling up the transition to electric mobility

⁴¹ 3.2M cars, motorbikes registered | Phnom Penh Post

PA1.4 Develop and support markets using recycled feedstock in production

	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Identify and promote existing and innovative recycled products in Cambodia and the region					
a. Research existing and new recycled products in SE Asia				MISTI, MoC, MFAIC, MISTI, MoI, MoT, MAFF	UNEP, Research Institutes, UNIDO
b. Promote appropriate products through commercial private sector stakeholders (e.g. recycled product manufacturers or distributors)					
2. Develop quality standards for recycled products					
a. Develop quality standards for organic composting				MoE, MISTI, MAFF	UNDP, other DPs, <i>Research Institutes, Comped</i>
b. Develop quality standards for plastic recycled products					
c. Develop quality standards for other products					
3. Support more efficient and modern equipment for processing recyclables and organic materials					
a. Support for plastic and organic recycling facilities in Battambang				MISTI, MoC, MoE, MEF, CDC	UNIDO, GGGI, Privates Sector
b. Subsidies or tax breaks for modern equipment				MoE, MEF	
4. Support industries to recover materials as feedstock, increasing the recycled content of products					
a. Identify relevant businesses and industry sectors				MISTI, MoE, MoC, MAFF, MoT, MEF	Research Institutes
b. Provide required support (e.g. finance, feedstock quality or volume)					

This PA seeks to support Cambodia in becoming a trusted supplier of reprocessed materials with a consistent supply and low contamination rates, and a more stable market for reprocessed materials. It is vital to encourage recyclable materials, such as plastic, organic waste, metal, and glass, to be collected and reprocessed for use as a production feedstock (linked to PA 3.2).

Recycling market development and support is critical for both reprocessors, producing a feedstock from recycled materials, and manufacturers using the reprocessed material. This PA supports market development in tandem with increasing collection of recyclable materials, as well as development of high-quality standards for these materials, including plastic and organic compost, to assure market trust.

Further support will be provided for more efficient and modern equipment for processing recyclables and organic materials to improve their operation capacity and business competitiveness. This modern equipment will benefit industries in Cambodia, which manufacture products that could use recycled content. Technical, marketing, or financial support will be provided to these manufacturing industries to develop their capacity for using higher levels of recycled materials in products. This can include support for a wide range of industries and products, from using recycled plastic in rainwater gutters and pipes to using crushed glass as an aggregate in concrete.

PA1.5 Develop Extended Producer Responsibility (EPR) schemes and plastic production standards

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Draft and enact regulations on EPR					
a. Conduct extensive analysis on EPR in the region, as well as plastic production in Cambodia and barriers to recycling				MoE, NCSD, MISTI, MoC, CDC	WB, UNDP, Private Sectors, Research Institutes
b. Identify appropriate EPR measures and assess feasibility					

c. Enact regulations to implement appropriate measures					
2. Create take-back programmes operated by or on behalf of manufacturers					
a. Identify and engage with relevant manufacturers to identify areas of collaboration					MISTI, MEF, MoE, MoC, MoLVT, CDC, MLMUPC
b. Develop and implement take-back initiatives					WB, UNDP, Private Sectors, Research Institutes
3. Develop and implement the production standard of plastic product to increase the recyclability of plastic products					
a. Develop standards					WB, UNDP, Private sectors, Research Institutes
b. Implement standards					MoE, MISTI, MoT

Extended Producer Responsibility (EPR) is a mechanism to ensure product manufacturers, importers, and sellers are held responsible for the waste they generate through their business activities, and that they remain accountable for their products and associated packaging even beyond the point of sale. EPR is a tool that will support the Cambodian economy’s move towards progressive resource management. Additionally, at the production stage, plastic products need to be designed and produced in a way that ensures they can be easily recycled.

This PA entails development of legislative frameworks for both plastic production standards and EPR to encourage recycling by the product producer and to ensure the products are designed for reuse or recyclability. It will create standards for production to increase recycling rates and support programmes for facilitating the movement of used products back to the seller or manufacturer. This can include schemes to enforce manufacturers of packaging to accept the return of their packaging for recycling, or sellers to accept the return of goods such as electronic and electrical waste items for recycling or refurbishment. EPR systems are complex. Therefore, this PA will be based on sound analysis of practical EPR options both nationally and within the region. The feasibility of identified options will be assessed and if they are taken forward, the EPR options will be supported by appropriate regulatory measures.

PA1.6 Develop eco-industrial parks

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Assess appropriate types of infrastructure and services for eco-industrial park					
a. Review existing EIA requirements for industrial zones to find areas for improvement				MoE, MISTI	Private Sectors, Research Institutes
b. Identify requirements for eco-industrial park using national and regional experience				MEF, MoE, MoInfo, MoPWT, MLMUPC, CDC, MISTI	ADB, Private Sectors, Research Institutes
c. Develop a financial plan to cover capital and operational costs					
2. Create eco-industrial park industrial and recycling clusters to enable the circular use of materials					
a. Identify key private sector stakeholders and conduct regional research on eco-industrial park successes				CDC, MISTI, MoE, MLMUPC, MEF	Private Sectors, Research Institutes
b. Facilitate provision of land for waste/resource processing facilities				MISTI, MoE, MLMUPC, MEF	
c. Develop detailed implementation plan building on existing SEZs, including environmental mitigation measures				MISTI, MoE, MEF	
d. Operationalise eco-industrial parks				MoE, CDC, MEF, MISTI	

As businesses in the waste and resource recovery sectors grow, creating efficiently performing eco-industrial parks using high technology is an integral part of the move towards a circular economy.

The PA will develop and promote efficiencies of eco-parks through sharing and exchanging resources and developing a highly skilled workforce in an industrial cluster. Initially, the PA will identify the infrastructure requirements for eco-industrial parks appropriate for the national context and primarily building on the existing SEZ model. This will enable development of a realistic financial plan which addresses the capital and operational costs necessary for the PA. The creation of eco-industrial parks will require close cooperation and inputs from private sector stakeholders, while building on lessons learned from successes within the region. Following the identification of suitable locations, an implementation plan will be developed that ensures robust environmental protection. This will be a long-term intervention as it requires a high-level political decision to create eco-industrial parks, in addition to the acquisition of both land and financing to support the development. Once eco-industrial parks are operationalised, the outcome of this PA is a SEZ that is able to collect, reprocess and reuse plastics and other waste materials generated on-site, while minimising adverse environmental impacts.

SO2: Promote Sustainable Consumption and Effective Reuse and Repair

SO2 adopts a two-pronged approach to realise waste prevention at source, which is the most preferred option in the waste hierarchy. This objective is firstly achieved through more sustainable consumption and substitution of less sustainable SUP for more sustainable products, and secondly through support to businesses for the reuse and repair of products. In line with the waste hierarchy, it is environmentally a better option to repair and reuse a product than it is to recycle it. Repair and reuse retains a product's value by keeping it in use for longer and avoids or delays the need for recycling, which is lower on the waste hierarchy.

PA2.1 Reduce consumption of single-use plastic (SUP) and other single-use materials

Actions	Timescale			Government agencies	Related DP initiatives
	S	M	L		
1. Reduce use of SUP and other single-use materials in target businesses					
a. Identify appropriate alternatives with stakeholders from national and regional suppliers (SO1)				MoE, MISTI, MoT, MEF, MoI, MoFAIC, MoH, MoC, NCDDS, MWA, MRC, MoYES MoInf	UNDP, WB, ADB
b. Promote use of MUP and alternatives in target private sector businesses (hotels, restaurants and cafes)					
2. Reduce use of SUP and promote use of sustainable products among end consumers					
a. Identify appropriate and available alternatives for consumers nationally and regionally (e.g. use of reusable food and drink containers or cotton shopping bags)				MoE, NCSD, MoEYS, NCDDS, MoI, MoT, MoH, MoC, MWA, MoInf	UNDP, WB, GGGI
b. Integrate use of alternatives into public awareness communications (SO5)					

This PA will actively promote SUP reduction through two target actors in order to lower consumption and improve waste prevention. The first target actor is major private sector businesses such as food and beverage, hospitality, and garment sector businesses, which are reliant on SUP for their services and daily operations. The PA entails raising awareness of the private sector to its vital role in reducing the use of SUP and other single-use materials and increasing the use of reusable/sustainable products (linked to the PA 1.2).

The second target actor is end consumers, primarily the public. Awareness raising activities will be implemented to inform consumers about negative impacts of the use of SUP (e.g. plastic bags, bottles,

expanded polystyrene foam, and straws). These activities will promote a range of solutions for consumers to use (e.g. use of reusable food and drink containers or personal shopping bags). The PA will further support collaboration between private and public sectors through promoting proven mechanisms, for example lower price incentives for the provision of reusable containers such as coffee cups (linked with the SO5).

PA2.2 Promote reuse and repair business models

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Promote the benefits of repair to consumers to reduce waste generation at source					
a. Identify key messages for public awareness on sectors suitable for reuse and repair (e.g. vehicles)		■		MISTI, MoE, MoEYS, MoIF, SNAs, MoLVT, MPT	UNIDO, UNDP
b. Develop a communication strategy to disseminate benefits/costs of reuse and repair		■			
c. Integrate the above strategy into communications campaigns (SO5)		■			
2. Develop networks of reuse and repair businesses to meet consumers' needs					
a. Develop relevant regulations to promote reuse and repair, ensuring environmental and public health and safety	■			MoLVT, MISTI, MEF, MoE, MoC	UNDP, WB, GIZ, ILO
b. Identify reuse and repair MSMEs nationally and upcycling opportunities		■			
c. Create, publicise and promote network to inform consumers		■			
3. Identify and support sectors to promote business models for product sharing and product renting					
a. Market analysis nationally and regionally		■		MISTI, MoE, MEF, MoC, MoLVT, MoI, MoWA	CCC,
b. Use analysis to identify appropriate models		■			
c. Develop and implement proven models			■		WIPO (Work, Intellectual Property), UNIDO

This PA promotes reuse and repair of products to give used products a second life before they are disposed of as waste. Reuse and repair practices entail cleaning, repairing or refurbishing products or their parts. Building on the already existing informal repair sector, this PA supports reuse and repair, for example of electronic and electrical equipment as well as vehicles.

Reuse and repair will be promoted through information campaigns that make visible its financial, environmental, and social benefits to consumers, and the development of a network of related businesses to meet consumers' needs.

The PA will also identify and support sectors to promote alternative business models such as: product sharing and product renting. Examples include businesses that rent reusable crockery and glasses for mass catering events such as weddings, businesses that rent goods that are used rarely instead of buying them such as power tools, or operations that support sharing and renting modes of transport such as bicycles or cars instead of owning them⁴².

⁴² In the UK a cars are parked for an average of 96% of the time meaning their resource inputs e.g. plastic, metal, rubber, are only benefiting the owner 4% of the time

SO3: Enhance Waste Collection and Recycling

Ensuring full and improved waste collection services across the country for villages, towns, cities, and businesses is an urgent priority. It is vital that waste is collected and transported to a safe site for appropriate treatments without impact on public health or the environment.

SO3 takes additional steps to build the foundations of a circular economy through improvements in recycling. Crucial to this is the enforcement of regulations to separate waste by material type at source. This step is a precondition for recycling industries to be viable by being able to reduce their operational costs, maintain high quality recycled products, and sustain and scale up their businesses.

PA3.1 Strengthen fee collection and effective waste collection

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Introduce a model waste collection contract to expand municipal waste collection service coverage					
a. Review and analyse barriers to waste service delivery and contract implementation				MoE ⁴³ , NCSD, MoI, SNAs, MEF	ADB, WB, TAF, GGGI
b. Engage private sector waste collection companies and MSMEs					
c. Develop collection contract guidance, collection schedule support and model incentivising collection and recycling and performance management					
d. Roll out contract with subnational authorities					
2. Introduce a model waste collection contract with weight-based fees for Special Economic Zones (SEZ)					
a. Review current industrial waste contracts				MoE, MEF, MISTI, MoI, SNAs, CDC, MoC,	WB, ADB, UNDP
b. Engage private sector waste collection companies and industrial waste producers in SEZs					
c. Develop collection model based on weight-based fee and performance management					
d. Roll out contract within SEZs					
3. Establish effective waste service user fee collection system					
a. Engage service users and subnational authorities as the fee collector (depending on fee collection mechanism, MEF or MME)				MEF, MME, MoE, SNAs	WB, GGGI, UNDP
b. Define locally appropriate fee level and mechanism for fee collection					
c. Roll out of fee collection after service improvements					

Improved waste collection coverage in Cambodia requires adequate financial resources collected from households, businesses and industries, in addition to central budget support. Waste service user fees are outlined in legislation, but their implementation and actual collection are limited, leading to insufficient funds for waste collection.

A model waste collection contract for municipal waste and waste from SEZs will be the foundation to long-term sustainable national waste collection. Improvements in waste collection contracts will lead to higher collection rates for industrial waste in SEZs and household municipal waste through ensuring the service specified in the contract is delivered through contract mechanisms such as clear performance standards and contract monitoring, and weight-based charging in SEZs. Collection contracts which incentivise service coverage and recycling will lead to a geographically wider service, separate collection of recyclables, and higher recycling rates.

⁴³ MoE Lead but SNAs will be the main implementor.

In the future, fees will be collected by subnational authorities rather than by waste collection companies. Effective approaches will be adopted such as nationwide options for residential and commercial user fee collection through existing means such as electricity bills or innovative technology-based solutions, building on the existing approach of user fees to be paid electronically through banks. The collection of fees will be matched by an improvement in waste collection service delivery.

PA3.2 Improve waste segregation and recycling

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Pilot segregated waste collection (recycling and residual waste) for industrial and municipal waste					
a. Pilot in Battambang for municipal waste for plastic and organic recycling				MoE, NCSD, MoI, NCDSD, SNAs, MISTI, MoPWT, MoWA, MoEYS, MoInf	UNIDO, GGGI, COMPED, WB
b. Pilot in Kep for municipal waste including community recyclables collection options					UNDP, GGGI, TAF, HBS
c. Pilot(s) for municipal waste in other province(s)					BORDA
d. Pilot with a garment waste producer and cement industry					Private sector (GOMI, H&M, Adidas, Chip Mong Insee)
e. Pilot e-waste recycling (e.g. electronics, batteries)					
2. Implement an informal waste picker engagement strategy, starting with above pilot initiatives					
a. Develop a strategy to engage informal waste pickers				MoE, NCSD, MoLVT, MoWA, SNAs, MoH, MoSVY, MoEYS, MoInfo	UNDP, WB, PIN, CSARO, BORDA
b. Implement the strategy					
3. Implement economic incentives for composting, recycling and reprocessing, including e-waste					
a. Introduce landfill gate fee (see SO4) to divert recyclables from landfills				MoE, MEF, MISTI, CDC, MME, MoH, MoI, SNAs,	ADB, WB (In PP), UNDP, COMPED, CSARO
b. Implement and provide financial incentives (e.g. subsidies, VAT exemptions)					
4. Develop emission standards and guidance for recycling and reprocessing industries					
a. Develop guidelines for treating, storing, and recycling demolished construction materials and municipal waste				MoE, MISTI, MLMUPC, NCSD, SNAs	Thai Government, Chinese Company,
b. Develop emission standards and monitoring systems					GGGI
c. Monitor and enforce the standards					
5. Support recycling initiatives and facility capacity improvements					
a. Provide appropriate financial support (e.g. business/green loans and subsidies)				MoE, MoF (financial body), MISTI and MoE (technical) MoLVT, MoE, MISTI, MoE, MoI, NCDSD	UNIDO, GGGI, EUROCham, Association of Bank of Cambodia, UNDP, COMPED, CSARO
b. Facilitate technical support to build in-country skills					
c. Develop and enact regulations to enable deposit return schemes for plastic, metal, and glass					

Following full waste collection, segregated waste is another prerequisite for promoting recycling, improved organic waste management, and WtE interventions.

Pilot initiatives will be supported to test simple waste sorting (such as organic and non-organic waste) and separate waste collection for recycling and residual waste to develop lessons learned for a wider expansion. This intervention first targets pilots for industrial waste for which sorting is implemented relatively easily compared to municipal waste. Subsequently, pilots on municipal waste will be supported with an initial focus on smaller cities such as those in Battambang and Kep province to test and demonstrate viable

financial and operational models of recycling for replication and scaling. An additional pilot(s) will be considered for recycling of e-waste such as electronics and batteries. Separate collection of recyclable wastes will be further supported through exploring options for community collection points for recycling. For these pilots, a strategy to fully engage informal waste pickers in recycling operations will be developed and implemented. Building on the lessons learned in the pilot, the PA will identify longer-term options for schemes to effectively collect recyclable materials at communal locations, instead of on an individual household basis.

Given the high operational costs of recycling businesses including plastic recycling, e-waste management, and organics treatment, which hinder its business sustainability and growth, this PA seeks to create an enabling environment to reduce costs and to improve their business profitability. One priority measure is to increase landfill gate fees to incentivise waste collectors to divert waste from landfills to recycling industries. Another is economic incentives such as subsidies and VAT exemptions for recycling, reprocessing, and composting. Additional financial support will be sought, such as green loans, for the acquisition of modern efficient equipment to improve processing capacities (e.g. organic composting) along with technical support to build in-country skills and knowledge required for high tech recycling industries.

Further support will be provided to strengthen the overall quality of recycled products and to expand market share. This includes development and enforcement of emission standards and guidance for recycling and reprocessing industries to avoid and minimize negative environmental and health impacts. Quality and safety standards will be developed and implemented for recycled products such as organic compost to build market trust in them.

In addition, a legislative framework for deposit return schemes will be enacted. This will set out a basis for formalising the financial, institutional, and logistical arrangements for the collection of materials on which a deposit will be paid, such as for glass bottles or plastic bottles.

PA3.3 Improve organic waste management

	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Analyse market potential and develop quality and safety standards					
a. Analysis of the compost market and uses including industrial, agricultural, and land restoration uses and existing initiatives				MoE, MoI, MoC, SNAs, MISTI, MAFF, MoT, MoWA, MoP	IGES, COMPED, NEXUS, KAS, JICA, IFAD, FAO
b. Develop a business model with target sectors and uses for piloting				MoE, MAFF, MISTI, SNAs	FAO, GGGI
c. Develop quality and safety standards and monitoring systems for organic waste treatment outputs (e.g. digestate and compost)					IGES, COMPED, GGGI, FAO
d. Implement a robust environmental monitoring approach					
2. Pilot and scale up existing initiatives for Anaerobic Digestion (AD) and composting					
a. Pilot AD facility for agricultural waste				MAFF (national biodigester programme), MoE, NCDDS, SNAs, MoI, MoT, MoWA, MoInfo	UNIDO, WB, GIZ, PIN, GGGI, Private Sectors
b. Pilot green waste / market waste for commercial composting facility					
c. Scale up proven approaches for wider application					

Organic waste has significant negative impacts on our health and environment. Uncontrolled organic waste biodegrades to pollute potable water sources and surface water bodies, further attracting disease vectors

such as flies. It causes odour and dust nuisance as it decays and dries. Organic waste is also a main source of methane emission, a potent greenhouse gas, constituting 11% of all global CH₄ emissions⁴⁴.

In Cambodia, sources of organic waste include the municipal waste stream which is 76% organic⁴⁵, comprising waste food, cardboard and garden vegetation from households. The agriculture and fishery sectors also produce significant organic wastes streams from growing and processing.

This PA pilots and implements key approaches to organic waste management, Anaerobic Digestion (AD), and quality composting to ensure organic waste is not harmful to human health or the environment. AD is a fully contained methane generating process which recovers the gas for energy production. Composting degrades waste aerobically, importantly without producing methane. Prior to piloting, a market analysis will be conducted to assess the likelihood that the products will be utilised and to develop a viable business model, supported by robust safety standards.

PA3.4 Provide effective business support for waste and resource sector

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Clarify the roles and responsibilities of national and subnational governments					
a. Clarify the roles and responsibilities between national and subnational governments in promoting recycling and composting and link to capacity building (SO5)				MoE, MoI, NCDDS, SNAs, MoC, MoT, MAFF, MoWA, MISTI	WB, IGES GGGI
b. Provide information and capacity building training for undertaking the roles and responsibilities					
2. Collect and disseminate data on different types of waste to inform governments and businesses					
a. Establish waste data collection focal point / team and data requirements				MoE, MEF, CDC, NCDDS, MoI, SNAs, MoP, MoIF, MAFF	WB, GA Circular, HBS
b. Disseminate data collection requirements to subnational authorities and private sector					
c. Use data to inform relevant Ministries to provide market insight and business support					
3. Develop a Business Registration Guidance Document for government-related information for the waste and resource sector					
a. Clarify and streamline procedures for approvals, permits, Environmental Impact Assessments (EIAs) for waste/resource sector businesses (e.g recycling, organic waste treatment)				MoE, NCSD, MoC, MISTI, SNAs CDC, MISTI, NCDDS, , MAFF, MoInfo, MEF	UNDP, WB, ADB, GGGI
b. Develop a Business Registration Guidance Document (check WtE)					
4. Create business and investor matchmaking platforms					
a. Identify private sector stakeholders				CDC, MoC, MISTI, NCSD, MoE, MEF, MAFF	GIZ, EUROCham, AmCham, Cambodia Chamber of Commerce GGGI
b. Identify national, regional, and international funding sources					
c. Develop open matching platform (e.g. registration process)					

Waste is a valuable resource. When collected and treated, it is no longer ‘waste’ to be discarded, but is a resource to be used in new products, giving rise to a new ‘resource’ sector. This PA supports waste and resource management sector businesses through facilitating business support, development, and finance with a breadth of activities.

⁴⁴ Singh, C.K., Kumar, A. & Roy, S.S. Quantitative analysis of the methane gas emissions from municipal solid waste in India. *Sci Rep* 8, 2913 (2018). <https://doi.org/10.1038/s41598-018-21326-9>

⁴⁵ Ricardo (2018) for UNDP Solid Waste Management in Cambodia – National Context.

The recent decentralization reform for waste management has been successful in transferring power and authority from central to subnational levels for waste management. Yet continued efforts should be undertaken to further clarify the roles and responsibilities of national and subnational governments along with capacity building support. This ensures that authorities can support business, in terms of finance, data, or other mechanisms. Importantly for businesses, this PA assists the private sector to understand the responsibilities of the government; clarity of roles will ensure that actions around waste and resource sector development are implemented and responsible parties are accountable.

Essential to the development of a long-term viable business is the accessibility of market information such as material volumes and flows, national and international market prices, and key waste producers. The PA strengthens collection and timely provision of accurate data on waste to guide investment decisions on waste and resource sector businesses.

In order to make it easier for a new waste or resource business entering the market, the processes for approvals, permits and the Environment Impact Assessment (EIA) will be clarified and streamlined. While the level of EIA requirements (which are robust and in accordance with international standards) will not be reduced, its application and approvals will be made more efficient. In addition, guidance on registration of waste and resource-related business will be improved through a simple ‘one stop shop’ to inform businesses about the requirements and where to go for information and support.

To further assist new business development and expansion, investment in national companies from both domestic and international investor sources will be supported through developing matchmaking platforms to facilitate relationships between investors and the private sector. This may take the form of specific internet portals for investors to offer finance to domestic waste and resource related companies requiring additional investment. The platform can be integrated into already established programs such as the annual Government-Private Sector Forum.

SO4: Ensure Effective Management of Residual Waste

SO4 focuses on effective management of residual waste. SO4 strengthens the management of residual waste through improvements to the current waste to land disposal approach, which is primarily in dumpsites rather than engineered landfills, and the emerging waste to energy industry.

PA4.1 Improve landfill disposal and operations

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Design and invest in new controlled or sanitary landfills at the subnational level					
a. Design model for controlled or sanitary landfill for Cambodia including financial and technical details				MoE, MEF, MoI, NCDDES, SNAs, NCSD, MPWT	ADB, WB
b. Design model for sanitary landfill for Cambodia including financial and technical details					
c. Pilot in Kep for sanitary landfill management					ADB
d. Invest in landfills with a larger catchment area to achieve economies of scale					ADB, WB
2. Adjust landfill weight-based gate fee to the optimal level to support landfill operational costs and to promote diversion of waste into recycling					
a. Conduct financial analysis to determine optimum gate fee for landfills				MoE, MEF, MoI, NCDDES, SNAs, MPWT	WB, JICA? KOICA?
b. Enforce the implementation and collection of gate fees					
3. Update and enforce residual waste disposal legislation					

a. Update residual waste disposal legislation to encourage economies of scale in landfill operations and improved landfill management including post-closure				MoE , MEF, MoI, NCCDS, NCSD, MPWT (economic corridor project)	WB, JICA, KOICA
b. Enforce residual waste disposal legislation					

Note: MoE: wastewater and pollution MPWT: constructions and infrastructures

It is vital to improve site management with operational plans and basic management functions to address the public health and environmental risks of the current dumpsites for residual waste disposal.

This PA accelerates landfill disposal and management improvements, by prioritising design and construction of appropriate landfills in alignment with ongoing investment in new landfills under ADB projects. The common design choice for many new sites in Cambodia has been controlled landfills as they do not require expensive and technologically challenging leachate treatment. However, more environmentally stringent sanitary landfills will be supported if economies of scale are achieved, coupled with adequate funding for maintenance of leachate treatment plants.

Landfill operation will be further supported through increasing the landfill gate fee to fully cover the recurrent operational costs of the sites and to encourage diversion from landfill. Options to collect gate fees include a landfill tax to ensure a minimum gate fee regardless of whether the landfill site owner is private or public sector.

The PA will develop and update an enabling regulatory framework to encourage larger-scale landfill sites capable of achieving the economies of scale and levels of environmental protection and management standards that cannot be obtained by small sites with low waste inputs. As an example, a small landfill site will require equipment such as a bulldozer or a weighbridge which may be needed to move or weigh waste for one hour a day, and a larger site will utilise a bulldozer for eight hours a day and use a weighbridge many times, making the purchase of the equipment far more cost effective.

PA4.2 Support Waste to Energy for residual waste treatment

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Conduct feasibility assessments for WtE options					
a. Conduct study on financial profitability				MME , MEF, MME, CDC, MoE, MISTI	GGGI on RDF from MSW, ADB on incineration to energy of municipal waste
b. Conduct study on environmental impacts including waste reduction and air quality				MoE , MME, MIST	
2. Pilot initial WtE initiatives with positive financial returns and environmental impacts in terms of waste reduction and minimal impacts on air quality					
a. Pilot biodigesters for agricultural residuals in rural areas				MAFF , MME, MISTI	ADB
b. Pilot large-scale WtE for garment and cement industries and RDF (e.g. H&M, Adidas, Chip Mong)				MME , MoE, MISTI	EU Switch Asia, GGGI
c. Pilot large-scale WtE interventions (municipal waste)				MME , MISTI, EDC, MoE, SNAs, MEF	ADB, KOICA GGGI
3. Develop emission standards for all WtE facilities to minimize negative environmental and health impacts					

a. Develop environmental and public health standards for small-scale on-site WtE incinerators (e.g. garment) including Refuse Derived Fuel (RDF) sites			MoE, NCSD, MME, MoH, SNAs, MISTI	ADB, UNDP GGGI
b. Develop environmental and public health standards for large-scale WtE interventions (municipal waste)			MoE, NCSD, MoH, MME, MoI, EDC, SNAs	ADB
c. Establish and operationalise a robust approach to monitor environmental and health impacts for WtE facilities			MoE, MoH MME, EDC,	ADB
4. Identify and provide required investments, equipment, infrastructures, economic incentives for WtE				
a. Identify required investments, equipment, infrastructures, economic incentives for WtE (e.g. subsidies, VAT exemptions).			MEF, CDC, MoE, MME	ADB, GGGI
b. Implement these incentives				ADB, GGGI
5. Develop enabling legislation for WtE				
a. Draft legislation to promote WtE (in addition to SO3)			MoE, CDC, MEF, EDC, MME, MoLVT	ADB
b. Enact legislation				ADB

This PA works alongside existing developments in WtE investment to use waste as a fuel source, generating heat and electricity. These WtE initiatives may include but are not limited to large-scale centralized WtE processing facilities used for thermal treatment of municipal waste to generate electricity and large-scale industrial facilities using waste as a feedstock. As an example of the latter case, a cement company has already applied “co-processing” to process hazardous and non-hazardous waste. This refers to the use of waste as raw material, and as a source of energy to replace coal in cement production. In addition, decentralised small-scale WtE options to convert waste to energy are currently used by some garment factories, and smaller refused derived fuel (RDF) sites are being planned.

This PA supports feasibility assessments of these various WtE options in terms of financial profitability and environmental impacts (e.g. waste reduction, air quality impacts). Pilots will be supported for WtE initiatives with positive financial returns and environmental impacts in terms of waste reduction and minimal impacts on air quality (e.g. RDF production and utilisation). Pilots will include small-scale biogas plants in rural areas to valorise and use agricultural organic waste for energy generation.

Any WtE interventions should address inherent risks associated with contamination of air and soil as the operation entails combustion of waste to generate energy, with potential emission of pollutants in air and soil. Thus it is critical for WtE to ensure the development of emissions standards in accordance with international best practices and monitoring mechanisms to ensure adherence to the standards. Failure to enforce emissions standards can have significant public health and environmental ramifications. Financial mechanisms to encourage WtE investment and developments will be explored, as economic incentives as well as funding are essential for complex long-term WtE infrastructure developments.

SO5: Enhance Crosscutting Stakeholder Engagement, Awareness and Capacity Building

SO5 includes actions which encompass all value chains, required throughout the entire period of transition to a circular economy. Most Actions in this SO are required at the outset of every new activity, policy, or legislative instrument, and will need to be continued over the next 15 years.

PA5.1 Improve CE awareness and environmental education

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Create a platform of industry stakeholders to promote knowledge exchange and collaboration					
a. Identify relevant stakeholders for CE transition				MoE, NCSD, CDC, MISTI, MoLVT, MoI, MoPT	UNDP, KAS, USAID, TAF
b. Develop a network encouraging collaboration and a knowledge exchange platform					
2. Develop and update communication materials relevant to CE themes for the public					
a. Develop resonant public messages and communication materials in collaboration with NGOs and development partners				MoE, NCSD, MoEYS, MIF, MoPTC, SNAs, MoI, MoT	UNDP, CCCA, WB, GGGI
b. Develop a dissemination programme and implement through government website, social media, and campaigns					
3. Improve environmental education					
a. Develop / update education materials for primary and secondary schools to integrate environmental issues				MOEYS, MOE, NCSD, MAFF, MoI	UNESCO, USAID (GPL) GGGI UNDP, CCCA
b. Integrate the new materials (e.g. supplemental books) into the national curriculum.					

Improved knowledge is conducive to inducing behavioural change towards a circular economy. This PA promotes dissemination of information and raising awareness among all relevant stakeholders, while adopting a country-wide approach to ensure consistent messages on CE issues. The messages must be sustained in the long term as well as tailored to meet different types of audiences in order to be effective. Messages for the private sector and industry will be delivered through a stakeholder platform, encouraging industry specialists and academic experts to collaborate and exchange knowledge on innovations and developments. Messages will be pertinent to industry and may cover but not be limited to sustainable energy use and energy efficiency, sustainable consumption, design for repair and recycling, alternatives to SUP for efficient packaging, transport, and distribution.

In collaboration with relevant NGOs and development partners, communication and outreach materials for citizens will be developed and continuously updated to share key messages to promote a CE approach. These messages may cover but not be limited to issues pertaining to sustainable consumption and the alternatives available, waste prevention, reuse, repair, recycling, household energy saving and legislation compliance. Information will be disseminated through various communication channels such as the government websites, newspapers, posters, and social media. In addition, strategic campaigns will be promoted in partnership with development partners, the private sector, academic institutions, and celebrities. Due to the urgency related to tackling plastic waste, the first five years of interventions will focus on raising awareness of issues related to plastic waste and promoting sustainable consumption to reduce single-use plastic usage and to increase the use of reusable products or single-use alternatives to plastic.

Environmental education is another crucial factor for inducing positive behavioural change. It is important that Cambodian students are aware of the environment and how human actions impact the environment and country, so that they can take actions to shape a sustainable future. This PA starts with developing and updating appropriate environmental education materials to integrate environmental issues (including climate change, sustainable consumption, circular economy, energy, and recycling) into primary and secondary school curriculums. The outcome will be school graduates with full knowledge of good

environmental behaviours, who can contribute directly to the circular economy through promoting sustainable consumption in their daily lives and in their future employment opportunities.

PA5.2 Enhance capacity and skills and employment opportunities of all stakeholders

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Build the capacity of national and subnational governments for the management of waste operations					
a. Training needs analysis to identify skill requirements for the waste, resource, and energy sectors (e.g. monitoring standards, enforcement of regulations, contracts, and standards)				MoE, MoLVT, NCDDS, MME, MoEYS, MoInf, MoI	WB, IGES, GGGI
b. Develop training and capacity development programme					GGGI
c. Implement long-term and comprehensive capacity development programme for relevant skills					
2. Update capacity and skills of private sector waste and recycling facility operators for modern operations and to maximise employment opportunities					
a. Training needs analysis to identify skill requirements for the waste, resource, and energy sectors				MoE, MoLVT, MME, MoI, NCDDS SNAs	WB, UNIDO, COMPED, GGGI
b. Develop training and capacity development programme					
c. With private sector support, implement skills and capacity development programme relevant to operators					
3. Develop higher education services and provide training to the wider private sector					
a. Engage higher education universities and technical colleges				MoEYS, MoE, NCSD, MISTI, RUPP, RUA, ITC, MRD, MoLVT, MoP, MEF, MAFF	AFD, WB
b. Identify the skill requirements for efficient production including energy / materials use, and more advanced reprocessing and recycling technologies					
c. Develop and deliver a curriculum to the wider waste, resource, and energy private sector businesses to maximise employment opportunities					
4. Train people in the informal waste sector and small businesses for their effective participation in CE					
a. Analyse priorities and needs of the informal waste sector				MoLVT, MoE, NCDDS SNAs, MoI, MoT	CSARO, TAF, UNDP, UNIDO, WB, KAS?
b. Develop and deliver appropriate formal and informal training inclusive approaches considering people's availability, literacy and other specific requirements					

Meeting necessary knowledge and skill requirements is essential in order to implement actions towards a CE. The outcome of this will be that no one in the current resource, energy, and waste sector will be left behind as the sector develops and transitions towards a CE and quality and long-term employment opportunities will be realised.

The first priority is to improve the technical capacity of relevant public sector, critical to implementing many actions for a CE. For instance, the Ministry of Environment, the National Committee for Sub-national Democratic Development (NCDDS), and subnational governments such as provincial, municipal, and district governments, have responsibility for, or input into, procuring and managing waste-related contracts including private sector contractors, that require monitoring and enforcement. Ministries including the

Ministry of Economy and Finance and the Ministry of Mines and Energy also play crucial roles in advising the complex technical contractual requirements of delivering WtE. In addition, the public sector, in particular, subnational government, requires the wider knowledge and skills to support segregated waste collection and recycling and waste management planning, while taking financial, institutional, and technological factors into consideration. Initially, a training needs analysis will clearly identify gaps between current and required knowledge for a CE approach. A training programme to upskill the public sector may include but not be limited to waste services procurement, waste contract management, technical operations and maintenance, environmental monitoring and enforcement, segregated waste collections and recycling, and WtE.

It is also imperative that any operators of waste and recycling sites are equipped with the specific knowledge and skills to operate and maintain their facilities to the design standard and avoid any public health and environmental hazards. Actions to support capacity and skills requirements in terms of waste treatment and technologies can include partnerships with regional businesses or academic institutions able to share skills or establishment of skills-based institutions to support professional development in the waste and resource sector. Operators of any landfill, recycling or composting facility or WtE plant will be required to have the technical skills to operate and maintain the sites at the design standard.

Further actions will address the twin needs of higher education for future resource, energy, and waste managers, as well as practical training and education for the production and manufacturing industry. The higher education sector has an important role in meeting the skill requirements for a CE model such as industrial chemistry, engineering, or logistics tailored towards the energy, waste, and resource market. A CE will offer an increasing range of employment opportunities that will appeal to graduates with appropriate academic experience. Additional training and skills development for the design and manufacturing sector will be delivered. This is critical to foster innovation for production and delivery of goods and services, in adopting the use of more sustainable energy and materials and increasing efficiencies in energy and material inputs. Increased knowledge of CE benefits and new technologies will also help manufacturing business leaders to make informed decisions about applying a CE approach in their business strategies and operations.

Furthermore, there are many existing small businesses and people working informally in the waste sector who will benefit from additional support and training to ensure their skills evolve as the CE evolves in Cambodia. This Action will ensure that training and upskilling for existing waste businesses including the informal waste sector is delivered, in order for all stakeholders to contribute to the transition to a CE.

PA5.3 Promote private sector engagement for CE innovation and scaling up

Actions	Timescale			Government agencies*	Related DP initiatives
	S	M	L		
1. Develop a private sector engagement strategy and mechanism to support their leadership					
a. Develop a private sector engagement strategy with key private sector businesses and stakeholders to identify technology, business, and innovation opportunities				MoE, NCSD CDC, MEF, MISTI, MoT, MoI, SNAs, MoLVT	UNDP
b. Design mechanisms to motivate the private sector to adopt CE approaches (e.g. innovation fund, rewards and incentives)					
c. Implement approaches to engage the private sector in CE initiatives and actions					
2. Pilot and upscale private sector CE innovations					
a. Identify pilots or new innovations (e.g. plastics, energy efficiency, sustainable energy, and recycling) which can also contribute to employment creation, environmental benefits, and resource efficiencies				MoE, NCSD MEF, MISTI, MoT, SNAs, CDC, MoC, MME	UNDP, GGGI

b. Implement pilots or innovations and develop business case for further private sector support				GGGI
c. Upscale proven approaches led by private sector partners				

Throughout the value chain, the private sector has a pivotal role in driving and scaling up business innovation, in accelerating a shift from a linear towards a circular economy. Their active engagement is crucial in adopting sustainable energy and resources, improving energy and resource efficiency, introducing alternatives to single-use items, promoting reuse, repair, and recycling, and operating landfill and WtE businesses. These businesses will also apply good international practice standards to minimize environmental impacts. An engagement strategy will be developed, using early input from stakeholders including industry, in order to ensure private sector buy-in for CE initiatives.

Systematic collaboration with the private sector requires a comprehensive understanding of major features of their current business practices, drivers, and business innovation opportunities for creating a circular economy, in addition to a robust engagement strategy. Drivers for businesses to engage with the CE approach may be shaped by their willingness to improve environmental performance and to promote sustainable and viable business (e.g. corporate social responsibility), access to wider consumer markets, and skills development. The PA will identify technology, business, and innovation opportunities, drivers and motivations of the private sector, and the market and financial environments appropriate for business development.

The strategy will reflect these findings and mechanisms for promoting effective means to ensure private sector’s long term and continuous engagement and buy-in to the CE approach. These may include CE innovation funds, or rewards and incentives.

Several short-term, quick pilots and innovations will be supported in the priority areas of single-use plastic waste, energy efficiency, sustainable energy, and recycling to generate valuable lessons in innovative private sector CE involvement. These lessons will be used to upscale private sector CE innovations. This upscaling means both increasing the size of the innovation or widening its reach, ensuring that nationally, the entire country benefits from CE innovations, including secondary cities.

Overall, these actions are selected and prioritised based on how appropriate they are for Cambodia now and in the future. Each Action will help to deliver the long-term goals outlined in this Plan. In addition, some short-term actions can be used to gain immediate momentum and support for the longer-term transition towards a circular economy approach.

8. FINANCING RESOURCES

This CE Strategy and Action Plan has a considerably wide-ranging scope, it reaches many sectors of the economy and aims to benefit all sectors of society. Therefore, the financing of this Strategy and Action Plan is required to be equally far reaching and secure financial resources are needed to ensure delivery of the identified Actions.

To this end, the Government will commit to:

- Ensuring efforts to identify and generate financial resources to implement and sustain CE Actions.
- Seeking opportunities for public-private partnerships to attain effective CE action delivery.
- Extending collaboration with external institutions (national institutions, regional institutions, development partners, and private sector entities) in order to attract development finance and long-term sustainable projects.
- Recruiting additional appropriate staff resources in relevant departments to ensure adequate resources are given to obtaining and sustaining finance for the CE Actions.

The responsibility for developing a costed action plan and identifying financial support for the Actions within this Strategy and Action Plan will primarily be the responsibility of the Government Agency allocated to oversee implementation of the Action. Collaboration between ministries and departments will be encouraged in order to share knowledge including technical skills, allowing for an accurate costing to be developed, and to share information on potential finance partners. Potential funding sources are identified below,

Table 3. The potential funding source

Funding Source	Examples
Government / national funds	National budget allocation to MoE, MEF Green Climate Fund (GCF) under the UNFCCC GEF STAR fund allocations
Development partner funds	Donors (multilateral and bilateral donors) including ADB, AFD, EU, GGGI, IFC, JICA, KOICA, Netherlands Development Cooperation, Sida, USAID, World Bank Nonprofit organisations including The Asia Foundation
Investments and cost sharing	Private sector investments for infrastructure and new CE businesses Collaborative implementation with international private sector with interest in Cambodia
Taxes and surcharges	Landfill tax Single-use plastic bag surcharge User fees for waste collection services Import surcharges on single-use materials
Permits, fees, and licenses	EIA fees Operating permits for waste/recycling facilities Operating permits for factory boilers Legal fines for pollution and non-compliance

9. MONITORING AND EVALUATION

The implementation for the CE Strategy and Action Plan spans a 15-year period from 2020. Within this time span, the CE Strategy and Action Plan will be reviewed initially after one year, identifying any initial challenges and adjustments, then subsequently every 5 years to evaluate progress and implement corrections as required to ensure the Strategy and Action Plan remains on track.

A monitoring and evaluation framework with indicators and targets [ANNEX I] will be used to monitor implementation and can subsequently be used to evaluate the impacts of implementation when specific actions are completed.

Completed activities will be monitored during the next monitoring period to confirm that any interventions, such as businesses or waste sites which should be in operation following completion of the Priority Action, are still operational and functioning as intended. This will monitor the financial and operational sustainability of the Priority Actions.

In implementing the CE Strategy and Action Plan, the relevant responsible ministry or department will ensure that it develops departmental annual operating plans which integrate the Priority Actions that the department will either lead or support.

The monitoring and reporting methodology and formats will be standardized to ensure consistent application to accurately observe progress and ensure meaningful adaptations are implemented where required. The reports presenting monitoring results will be incorporated in relevant national reports and key recommendations implemented as part of adopting adaptive management strategies.

Table 4. ANNEX I Proposed monitoring and evaluation framework (for discussion and further inputs)

SO1: Increase Efficient Use of Raw Materials, and Promote Sustainable Design, Production, Remanufacturing and Distribution

Priority Area	Output	Output Indicator	Target	Target Year	Timeline (2021 – 2035)							Lead Agencies	Budget					
					2021	2022	2023	2024	2025	2026-2030	2031-2035		Gov't	DP/Private Sector	Other	Total		
PA1.1 Promote use of sustainable energy and materials and energy efficiency	1.1.1 Pilot initiatives and benchmarks are implemented for garment, construction/property, and hospitality sectors	Number of pilots with energy benchmarks supported in the: (a) Garment industry (b) Construction/property industry (c) Hospitality industry	(a) 1 (b) 1 (c) 1	2025														
	1.1.2 Energy efficiency enabling regulations are in place	Number of energy efficiency regulations enacted/issued in the form of: (a) Policies (b) Sub-decrees (c) Prakas (d) Technical guidelines	(a) 1 policy (b) 1 sub-decree (c) 2 prakas (d) 3 technical guidelines	2025														
	1.1.3 Sustainable energy and materials and energy efficiency interventions are upscaled	Number of successful energy and material interventions scaled up	6 interventions	2030														
PA1.2 Promote production of alternatives to single-use plastic	1.2.1 Production of multi-use plastic and SUP alternatives is increased	Number of manufacturers with a 20% increase in output of multi-use plastic and SUP alternatives over 2021 baseline	10 manufacturers	2025														
	1.2.2 SUP regulations are in place	Number of SUP sub-decrees in place	2 sub-decrees (sub-decree 168 updated and	2021														

SO2: Promote Sustainable Consumption and Effective Reuse and Repair

Priority Area	Output	Output Indicator	Target	Target Year	Timeline (2021 – 2035)							Lead Agencies	Budget				
					2021	2022	2023	2024	2025	2026-2030	2031-2035		Gov't	DP/Private Sector	Other	Total	
PA2.1 Reduce consumption of single-use plastic (SUP) and other single-use materials	2.1.1 Single-use plastic use is reduced in target business sectors	Percentage decrease in single-use plastic use in target sectors compared to 2021 baseline	50%	2023													
	2.1.2 Single-use plastic use is reduced among end consumers	Percentage decrease in surveyed sample of consumers using single-use plastics compared to 2021 baseline sample	50%	2023													
PA2.2 Promote reuse and repair business models	2.2.1 Benefits of repair are promoted to consumers	Communication strategy on repair is integrated into CE communication material (PA 5.1) (Yes/No)	Yes	2028													
	2.2.2 A network of reuse and repair businesses is created	(a) Number of regulations on repair and reuse enacted (b) Number of repair and reuse businesses registered as part of a national network	(a) 1 regulation (b) 50 businesses	(a) 2030 (b) 2030													
	2.2.3 Product sharing and product renting business models are supported	Number of product sharing and renting models operationalized	2 models	2035													

SO3: Enhance Waste Collection and Recycling

Priority Area	Output	Output Indicator	Target	Target Year	Timeline (2021 – 2035)							Lead Agencies	Budget						
					2021	2022	2023	2024	2025	2026-2030	2031-2035		Gov't	DP/Private Sector	Other	Total			
PA3.1 Strengthen fee collection and effective waste collection	3.1.1. A model municipal waste collection contract to expand coverage is introduced	Number of subnational municipalities using a model contract with SWM companies	3 municipalities	2030															
	3.1.2. A model SEZ waste collection contract with weight-based fees is introduced	Number of SEZs using model contract's weight-based fees with industrial waste collection companies	3 SEZs	2025															
	3.1.3. An effective waste service user fee collection system is established	(a) Number of subnational municipalities adopting new fee collection system (b) Percentage of fee collection rates in subnational municipalities with new fee collection system	(a) 3 municipalities (b) 100%	(a) 2024 (b) 2024															
	3.1.3. An effective waste collection is established	Percentage of waste collection coverage in subnational municipalities	100%	2025															

SO4: Ensure Effective Management of Residual Waste

Priority Area	Output	Output Indicator	Target	Target Year	Timeline (2021 – 2035)							Lead Agencies	Budget			
					2021	2022	2023	2024	2025	2026 - 2030	2031 - 2035		Gov't	DP/Private Sector	Other	Total
PA4.1 Improve landfill disposal and operations	4.1.1 Infrastructure for controlled or sanitary landfills at the subnational level increased	(a) Number of guidance documents for model landfills developed (b) Number of landfill pilots operationalized at the provincial level (c) Number of new landfills at subnational level	(a) 1 report (b) 1 pilot in Kep (c) 5 landfills	(a) 2022 (b) 2025 (c) 2030	2021	2022	2023	2024	2025	2026 - 2030	2031 - 2035	MoE, MEF, MoI, NCDSDS, SNAs, NCSD, MPWT, MoT	Gov't	Private Sector	Other	Total
PA4.2 Support Waste to Energy for residual	4.1.2 Landfill weight-based gate fee is set to optimal level	(a) Financial analysis report published with optimum gate fee (Yes/No) (b) Percentage of state-owned landfills enforcing the optimum level gate fee	(a) Yes (b) 80%	(a) 2025 (b) 2030							MoE, MEF, MoI, NCDSDS, SNAs, MPWT	Gov't	Private Sector	Other	Total	
PA4.2 Support Waste to Energy for residual	4.1.3 Residual waste disposal legislation is updated and enforced	Percentage of state-owned landfills that follow updated residual waste legislation	100%	2030							MoE, MEF, MoI, NCDSDS, NCSD, MPWT	Gov't	Private Sector	Other	Total	
PA4.2 Support Waste to Energy for residual	4.2.1 Feasibility assessments on WTE conducted	Number of studies completed on WTE	2 (1 study on financial profitability and 1 study on environmental impacts)	2023							MEF, MME, CDC, MoE, MISTI	Gov't	Private Sector	Other	Total	

SO5: Enhance Crosscutting Stakeholder Engagement, Awareness and Capacity Building

Priority Area	Output	Output Indicator	Target	Target Year	Timeline (2021 – 2035)										Lead Agencies	Budget			
					2021	2022	2023	2024	2025	2026-2030	2031-2035	Gov't	DP/Private Sector	Other		Total			
PA5.1 Improve CE awareness and environmental education	5.1.1 Platform for industry stakeholders to promote knowledge is in place	Number of industry stakeholders registered on the CE platform	30	2022															
	5.1.2 Communication materials relevant to CE themes reach public	Number of people reached by CE communications, including social media posts and visitors to government website (gender disaggregated)	1 million (including 50% women)	2025															
	5.1.3 Environmental education is improved	(a) National curriculum updated for environmental education after review (Yes/No) (b) Number of supplemental environmental education books approved for national curriculum	(a) Yes (b) 2	(a) 2024 (b) 2024															
PA5.2 Enhance capacity & skills and employment opportunities of all stakeholders	5.2.1 Capacity of national and subnational governments for the management of waste operations is increased	Number of national and subnational government employees trained on management of waste operations and showing improved capacity based on a scorecard assessment (gender disaggregated)	100 (50% female)	2023															

