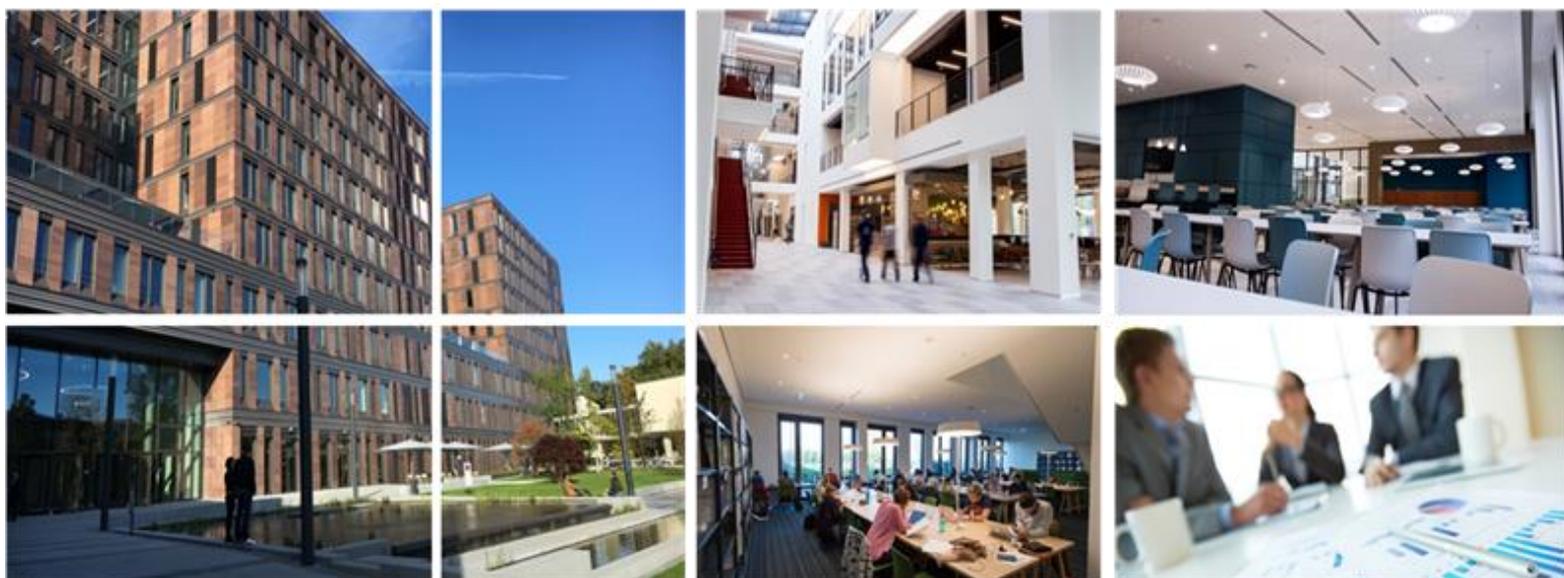




Frankfurt School
FS-UNEP Collaborating Centre
for Climate & Sustainable Energy Finance

Finance for circular economy in low- and middle-income countries



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Abbreviations

BMZ	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung
CE	Circular Economy
CV	Curriculum Vitae
EC-DEVCO	European-Commission Directorate-General for International Partnerships
EE	Energy Efficiency
EIB	European Investment Bank
EPR	Extended Producer Responsibility
ESG	Environmental, Social, and Governance
FDI	Foreign Direct Investment
GGGI	Global Green Growth Institute
GHG	Greenhouse Gas
GIZ	Gesellschaft für Internationale Zusammenarbeit
IAS	International Advisory Services
ICMA	International Capital Market Association
ICT	Information and Communications Technology
IFIs	International Finance Institutions
KfW	Kreditanstalt für Wiederaufbau
KPI	Key Performance Indicator
LDC	Least Developed Countries
LMIC	Low- and Middle-Income Countries
MFIs	Microfinance Institutions
NDC	Nationally Determined Contribution
PPP	Public-Private-Partnership
PSS	Production Service Systems
RE	Renewable Energy
SDGs	Sustainable Development Goals
SEZ	Special Economic Zones
SIDS	Small Island Developing State
SME	Small and Medium Enterprise
SPV	Special Purpose Vehicle
TA	Technical Assistance
ToR	Terms of Reference
UNDP	United Nations Development Program
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization

0 Executive Summary

The objective of this study is to provide some prospective guidance on how the **(German) development cooperation** could **contribute to closing the still-prevailing financing gap for Circular Economy (CE) in low- and middle-income countries** (LMICs). This study assesses distinct barriers that hinder as well as drivers that stimulate circular economy in LMICs. The study sets a focus on five selected countries: Albania, Colombia, the Dominican Republic, Rwanda, and Vietnam.

The study is structured as follows:

- Section 1 shows country-and-sector-agnostic barriers (1.1.) and CE interventions (1.2.) on a global scale,
- Section 2 zooms in sector barriers and circular interventions on the value hill (e.g., up-hill, top-hill, down-hill) without considering country characteristics. This country-agnostic perspective can be partly mapped to country examples, and
- Section 3 provides a deep dive in the assessed LMICs. Entry points for circular interventions are majorly determined by national priorities, existing structures, and the legal base. Recommendations are partly indicative (e.g., highlighting circumstances and potential entry points) and partly more in-depth (e.g., concrete intervention, including counterparts for potential collaborations).

Additionally, to the main sections of the report, a list of Annexes provides subsidiary information as follows:

- Annex I reports briefly on recent initiatives and takes stock of essential documents,
- Annex II describes the methodological approach of the country selection from 16 long listed to 5 short-listed countries,
- Annex III serves as a guiding document for circular economy finance instruments. First, all major instruments are described in their mode of operation with a focus on leveraging circular approaches, including existing funding activities by (international) financing institutions. Second, the finance instruments are mapped on the value hill to showcase relevance in a circular language, and
- Annex IV provides detailed sector descriptions, general barriers, and windows of engagement on a country-agnostic but sector specific breakdown, incl. Construction and demolition waste, Electronics, Plastics, Textiles, Packaging, Food, and Waste management.

Overall

A circular economy can be considered as an **essential backbone for sustainable development** across all sectors (incl. production of consumer goods, construction, waste treatment) and all actors (private/public). The circular economy can support the envisaged Paris Alignment, the implementation of National Determined Contributions (NDCs), and the Sustainable Development Goals (SDGs) – in particular SDG 12: ‘Responsible consumption and production’. While there are several barriers (within and without the financial system) preventing the acceleration of circular activities across countries, driving momentum can be identified in specific sectors, in countries, and in the behaviour of economic actors such as impact investors.

Critical elements for a successful transition to a circular economy in LMICs should be implemented in an integrated manner as early as possible in the stage of development. Circular interventions aim to serve multiple SDGs such as tackling climate change, fostering biodiversity conservation, and achieving pro-poor growth in LMICs. Current market observations confirm that only a few business cases are already addressing fully circular approaches compared to the vast share of traditional (linear) economic practices. The latter largely accept consequences such as habitat losses, depleted resources, or serious health issues. When zooming-in into sectors such as chemical production or construction, we see business cases demonstrating partly circular practices, but these good-practices cannot be identified consistently. Generally, activities are often not labelled as circular, even if they are. This is contrary to established “topics” such as climate change interventions (i.e., solar or wind parks).¹ While there exist two essential sets of measures for climate change (mitigation via reduction of GHG emissions, and adaptation via reduction of climate vulnerability), circular-economy-related indicators are much more cross-linked to all segments of the economy. For instance, the OECD Inventory of Circular Economy lists 474 potential indicators.

¹ <https://circulareconomy.europa.eu/platform/en/toolkits-guidelines/circular-economy-finance-guidelines> (Assessed online 10 August 2021). Notably, the CE Finance Guidelines recommends not classifying renewable energy (RE) projects – for example solar, wind and hydro energy – as CE projects because of the lack of circularity in the product value-chain.

The general approach is to differentiate in a circular economy between up-hill, top-hill, and down-hill activities² as illustratively described in the box below.

<p>Up-hill: Systemic approach to change to circular thinking and practice. Besides developing new technologies and services, strategies, structures, operations, and supply chains need to be adjusted by organisations to align with circular business models. Investment environment must be put in place through a suitable legal base (e.g., financial regulation) and economic incentives (e.g., fiscal policy).</p>	<p>Top-hill Business cases must be enabled for production and consumption sectors due to their high use of resources, e.g., construction and buildings, capital equipment, electronics, plastics, textiles, packaging, and food. In all sectors, major developments are essential to avoid undesirable future scenarios, incl. huge losses and damages because of vulnerable eco-systems.</p>	<p>Down-hill End-of-life considerations (e.g., waste management) must overcome various barriers (e.g., public good character, missing awareness). The potential of circular designed products and materials must be captured in this phase and therefore a resource management process must be adapted.</p>
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To tax circular economy activities across this value hill, the European Commission (EC) and the European Investment Bank (EIB) defined 14 circular economy categories which **aim at resource efficiency and reducing environmental harm throughout value chains**. Based on the EC categorization, different elements are crucial at different stages in the value chain creation for a successful transition to CE in LMICs. Further clarification is expected by the ongoing development of the screening criteria for the EU Taxonomy (*Objective 4 - transition to a circular economy*). This will strengthen its visibility for actors, incl. investors, governmental authorities, and the civil society. Thus, to finance circular interventions addressing all parts of the value hill (figure), various entry points can be identified. But moreover, a mix of instruments is needed to up-scale CE investments. Besides responsive policies and legal frameworks, the financial sector needs to align financial products to consider circular investment opportunities by adjusting ways of decision making, which is currently dominated by a short-sighted and directly linked cash-flow generating mechanism.

Barriers

Despite the large variety of barriers by sector and country, explanations can be borrowed from the traditional economic literature (see Table 2 in Section 1.1.) covering unpriced **externalities** (e.g., in relation to greenhouse gas emissions, health hazards, pollution or biodiversity loss), **imperfect financial markets** (e.g., short-termism, home-bias, market frictions through subsidies), and **asymmetric information** (e.g., different perceptions and knowledge of waste treatment regulations). Those underlying barriers are materializing in **various financial barriers**. Particularly **large upfront costs** for circular infrastructure investments, **budget constraints** and **limited access to credit facilities** due to missing tracked records, **market uncertainties** (e.g. return-based finance requires a degree of certainty that the project/promoter can generate cash flows), **political uncertainty** (e.g. missing credible commitments by public authorities are posing additional risk on (long-term) investment decisions), and an **unabling investment environment** (e.g. missing policies/regulation and capabilities needed to channel flows accordingly) hinder the up-scaling of circular investments. From a theoretical standpoint that maximizes social welfare in an open economy, circular investments will be turning to the economically viable side, when properly reflecting full-life-cycle costs and pricing-in of societal benefits (e.g., given the public good character of a circular economy).

Interventions

Based on governmental priorities, incl. SDG targets and NDCs, different circular investment priorities (see respective Sub-Section in Section 3 Barriers and Interventions by Countries) can be identified, partly of private or public goods – and which **require a mix of instruments** – across areas of interest. It is important to consider the **development stage** of required circular interventions and **barriers** that prevent investments. Overall, the successful use and application of (financial) instruments **depends largely on national framework conditions and parameters** and will need to consider the time frame and the amount of financing required (see Table 4: Investment needs, barriers and responding options, in Section 1.2). Thus, developing enabling frameworks to internalize environmental costs (e.g., via regulation, standards) and addressing capacity building needs (e.g., technical assistance and training) are crucial to overcome identified market failures and barriers. Therefore, pricing in environmental damage for linear activities encourage circular investments. In addition, investments

² There is no binding definition on the terminology for value hill considerations.

in assets on the project-level are needed (see Table 4, Section 1.2). Access to finance through loan finance, equity injections, leasing agreements as well as risk mitigation instruments such as loan default guarantees are essential to spur circular investments.

0.1 Country selection

In total, GIZ provided 16 LMIC in the long list for the country analysis (see Table 1). The long-listed countries have been e.g., developed according to politically priorities of the GIZ and the BMZ and further assumptions. The country selection aimed to select 4 to 6 countries for closer consideration during this study. The country selection has been conducted by a two-step approach.

The country selection follows a two-step approach

1. Line of sight

In the first step, key **quantitative** indicators were defined and weightings for relevance were factored in the quantitative results. The quantitative indicators were used to ensure comparability within all long-listed countries. In Figure 2, some used indicators are listed,

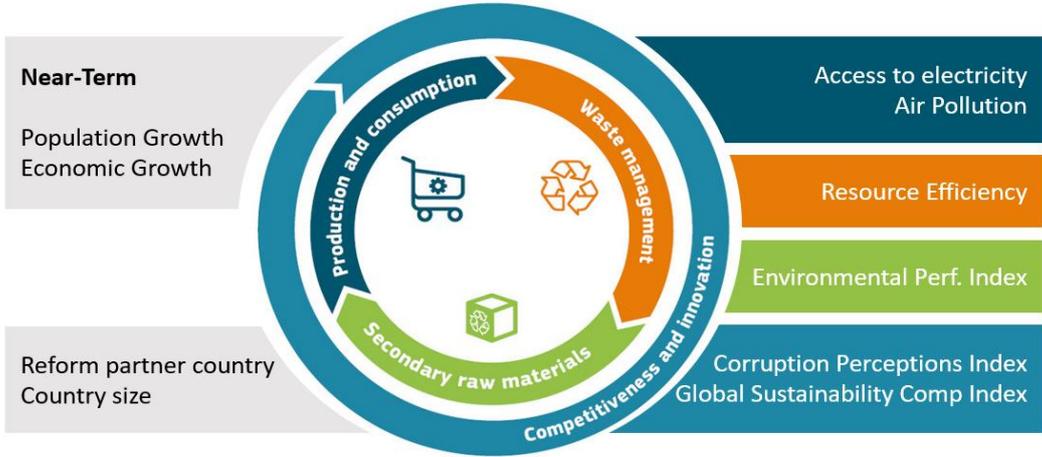
2. Typology

In the second step, the countries were corrected based on a typological ordering. **Qualitative** indicators (i.e., broader context, experience, recent developments) have been taken into consideration to streamline the results. Therefore, adjustments have been made to ensure regional coverage to get a list of balanced short-listed countries. Excluding and including factors were considered here.



As described in the **line of sight**, quantitative indicators have been considered in the evaluation, based on the key indicators of the European Commission (EC) to monitor the progress towards a CE. These indicators capture the main elements of a CE. While the list is designed for the tracking of European statistics, the key sectors are undergirded with suitable indicators (see Annex) for low- and middle-income countries. In addition, typological characteristics have been considered (exclusion and inclusion list) as described below.

Figure 1: Indicators towards a circular economy reflected in the country selection



Note: Only indicative, non-exhaustive. Circle diagram drawn from Eurostat³ and modified by the authors.

³ <https://ec.europa.eu/eurostat/web/circular-economy/indicators> (Accessed online 24 October 2021)

Country selection based on typology: Including and Excluding Factors

Excluding Factors: A minimum level of Sustainable and Environmental Performance is considered as necessary (Excluding Zambia, Ethiopia, Tanzania, and India). Countries with higher corruption perception are excluded as well (Kenya, Mexico).

Including Factors: High population and economic growth represent a critical dimension for long lasting development pathways. **Rwanda** (+25% population in the next five years) and **Vietnam** (+8% p.a. GDP growths) represents a good match. Small countries can represent incubator roles. Having at least one small country in the sample **Albania** (also because of the regional coverage) as well as **Jamaica** are preferable compared to huge countries such as China and India. Finally, reform partner countries (incl. **Colombia**) of the German Development Cooperation and BMZ2030 represents a useful knowledge assimilation/acquisition for future synergies.

Notably, each country has unique specifics and focus areas when it comes to CE activities. The quantitative comparison, however, has considerable weakness points, but represented a consistent approach for the country selection. Finally, the suggested short-listed countries cover 1 African countries, 1 Asian countries, 1 Country from Latin America and 1 from the Caribbeans, and 1 European country, representing a solid balance of various sectors, various levels of enabled environments and various stages of development.

Table 1: Results quantitative country performance, and final country selection

Country	Ranking* (Quant.)	Adjustments	Country
	<i>First step (Line of sight)</i>	<i>Second step (Typology)</i>	
Rwanda	1	->	Rwanda
Ghana	2		
Ethiopia	3		
Colombia	4	->	Colombia
Vietnam	5	->	Vietnam
Kenya	6		
Peru	7		
India	8	->	(India)
Jamaica / Dominican Rep.	9	->	Dominican Republic
Tanzania	10		
China	11		
Zambia	12		
Albania	13	->	Albania
Indonesia	14		
Bosnia-Herz.	15		
Mexico	16		

Note: *Results based on ranking as indicated in **Fehler! Verweisquelle konnte nicht gefunden werden.**: Quantitative Indicators for country selections and Frankfurt School Recommendation.

The detailed list and description of the quantitative indicators are listed in the II Annex: Country selection

0.2 Circular Economy Country Briefs

Country brief Colombia

Based on political and economic priorities of Colombia as well as relevance for circular economy, the following two areas of interest are addressed in this country brief:

- Production and consumption
- Construction and demolition waste

1. Production and consumption

Major challenges for circular economy: Innovative circular thinking has not yet taken root among industrial manufacturers and hence, “take-make-dispose”-models prevail in the production and consumption sectors. On the decision-maker level, a lack of knowledge about environmental management, e.g., to identify challenges and potential CE business models, exists. The application of the globally established ISO 14001 standard for the management of environmental responsibilities is broadly perceived as costly, complex, and difficult to implement. In addition, a considerable share of business informality – up to 2/3 in some sectors – hinders the application of existing programmes and benefits to foster economic development, as they are targeting formal businesses only.

Relevant Strategies and frameworks for circular economy: The **Green Growth Policy** adopted in 2018 represents a key strategy to foster productivity, growth, and economic competitiveness, while ensuring the sustainable use of natural capital and social inclusion in line with climate targets by 2030.⁴ As a way to implement the policy, a **National Strategy on Circular Economy** was released in 2019 by the Ministry of Commerce (MINCIT) and the Ministry of Environment and Sustainable Development (MADS). The strategy serves as a guideline to support the transition towards a circular economy in **prioritized material and resource flows** such as packaging, building, industrial materials, mass consumption products, as well as natural resources, by increasing durability, reusability, reparability, and recyclability. The implementation of this strategy requires a series of **enabling conditions** to which international resources, finance, and knowledge, can significantly contribute. There is a need to formalize businesses via **technical assistance and financial support**. Moreover, the uptake of certification schemes for sustainable practices (e.g., eco-labels to foster competition and sustainability) also needs support. In addition, 22 national commercial and development banks have voluntarily signed a **Green Protocol** together with the National Planning Department (DNP) and the MADS. **The objectives** are to move towards sustainable and low-carbon growth, protect and ensure the sustainable use of natural capital and improve environmental quality and

⁴ National Planning Department (DNP), Documento CONPES 3934 Política de Crecimiento Verde.

⁵ CDKN, 2017 Bonos verdes para el financiamiento climático en Colombia.

governance, as well as to achieve resilient growth and to reduce vulnerability by providing **lending for green projects** and **improving environmental screenings and performance**. While some banks have already issued green bonds,⁵ the country seeks to **mainstream sustainable finance** in all financial operations via standardisation and improved reporting directives. To this end, a **green finance taxonomy** is under development to provide technical screening criteria that allow classifying activities as sustainable, while developing green capital markets and contributing to effective mobilization and tracking of private and public resources. With the EU Sustainable Finance Taxonomy as main reference, the focus areas of the Colombia taxonomy are: 1. climate change mitigation; 2. adaptation to climate change; 3. ecosystems and biodiversity; 4. water management; 5. soil management; **6. circular economy (CE)**; 7. pollution prevention and control.

Table C1: Production and Consumption in Colombia - Entry points for circular economy on the value hill (excerpt)

Up-hill	Top-hill	Down-hill
Promote eco-design and manufacturing of sustainable packaging for consumer goods .	Formalize business and introduce certification schemes for sustainable practices .	EPR should be broadened and optimized.

Promising interventions for circular economy in Colombia – production and consumption:

1a. Support the establishment of green businesses and improve the environmental performance of SMEs in line with the National Circular Economy Strategy: Generally, **environmental management of businesses** needs to be improved. This is particularly urgent for SMEs. Due to lacking financial capacities they are more price-sensitive to integrating circular concepts into their production processes. The most pressing issues identified by the National Strategy on Circular Economy are material input intensity, resource inefficiency and poor waste management. To achieve the goals of this strategy, Colombia has highlighted the necessity to cooperate with international partners⁶ including on **technical assistance for green business development e.g., capacity building and innovation hubs**. The Colombian Presidential Agency of International Cooperation (APC) and the Ministries will coordinate programs and projects with international cooperation agencies such as IDB, Andean Development Bank (CAF), the Directorate-General for Environment of the European Commission.

1b. Support the development of the Sustainable Finance Taxonomy component 6 on circular economy and co-finance the Latin American and Caribbean CE Coalition: The **Colombian Green Finance Taxonomy** seeks to develop green capital markets and promote the effective mobilization of private and public resources towards investments that allow the fulfilment of the country's commitments towards sustainable development. In the ongoing first phase of developing technical screening criteria,

only components 1 to 5 (see above) are under consideration. Circular economy (component 6) will be regarded in the next phase. Assess the opportunity to support the development of technical screening criteria for the CE-component of the Taxonomy (via **grant funding**). While it is expected that the green taxonomy provides more regulatory clarity and prevents greenwashing, other policies should be aligned e.g., the legislation on EPR should be expanded to additional products and activities and optimized to ensure that environmental damage is properly reflected. Additionally, support the Latin America and the Caribbean Circular Economy Coalition via **technical assistance/grant funding to upscale their** activities on improving access to financing by governments and the private sector for circular activities, to close regulation gaps, and to identify and promote CE-related activities for businesses and financial sector players.

2. Construction and Demolition Waste (CDW)

Major challenges for circular economy: Strong growth and high economic performance have been driven by extensive use of natural resources coupled with low material recycling rates of around 2 per cent in recent decades. The main barrier for CE in CDW in Colombia is the lack of reuse markets and supply chains, which is amplified by a perceived risk of using recycled materials, e.g., in relation to quality standards and sourcing.

Relevant Strategies and frameworks for circular economy: To promote circular approaches for CDW management, the enabling framework needs to be adjusted and access to finance for circular business models improved. Required production and construction components in industrial manufacturing have become more expensive, and disruptions in the supply chains have delayed deliveries due to the COVID-19 pandemic.⁷ In line with the **solid governmental commitment to circular economy**, the **post-pandemic economic build-back measures** offer a window of opportunity for establishing more circular practices. The **Integrated Management of Construction and Demolition Waste Plan** established in 2021 builds on the National Circular Economy Strategy and obliges major construction and demolition waste generators to set up industrial symbiosis with other companies to exchange material flows.

Table C2: Construction and demolition waste in Colombia - Entry points for circular economy on the value hill (excerpt)

Up-hill	Down-hill
Reduce virgin material use by using CDW as raw material and mineral filler (e.g., converted into mineral aggregates for concrete and asphalt).	Target setting for processing of CDW and deconstruction. Establish demolition audits.

Promising interventions for circular economy in Colombia – construction and demolition waste:

⁷ Camacol, April 2021. Informe económico 110.

⁸ Colombia Productiva, Centro Nacional de Producción más Limpia, 2020. Guía Empresarial Economía Circular.

2a. Support the enforcement of CE-related regulations in the construction sector by improving data collection and capacity building on full-cycle costing and natural capital accounting: Circular actions in the construction sector have the potential to drive significant change as 96 per cent of construction and demolition waste are potentially recyclable.⁸ It is therefore vital to support the introduction of circular economy principles into construction such as the reuse of CDW in construction processes. The lack of knowledge and data hinders the enforcement of regulations. Therefore, support by development cooperation (via **grant funding**) could be valuable to improve data collection, availability, and transparency, to establish indicators and accounts on resource efficiency and waste, e.g., based on material flow accounts, and to improve knowledge on environmental impacts and costs of material resource use. Concretely, offer trainings to public and private stakeholders on **full-cycle costing and natural capital accounting** (e.g., see World Bank WAVES programs) and improve awareness on true cost accounting in the construction sector.

2b. Support research and development on recycling of construction waste and circular construction: Explore supporting R&D activities (via **grant funding**) to develop innovative recycling methods for construction waste and promote circular approaches in the construction sector. For instance, it could be considered to channel support through TESTEO⁹, the “living laboratory for sustainable construction” in Colombia. TESTEO was designed and built by the Santander Construction Cluster with support of the Swiss Embassy in Colombia - Economic Cooperation and Development (SECO), taking the NeighborHub, a Smart Living Lab project in Switzerland, as a role model. The lab promotes research activities, innovation, and technological development in the construction sector in co-operation with public and private sector actors. Finance corporates carry out financial evaluations for TESTEO to identify opportunities for saving material savings and increasing profitability, thus, de-risking investment decisions through transparency, awareness building, and a strong network. Additionally, the lab provides a suitable environment to develop capacity and technical trainings on circular construction.

Key stakeholders for circular economy in Colombia

- Since March 2020, the Ministry of Environment and Sustainable Development (MADS), the Ministry of Finance and Public Credit (Minhacienda), the National Statistics Department (DANE), the DNP, and the Superintendence of Finance, together with representatives from the financial sector are developing the **green finance taxonomy**.
- The Asociación Nacional de Empresarios de Colombia (**ANDI**) is a non-profit entity with objective of disseminating and promoting economic, environmental, and social policies in the industrial sector. It develops capacity building activities, pilot projects and

⁹ <https://www.swisscontact.org/en/news/Colombia-launched-first-living-laboratory-for-sustainable-construction>

cooperation initiatives with private sector actors and international organisations.

- Colombia is a member of the **Platform for Green Industry** and seeks to increase efficiency in the use of resources, improve waste management, better utilize renewable energy, and support research and innovation for green industry.
- The global Resource Efficient and Cleaner Production Network (RECPnet) promotes eco-innovations, supporting especially manufacturing SMEs. In Colombia, the **Centro Nacional de Producción más limpia y tecnologías ambientales Colombia (CNPMLTA)** is a partner of the network.

Country brief Dominican Republic

Based on political and economic priorities of the Dominican Republic as well as relevance for circular economy, the following two areas of interest are addressed in this country brief:

- Tourism
- Waste management

1. Tourism

Major challenges for circular economy: The “sand, sea, sun” model is the dominating and persisting tourism model in the Dominican Republic and beyond. This tourism model puts increasing pressure on available resources, especially in sensitive ecosystems. Companies in the tourism sector, particularly (M)SMEs tend to invest on a short-term horizon given the high degree of uncertainty of touristic inflows and generally lack ecological/sustainable certification or accreditation. The large dependency on external factors hinders alternative (long-lasting) investments such as in circular tourism models. The additional waste generated by the tourism sector increases pressure on the island’s waste management system.

Relevant Strategies and frameworks for circular economy: The Government of the Dominican Republic recognizes the long-term need for adapting the “sand, sea, sun” model within the framework of sustainable development. In the 20-year National Development Strategy to 2030, a further diversification of the tourism sector by developing more sustainable alternatives such as eco-tourism is envisaged. Moreover, with the endorsed Roadmap for Low Carbon and Resource Efficient Accommodation the government commits to reducing food waste by 50 per cent until 2030. Finally, in its updated Nationally Determined Contribution (NDCs) from December 2021, the Government reiterated its plans to implement concrete circular economy processes in relation to i.e., accommodations, single-use products, sustainability certificates and procurement practices.

Table D1: Tourism in the Dominican Republic - Entry points for circular economy on the value hill (excerpt)

Up-hill	Top-hill	Down-hill
Integrating explicitly circular concepts for lowering environmental impact of current hotel tourism model.	Forming local alliances with sharing platforms (to stimulate local economic supply and demand).	Foster CCDP and consider options to improve waste management (IWM through sustainable / green infrastructure).

Promising interventions for circular economy in the Dominican Republic – Tourism:

1a. Promote more circular procurement practices in the tourism sector and financially support (M)SMEs in developing circular business models including quality certification systems: A supportive entry point for impactful development assistance is the promotion of sustainable procurement practices by private and public actors (e.g., commodities, infrastructure, hotel resorts). The need for offering high-level **trainings** have been identified in due diligence guidance for responsible business models, and

application of ecological standards in the up-hill phase for new accommodations and retrofitting of existing ones (e.g., integrating re-use and high-value recycling of components and materials concepts). In addition, offering **financial assistance** to support the plans to establish a sustainability certification that simplifies procurement standards (e.g., for new accommodations). Such a certification could be approved by the Global Sustainable Tourism Council (GSTC), but it might be necessary to rather develop a stand-alone circular certification scheme (e.g., reflecting circular principles such as prevent, reuse, and recycle instead of adapting established certificates, that only partly recognize circular practices.

1b. Capitalize the Central American Mezzanine Infrastructure Fund (CAMIF II) investing in circular infrastructure for tourism activities in the region: Validate opportunities to provide finance (e.g. **first loss equity via existing funding vehicles**) to the Central American Mezzanine Infrastructure Fund II (CAMIF II, USD 250 million, Assets under Management), which could potentially be pegged to existing circular related indicators (e.g. mutualisation of resources, materials and idle assets for tourism activities such as asset re-circulation, eco-tourism, sharing platforms), but also facilitate investment opportunities via capacity building (e.g. for implementing planned Environmental Management Systems to monitor energy consumption, resource use, emissions, food waste and associated operational cost savings opportunities, as outlined in the NDC).

2. Waste management

Major challenges for circular economy: Produced and exported goods shifted in the recent decades from labour-intensive manufacturing (garment industry) to primary commodities (e.g., cash crops). Large, administrative costs of the bureaucracy, low electricity stability, and weak contract enforcement puts pressure on more long-term investment with public good character, especially for (M)SMEs. In addition, access to credit and fiscal space is still very limited and expensive, despite the strong uptake of digital financial activities. Regarding waste management mechanisms, the legal framework is put in place, but leveraging the private sector remains challenging. Currently, there are only limited private waste business models, most of them collect garbage/solid waste from hotels with trucks; sort waste in rudimentary facilities; or sell sorted/separated waste to export markets or waste to energy facilities.

Relevant Strategies and frameworks for circular economy: In the Dominican Republic various sustainable and green finance market initiatives have been successfully launched: i.e., the endorsement of national green bond guidelines by Securities Market of the Dominican Republic (SIMV) has paved the way for issuing green bonds at the stock exchange. Regarding waste management, the endorsed “Integral Management and Co-processing of Solid Waste Law” constitutes the legal framework to promote reduction, reuse, recycling, and recovery of waste. It allows for waste taxes and establishment of extended

producer responsibility (EPR) schemes for specific products such as batteries, heavy capital equipment, electronics, packing, tires, and oils.¹⁰

Table D2: Waste Management in the Dominican Republic - Entry points for circular economy on the value hill (excerpt)

Up-hill	Top-hill	Down-hill
Train financial sector actors (e.g., local banks) on CE and optimize tax base for waste management? via fiscal policy trainings.	Support reverse supply chain management principles (e.g., re-use) to reduce waste generation.	Support integrated waste management systems to prevent waste leaking into the environment.

Promising interventions for circular economy in the Dominican Republic – Waste management:

2a. Consider funding opportunities to Circulate Capital (Circulate Capital Ocean Fund): IDB committed a USD 4 million **equity injection** to Circulate Capital focusing on capacity development programmes for regional innovative ecosystem actors to improve e.g., circular recycling systems. The Circulate Capital Ocean Fund (USD 106 million Assets under Management) is the flagship model in successfully leveraging private sector capital for circular activities (e.g., Mondelez, Coca Cola). The Fund is backed by international support such as the United States Agency for International Development (USAID) and the European Investment Bank (EIB), which offers low-cost capital (e.g. **quasi) equity and concessional loans**) channelled to early-stage start-ups and SMEs with investment sizes of around USD 2 million. The investment experience with EIB could be validated and further funding before next(third) financial close considered.

2b. Offer fiscal policy capacity building for waste tax development and capitalize the Public-Private Trust for Comprehensive Waste Management: The legal framework for solid waste management allows to tax every legal person, entity, and public institution for certain types of waste. These waste taxes capitalize the existing “Public-Private Trust Fund for Comprehensive Waste Management” that is charged to mitigate the negative effects of the current waste disposal. The trust fund is **open for capitalization by international donors**. Development cooperation could provide **trainings** to tax designers (focus on progressive tax structure to ensure that this tax is income-elastic and no additional burden to the bottom of the pyramid) and **capitalize** the “Public-Private Trust Fund for Comprehensive Waste Management”.

Key stakeholders for circular economy in the Dominican Republic

- The **Ministry of Environment and Natural Resources**¹¹ is responsible for circular economy activities (by public and private actors). It is guiding the work of the National System for Comprehensive Waste Management and stipulates a mandatory waste tax. Its **Directorate of Sustainable Consumption and Production** coordinates with other ministries, such as the Ministry of Industry and Commerce,

the Ministry of Agriculture, and the Ministry of Tourism.

- The **General Directorate of Public Procurement** (DGCP) is the main body with competence for setting government procurement policy and enforcing compliance. It also oversees public bidding processes.

¹⁰ Economía circular en América Latina y el Caribe: Oportunidad para una recuperación transformadora (2021).

¹¹ <https://ambiente.gob.do/>

Country brief Vietnam

Based on political and economic priorities of Vietnam as well as relevance for circular economy, the following two areas of interest are addressed in this country brief:

- Production and consumption (including eco-industrial parks)
- Textiles and garments

1. Production and consumption incl. eco-industrial parks

Major challenges for circular economy: Due to the low level of financial inclusion organisations - especially SMEs – face hurdles to access dedicated finance with explicit criteria, thereby impeding investments for green/circular production. This is accompanied by a lack of awareness for opportunities and benefits provided by circular economy on the supply (e.g., manufacturer) and demand (e.g., client or consumers) side. Despite the progress on institutional, policy and regulatory level in CE-related areas (see entry points below), fragmentation and insufficient coherence within policy planning remains high. The private and public sector investment environment is not fully ready to promote responsible investments on the needed long-term basis.

Relevant Strategies and frameworks for circular economy: The Government of Vietnam aims to promote circular economy via various initiatives to prolong material lifespans, reduce waste and emissions, and restore the ecological system.¹² Concretely, the **National Action Plan on Sustainable Production and Consumption (2021-2030)** emphasizes the commitment to a circular economy by setting specific targets for reducing the use of certain materials and resources and aiming at eco-friendly products and packaging, e.g. by 2030, seven to ten per cent decrease in resources and materials used by major production sectors such as textile, steel, plastic, chemical, cement, alcohol and beer, beverage, paper, seafood processing and some other production sectors.

Different endorsed national legal frameworks such as Decree 82/2018/ND-CP on the Management of Industrial Parks and Economic Zones, Decree 54/2015/ND-CP on regulating privileges for water saving and efficient practices and Decree 38/2015/ND-CP on Management of waste and discarded materials aim at more sustainable production. Currently, the Ministry of Natural Resources and Environment (MONRE) and the Ministry of Finance (MOF) together with the State Bank of Vietnam (SBV) develop a **taxonomy for sustainable finance**, which is expected to be aligned with the EU Taxonomy. This comes in line with a continuously rising investors' interest in sustainable investment products in recent years

A key entry point represents the **Eco-Industrial Park Initiative** that addresses a range of activities partly reflecting circular concepts. While only a small number of industrial zones is targeted, this offers potential investment opportunities by integrating ecological considerations in other

industrial zones. Finally, critical drivers for more sustainability are the participation in **Free Trade Agreements (FTAs)** including their favoured conditions like tax reliefs for certified sustainable production.

Table V1: Production and Consumption in Vietnam - Entry points for circular economy on the value hill (excerpt)

Up-hill	Top-hill
Introduce the CE concept along the value chain of (eco-) industrial parks	Support the transition of industrial zones into eco-industrial parks addressing sustainable infrastructure (incl. recycling, biogas plants, wastewater treatment).

Promising interventions for circular economy in Vietnam – Production and consumption:

1a. Facilitate the integration of circular concepts in Vietnam's industrial zones and build on good practice of the Eco-Industrial Park Initiative: Assess (via **technical assistance/grant funding**) investment needs for upgrading industrial zones to eco-industrial parks and integrating the CE concept and compare it with available funding that does not explicitly address circular economy, but encompasses circular-relevant investments (e.g. IFC for cleaner production, AFD and World Bank for energy efficiency, and the Vietnam Environment Protection Fund (VEPF) for environmental protection at industrial zones, the Green Credit Trust Fund, the Vietnam Development Bank (VDB) and the National Technology Innovation Fund, etc.). Tailored **loan and equity finance** through a sustainable green/circular credit line could be provided to corporates in industrial zones to implement circular measures. Such a credit line needs to be endowed with explicit investment criteria and indicators that encourage green production and the integration of circular concepts including circular product design and shared services.

1b. Assess opportunities to leverage alternative finance sources for CE such as pension funds as long-term saving vehicles: Consider supporting leveraging alternative re-finance sources, such as pension funds (e.g., in cooperation with the MOF and SBV). Private pension funds could be considered as one form of long-term saving vehicles and funding mobilization via the capital market (taking ESG risks and opportunities into account). A deep-dive analysis would be needed to assess opportunities and incentives.

2. Textile and garment sector

Major challenges for circular economy: Strong economic growth has been accompanied by extensive natural resource exploitation in the recent decades. The current textile production facilities are very energy-, resource-, and pollution-intensive. International export competition preserves the business-as-usual linear mode as a predominant business model, especially among SMEs. Insufficient financial, technological, and human resources besides clients' and customers' preference for "fast" fashion

¹² UNDP, 2021, Consultation on CE Policies and Vietnam CE Hub – ways towards a low carbon and circular Vietnam.

cycles and more sales rather than high quality and durable products are also barriers for circular approaches in the textile sector.¹³

Relevant Strategies and frameworks for circular economy: To spur circular opportunities in the textile sector, the **enabling framework and access to finance** must be improved. While the international export market sets prices that are not reflecting true social and environmental costs, there are emerging global driving forces for integrating circular concepts due to **increasing consumer awareness** and buyer requirements. Some global players with high production standards (GAP, H&M, or Levi Strauss & Co) have started to reflect sustainability targets in their strategies and supply chains, including recycled materials, sourcing organic or sustainable raw materials, reducing energy consumption, and conservation of non-renewable resources. Such initiatives are also promoted by the introduction of **environmental certifications** and eco-labels such as the Global Recycled Standard, Better Cotton Initiatives, Cradle-to-Cradle, Global Organic Textile Standard, ISO 14001, bluesign PRODUCTS, and EU Ecolabel. With support of the **Vietnam Textile and Apparel Association (VITAS)**, the textile and garment industry is gradually recognising the need to apply circular activities, emphasizing sustainable production, clean water management and reducing GHG emissions to be in line with national priorities as the **National Strategy on Environment Protection** and global commitments, particularly the **Paris Agreement**, and Kigali Amendment. Finally, the endorsed national legal framework also requires a more sustainable garment production (e.g., Law, 55/2014/QH13, Environmental Protection). To green the textile sector through resource efficiency, decreasing waste release, stopping microfiber discharge, and addressing the ‘throw away culture’, **capacity building** is needed.

Table V2: Textiles and garments in Vietnam - Entry points for circular economy on the value hill (excerpt)

Up-hill	Top-hill	Down-hill
Design and planning of garment production without harmful residuals and less virgin materials	Facilitate coordinating vehicles to drive circular ambitions / standards	Improve chemical end-of-use processing (in combination with chemical leasing)

Promising interventions for circular economy in Vietnam – Textiles and garments:

2a. Assess circular concepts and business models in the textile sector including chemical leasing in cooperation with the Vietnam Cleaner Production Centre (VNCPC): Support a sector assessment (via **grant funding**) in collaboration with VNCPC and VITAS to identify relevant circular interventions and business models for the textile sector in Vietnam. This could be done via a detailed environmental impact assessment as well as reviewing and comparing good practices in Vietnam and in neighbour countries such as the international operating company PTT Global Chemical PCL from Thailand which ranks best in an Asian

chemical company sector rating by RobecoSAM that covers also sustainability aspects.

Moreover, **bankable circular business models in the textile sector** need to be identified and/or developed. For instance, the economic viability of chemical leasing, a performance-based business model, that supplies chemicals to customers rather by selling-a-service than selling-a-product, could be assessed for Vietnam’s textile sector. It allows for more efficient use of chemicals (see Figure V1) and shifts responsibility for disposal up the value hill to the producers. A pathway to enable chemical leasing could be via extended producer responsibilities (EPR) and introduction of tight restrictions on disposal “outputs”, thereby catalysing innovations in the production process. Interventions could build on experiences in India where GIZ supports the development of a national framework for treated wastewater, and the Nation Mission of Clean Ganga (NMCG) develops policies including zero-liquid discharges (ZLD) and provides trainings. Moreover, South-South knowledge transfer of best practice examples with other countries experienced in textile production should be considered.

2b. Capitalize the National Technology Innovation Fund (NATIF) to support circular innovation in the garment sector:

Facilitate access to finance (via e.g., **concessional loan finance**) for circular concepts, such as urgently needed textile recycling activities. This could be in cooperation with VNCPC and the World Bank thereby building on results of a recent “textiles sector assessment and feasibility study to implement wastewater reuse in industrial parks”. In addition, consider additional capitalization (via e.g., **equity injection**) of the National Technology Innovation Fund (NATIF) as key national finance vehicle, which already provides soft loans, guarantees or financial aid for organisations **to research, apply, transfer, innovate, and complete innovative technology**.

Key stakeholders for circular economy in Vietnam

- The **Vietnam Cleaner Production Centre (VNCPC)** has the objective to disseminate the cleaner production concept and is gradually integrating circular concepts in Vietnam’s industry.
- The **Vietnam Circular Economy Network / Hub**¹⁴ has been introduced in October 2021 with support from the Norwegian Embassy and technical support from the Dutch Embassy. It has the objective to raise awareness and build capacities in adopting CE principles.
- The **Institute for Circular Economy Development (ICED)** established in July 2020 – a private/government/university collaboration – has the objective to propose policies in application and development of circular economy models for related agencies.

¹³ WWF (2020): Guidelines for Greening the Textile Sector in Vietnam.

¹⁴ www.vietnamcirculareconomy.vn (Assessed online February 2022)

Country brief Albania

Based on political and economic priorities of Albania as well as relevance for circular economy, the following two areas of interest are addressed in this country brief:

- Waste management
- Construction

1. Waste management

Major challenges for circular economy: The Albanian government shows ambitions to implement circularity in the waste sector. The respective political framework, however, still needs to be developed further. Currently, 4/5 of the waste ends up on landfills. All sectors (consumer goods, capital infrastructure) are open to foreign investors as there are no legal barriers to market entry. Thus, foreign investment and imports of consumer goods and infrastructure add to waste generation in Albania.

Relevant Strategies and frameworks for circular economy: The revised **Integrated Waste Management Strategy (IWMS)** - referencing EU targets and directives - is developed around the concept of "zero waste". It aims at waste being collected and treated as raw materials. Waste is to be managed in accordance with the concept of circular systems, serving the criterion of use and preservation of raw material resources. Beyond the IWMS, the current legal framework, does not provide a sufficient basis for implementing a circular concept. Hence, there - is an urgent need for improvements in the current legal framework that will increase the country's ability to better utilize its resources and prolong the lifecycle of materials, products, and services. Waste management infrastructure requires modernisation, starting with the closing or making use of (illegal) landfills and implementing sound waste collection, sorting and treatment systems. However, this leaves opportunities to leap-frog and tap into underestimated circular opportunities.

Table A1: Waste management in Albania - Entry points for circular economy on the value hill (excerpt)

Up-hill	Cross-hill
Regulate or ban the import of non-CE conform products; Phase out landfills and illegal dumping.	Support and finance businesses and innovations that collect organic household waste.

Promising interventions for circular economy in Albania – Waste management:

1a. Support the establishment and cost-coverage of more efficient waste collection and treatment schemes: Support **local entrepreneurship** by building capacity (via **technical assistance/grant funding**) of value chain stake-

holders, including banks (increase knowledge about bankable waste collection and treatment concepts), and supporting public authorities, financing of start-ups, setting up networks, creating innovation hubs, financing and supporting experimentation pockets, and spreading the insights, etc.. Support municipalities/ local authorities (via **technical assistance/grant funding**) to cover the full costs for waste collection and treatment by increasing the fee collection rate and fiscal transfers from central governments, but also to introduce adequate fiscal policy measures covering direct product tax reduction on circular products and / or suspension of income tax for waste management firms.

1b. Support economic exploitation of the high-value organic waste streams by local entrepreneurs: urban waste consists of 60 per cent of high-valuable organic waste. and can be transformed into carbon-rich and nitrogen-rich compost - closing the nutrition gap that results from intensive agriculture – or into biogas Support economic exploitation of the high-value organic waste stream by local entrepreneurs (in line with recommendation 1a.). This could be done by providing access to finance (e.g., via **equity injections or low-cost debt, KPI-linked loans** to local corporates to set up technology, such as high-level composting plants and other infrastructure to treat organic waste), but also capacity building (e.g., via information, education, and consultation of potential stakeholders), as well as financial and organizational support to develop early-stage firms and leverage established actors. **Seed grants** could finance the identification and mapping of food losses, agricultural waste, and by-product streams along the harvest and post-harvest infrastructure.

Inspirational best practices

The city of **Milan (Italy)** collects food waste directly from commercial sources like restaurants. Considering the level of organic waste collection unsatisfactory, the government started a programme to produce compost and biogas from residential waste separated at source and sent to an anaerobic digestion and composting facility.¹⁵ As part of an effort to improve waste management in **Riga (Latvia)**, the landfill was upgraded to capture landfill gas, and to produce electricity and heat. Revenues are generated through a combination of electricity sales, and heat used in local greenhouses to produce tomatoes, which are sold at the local market.¹⁶

¹⁵ Ellen MacArthur Foundation, 2017, Urban Biocycles, (<https://emf.thirdlight.com/link/pteijhurhai5-iigai0/@/pre-view/1?o>).

¹⁶ Financing Landfill Gas Projects in Developing Countries, Urban development Series, Knowledge Papers, World Bank Group, 2016.

2. Construction

Major challenges for circular economy: Due to the “slow-flowing” product character of buildings, infrastructure, and capital equipment, decisions taken in the construction sector impact the economy and the environment for a long time. Insufficient integration of circular economy principles in procurement regulations, particularly when it comes to large investment projects, leads to the risk of critical linear lock-in effects.

Relevant Strategies and frameworks for circular economy: The **National Strategy for Development and Integration 2015-2020 (NSDI-II)** is the key national planning document currently in place (adopted by the Government of Albania in May 2016). This strategic document reflects the vision, priorities, objectives and means for social and economic development of the country up to 2020. The overarching goal of NSDI-II was the accession to the European Union (EU).

Due to the aftermath of the COVID-19 crisis, a strong consumer confidence and external demand, as well as a policy stimulus support a strong economic recovery. Sector-wise, those initiatives are majorly driven by activities in the construction sector. The current dynamics can be beneficial to implement circular strategies into infrastructure solutions like building and construction as well as connected public services (e.g., healthcare facilities). There is the risk, if momentum is not used in large investment projects, linear business as usual solutions can be locked-in for a long time.

Table A2: Construction in Albania - Entry points for circular economy on the value hill (excerpt)

Up-hill	Top-hill
Identify and support use of sustainable input materials (e.g., open-loop re-use or recycling materials like recycled concrete or used window frames, alternative materials like natural insulation or clay plaster, closed-loop recyclable materials) and integrate respective regulations into procurement policies .	Intensify use of existing infrastructure (e.g., re-assignment of use); Develop building-as-a-service models (like e.g., public hospitals).

Promising interventions for circular economy in Albania – Construction:

2a. Support the integration of circular aspects into procurement regulations in the construction sector: Infrastructure projects, such as the proposed Tirana-Durrës-Rinas railway and prospects for a new international airport and new docks have garnered attention from domestic and foreign investors. Government-financed infrastructure projects focus mainly on roads, water supply, and sewerage. Given this investment pipeline, the demand for heavy machinery, equipment, and services is expected to increase.¹⁷ Regarding the **investments in infrastructure**, circular strategy opportunities exist for the use of heavy construction machinery, as well as for buildings and constructions like roads, railway, airports, tunnels, and ports. In addition, ongoing and future investments in

construction-waste treatment and processing offer potential for closing resource loops in the building and construction sector. To avoid critical linear lock-in effects in the long term, the integration of **circularity aspects into public procurement procedures** is crucial. Industry standards and building codes that align with EU standards are well suited to address the mentioned risks. The feasibility of including **product service models** as part of public procurements could be assessed. Therefore, to address a system change, governmental participation and risk-sharing will be necessary, as well as the identification of project and experimentation pockets that allow for trusting and narrow stakeholder collaborations.

2b. Assess the opportunity to establish an innovation hub for circular construction in Tirana: e.g., through a digital platform for construction sector activities. Such a (virtual) platform (upfront investments for the capital expenditures via primarily **grant funding** and operated via **pay-for-performance fees** for the benefitting service suppliers). The platform could be aligned with the existing Circular Economy Club Tirana, and could bring together various actors, such as commissioning parties (e.g., municipalities, public authorities); supply side actors (e.g., manufactures, construction materials suppliers, architects/engineers, demolition firms), and customers (e.g., chamber of commerce, governmental actors) by fostering demand-driven innovation and leveraging private sector engagement.

Key stakeholders for circular economy in Albania:

- The responsibilities of the **National Environmental Agency** include permitting, environmental impact assessment, and public information as well as supporting the retrofitting and expansion of the country’s existing observational network of weather and hydro-met stations.
- The **Ministry of Tourism and Environment** is responsible for Albania’s climate change related activities and scientific evaluations.
- Environmental Center for Development Education and Networking (EDEN)
- Environmental & Territorial Management Institute (ETMI-AI)
- Youth and Environment Europe - Albania
- **Circular Economy Club – Tirana**
- **GO2 Albania – Sustainable Urban Planning Organization**

¹⁷ <https://www.trade.gov/country-commercial-guides/albania-market-opportunities>

Country brief Rwanda

Based on political and economic priorities of Rwanda as well as relevance for circular economy, the following two areas of interest are addressed in this country brief:

- Construction including Urbanization
- Production including Procurement Policies

1. Construction incl. Urbanization

Major challenges for circular economy: Fast population growth (17 per cent between 2014-19 to 11 million inhabitants), strong economic momentum (six per cent growth per year in the last decade to USD 820 per capita in 2019), and ongoing urbanization (forecasted urban share to be doubled between 2020 and 2024 to 35 per cent) put enormous pressure on available urban eco-systems in Kigali and the six secondary city districts. In the City of Kigali alone (0.8 million) more than 0.3 million additional houses need to be constructed/retrofitted until 2032 in order to address governmental plans. While the green building agenda for the Green City Kigali Project (1 per cent area of City of Kigali) already integrates energy efficiency, sustainable waste management, and urban forests, there is a lack of capacities for sustainable building and construction needs (especially in the residential development) in other parts of the country (e.g., secondary cities). Overall, there is a low level of resource and energy efficiency standards in construction of domestic and commercial buildings.

Relevant Strategies and frameworks for circular economy: Various legal documents (e.g., National Strategy for Transformation, National Roadmap for Green Secondary City Development, Green Growth and Climate Resilience Strategy) are promoting a sustainable agenda in the next decades and highlight circular activities. In addition, there is an increased interest by various private and public stakeholders in circular built environment initiatives. Thus, from a legal and institutional perspective, there is strong willingness to foster a green transformation and be recognized in the global community as a role model in (East) Africa. On the circular economy value hill (Table R1), key levers are synthesized based on the national priorities and planned outcomes.

Table R1: Construction incl. Urbanization in Rwanda - Entry points for circular economy on the value hill (excerpt)

Up-hill	Top-hill	Down-hill
Establishment of functioning markets for non-virgin/eco-friendly material, e.g., via green public procurement (and stricter construction regulation).	Capitalize the Green Investment Facility (FONERWA) through one of its four investment windows/support private and public stakeholders.	Address huge import-export deficit for construction material by enabling circular concepts/build on "Made in Rwanda" initiative promoting use of local construction materials .

Promising interventions for circular economy in Rwanda – Construction including Urbanization:

1a. Support the Rwanda Environment Management Authority (REMA) to implement the adopted Green Building Minimum Compliance System (GBMC), particularly

its circular-aligned sustainability standards - through ongoing awareness programmes, outreach, and capacity building: The Rwanda Green Building Minimum Compliance System (GBMC) established in 2019 represents the first mandatory Green Building Code in an African country, that supports the development of partly circular-aligned sustainability standards for commercial and public buildings. While it is not mandatory for residential developments, real estate developers are encouraged to adopt the system on a voluntary basis. In the light of the enormous housing demand, the updated Nationally Determined Contributions (NDC) indicate that under the Business-as-Usual scenario, emissions from the building sector increase six-folded, but could be reduced by 50 per cent when applying consistent building standards until 2030. Thus, a major lever has been identified in co-supporting (via **technical assistance; grant funding**) the Rwanda Environment Management Authority (REMA), and the Rwanda Housing Authority (RHA) in implementing the GBMC through ongoing awareness programs, outreach, and capacity building. This helps to ensure that environmental, economic, and social benefits of green buildings tickle down the construction value-chain.

1b. Provide external funding to the national basket fund (FONERWA) to support the use of more regenerative including non-virgin materials in the construction sector: In the light of the large amount of planned infrastructure projects, substituting cement and steel with more regenerative, incl. non-virgin materials (i.e., construction and demolition waste), is essential, but requires additional funding from international partners. The publicly closed-meshed green fund mobilizes international aid and private funding injections to local corporates/SMEs with lines of credit (well below market rate of ten per cent per year), loan guarantees, and public equity capital. For circular activities, the "innovative grant mechanism" and the "green incubator program" aim to leverage sustainable and innovative business opportunities. The green investment facility is permanently looking for further capitalization (already funded by UNEP, GCF, NDF, AfDB, KfW, and other ODA donors) through **grant funding and low-cost loans (high concessionality)**.

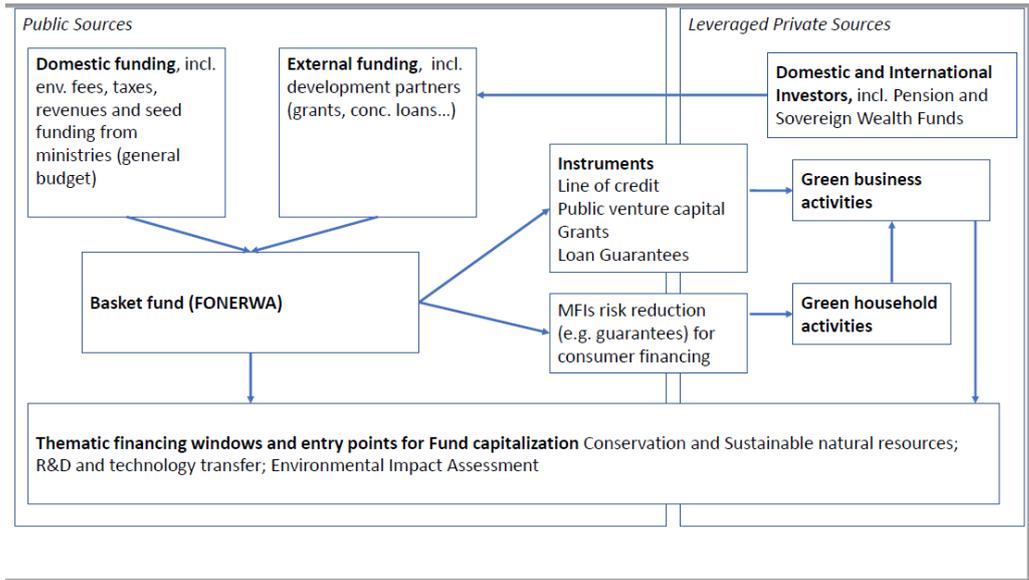


Figure R1: Proposed capitalization of FONERWA (own figure, non-exhaustive, only-illustrative)

Figure R1 describes potential funding mechanisms, entry points, and thematic funding windows for the capitalization of FONERWA. The capitalization of FONERWA represents a prime funding opportunity in the African country context as the fund is well established and internationally recognized (e.g., FONERWA won the UN Momentum for Change Award in 2018).

2. Production, incl. Procurement Policies

Major challenges for circular economy: Against the background of high population and economic growth, the prevalent “take, make, dispose” business models in Rwanda add to the degradation of natural ecosystems. Main drivers are survival concerns by (M)SMEs and lack of awareness of circular business opportunities, even in the time of tight regulation such as the single-plastics ban in 2008. While special economic zones (SEZs) provide basic infrastructure for corporates, they often still lack proper waste management, and major challenges regarding environmental degradation are present despite various existing policies. Innovative Business models for e.g., shared equipment (e.g., in SEZs) or more resource efficient practices are still lacking. **Relevant strategies and frameworks for circular economy:** The Government of Rwanda is aware of the range of environmental challenges, e.g., driven by continuous land degradation and fossil fuel dependency as well as lack of material standards and green infrastructure development (see recommendation 1a.).

Table R2: Production including Procurement Policies in Rwanda - Entry points for circular economy on the value hill (excerpt)

Up-hill	Top-hill	Down-hill
Improve legal base of eco-industrial parks/SEZs.	Reshape business models for a more service-based economy to capitalize on longer use.	Develop progressive waste collection schemes to activate the private sector.

Promising interventions for circular economy in Rwanda – Production including Procurement Policies:

2a. Support the development of green/circular procurement practices, particularly in special economic zones (SEZ): Currently, Rwanda envisages the establishment of nine new SEZs. Under the Green Growth and Climate Resilience Strategy (GGCRS), green industry development - including efficient and zero waste technologies, practices, and design in SEZs - is addressing energy and water efficiency, green site preparation, building and design as well as waste treatment options. Against this background, co-supporting (via **technical assistance / grant funding**) the Rwanda Public Procurement Authority (RPPA) in the development of the planned Green Procurement Policy represents an impactful lever to strengthen circular approaches in SEZs. Concretely, the intervention can cover considerations such as general circular practices (e.g., full life-cycle costing), and investments in more circular SEZ-facilities (e.g., applying integrated solutions and holistic approaches such as privileged access to intermediate supply of raw materials from local companies). Activities can build on good practice of REMA’s initiative to develop eco-industrial parks and their cooperation with CPCIC to define a concrete CE-Investment pipeline as well as on Public Procurement Trainings by GGGI.

2b. Financially support the Cleaner Production and Climate Innovation Centre (CPCIC) in strengthening its approach of good circular economy practices: With the “Made in Rwanda” initiative based on the Rwanda Vision 2020, the Government of Rwanda is committed to expand and diversify the economic base to strengthen domestic value creation for export markets. Hence, new and innovative production models are needed and envisaged. In this context, the Cleaner Production and Climate Innovation Centre (CPCIC) - offering technical audits, advisory services, and capacity building including on resource efficiency and circular concepts for companies in e.g. leather production, garments, and textiles. The centre’s momentum might benefit from further financial support to strengthening its circular approaches i.e., in terms of shared capital equipment, product-as-a-service models, and **chemical leasing** services.

Key stakeholders for circular economy in Rwanda

- **Rwanda Environment Management Authority** (REMA) facilitates the implementation of national policies and focuses on sustainable use of natural resources through decentralized structures of governance.
- **Cleaner Production and Climate Innovation Centre** (CPCIC) provides access to green technologies and business services and promotes circular practices, climate resilience, environmental compliance, and sustainable development.
- **Ministry of Infrastructure** (MININFRA) aims to promote and supports policy making for circularity and enable regulatory frameworks.
- For consultations on circular built environment MININFRA, the **Rwanda Housing Authority** (RHA) and the **City of Kigali** (CoK) are relevant public authorities. Relevant private sectors include MASS Design, SKAT Rwanda (Modern Bricks), Earth Enable (affordable, sanitary flooring using circular practices), Seyani Brothers (circular architects/construction), and Landmark Studio (circular architects).
- In addition, the **Green Global Growth Institute** (GGGI) is a very pro-active development partner supporting the Government in developing a circular economy.

1 Introduction – general considerations

In March 2020, the ‘Circular Economy Finance Expert Group’ of the European Commission provided a sector agnostic ‘Categorisation System for the Circular Economy’. The work was performed as part of the **Circular Economy Finance Support Platform** to provide advice and expertise to the EU Commission on how to best promote the generation and financing of Circular Economy projects in EU Member States. As in scientific literature globally there are countless definitions about what Circular Economy is, the work was initiated by first reviewing and comparing existing definitions and classification systems of the Circular Economy used by organisations promoting and financing investments in the Circular Economy.¹⁸ Regardless the geographical scope, the taxonomy presented under the above-mentioned categorisation is a tangible and most recent contribution as to identifying activities that contribute substantially to a circular economy objective. The proposed circular economy categorisation system consists of 14 circular categories organised in four high level category groups or models (see below: Up-hill or Circular Design & Production, Top hill or Circular Use, Down-hill or Circular Value Recovery and Cross hill or Circular Support). These groups align with the Value Hill Business Model Tool developed by Circle Economy.¹⁹ What is common to all 14 circular categories is that they contribute, directly or indirectly, to increasing resource efficiency and decreasing environmental impacts throughout value chains.

1.1 Barriers to a circular economy

Most of the global economy, across sectors, strategies, structures, operations, and supply chains is based on a linear approach. Despite obvious drivers (e.g., consequences of habitat losses, depleted resources) to transition to a circular economy, it needs a systemic approach to change to circular thinking and practice (up-hill). Besides developing new technologies and services, strategies, structures, operations, and supply chains need to be adjusted by organisations to align with circular business models (top-hill). It also needs an enabling environment, e.g., policy makers that put in place suitable regulations and incentives. Comprehensive knowledge about circular economy needs to be divulged. Moreover, the financial sector needs to align financial products to consider circular investment opportunities by adjusting ways of decision making, which is currently dominated by a short-sighted and directly linked cash-flow generating mechanism. Production and consumption sectors (top hill) with high CE potential due to their high use of resources are, e.g., construction and buildings, capital equipment, electronics and ICT, plastics, textiles, packaging as well as food. In all sectors, major developments are essential to avoid undesirable future scenarios, incl. huge losses and damages because of vulnerable eco-systems. Waste management (down-hill) is another area with high CE potential but still impeded by various barriers (e.g., public good character, missing awareness). For one, along the downhill process, the potential of the circular designed products and materials must be captured in this phase and therefore, resource management process must be adapted. And finally, current linear waste management processes need to go together with the design phase at the beginning of the product life-cycle.

Despite the dependencies of the barriers on the sector and the national context, there is a shared similar set of barriers to accelerate circular solutions in general, exemplary presented in Table 2. Notably, the general barriers are presented based on traditional economic theories²⁰, and used for simplification/approximation.

¹⁸ Categorisation System for the Circular Economy. A sector-agnostic approach for activities contributing to the circular economy. European Commission. Brussels. March 2020.

¹⁹ Elisa Achterberg, Jeroen Hinfelaar, Nancy Bocken, “The Value Hill Business Model Tool: identifying gaps and opportunities in a circular network” (2016)

²⁰ E.g., for *Asymmetric Information* see work by George Akerlof, Michael Spence, and Joseph Stiglitz in the 1970s and 1980s. For *Externalities* see work by Ronald Coase in the 1960s. For *Imperfect financial markets* see work by Kenneth Arrow (1950s) and Joseph Stiglitz (1980s)

Table 2: General market imperfection – theoretical assumptions.

Externalities	Imperfect financial markets	Asymmetric information
Very commonly, externalities in the value chain are not accounted for (e.g., greenhouse gas emissions, health hazards, pollution, or biodiversity loss). Circular activities, generally less affected to externalities (less resource depletion) incurring lower costs in doing so, at a competitive disadvantage (unlevel playing field).	Underwriting standards (sign and accept liabilities) favour short-term linear business models which often penalizes circular business models or approaches given their long-term materialization and the missing track record. In addition, fiscal subsidies (e.g., unwillingly, or willingly known) favour conventional linear solutions and lead to long-term lock-in effects (e.g., subsidies installing an overcapacity of waste incineration plants or subsidies lead to harmful agricultural practices).	Regulations, classifications, or standards naturally differ across countries (e.g., regarding substance input or waste treatment regulations). However, such inconsistencies complicate the acceleration of circular solutions. This barrier tends to become harder to overcome the faster-flowing the product and the more complex and globally interlaced the value chain is.

From an investment perspective, the briefly described barriers (e.g., Table 2) come in line with challenging financing conditions, such as:

- Investments requiring **large upfront costs** (especially critically for SMEs, which are more sensitive than large corporates),
- Lack of financial resources, **budget constraints** and access to credit facilities (particularly for MSMEs and municipalities),
- Lack of a mix of financial instruments (e.g., **risk mitigation instruments**),
- Market and political **uncertainty** (e.g., return-based finance requires a degree of certainty that the project/promoter can generate cash flows). Missing credible commitments by public authorities (governments) are posing additional risk on (long-term) investment decisions for private sector actors, and
- **Lack of enabling frameworks** (e.g., policies/regulation and capacities) that help to push investment decision

In the following Table 3, the 14 circular economy categories are summarized, as described in the ‘Categorization System for the Circular Economy’ by the EU, together with some common sector-agnostic barriers.

Table 3: Summary of Circular Economy categories and common barriers

Up-hill (Circular Design & Production)	Top-hill (Circular Use)	Down-hill (Circular Value Recovery)	Cross-hill (Circular Support)
<p>It is often repeated that decisions made during the design phase of a product are responsible for about 80% of the environmental impact. With a proceeding implementation of a circular economy this proportion might shift in the times to come. However, the decisions made about sourcing of the substances and design of a product will keep determining the potential of a product regarding an intensified and extended product and material life cycle.</p>	<p>Keeping products or resources in use for longer (long life loops) or tapping into un- or underused capacity of a product or resource during their life cycle (intensifying loops) are possibilities to extract more resource value from a particular product. Strategies to keep a product performing on consistent or evolving standards or performance are such as maintenance, repair, refurbishment etc. Strategies to intensify a product use or to facilitate its subsequent can be sharing, co-use or cascading.</p>	<p>Next to the prevention of waste in the first place, an important pillar of the Circular Economy is treating ‘waste’ as a valuable resource and handle it accordingly. For that, enabling collection, recycling and reverse logistics systems must be put in place.</p>	<p>Circular support models focus on the support and facilitation of all circular strategies in all lifecycle phases. This entails the management and coordination of circular value networks and resource flows, optimising incentives, and other activities that support the transition to circularity.</p>
CE Categories			
<p>1a: Design and production of products and assets that enable circular economy strategies through e.g. (i) increased resource efficiency, durability, (ii) use of materials that are reusable. 1b: Development and deployment of process technologies that enable circular economy strategies. 1c: Development and sustainable production of new materials (including bio-based materials) that are reusable, recyclable, or compostable. 1d: Substitution or substantial reduction of substances of concern in materials, products, and assets to enable circular economy strategies. 1e: Substitution of virgin materials with secondary raw materials and by-products.</p>	<p>2a: Reuse, repair, refurbishing, repurposing, and remanufacturing of end-of-life or redundant products, movable assets and their components that would otherwise be discarded. 2b: Refurbishment and repurposing of end-of life or redundant immovable assets (buildings/infrastructure/facilities). 2c: Product-as-a-service, reuse and sharing models based on, inter alia, leasing, pay-per-use, subscription, or deposit return schemes, that enable circular economy strategies. 2d: Rehabilitation of degraded land to return to useful state and remediation of abandoned or underutilised brownfield sites in preparation for redevelopment.</p>	<p>3a: Separate collection and reverse logistics of wastes as well as redundant products, parts and materials enabling circular value retention and recovery strategies. 3b: Recovery of materials from waste in preparation for circular value retention and recovery strategies (excluding feedstock covered under 3.c). 3c: Recovery and valorisation of biomass waste and residues as food, feed, nutrients, fertilisers, biobased materials, or chemical feedstock. 3d: Reuse/recycling of wastewater.</p>	<p>4a: Development/deployment of tools, applications, and services enabling circular economy strategies.</p>
Common Barriers (sector-agnostics)			
<p>During the design and production phase, there are some barriers that can be found almost commonly through all sectors to various degrees and with different impacts:</p> <ul style="list-style-type: none"> ▪ No incentive to use secondary materials ▪ Poorly functioning markets & unstable secondary material supply ▪ No level playing field for circular materials ▪ Lack of transparency on origin, quality, and recycled content of secondary materials ▪ Lack of incentives to design for circularity ▪ Limited collaboration across the value chain ▪ Lack of industry-wide agreed standards and definitions for design for circularity & limited guidance to balance design requirements ▪ Lack of financing to develop alternatives. 	<p>There are some barriers, that many of the long life or intensified loop strategies have in common:</p> <ul style="list-style-type: none"> ▪ Regulatory disincentives to product use extension ▪ No level playing field for circular products ▪ Insufficient integration of circular economy principles in organizational procurement ▪ Complex regulatory processes and high transaction costs for reverse logistics with circular objectives ▪ Short innovation cycles that invalidate technical longevity ▪ Insufficient consumer access to repair and refurbishment services ▪ Challenging business case for product use extension models ▪ Sustainability is not consumers’ most important decision driver. 	<p>The barriers to these circular practices can be found globally in various degrees. However, most of them exist to some degree in most countries:</p> <ul style="list-style-type: none"> ▪ Limited incentives for investment in recycling infrastructure ▪ Poor collection and waste management systems (e.g., underdevelopment of sorting and pre-processing technology) ▪ Established informal waste collection and treatment ▪ Insufficient material information ▪ Complex regulatory processes and high transaction costs for reverse logistics with circular objectives ▪ Limited incentives for consumers to bring back products at end-of-use. 	<p>There are some common barriers to implement supporting systems for circular schemes:</p> <ul style="list-style-type: none"> ▪ Data inconsistency and siloes ▪ Lack of competence (design phase) and limited access to circular design know-how ▪ Wanting awareness (civil society) ▪ Reuse requires consumer behaviour change ▪ Socio/Cultural habits.

The type of CE barriers determines the type of financing instruments enabling the intervention needed to promote desired CE investments. Notably, there exist a variety of different financial instruments to correct existing market failures. There are interventions available to overcome these investment barriers as discussed in the next section.

1.2 Interventions to address barriers to a circular economy

For climate-related economic activities, there are established markers that can be more or less well translated into robust Key Performance Indicators (KPIs), such as reduced emissions per invested dollar, or number of persons with increased resilience. Thus, climate activities can be more easily defined than circular economy activities. Circular economy related economic activities are generally more complex, given their claim to be a stand-alone economic model. A circular economy does not add a function to the running system, it is one approach to structure the dominant form of economic activities within a country. Putting this in perspective, interventions proposed in this study, however, are focusing on more pragmatic approaches to “fix the market”. However, common indicators (KPIs) are less established than climate indicators which make it more difficult to assess progress and to bring actors (e.g., investors) “on-board”. In comparison to climate, indicators, CE-activities, cover more areas in the real economy, and thus offer more entry points, and require a broader range of technologies, such as traditional low-tech and innovative high-tech. This might be a reason, why “Circular Economy” has been broadly used by various stakeholders as buzz word with wide coverage, but non-deep operationalization. For instance, the OECD Inventory of Circular Economy Indicators lists 474 circular-economy-related indicators - highlighting the enormous range.

Because **circular economy business models** inherit an impact on public good (e.g., the life-cycle maximization of resources is profitable to future generations), traditional financing models (e.g., focusing on profit maximization by private entities, without considering contributions to the public sphere) are hard to adapt. Thus, capacity building (e.g., incl. but not limited to local authorities and operating firms) but also the development of an enabling investment environment and regulatory framework (especially regarding the internalization of social, environmental and climate costs), are essential for circular economy business models to become sustainable in environmental, social, and financial (or commercial) terms. **Soft cost investments that aim to revise regulations** (e.g., introduce Extended Producer Responsibility (ERP), or building standards) are expected to have a positive cascade effect on future finance flows to circular economy aligned investments. From the perspective of a financial institution, the perception of a low level of bankability of circular economy activities requires appropriate **de-risking interventions**. For business cases that are “not mature”, early-stage project preparation (incl. assessments, feasibility studies) support is needed.

Public commitment to transition to a circular economy represents a key requirement for long lasting investment decisions. Noting, that development assistance cannot much influence government regimes, it is even more important to focus on country ownership and a proper legal base – profitable to the whole society. And indeed, the investment opportunities are largely connected to SDGs and identified in NDCs as a central element and the operational mechanisms of the Paris Agreement. NDCs provide a good indication for investment needs of countries in different sectors.²¹ However, the NDC and SDG targets do not consequently reflect the governmental view and ambitious. Thus, financing needs outlined in key documents (e.g., the NDCs) must be attractively translated into investment opportunities to kick-start investment dynamics on the mid-to-long term.

For the choice of the financial instrument, there is **no one-fits-all solution** to any of those barriers indicated in section 1.1, as every barrier is interconnected within a complex system of hard and soft dependencies and uncertainties, like economic power structures (e.g., centralized and intransparent decisions), techno-centrism or cultural behaviour. However, while financial instruments need to be tailored to local conditions, there are some **general considerations** how public and private financial actors can support and adapt to a Circular Economy:

- **Development finance institutions** can e.g., provide **seed funding** to support development efforts (e.g., feasibility assessments) in the establishment of integrated waste management infrastructure,
- **Asset managers and impact investors** can support **access to capital** for private sector investments in clean upstream technologies and circular business models (e.g., via dedicated private credit lines),

²¹ However, it is also recommended to look beyond NDCs, because not all reflect the full range of needs. For instance, a range of water stressed countries do not mention IWRM in their NDCs but focus primarily on infrastructure priorities while management and governance lack attention. (Global Water Partnership (GWP), 2018, NDCS AND WATER – IMPLEMENTING THE PARIS AGREEMENT - Emerging insights from GWP’s analysis of 80 NDCs from a water perspective, in conjunction with the UN’s 2018 progress report on implementing SDG 6).

- **Risk managers** can adopt a longer-term perspective and **price-in resilience of business models** and value chains. Considering public commitments (e.g., in line with the Paris Agreement), transition risks (e.g., stranded assets for high-carbon investments) will materialize and heavily impact asset classes. Proper reflection of those can naturally channel investments to more “sustainable-linked” investments, including circular business cases.
- **Financial advisors** can also support companies in **developing sustainability-linked bonds** for investment in more circular technologies. Already nowadays in 2022, the yield for green bonds is often in favour of traditional (corporates or governments) bonds showing, the huge trust and believe to green pegged investments. Circular bonds are at a very early stage but telling already positive success stories (e.g., Circulate Capital Ocean Fund), even for early-stage firms.
- **Fiscal policy** measures can **adjust the economic attractiveness of circular activities** (e.g., reducing value added taxes for closed loop products), **and non-circular activities** (e.g., increase taxes for environmental harmful activities, such as chemical dying).
- **Financial regulations** play a key role in **setting the level playing field** by introducing standards and norms for various activities.

Considering governmental priorities, incl. national development priorities, SDG targets, or NDCs, different circular investment priorities can be confirmed - partly of private or public good – which **require a mix of instruments** – across sectors. This document does not emphasize any one mechanism/instrument but calls attention to the suite of options that can be implemented to generate the investments needed to promote a circular economy. Important is to consider the **development stage** of required circular aligned interventions and **barriers** that prevent investments.

Overall, the successful use and application of financial instruments **depend on national framework conditions and parameters** and will need to consider the time frame and the amount of financing required.

In this document, interventions are clustered and framed as **responding mechanisms and instruments** based on identified **needs to overcome investment barriers** as highlighted in the following Table 4.

Table 4: Investment needs, barriers and responding options

	Needs to overcome investment barriers	Responding mechanisms and instruments
Investment need	<p>a.) Investments in Enabling Frameworks (<i>targeting policies / regulation and capacities</i>)</p> <ul style="list-style-type: none"> ▪ Modify institutional, regulatory and policy framework (correct systemic market failures), ▪ Adjust or develop new policies and regulations, ▪ Information and capacity building. 	<p>Internalizes environmental costs; provide incentives for applying CE concepts via market and regulatory instruments, including:</p> <ul style="list-style-type: none"> ▪ National strategies, regulation, standards and codes and other policies (e.g., facilitating Extended Producer Responsibility); ▪ Financial regulation (e.g., implicit taxes, monetary policy) ▪ Fiscal policies (e.g., virgin material or landfill taxes, reduced value added taxes and reform of environmentally harmful subsidies). <p>Address capacity building needs, including:</p> <ul style="list-style-type: none"> ▪ Technical assistance and programmatic and tailored training (e.g., adjusted curricular in universities, trainings for local bank officers).
	<p>b.) Investments in Assets (<i>targeting project-level assistance</i>)</p> <p>Facilitate investment and management of assets to compensate investors for effects on the risk/return profile, reduce risks and provide access to finance.</p>	<p>Provide funds for development of different stages (transaction and scaling financial mechanisms), including:</p> <ul style="list-style-type: none"> ▪ Access to finance: loan finance, equity investment, leasing (particularly <i>for profit</i>) and public finance instruments, grants (particularly for <i>non-for profit</i>) and ▪ Risk mitigation: such as loan default guarantees.

Overcoming the market failure and the barriers, needs and responding mechanisms, as explained in

Table 4, can be differentiated in two types:

- a.) **Building Enabling Frameworks:** to correct systemic market failures through regulation and policy targeting (see above Needs, Enabling Framework), and
- b.) **Investments in Assets:** to compensate the project owner/stakeholders for the effects on the risk/return profile on the project level through project-level assistances (see Needs, Assets).

As illustrated in

Table 4 and further detailed in Table 5, **financial instruments** are available for providing either **access to capital** or **reducing or sharing risks**. Not every funding type, however, is suitable for every company/project. On the other hand, **market/regulatory instruments** can be used to incentivize the application of circular economy concepts or to internalize environmental costs. Information and building knowledge for closing capacity gaps are equally important to encourage circular approaches as well as for scaling circular economy aligned investments.

Table 5: Instruments by function

Access to capital		Reduce risk	Enabling framework
Private Equity <ul style="list-style-type: none"> ▪ Venture capital funds ▪ Funds ▪ Public markets ▪ Angel investors 	Debt <ul style="list-style-type: none"> ▪ Commercial loans ▪ Concessional loans (lower interest rate; and/or longer grace period; maturity) ▪ KPI-linked loans²³ 	Guarantees²⁶ <ul style="list-style-type: none"> ▪ Loan guarantees ▪ Purchase guarantees ▪ Insurances 	<ul style="list-style-type: none"> ▪ Market/Fiscal/Regulatory instruments ▪ Policy development and sustainability standards (e.g., minimum construction/building standards) ▪ Project preparation (e.g., feasibility assessments, environmental social impact assessment) ▪ Capacity building (technical assistance, training)
Public Equity <ul style="list-style-type: none"> ▪ Stock Exchange ▪ IPOs 	Bonds <ul style="list-style-type: none"> ▪ Green bonds ▪ Social bonds ▪ Sustainability-linked bonds 	Public-Private-Partnerships²⁷	
Mezzanine financing (hybrid debt-equity)²²	Other debt <ul style="list-style-type: none"> ▪ Pay-for-success models²⁴ ▪ Peer-to-peer / Crowd-lending ▪ Leasing²⁵ 		
Project finance, structured finance			Grants, partly policy-based lending

Note: Full description see III Annex: Report on Financing Instruments.

²² Actually, a debt instrument bridging the gap between debt and equity financing and is one of the highest-risk forms of debt.

²³ Green and sustainability loans are issued by financial institutions to fund green projects and assets, often in line with a recognised set of principles such as the Loan Market Association’s (LMA) Green Loan Principles. An emerging trend in the labelled loan space is the KPI-linked model, where the margin is tied to the borrower meeting a set of sustainability-related Key Performance Indicators (KPIs) within a set time frame. The LMA has published the Sustainability Linked Loan Principles as guidance to lenders and borrowers. https://www.climatebonds.net/files/reports/markets_waste_resource_efficiency_briefing_2020.pdf (Assessed online 03 January 2022).

²⁴ See e.g., Social impact bond, Social impact incentives, Social success note.

²⁵ The leasing agreement has long been successfully used in countries with developed market (competitive) economies. Leasing is primarily understood as renting machines, equipment, vehicles, and industrial facilities. The leasing agreement is understood both from an economic and legal points of view. From an economic point of view, a leasing agreement is a credit transaction and a type of investment activity. From a legal point of view, a leasing contract is an independent contract that has certain components of civil law institutions, such as sales, rent, credit, and so on. <https://www.tandfonline.com/doi/full/10.1080/20430795.2020.1784681?scroll=top&needAccess=true> (Assessed online 03 January 2022).

²⁶ Guarantees represent an agreement by the guarantor to pay part of the costs incurred by a project in case of specified events. The guarantor offers the guarantee to the financier against the performance of the entity receiving the finance.

²⁷ A long-term contract between a private party and a government entity, for providing a public asset or service, in which the private party bears significant risk and management responsibility and remuneration is linked to performance <https://pppknowledgelab.org/guide/sections/3-what-is-a-ppp-defining-public-private-partnership> (Assessed online 03 January 2022).

Important for choosing the ‘right’ finance instrument is considering the stage of development, which is indicated in the following Table 6. Public sources are limited and therefore, there is a need to find the adequate degree of concessionality, or grant element (if any), that a project or programme should receive. The degree of concessionality should increase proportionally to the magnitude of the barriers to implementation. Barriers are often associated with the development stage. Thus, when defining instruments, one critical step is to consider different stages of development as they also determine the opportunity for revenue-making of investments. Proof of Concept (PoC): Grants and VC financing are used when an innovative project, targeting new technology, product, or service (e.g., R&D) does not generate revenue. Commercialization: A combination of grants, equity financing and subordinated loans are typically relevant. Scale-up: Equity and debt financing (potentially with preferential conditions) are typically relevant. Locating the instrument on the value hill is only an indication, further analysis is needed for verification. Financial instruments mapping is only-illustrative and non-exhaustive as it heavily depends on project circumstances which cannot be fully captured in Table 6. In addition, Table 6 locates the financial instrument and its stage of development partly on the value hill. This mapping represents a non-complete mapping but provides insights for potential future work and project pipeline development in this field.

Table 6: Stages of development and the choice of instruments on the CE value hill (Marker: + common choice, - less common choice)

	Degree of bankability	Proof of concept (PoC)		Commercialisation		Scale-up	
		Choice	Value Hill	Choice	Value Hill	Choice	Value Hill
Access to finance	(E) Private equity	+		+		+++	All
	(E) Venture capital	++	All	+		+	
	(E) Public markets	--		-		+	
	(D) Commercial loans	---		+		+++	All
	(D) Concessional loans ²⁸	-		+++	All	--	
	(D) Green/Social bonds			++	Top	+++	All
	(E/D) Peer-to-peer lending	+		++	Top	-	
(E/D) Payment for success	++	Top	++	Top	+		
Reduce risk	(G) (Loan) Guarantees ²⁹	++	All	++	All	+	
	(G) (Purchase) Guarantees ³⁰	-		+		+	
	Grants ³¹	+++	Up / Down	---		---	
	(G) Insurances ³²	-		+		++	All
	Leasing options			++	Top	++	Top / Down
Enabling environment	Capacity building (training)	+++	Up / Down	+		-	
	Define sustainable standards	-		+		++	Up
	Fiscal policy development ³³	+		++	Up	++	Up

Note: This is a simplified non-exhaustive depiction and only indicative, further analysis is needed for verification. Overlapping possible. (E)=Equity; (D)=Debt; (G)=forms of guarantees.

²⁸ Ad hoc subsidised financing for investor.

²⁹ Offering guarantees to a credit line to reduce needed collateral.

³⁰ Offering guarantees for private companies or investors, e.g., purchase guarantees to assure that the products will be bought.

³¹ Offering capital subsidies, grants, or rebates as one-time payments to cover a percentage of capital cost investments.

³² Business models include peer-to-peer sharing and business to consumer rentals.

³³ Offering a long-term credible commitment that sales in repair and remanufacturing must pay less taxes.

2 Circular Economy Approaches in Relevant Sectors and Material Streams - Barriers and Potential Entry Points (global)

The greenhouse gases related to material use account for about 45% of the global greenhouse gas emissions, which could be attributed to the production of materials and products (10.2 billion tonnes of CO₂eq), and food, as well as the management of land (11.9 billion tonnes of CO₂eq) in 2010.³⁴

To address those emissions, it is crucial to embed circular principles and goals across all sectors and industries, especially, as emissions are bound to increase. For example, the global demand for industrial material (such as steel, cement, aluminium, and plastics) is projected to increase by a factor of two to four until the year 2050. The cumulative emissions from the production of steel, cement, aluminium, and plastics alone will reach up to 649 billion tonnes CO₂eq. Considering a 1.5°C target, this exceeds the remaining carbon budget for industry and energy emissions of 420 – 580 billion tonnes. Additionally, the global food demand is expected to increase by around 42%.³⁵

The following sectors and industries have been chosen to be analysed, because their current linear practices exhibit a **high environmental impact** that needs to be addressed and/or they promise **huge circular opportunities** that could drive the transformation and/or they are **focus sectors** in the five analysed countries. All chosen sectors and industries need external interventions to accelerate the circular economy.

The analysis shows that each sector may have different main problems and main levers to address the problems. The agriculture and food sector (Section 2.7), for example, suffers from extreme nutrition exploitation and food loss along the up-hill process, and the issues are to be addressed right at their source. The concerning problem of packaging (Section 2.6), however, is the amount of waste and corresponding excessive environmental impact down the value hill, while the solution to this problem is mostly located at the opposite site of the value hill, at the product and design phase. Also, the corresponding circular investments have different drivers. While for textile, a major driver can be seen in sustainability demanding consumers, in comparison, for plastic products (Section 2.4), mostly a sound regulatory framework might drive the change.

The following tables (in the Sub-Section 2.1-2.8) list those sector specific considerations, while the figures show a more detailed analysis of how circular solutions can be implemented, what some of the main barriers are to the individual circular strategies and what responses to the barriers could look like (for more details see IV. Annex: Sector descriptions and general barriers and windows of engagement). Additionally, the figures illustrate financial instruments that are suitable to address regarding barriers (for more details to the financial instruments see Annex III: Report on Financing Instruments).

It needs to be pointed out, that the implementation of circular solutions is a holistic approach. While there are certain responses to individual barriers, only the joint implementation of a suitable set of responses might lead to a successful circular transformation.

2.1 Construction, buildings, and demolition waste

The construction sector is responsible for a significant share of current and projected material consumption. Today, in the EU, construction and use of buildings alone account for almost half of all raw material and energy consumption already, as well as for about one third of all water consumption.³⁶ Even larger volumes are shown by a GI Hub analysis, which indicates that infrastructure consumes around 63% of the world's materials, while the G20 share of this consumption is around 80%.³⁷

³⁴ Ellen MacArthur Foundation. Completing the Picture. How the Circular Economy tackles Climate Change. Reprint. 2021.

³⁵ Ellen MacArthur Foundation. Completing the Picture. How the Circular Economy tackles Climate Change. Reprint. 2021.

³⁶ <https://www.novia.fi/cewood/articles/new-circular-construction-methods> (Assessed online Dec 2021)

³⁷ https://cdn.gihub.org/umbraco/media/4265/gi-hub-paper_advancing-circular-economy-through-infrastructure_2021.pdf (Assessed online Dec 2021)

However, the majority of materials used in construction are non-metallic minerals. Their annual consumption is projected to be doubled by mid-century.^{38,39} The sector's greenhouse gas (GHG) emissions account for approximately 40% of global GHG emissions. The major contributors to these emissions are the materials used⁴⁰ as well as the heating, cooling, and lighting of buildings and infrastructure.⁴¹

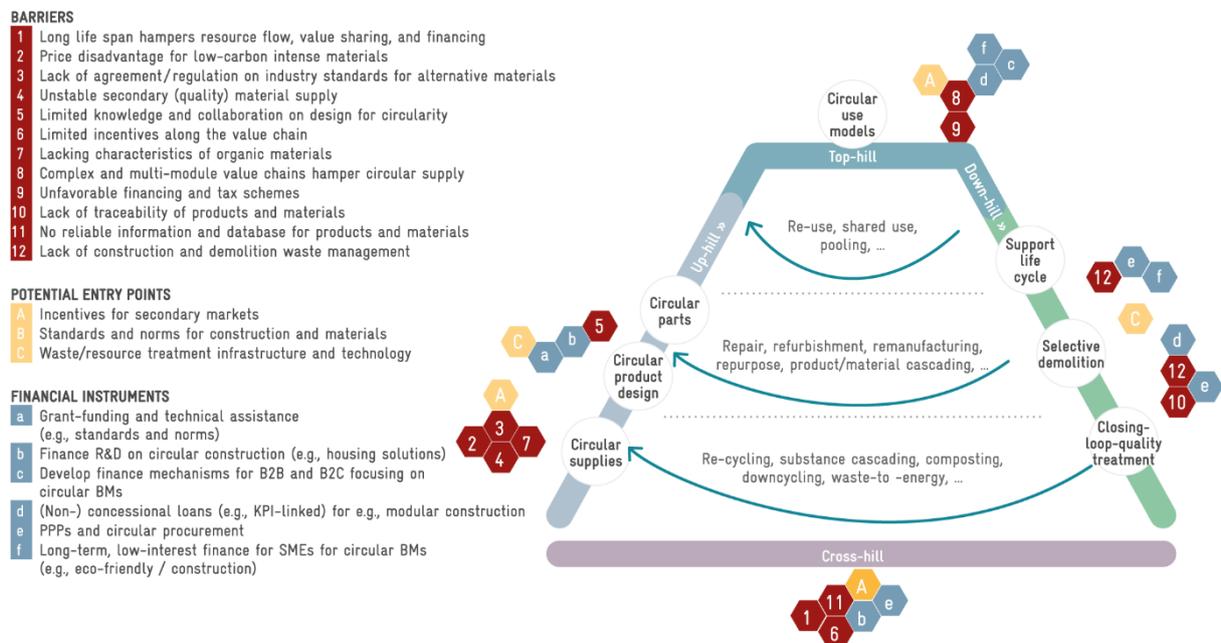
Especially the production of concrete is a major source of CO₂ emissions. It is made from sand, gravel, crushed stone, water, and cement. Although cement makes up just 7–20% of concrete, it accounts for at least 95% of the carbon footprint (about 109 Mt of CO₂ per year). However, cement plays a key role in the construction sector, as it holds the concrete together and leads to structural stability.⁴²

Because of the linear design of buildings, most construction materials are discarded or down-cycled at the end-of-life stage. The introduction of **circular economy approaches in the construction sector is one of the most promising concepts** in order to keep construction materials in the value chain for as long as possible. Circular economy offers opportunities e.g., in avoiding 500 million tonnes of additional primary steel production by 2050, corresponding to GHG emission savings of more than 1 billion tonnes per year.⁴³

The following figure illustrates common barriers to circularity in the construction sector, as well as potential entry points for circular approaches and suitable instruments.

Figure 2: Construction - value hill illustration on barriers, potential entry points and financial instruments for CE

Construction



Graphic is only illustrative. For more details, please see Annex 'Sector description'. Especially, instruments mapping heavily depends on circumstances that cannot be fully mapped on the value hill.

³⁸ <https://www.worldbank.org/en/topic/urbandevelopment/overview#1> (Assessed online Dec 2021).

³⁹ <https://www.oecd-ilibrary.org/sites/967a3098-en/index.html?itemId=/content/component/967a3098-en> (Assessed online Dec 2021).

⁴⁰ <https://www2.deloitte.com/ce/en/pages/real-estate/articles/putting-the-construction-sector-at-the-core-of-the-climate-change-debate.html>

⁴¹ While playing a large role in resource consumption and GHG-Emissions, resource consumption for the energy supply during the lifetime of buildings is not part of this consideration.

⁴² Material Economics. 2019, Industrial transformation 2050. Pathway to net-zero emissions from EU heavy industry.

⁴³ Ellen MacArthur Foundation. Completing the Picture. How the Circular Economy tackles Climate Change. Reprint. 2021.

Buildings and other infrastructure are amongst the longest lasting products, which expands the value chain not only across countries but also across a long-time span. This complicates value sharing with other stakeholders, e.g., between resource and material providers, constructors, beneficiaries of constructions, and recyclers. Value sharing, however, would be also key to decrease costs per construction phase for the beneficiaries of the buildings. Additionally, as costs and benefits are not shared over time, and frameworks for the transfer of ownership for build-in products can be demanding, the bankability of circular construction projects as well as for product-service-systems is still inadequate.

The following table sums up the main challenge, potential drivers, and levers for circular economy approaches in the field of construction:

Table 7: Circular economy approaches for construction - overview of sector characteristics

Main problems	Potential entry points	Main drivers
<p><i>Cross-hill:</i> Overconsumption and long-time stocking of natural resources in infrastructure buildings.</p> <p><i>Up-hill:</i> Underuse and premature end of use of available infrastructure resources.</p> <p><i>Down-hill:</i> Premature end of life of construction material (downcycling or dumping of construction waste).</p>	<p><i>Cross-hill:</i> Enable value sharing over long time horizons and along the complex value chain. Supporting and financing business models for the reuse of resources and materials.</p> <p><i>Up-hill:</i> Finance innovation for reduced resource and material input and incentivise design for recycling and collaboration along the value chain (i.e., building passports, modular construction).</p> <p><i>Top-hill:</i> Support and finance optimal use and life cycle models for infrastructure.</p> <p><i>Down-hill:</i> Finance technology and business model development to increase reuse and recycling of construction material.</p>	<p>Main driver is a policy framework as well as enabling financial instruments to overcome the long-time horizon of construction and allow for innovative value creation and sharing of architecture along the value chain. Additionally, a close collaboration of all stakeholders is necessary to develop and work towards a joint long-term use vision for buildings.</p>

2.2 Capital equipment

Capital equipment incorporates a vast range of physical hardware, e.g., machinery and equipment, from data servers to medical scanners, and from power plants to ships.⁴⁴ While essential for serving society’s needs around the world, **capital equipment manufacturing consumes 7.2 billion tons of raw materials globally each year** and accounts for **more than half (56%) of global ore consumption**. It is critical to optimize the inventory of capital equipment and its uses through circular strategies to reduce and minimize environmental impact, address resource scarcity, increase market resilience, and develop value chain sustainability.

Capital equipment, together with buildings and infrastructure, represent key components of the overall economic stock (materials in long-term use). Their lifespan covers decades.⁴⁵ **The demolition of long-lived assets represents 23% of global waste generation every year**. The specific characteristics of the construction sector are treated in the previous chapter.

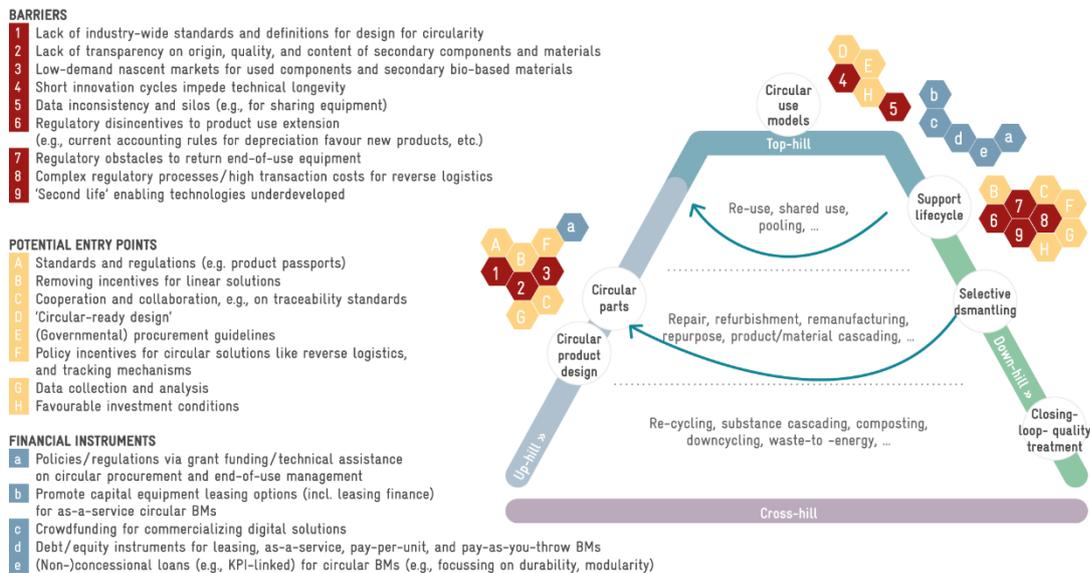
Capital equipment is designed, built, and acquired to last. Therefore, circular strategies, that are applicable to short-living products and consumables („products that flow’), might not be effective and/or suitable. Capital equipment as long-life products („products that last’) require a specific approach.

The following figure illustrates common barriers to circularity for capital equipment, as well as potential entry points for circular approaches and suitable instruments.

⁴⁴ e.g., motor vehicles, machinery and equipment, electrical machinery such as elevators, other transport equipment such as trains, ICT equipment such as antennas or data centre equipment, medical and precision instruments such as Magnetic Resonance Imaging, office machinery and computers.
⁴⁵ A car has a typical use life of 15-20 years; an elevator or a train can last for over 30 years; 95% of lithographic printing machines manufactured since 1984 by ASML are still in use today.

Figure 3: Capital equipment - value hill illustration on barriers, potential entry points and financial instruments for CE

Capital equipment



Graphic is only illustrative. For more details, please see Annex 'Sector description'. Especially, instruments mapping heavily depends on circumstances that cannot be fully mapped on the value hill.

Capital equipment has a strong potential for resource-efficient value creation. Its long lifespans can be extended even further, be shared in use, and slowing down their degradation could contribute to major waste avoidance, given the extensive size of the existing economic stock of equipment.⁴⁶ Circular economy strategies targeting capital equipment should aim at retaining the highest possible value of the equipment, focusing on reuse including repurposing, refurbishing, and remanufacturing as well as on remote and predictive maintenance, remote and on-site upgrades, and software solutions that improve use rates of hardware or can even replace hardware (e.g. a mobile app instead of a dedicated screen). Still, recycling remains the final solution when the technology or condition makes the equipment no longer viable. In the capital equipment sector, the financial capital invested and at stake is relatively high. Therefore, customers are already more used to keeping their investment through service models. With stakeholders in a B2B setting, this makes it easier to arrange new business models, such as 'product-as-a-service', compared to B2C settings. Against this background, circular strategies such as maintenance and refurbishment have been applied as common practice in the capital equipment sector for quite some time. This makes the capital equipment sector a circular economy frontrunner in some respects, that has good practices and learnings to share with other sectors. However, there is still a need to improve the economics of reuse models.

The following table sums up the main challenge, potential drivers, and levers for circular economy approaches in the field of capital equipment.

Table 8: Circular approaches for capital equipment - Overview of sector characteristics

Main challenges	Potential entry points	Main drivers
Cross-hill: large resource consumption and long-term stocking.	Up-hill: Support the extension of usage time of products by e.g., investment in technology options and regulatory and market frameworks for circular business models.	Main drivers are technological solutions as well as regulatory ⁴⁷ and market frameworks to enable extended use cycles.

⁴⁶ Retired aircraft treatment showcases the potential of circularity. When aircraft are retired, 85%-90% of the content is reused or recycled, with around 40%-50% redistributed as useable components. Any unserviceable materials are recycled and fed back into the supply chain as raw materials (https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2019/ENVRReport2019_pg279-284.pdf).

⁴⁷ E.g., supporting taxation.

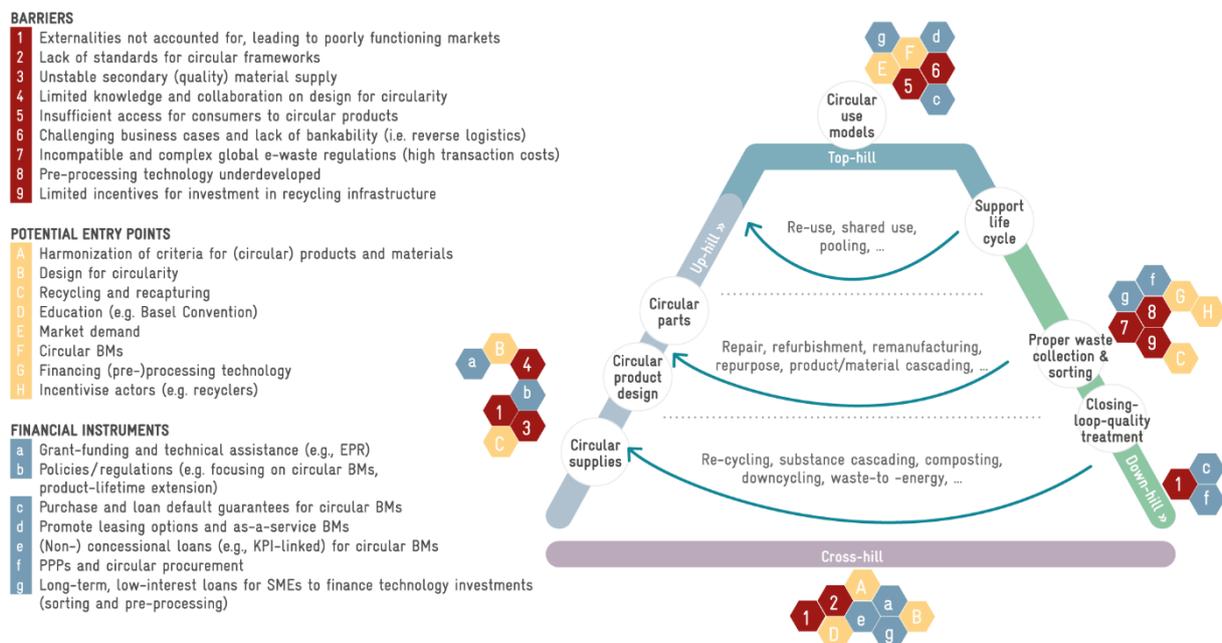
2.3 Electronics and information and communications technology (ICT)

Electronic and electrical waste (e-waste) is the fastest-growing waste stream in the world. In 2018, about 50 million tonnes of e-waste (incl. 150 million phones⁴⁸) were generated globally.⁴⁹ Only about 20% of e-waste is collected and recycled appropriately. The other 80% end up in the residual waste streams or are traded or treated under inadequate conditions. Theoretically, nearly all electronic waste could be recycled but metals are difficult to extract from e-waste. It could be profitable, however, as e-waste is worth at least USD 62.5 billion annually. ‘Urban mining’, where resources are extracted from complex waste streams, can now even be economically more viable than extracting metal ores from the ground. Despite the dire need and important opportunities, however, a circular transition for the electronics industry faces many barriers beyond the control of any individual stakeholder. The key barriers can only be overcome by collaboration and cooperation along the value chain and amongst all stakeholders like governments, businesses, and civil society.^{50, 51}

The following figure illustrates common barriers to circularity in the electronics/ ICT sector, as well as potential entry points for circular approaches and suitable instruments.

Figure 4: Electronics - value hill Illustration on barriers, potential entry points and financial instruments for CE

Electronics



Graphic is only illustrative. For more details, please see Annex ‘Sector description’. Especially, instruments mapping heavily depends on circumstances that cannot be fully mapped on the value hill.

Electronic consumer goods are amongst the fast-flowing goods (especially in relation to the value of the input materials). Policy frameworks as well as support for business models that enable long product lives are necessary to stop material losses and reduce pollution.

The supply chain is global, highly complex and laden with environmental and social conflicts. Due to the participation of countries with weak or non-existing regulations, global regulatory intervention is mandatory to prevent exploitation of regulatory loopholes and allow for circular solutions and value sharing. Beyond that, economically viable reverse cycles are crucial for closing resource loops. Hence, design for recycling as well as investment in innovative recycling technologies is needed.

⁴⁸ <https://www.zdnet.com/article/our-old-devices-are-creating-a-mountain-of-e-waste-and-its-getting-a-lot-bigger/> (Assessed Feb 2022).

⁴⁹ [https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics+Final%20\(1\).pdf](https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics+Final%20(1).pdf) Assessed online February 2022).

⁵⁰ Ellen MacArthur Foundation, 2017, Circular Consumer Electronics.

⁵¹ Platform for Accelerating the Circular Economy (PACE), 2019, A New Circular Vision for Electronics, Time for a Global Reboot (United Nations E-waste Coalition).

The following table sums up the main challenges, potential drivers, and levers for circular economy approaches in the electronics sector.

Table 9: Circular approaches for electronics/ ICT - overview of sector characteristics

Main challenges	Potential entry points	Main drivers
<p><i>Top-hill:</i> Many electronic products are designed to be fast-moving consumer products, that underly electronic ‘fashion-trends’, adding to the waste crisis.</p> <p><i>Down-hill:</i> Immense – and increasing – amounts of electronic waste are generated, and about 80% cannot be accounted for or are known to be (illegally) disposed of. Even as product-life extending markets exist, the products eventually end up as waste.</p> <p>Recycling of electronic products is complex and costly.</p>	<p><i>Cross-hill:</i> Prevention of loss of electronic waste (e.g., enforcement of policy frameworks, setting up mandatory and tangible reverse logistic cycles, ownership of material remaining with the provider, etc.)</p> <p><i>Cross-hill:</i> Closing the material cycle by designing for easy recycling, supporting recycling-technology innovation, and fostering value chain collaboration.</p> <p><i>Top-hill:</i> Substantial extension of the use-phase and possibility of refurbishment of products needs to be supported.</p>	<p>The key barriers for circularity can only be overcome by collaboration and cooperation along the value chain and amongst all stakeholders like governments, businesses, and civil society/consumers.^{52, 53}</p>

2.4 Plastics

Plastic is widely used in many sectors. The generation of plastic **waste, however, is strongly influenced by the lifetime and cost of the product**. While the main problem of short-term products is current waste generation (96% of plastic packaging ends up as waste⁵⁴), and its leakage into the environment, products with a long mean lifetime, like building products (in average about 35 years), create other problems: they delay crucial issues like the treatment of toxic or non-recyclable materials into the future. Therefore, also for those applications, it is important to rethink material composition and design.

A **common problem of all plastic products** is their **reliance on and consumption of fossil resources**. E.g., the plastic industry in the US releases at least 232 million tonnes of GHG emissions each year along its value chain. That is the equivalent of 116 coal-fired power plants.⁵⁵ Another joint problem is a **tremendous addition of (problematic) additives** to enhance the materials performance (e.g. plasticizers, flame retardants, antioxidants, acid scavengers, light and heat stabilizers, lubricants, pigments, antistatic agents, slip compounds and thermal stabilizers).⁵⁶ Depending on the kind of additives, the production process, the circumstances of the product use, and the end-of-life treatment, the substances can migrate, be emitted, leak, fragment or be released⁵⁷ into the environment and thus put ecosystems and human health at risk. Moreover, they pose obstacles to recycling.

The following figure illustrates common barriers to circularity in the plastics stream, as well as potential entry points for circular approaches and suitable instruments. The specifics of plastic packaging are considered in the next chapter.

⁵² Ellen MacArthur Foundation, 2017, Circular Consumer Electronics.

⁵³ Platform for Accelerating the Circular Economy (PACE), 2019, A New Circular Vision for Electronics, Time for a Global Reboot (United Nations E-waste Coalition).

⁵⁴ Plastic waste in tonnes, and waste production in relation of annual plastic production per sector (2015): packaging 141 million tonnes (96%), textiles 42 million tonnes (71%), other sectors 38 million tonnes (81%), consumer & institutional products 37 million tonnes (88%), transportation 17 million tonnes (63%), building & construction 13 million tonnes (5%), electrical/electronics 13 million tonnes (72%), industrial machinery 1 million tonnes (33%). <https://ourworldindata.org/plastic-pollution> (Assessed online Dec 2021).

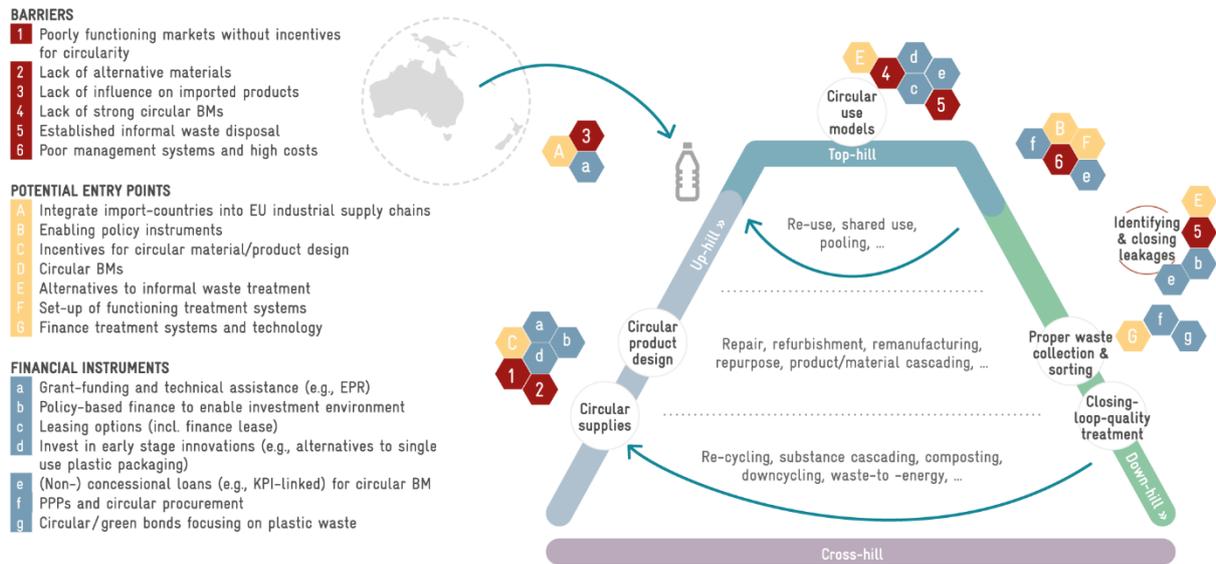
⁵⁵ <https://www.reuters.com/business/cop/plastics-outpace-coals-greenhouse-gas-emissions-by-2030-report-2021-10-21/> (Accessed Feb 13th, 2022); Beyond Plastics. The New Coal. Plastics & Climate Change. October 2021.

⁵⁶ Hahladakis, J. et al. An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal, and recycling. Journal of Hazardous Materials. Volume 344. February 2018.

⁵⁷ Hahladakis, J. et al. An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal, and recycling. Journal of Hazardous Materials. Volume 344. February 2018.

Figure 5: Plastics - value hill illustration on barriers, potential entry points and financial instruments for CE

Plastics



Graphic is only illustrative. For more details, please see Annex 'Sector description'. Especially, instruments mapping heavily depends on circumstances that cannot be fully mapped on the value hill.

The use of plastics allows to create tailored product characteristics. Plastics are comparably cheap, with low part-complexity, lightweight, and can exhibit diverse material properties through customization with a variety of additives. With these prerequisites, plastic most likely will remain part of our economic life. Alternatives for fossil fuel-based raw materials as well as for the use of problematic additives (e.g., flame retardants for textiles used in airplanes or in building insulation, etc.) need to be explored and solutions for a safe product life and end-of-life treatment to be found. Currently, for example, styrofoam scraps containing flame retardants used e.g., on building construction sites are released into the environment where they are mechanically broken down into microplastics and further dissipate into ecosystems. The choice of input material, product design as well as transparent data about material composition (i.e., digital product passports) are decisive factors for the recyclability of the products.

In general, mid- to long-lasting plastic products (e.g., parts for cars or machinery, windows, kitchen machines, etc.) can be traced to a manufacturer or could be designed for traceability. Plastic products that last can be part of mid- to high-pricing product groups, which allows for certain use-extension or take-back schemes. Supply and value chains of slow-flowing plastic products are often semi-complex and expand over two or more countries. Moreover, the reduction of plastic production through prevention, reuse, and new delivery models, offers the biggest potential for reducing plastic pollution and therefore exhibits the highest mitigation opportunity for GHG emissions.⁵⁸

⁵⁸ 2020 The Pew Charitable Trust "Breaking the Plastic Wave. A comprehensive assessment of pathways towards stopping ocean plastic pollution".

The following table sums up the main challenges, potential drivers, and levers for circular economy approaches in the plastics stream.

Table 10: Circular economy approaches for slow-flowing plastics - overview of sector characteristics

Main challenges	Potential entry points	Main drivers
<p><i>Top-hill:</i> General (over)-consumption of resources, mostly due to a still 'premature end-of-use' of products (e.g., windows or floorings are destroyed when buildings are refurbished or torn down) and 'underused product capacity' (e.g., kitchenware, like mixers are present in many households but are seldomly used).</p> <p><i>Top-hill:</i> uncontrollable leakage of materials containing problematic substances along the production and use process</p> <p><i>Down-hill:</i> end-of-life treatment of toxic or non-recyclable materials (e.g., flooring, plastics in electronic products) is delayed into the future, where they prevent safe and like-for-like recycling.</p>	<p><i>Up-hill:</i> Address (over)-consumption of resources and delay of treatment of problematic substances during the design phase of a product by choosing (alternative) input materials as well as by design for re-use or recycling.</p> <p><i>Top-hill:</i> Depending on the kind of product, innovative product life cycle extension models (e.g., product longevity, re-use, sharing-models, etc.) can help to keep products in use for longer.</p> <p><i>Down-hill:</i> Closed material loops or similar adequate end-of-life collection and treatment must be ensured.</p>	<p>Plastic has a fractured manufacturing chain with an asymmetric power balance. Formulators – the ones able to design-in recyclability – are generally not the decision makers in terms of product composition. Neither the manufacturer nor the customers and recyclers, demand circularity. Therefore, regulatory frameworks that address all actors along the whole value chain are certainly the main driver.</p>

2.5 Packaging including Plastic Packaging

The primary purpose of packaging is to **protect its contents** from any damage that could happen during **transport, handling, and storage**. Especially the protection of food is highly important, as food waste is identified as a major environmental problem due to the depletion of natural resources during food production.⁵⁹

The packaging sector is highly complex with many stakeholders involved. Packaging belongs to the very low-priced products and manufacturing rarely expands over more than two countries. However, stakeholders from other sectors such as retail, distributors, and of course the consumers as end-users are important decision makers when it comes to packaging design. The packaged goods are usually distributed globally, and the packaging material can hardly be traced or re-routed back to the producer.

Over the last decades, packaging has become a massive problem. The majority of packaging is designed for single-use and a large proportion of it leaks as waste into the environment (see also the section about waste management below). In 2019, a total volume of 79.3 million tonnes of packaging waste was generated in the EU.⁶⁰ Paper and cardboard (40.6 per cent), plastic (19.4 per cent), glass (19.2 per cent), wood (15.6 per cent), and metal (5.0 per cent) are the most common types of packaging waste. The EU reports a recycling rate of packaging waste of 64.8 per cent for 2019.⁶¹ While these amounts at least did not end up in the environment, the figures also do not represent the kind of like-for-like recycling we need to see in a circular economy. Packaging waste that is downcycled, used as substitute fuel, and in some cases incinerated, is included in those recycling figures. While paper, plastics, metal, and glass in general have very good recycling properties, the packaging and its material compounds are usually designed in a way that prevents single-origin collection and like-for-like recycling.

The following figure illustrates common barriers to circularity in the packaging stream, as well as potential entry points for circular approaches and suitable instruments.

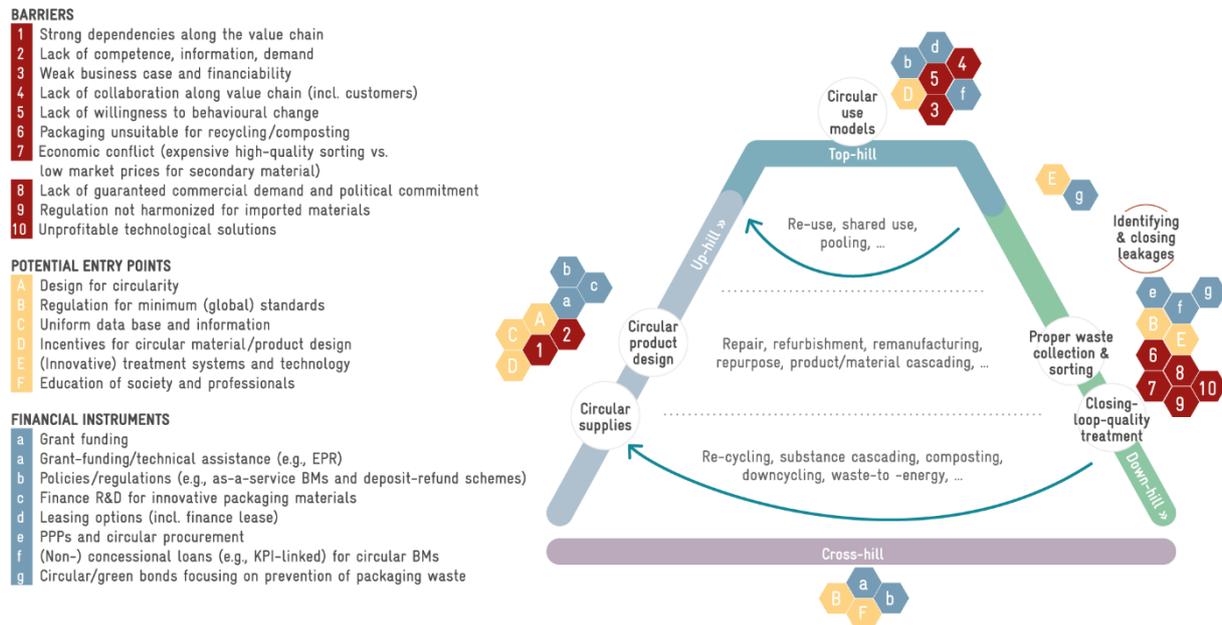
⁵⁹ In the EU, around 88 million tonnes of food waste are generated annually with associated costs estimated at 143 billion euros. https://ec.europa.eu/food/safety/food-waste_de (Assessed online Dec 2021).

⁶⁰ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics#Waste_generation_by_packaging_material (Assessed online Dec 2021).

⁶¹ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics#Waste_generation_by_packaging_material (Assessed online Dec 2021).

Figure 6: Packaging - value hill illustration on barriers, potential entry points and financial instruments for CE

Packaging including plastic packaging



Graphic is only illustrative. For more details, please see Annex 'Sector description'. Especially, instruments mapping heavily depends on circumstances that cannot be fully mapped on the value hill.

Packaging is usually a single-use product and is amongst the fastest-flowing resources in our economy. One way to address the packaging waste challenge is to design out packaging wherever possible, and to slow down the resource flow by designing re-usable packaging. However, the majority of packaging might remain single-use. In that case, the resource flows need to be organised and controlled. The current design of packaging allows for a wide range of improvements, e.g., by phasing out fossil-based input materials, design for recycling, tracer-based sorting of materials, etc. Beyond that, lacking waste management still leaves many opportunities to improve resource flows.

Packaging belongs to the very low-priced products and manufacturing rarely expands over more than two countries. However, stakeholders from other sectors are important decision makers when it comes to packaging design, such as retail, distributors, and of course the consumers as end-users. The packaged goods are usually distributed globally, and the packaging material can hardly be traced or re-routed back to the producer.

Plastic Credits – an innovative finance mechanism?

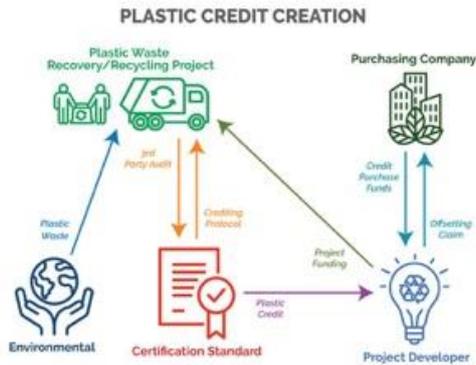
Plastic credits can be bought by both companies as well as private consumers to compensate for their plastic footprint. While not necessarily creating sufficient and sustainable funding, they promise to be an efficient instrument to improve the collection and treatment of plastic waste in areas without sufficient waste management infrastructure while creating socio-economic co-benefits by improving income opportunities for waste workers. There is no commonly agreed definition of plastic credits yet. The various schemes differ greatly with respect to their standards and processes. Hence, plastic credits still entail some risks for (unintended) consequences like green washing or undermining of EPR schemes.⁶²

A plastic credit is a transferable unit representing a specific quantity of plastic pollution removed from the environment and/or fed back into the circular economy (i.e., collected and/or recycled) in excess of what would have happened in the absence of the credit-generating activity (i.e., business as usual). Plastic credits reduce the amount of plastic in the environment (or that which would have ended up in the environment) and increase the circularity of plastics through funding waste collection and/or recycling activities.⁶³ The figure describes the basic mechanism.⁶⁴

⁶² PREVENT (2021) Plastic credit schemes and EPR – risks and opportunities, <http://prevent-waste.net/Prevention-Discussion-Paper-Plastic-credit-schemes-and-EPR.pdf> (prevent-waste.net)

⁶³ 3RInitiative (2021). Guidelines for Corporate Plastic Stewardship, https://www.3rinitiative.org/files/ugd/e94bf0_0480d0bd0efa4cf08b56355ca73ebc98.pdf

⁶⁴ <https://www.sustainableplastics.com/news/plastic-credits-can-help-scale-recovery-and-recycling-efforts>



Provided that the (potential) shortcomings of plastic credit schemes are taken into account, the general blueprint of plastic credits can be used as starting point to address market imperfections, especially at the end-of-life phase of plastic. However, focusing on one material only limits synergies in waste management severely, i.e., collecting plastic waste together with metal or glass. As such, plastic credits are still a linear answer to a linear problem – a fix of the system instead of a systemic approach to transform the system. Such frameworks need to be developed further to become an impactful lever to address market imperfections.

The following table sums up the main challenges, potential drivers, and levers for circular economy approaches in the packaging stream.

Table 11: Circular economy approaches for packaging - overview of sector characteristics

Main challenges	Potential entry points	Main drivers
<p><i>Up-hill:</i> General (over)-consumption of resources and materials and lack of optimized packaging design for re-use and recycling.</p> <p><i>Top-hill:</i> the anonymity of packaging producer makes packaging waste a problem of the importing countries.</p> <p><i>Down-hill:</i> Packaging waste leaking into the terrestrial and marine environment (illegal dumping, landfills, and littering).</p>	<p><i>Up-hill:</i> The recyclability and reusability of packaging material, the optimal use of material as well as the substitution of harmful materials needs to be addressed already in the design phase.</p> <p><i>Top-hill:</i> Countries need to provide frameworks to control materials or products that enter their country and to ensure their readiness for circularity.</p> <p><i>Down-hill:</i> The leakage of packaging waste into the environment needs to be stopped by ensuring secure waste collection systems in the regarding countries and by preventing the export of wastes into such countries.</p>	<p>Relevant actors in the complex and fractured (global) system are packaging developers, material providers (formulators), product providers, commerce and distributors and customers, as well as waste collectors, and recyclers.</p> <p>Tight regulatory and political frameworks, especially for food packaging which prevent circular approaches (i.e., reusable packaging) is often in place. Changing packaging means to change a very complex system.</p>

2.6 Textiles

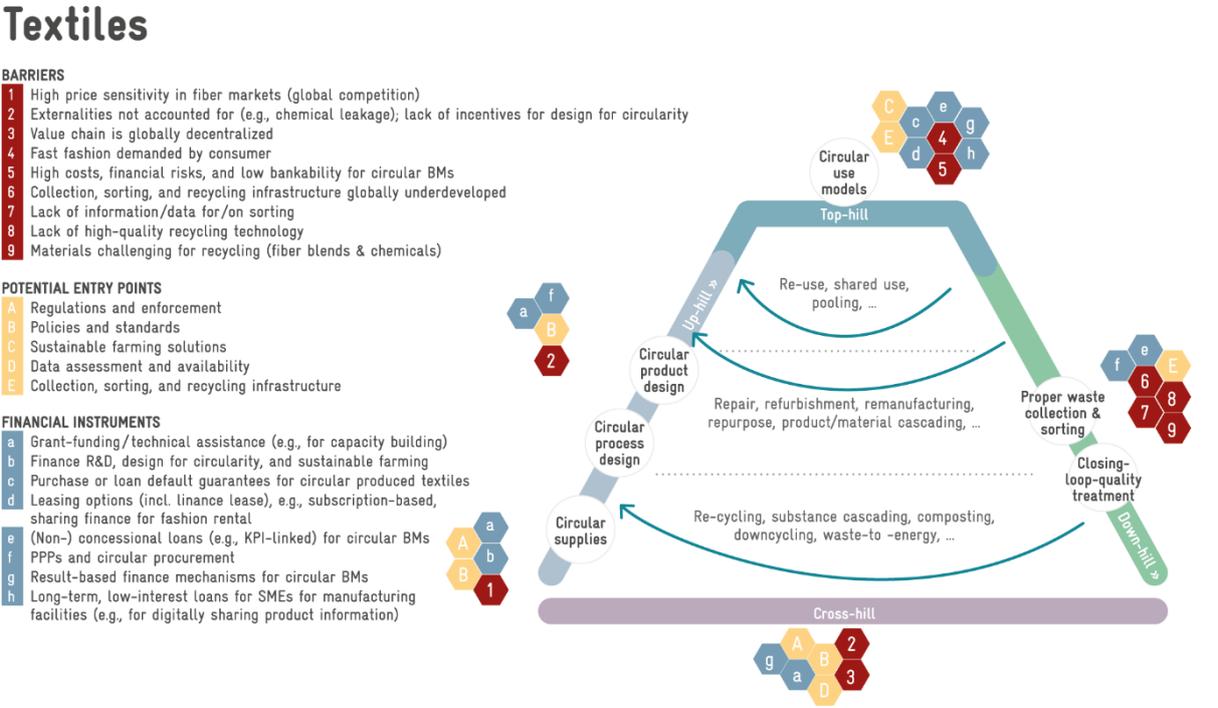
Today, clothing is among the fast flowing and low-priced consumer products. The global value chain is one of the most complex of all sectors and with highly asymmetric balances of power. Problematic parts of the value and supply chain keep shifting around the world, temporarily settling in low-income economies. Admittedly, the wandering textile industry helps countries to grow out of poverty, raises the countries productivity, wages and working conditions across the local economy over time, while the countries production and export baskets diversify into more sophisticated goods and services. However, as the textile industry moves on, the major challenges within this industry remain the same: ensuring fair and decent conditions for workers and reducing environmental impacts along the value chain.

The textiles industry (specifically clothing and cotton production, etc.), hence, is critical for many economies in terms of employment. Globally, supply chains of clothing, footwear and household textiles cause significant pressure on primary raw materials, water, and land use. After food and construction, the fashion industry and its supply chain are considered to be **the planet's third largest polluter**. Between 2000 and 2014, clothing production doubled with the average consumer buying 60% more pieces of garment compared to 15 years ago. At the same time each clothing item is now kept for only half as long.⁶⁵ Global fibre consumption is expected to increase even more and reach between 130 and 145 million metric tonnes by 2025.⁶⁶

Just a fraction of end-of-life textiles is recycled and only 1% is estimated to be recycled to produce new fibres of similar value, while about 73% of textiles goes to landfills or is incinerated. About 12% are downcycled to other lower-quality products like insulating materials or cleaning cloths. Another 12% is estimated to be lost during manufacturing as offcuts or destroyed as unsellable surplus stock. Another 0.5 million tons of the volume (which accounts for almost 1%) finds its way into waters as microplastic fibres, mostly as a result of washing synthetic textile.⁶⁷ Due to the current practices, at least USD 100 billion worth of materials are lost annually.

The following figure illustrates common barriers to circularity in the textiles sector, as well as potential entry points for circular approaches and suitable instruments.

Figure 7: Textiles - value hill Illustration on barriers, potential entry points and financial instruments for CE



Graphic is only illustrative. For more details, please see Annex 'Sector description'. Especially, instruments mapping heavily depends on circumstances that cannot be fully mapped on the value hill.

A transition to a circular economy is expected to unlock a USD 560 billion economic opportunity in the fashion industry, by better capturing the value of underutilized and landfilled or incinerated clothes.⁶⁸

The Professional Clothing Industry Association Worldwide Ltd. (PCIAW)⁶⁹ highlights that the textile industry can turn 80% circular by 2030, but it requires substantial investments especially in recycling technologies and infrastructure. Globally, the sector needs between USD 5-7 billion capital investment in recycling technologies (besides collection and sorting infrastructure) by 2026.

⁶⁵ https://unece.org/fileadmin/DAM/timber/meetings/2018/20180716/UN_Partnership_on_Sustainable_Fashion_programme_as_of_6-7-2018.pdf (Assessed online Dec 2021).

⁶⁶ Ellen MacArthur Foundation. 2017, A new Textiles Economy: Redesigning Fashion's Future, Circular Fibres Initiative.

⁶⁷ https://www.recovery-worldwide.com/en/artikel/the-limitations-of-textile-recycling_3411757.html

⁶⁸ Ellen MacArthur Foundation, 2017, A New Textiles Economy: Redesigning fashion's future.

⁶⁹ PCIAW, 2021, (<https://pciaw.org/?s=circular>) (Accessed online 30 Nov. 2021).

The following table sums up the main challenges, potential drivers, and levers for circular economy approaches in the textiles sector.

Table 12: Circular economy approaches for textiles - overview of sector characteristics

Main problems	Potential entry points	Main drivers
<p><i>Up-hill:</i> Use of harmful substances in manufacturing processes and pollution, as well as devastating working conditions.</p> <p><i>Up-hill:</i> Over-consumption of resources due to ‘fast fashion’ (e.g., low-quality and/or quickly changing fashion standards).</p> <p><i>Down-hill:</i> Extremely large volumes of textile wastes, which in practice are mostly not recyclable (mixed materials).</p>	<p><i>Cross-hill:</i> Economic and policy frameworks are needed for sustainable, circular, and ‘slow fashion’ practices along the value chain (e.g. (globally binding) regulatory frameworks and standards for environmental protection, internalisation of external costs and fair working conditions).</p> <p><i>Up-hill:</i> Finance innovation and incentivise design for recycling as well as collaboration along the value chain.</p> <p><i>Top-hill:</i> Awareness rising of consumers and incentivising and enabling sustainable consumption for industry and consumers.</p> <p><i>Down-hill:</i> Support and finance technology development to increase textile recycling and close the resource loop.</p>	<p>Major drivers are the consumers, a globally binding regulatory framework, and equally impactful industry standards.</p>

2.7 Food

The terms “food waste” and “food loss” are commonly used terms but refer to different things. While “food loss” typically refers to losses in earlier stages of production such as during harvest, storage, and transportation, “food waste” refers to items that are fit for human consumption but are thrown away, often by supermarkets or consumers.⁷⁰

According to the Food Waste Index, about 17% of global food production is wasted, with 61% of this waste coming from households, 26% from food services and 13% from retail.⁷¹ Eliminating waste in the food industry could reduce annual emissions by 1.4 billion tons by 2050 (that is more than the entire airline industry pre-pandemically). Additionally, regenerating nature through ecosystem-focused agricultural practices and switching to regenerative food production globally would reduce emissions by 3.9 billion tonnes of greenhouse gases per year by 2050.⁷²

The following figure illustrates common barriers to circularity in the food sector, as well as potential entry points for circular approaches and suitable instruments.

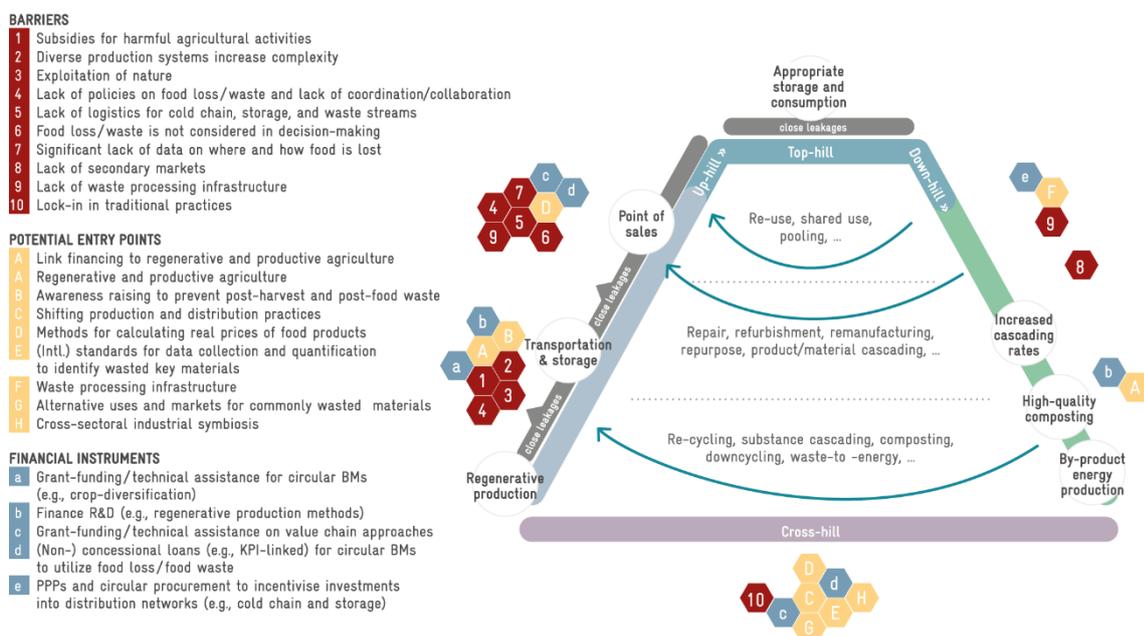
⁷⁰ <https://en.reset.org/global-food-waste-and-its-environmental-impact-09122018/> (Assessed online Dec 2021)

⁷¹ UNEP. Food Waste Index. Report 2021.

⁷² Ellen MacArthur Foundation. Completing the Picture. How the Circular Economy tackles Climate Change. Reprint. 2021.

Figure 8: Food - value hill illustration on barriers, potential entry points and financial instruments for CE

Food



Graphic is only illustrative. For more details, please see Annex 'Sector description'. Especially, instruments mapping heavily depends on circumstances that cannot be fully mapped on the value hill.

The loops of nutrients and organic matter can be partly closed by reusing food, by-products, and food waste. A minimization of food surplus and waste reduces the overall consumption of organic matter in the economy and decreases nutrition consumption. Circular measures must be implemented both at the producer and consumer levels and, finally, in waste management. In the transition towards sustainability, small-scale experiments offer opportunities for local and national policy development.⁷³

The following table sums up the main challenges, potential drivers, and levers for circular economy approaches in the food sector.

Table 13: Circular economy approaches for food - overview of sector characteristics

Main challenges	Potential entry points	Main drivers
<p><i>Up-hill:</i> Food loss along food production and distribution, especially in low- and middle-income countries leads to high resource consumption and nutrition losses.</p> <p><i>Top-hill:</i> Waste of food that is fit for consumption e.g., by consumers, supermarkets or restaurants leads to resource consumption and nutrition losses.</p> <p><i>Down-hill:</i> Nutrition destruction along the waste-management.</p>	<p><i>Up-hill:</i> Stop food loss by e.g., education of stakeholders (technology and knowledge transfer) and fostering innovation and organisational solutions.</p> <p><i>Top-hill:</i> Educate consumers, supermarkets, and other stakeholders on how to avoid food waste and support local initiatives, technologies, and businesses to prevent or process food waste.</p> <p><i>Down-hill:</i> Close the nutrition cycle by re-routing organic waste streams (in particular phosphorus) back to agricultural land. I</p>	<p>Actions are required along the entire value chain. Introduction and investment in (innovation of) technologies, innovative solutions, new ways of working and manage food quality are essential.⁷⁴</p>

⁷³ Jurgilevich, A. et al. Transitioning towards a Circular Economy in the food system. Sustainability. Jan 2016.

⁷⁴ <https://www.un.org/en/observances/end-food-waste-day> (Assessed online Dec 2021).

2.8 Waste Management

The world is consuming 100 billion tonnes of materials every year⁷⁵, while it is estimated that the world's cities generate about up to 10 billion tonnes of solid wastes annually⁷⁶. Waste composition differs across income levels, reflecting various patterns of consumption. High-income countries generate relatively little food and green waste (32%) but generate more dry and therefore recyclable waste (51%) including plastic, paper, cardboard, metal, and glass. In low-income countries, materials that could be recycled account for only 20% of the waste stream.⁷⁷

Waste collection is critical to managing waste, but the rates vary largely by income levels, with upper-middle- and high-income countries reaching nearly 100% waste collection. Low-income countries collect about 48% of waste in cities, but this proportion drops to 26% outside of urban areas.^{78, 79} Of the 2.01 billion tonnes municipal solid waste generated globally each year at least 33%— estimated extremely conservatively— is not managed in an environmentally safe manner.⁸⁰ An estimation in 2015 showed that at least 2 billion people worldwide still lack access to solid waste collection and at least 3 billion people worldwide still lack access to controlled waste disposal facilities.⁸¹

As world population grows, rural-urban migration intensifies, economic prosperity widens, and due to economic development and increased consumption, the generation of waste is increasing steadily. At the same time, circularity is in reverse: the Circularity Gap Report 2020 states that the global economy is only 8.6% circular, while the 2018 edition reported 9.1%. Moreover, due to lacking data, one-time recycling and even downcycling are already counted as 'circular' in that study, which is not the closed-loop circulation we are striving for.^{82, 83} This shows, that we are even further away from circularity than we generally think.

Waste management has a huge impact on GHG emissions. Around 5% of global emissions are annually generated from solid waste treatment and disposal. This corresponds to 1.6 billion tonnes of CO₂ equivalent greenhouse gas emissions.⁸⁴ The strong growth in population and income in regions with under-developed waste management systems contributes to a large increase in emissions. It is projected that methane emissions will increase to about 13 million tonnes per year in the waste and wastewater sectors alone, while anthropogenic methane emissions will reach around 380 million tonnes per year by 2030.⁸⁵

Moreover, mismanaged waste leaks into the environment, alters habitats, harms wildlife, damages ecosystem functions and services and poses risks for human health. For example, between 5 and 13 million tonnes of plastic waste leak into the sea each year - adding to the 150 million metric tonnes already in the oceans⁸⁶ - adversely impacting more than 1400 species, including marine megafauna such as sea turtles and mammals.⁸⁷

Proper waste management plays a crucial part in a circular economy. Separate collection allows for the preservation of valuable materials and thereby enables the closing of material loops through recycling. Moreover, it contributes to regenerating nature by keeping waste out of the environment.

The following figure illustrates common barriers to circularity in the waste sector, as well as potential entry points for circular approaches and suitable instruments.

⁷⁵ <https://www.circularity-gap.world/2021#downloads>

⁷⁶ <https://www.unep.org/news-and-stories/press-release/mounting-problem-worlds-cities-produce-10-billion-tonnes-waste-each>

⁷⁷ <https://www.globalwastemanagementconference.com/> (Assessed online Dec 2021).

⁷⁸ <https://www.circularity-gap.world/2021#downloads> (Assessed online Dec 2021).

⁷⁹ <https://www.globalwastemanagementconference.com/> (Assessed online Dec 2021).

⁸⁰ https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html (Assessed online Dec 2021).

⁸¹ UNEP, ISWA (2015). [Global Waste Management Outlook](#).

⁸² <https://www.circularity-gap.world/2021#downloads> (Assessed online Dec 2021).

⁸³ <https://www.globalwastemanagementconference.com/> (Assessed online Dec 2021).

⁸⁴ World Bank (2018). [What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050](#)

⁸⁵ UNEP (2021). [Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions](#)

⁸⁶ 2020 The Pew Charitable Trust "Breaking the Plastic Wave. A comprehensive assessment of pathways towards stopping ocean plastic pollution".

⁸⁷ Claro et al. (2019). [Tools and constraints in monitoring interactions between marine litter and megafauna: Insights from case studies around the world](#).

Figure 9: Waste management - value hill illustration on barriers, potential entry points and financial instruments for CE

Waste management

BARRIERS

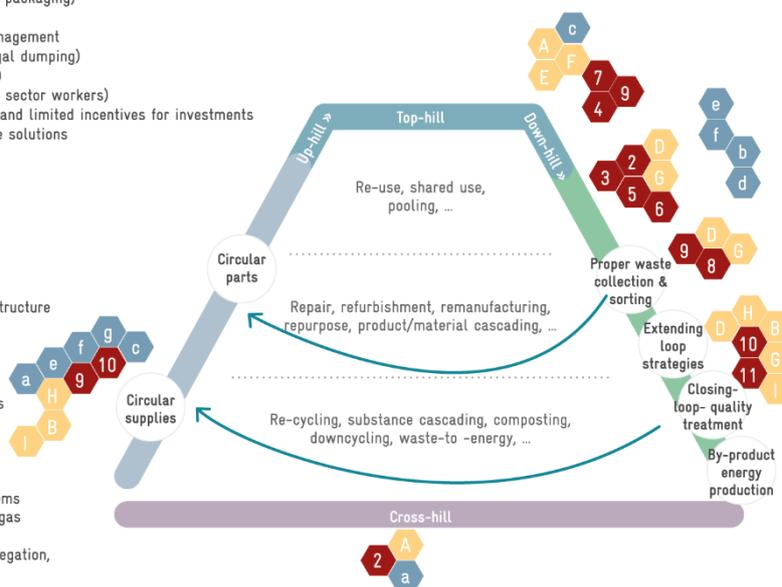
- 1 Little influence on waste composition (import of goods and packaging)
- 2 Insufficient information on materials/waste composition
- 3 Insufficient service fees to cover costs of public waste management
- 4 High service fees for low income households (leads to illegal dumping)
- 5 Lacking waste management (e.g., collection and separation)
- 6 Poor practices of waste collection (dependency on informal sector workers)
- 7 Inadequate financing for waste management infrastructure and limited incentives for investments
- 8 Insufficient technical/scientific capacity to develop cascade solutions
- 9 Locked-in of disadvantageous practices
- 10 Insufficient market for cascaded or recycled materials
- 11 Lack of quality of non-virgin materials

POTENTIAL ENTRY POINTS

- A Incentives for waste reduction
- B Price competitiveness for non-virgin materials
- C Design for (material) recycling
- D Construction and maintenance of waste management infrastructure
- E Affordable collection services
- F Integration of informal waste collection
- G Avoidance of lock-in effects into lower-value loops or linear systems
- H Mainstreaming of extending-loop and closing-loop solutions
- I Bridging the gap of market imperfections

FINANCIAL INSTRUMENTS

- a Grant-funding/technical assistance (e.g., EPR)
- b Policies/regulations for financing waste management systems (e.g., combining collected fees and revenues for sale of biogas and fertilisers)
- c Long-term, low-interest loans for SMEs for collection, segregation, or waste separate systems
- d PPPs and circular procurement
- e Grant-funding/Blended finance to cover transaction costs of large waste treatment investments
- f Loan default guarantees (incl. political risk insurance) for infrastructure investments to reduce cost of capital and improve access-to-finance
- g Fiscal transfers to finance municipal waste collection and treatment



Graphic is only illustrative. For more details, please see Annex 'Sector description'. Especially, instruments mapping heavily depends on circumstances that cannot be fully mapped on the value hill.

Sound solid waste management is dramatically cheaper than to clean up the 'sins of the past' in future years.⁸⁸ Moreover, improved treatment and disposal of solid waste could reduce methane emissions by 29–36 million tonnes per year by 2030.⁸⁹ Moreover, through enabling recycling, waste management also contributes notably to GHG savings in other sectors.

The following table sums up the main challenges, potential drivers, and levers for circular economy approaches in the waste sector.

⁸⁸ UNEP, ISWA (2015). [Global Waste Management Outlook](#).

⁸⁹ UNEP (2021). [Global Methane Assessment: Benefits and Costs of Mitigating Methane Emissions](#).

Table 14: Circular economy approaches for waste management - overview of sector characteristics

Main challenges	Potential entry points	Main drivers
<p><i>Down-hill:</i> Lacking waste management (strategy, regulatory framework, enforcement) poses a major threat to the environment as harmful waste and substances leak and endanger ecosystems.</p> <p>Waste management systems are largely designed as end-of-pipe solutions to decrease waste volumes and destroy harmful substances and not for preserving value. Revenues rely on stable waste volumes in the future.</p> <p>Lack of technology for like-for-like recycling, partly even for materials that themselves are still under development.</p>	<p><i>Cross-hill:</i> Economic and policy frameworks are needed to phase out linear waste management practices and incentivise circular solutions.</p> <p><i>Cross-hill:</i> Support to technological innovation and up-scaling through political frameworks and financial support.</p> <p><i>Down-hill:</i> Functioning waste management systems (collection, sorting, treatment) need to be installed, improved, and expanded to recover resources and protect the environment while considering socio-economic aspects (including informal sector collectors).</p>	<p>For developing waste management systems, the main drivers are regulatory frameworks and enforcement.</p> <p>For countries that are transitioning towards a Circular Economy, a supporting framework for enabling innovation is necessary.</p>

3 Potential entry points for CE and associated barriers by country

3.1 Rwanda

Abbreviations (Rwanda)

ACEA	African Circular Economy Alliance
BPR	Banque Populaire du Rwanda SA
Ci-Dev	Carbon Initiative for Development
CPCIC	Cleaner Production and Climate Innovation Centre
EDCL	Energy Development Corporation Limited
ESSP	Energy Sector Strategic Plan
EUCL	Energy Utility Corporation Limited
EPR	Extended Producer Responsibility
FSS	Financial Sector Strategy
GGCR	Green Growth and Climate Resilience
GoR	Government of Rwanda
IPP	Independent Power Producer
KIFC	Kigali International Finance Centre
MINILAF	Ministry of Lands and Forestry
MININFRA	Ministry of Infrastructure
NBP	National Biomass Programme
MoU	Memorandum of Understanding
NIRDA	National Industrial Research and Development Agency
NST1	National Strategy for Transformation
NR	National Roadmap for Green Secondary City Development
SACCO	Savings and Credit Cooperatives
SAIP	Food Security Project
SWM	Solid Waste Management
RALGA	Rwanda Association of Local Government Authorities
REMA	Rwanda Environment Management Authority
REWSA	Rwanda Energy, Water and Sanitation Authority
RFSDP	Rwanda Financial Sector Development Plan
RGCI	Rwanda Catalytic Green Investment Bank
RGIF	Rwanda Green Investment Facility
RPPA	Rwanda Public Procurement Agency
RWFA	Rwanda Water and Forestry Authority
WASAC	Water and Sanitation Corporation
WAVES	Wealth Accounting and the Valuation of Ecosystem Services

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3.1.3.2.	Production
3.1.3.3.	Waste Management

3.1.1 Macroeconomic context

Rwanda's political environment is stable, its economic growth high (among the highest on the African continent) and the inflation rate low. In 2020, GDP growth dropped to 4.6% (compared to 12.6% in 2019) due to COVID-19.⁹⁰ According to the IMF forecasts, GDP growth will improve to 5.1% in 2021. Other forecasts predict a doubling GDP per Capita by 2024 due to industrial growth.⁹¹ The main financing sources for the country's growth to date have been public investments supported by grants, concessional and non-concessional loans from external donors whereas investments from the private sector are still low. The competitiveness of the private sector is also weighed down by water, transport, and energy infrastructure deficits, which leads to high cost of doing business. The government has set ambitious goals to become a middle-income private sector driven country by 2035.

The additional costs of the effects of climate change are estimated at 1% of GDP each year by 2030. The climate risk profile by USAID shows, that for instance, single extreme weather phenomena, such as heavy rains in 2012, led to a loss of 1.4% in GDP.⁹²

3.1.2 Financial sector

There are 16 licensed banks in Rwanda and 457 MFIs (19 Limited Companies and 438 Savings and Credit Cooperatives (SACCOs)).⁹³ Since 2008, the banking sector has been growing significantly with more than 20% growth p.a. and 25% since 2014.⁹⁴ However, financial inclusion remains low in Rwanda, with only 37% of Rwandans owning a formal financial account (in rural areas only 13%).⁹⁵ Banks are risk-averse and Rwanda's credit growth is low (although it accelerated to 20%).

After having peaked in 2017 at more than 8%, non-performing loans fell to 5.3% of total loans in September 2019 due to a new regulation on credit classification and provisioning and banks are well capitalised with a ratio of capital to risk-weighted assets above the minimum required. The volume of credits increased, but mainly due to the financing of large-scale projects.⁹⁶ To foster private investment, in January 2019, the National Bank of Rwanda adopted an interest-based monetary policy framework.⁹⁷ The Association of Microfinance Institutions (MFIs) in Rwanda has 318 active members, serving poor and middle-class families throughout the country. MFIs remain the biggest lenders to farmers—especially smallholder farmers. Agribusinesses are among the firms least likely to access bank finance, even if about 70% of the country's population works in the agri-sector.⁹⁸

⁹⁰ National Institute of Statistic of Rwanda, 2021, Gross Domestic Product – National Accounts 2020.

⁹¹ National Circular Economy Forum, 2021, Advancing Green Growth in Rwanda.

⁹² Climate Links, 2019, Climate Risk Profile: Rwanda, <https://www.climatelinks.org/resources/climate-risk-profile-rwanda> (Accessed online 20 November 2021).

⁹³ National Bank of Rwanda, 2021, List of Licensed MFIs and SAC, <https://www.bnr.rw/financial-stability/microfinance-institutions/list-of-licensed-mfis-and-sac/> (Accessed online 03 Nov. 2021).

⁹⁴ http://www.ngurizanshore.rw/IMG/pdf/banking_and_investment_analysis_rwanda_nguriza_nshore_revised_final.pdf (Accessed online 03 Nov. 2021).

⁹⁵ USAID, 2019, Feed the Future, Off-Grid Solar Market Assessment, https://sun-connect-news.org/fileadmin/DATEIEN/Dateien/New/PAOP-Rwanda-MarketAssessment-Final_508.pdf (Accessed online 03 Nov. 2021).

⁹⁶ World Bank, 2019, Rwanda Economic Update: Lighting Rwanda, <http://documents.worldbank.org/curated/en/593831561388957701/Rwanda-Economic-Update-Lighting-Rwanda> (Accessed online 03 Nov. 2021).

⁹⁷ AfDB, 2021, Rwanda Economic Outlook, <https://www.afdb.org/en/countries/east-africa/rwanda/rwanda-economic-outlook> (Accessed online 03 Nov. 2021).

⁹⁸ http://www.ngurizanshore.rw/IMG/pdf/banking_and_investment_analysis_rwanda_nguriza_nshore_revised_final.pdf (Accessed online 03 Nov. 2021).

The Financial Sector Strategy (FSS) is a long-term development strategy that governs the entire financial sector of Rwanda. The aim of the strategy is to support financial sector objectives as set out in Vision 2020, Vision 2050, National Strategy for Transformation (NST1), the Rwanda Financial Sector Development Plan (FSDP) II and the Strategy for Rwanda to become an international financial service centre. Some evidence of sustainable finance solutions for the private sector can be found in Rwanda, but with a focus on climate finance (such as access to clean energy and increasing climate resilience).⁹⁹

In 2020, it was announced that Rwanda will **convert FONERWA and set up a National Bank of Green Finance**, specifically dedicated to green finance (“Rwanda Catalytic Green Investment Bank”, RGCI). This financial institution will serve to mobilise private financing to support the implementation of green projects in Rwanda. In addition, the green bank should also constitute a climate finance hub for other African countries.¹⁰⁰ Most investments regarding **financing circular economy (CE) interventions** come from the Government of Rwanda (GoR), and Development Finance Institutions (DFIs). So far, the private sector plays a subordinated role, but its involvement is of great importance for future developments. The GoR is aware of this and plans the **establishment of private sector investment incentives** in the Green Growth and Climate Resilience (GGCR) Strategy.

3.1.3 Developments and areas of interest

Introduction

Rwanda is a small, hilly country (total area: 26,339 km²) with a **high population density** of 445 people per km². With about 80% being rural, almost 90% of the population highly depends on natural resources, including land, water, ecosystems, and forests.¹⁰¹ Rwanda comprises vast natural capital, particularly soil and forestry resources. However, Rwanda also faces destruction of its natural resources (partly due to urban pollution and natural resources pressures; water pollution e.g. due to agro-inputs; generation of hazardous and solid waste particularly in Kigali and Rwanda’s secondary cities, land scarcity, soil degradation and soil erosion, deforestation, climate change and loss of biodiversity).¹⁰² The **institutional and policy framework of Rwanda** and different initiatives are evolving to respond to the challenges and to support sustainable development, including CE activities. In 2017, GoR together with the World Economic Forum launched the **African Circular Economy Alliance (ACEA)** as a country-led platform, that support CE projects. Further, GoR has set up a **National Circular Economy Forum** where the public and private sectors exchange on opportunities and challenges. One focus of the Forum is the production of **biogas from urban, domestic, and industrial wastes**. Another focus is on **single-use plastics and the need to transitioning to sustainable alternatives** and concepts for **effective PET bottle recovery schemes**.

Key national institutions

One example that highlights the acknowledgement of the alarming rate of environmental destruction by the Government of Rwanda (GoR), was the formation of the **Rwanda Environment Management Authority (REMA)** established in August 2013. It facilitates the implementation of national policies and focuses on sustainable use of natural resources through decentralized structures of governance.¹⁰³ REMA is engaged in various programmes that promote sustainable development, including the **Green Industry and Private Sector Development**, with focus on **scaling resource efficient and cleaner production**, e.g. by promoting special economic zones (SEZs), incl. the deployment of energy efficient technologies, water recycling, waste management systems and low carbon building design (**Development of eco-industrial parks**).

The National Industrial Research and Development Agency (NIRDA) established the **Cleaner Production and Climate Innovation Centre (CPCIC)**¹⁰⁴, which replaced the Rwanda Resource Efficient and Cleaner Production Centre and **provides access to green technologies and business services and promotes for instance CE**, climate resilience, environmental compliance, and sustainable development in general.

⁹⁹ For instance, the GCF-supported KawiSafi Ventures Fund or programmes implemented via FONERWA.

¹⁰⁰ Afrik21, 2020, RWANDA: Green bank creation on government’s agenda, <https://www.afrik21.africa/en/rwanda-green-bank-creation-on-governments-agenda/> (Accessed online 03 Nov. 2021).

¹⁰¹ Wavespartnership, 2020, Rwanda, <https://www.wavespartnership.org/en/rwanda> (Accessed online 20 November 2021).

¹⁰² SIDA; 2019, Rwanda Environment and Climate Change Analysis (SIDA Helpdesk for Environment and Climate Change)

¹⁰³ Land Portal, 2020, Rwanda Environment Management Authority, <https://www.landportal.org/organization/rwanda-environment-management-authority> (Accessed online 20 November 2021).

¹⁰⁴ CPCIC was established at the time when the Kigali Amendment (e.g., reduce the consumption and production of hydrofluorocarbons (HFCs) was signed in 2016. <https://www.ktpress.rw/2021/08/how-cpic-is-contributing-to-rwandas-green-growth-agenda-through-tech-shift/> (Assessed online 10 February 2022).

FONERWA, the **Rwanda Green Fund** is a special environment and climate change fund established in 2012 - supporting the GGCR strategy. The fund is financed by the GoR, bilateral and multilateral development partners (incl. DFID, KfW, UNDP, CIDT, CDKN, GGGI, GCF, Sida) and private sector contributions. It is **funding green technologies** and builds capacities among industries, manufacturers, and hotels to reduce energy, water use and pollution – addressing public and private interventions. The GoR aims to **convert FONERWA into a Green Bank, the Rwanda Catalytic Green Investment Bank (RCGIB)** as a public-private partnership that will initially focus on provision of loans, non-reimbursable and reimbursable grants for financing pipeline projects. The RCGIB will also be part of the Kigali International Finance Centre (KIFC) and will provide climate financing to a regional market.

Key national strategies and policies with relevance for CE

Rwanda's updated Nationally Determined Contribution (NDC) is strengthening its mitigation and adaptation contributions with improved data collection and analysis. The NDC includes unconditional and conditional GHG mitigation targets from activities in the energy, **industrial processes and product use, waste**, and agriculture sectors and indicates that forestry and other land use might be included within future contributions. 24 adaptation interventions are presented including for the water, agriculture, land, and forestry sectors. Other interventions involve improvement of forest management and promotion of afforestation and reforestation, wetlands restoration, water storage and **efficient water use, and conservation practices**. In addition, it underscores the value of monitoring, reporting and verification frameworks. The NDC estimates the total cost for Rwanda's identified NDC measures through 2030 at USD 11 billion (40% for unconditional and 60% for conditional measures).¹⁰⁵

Rwanda's National Strategy for Transformation (NST1) (2018–2024) is the successor of the Economic Development and Poverty Reduction Strategies 1 & 2 (EDPRS) setting medium-term objectives. NST1 is built on three pillars: **1. Economic Transformation, 2. Social Transformation, and 3. Transformational Governance**. The overarching objective of the Economic Transformation pillar is to: **accelerate inclusive economic growth and development founded on the private sector**, knowledge, and Rwanda's natural resources. Natural resources shall be exploited sustainably, and the environment protected.¹⁰⁶ Some **CE-relevant key objectives** highlighted in NST1 for 2023/2024¹⁰⁷ include the promote climate resilient human settlements: Households settled in integrated planned settlements will increase from 55.8% 2014 to 80% by 2024; creating green spaces in urban and semi urban areas including secondary cities; Encourage cleaner production and resource efficiency practices in industries (water recycling and pollution control); Manage and protect water catchments to mitigate disasters and efficient storm water management; Positioning Rwanda as a world class and high end ecotourism destination; and Improve cross sectoral coordination to ensure smooth implementation of environmental policies and regulations.

The Green Growth and Climate Resilience National (GGCR) Strategy has been in place since 2011 and aims facilitating the transition to a developed climate-resilient and low-carbon economy by 2050. It includes 14 Programmes of action and a roadmap, lists 'Big Wins' that if implemented will make a significant impact on adaptation, mitigation and economic development as well as immediate 'quick wins'. The strategy also includes information on funding opportunities, highlighting the importance of domestic sources of revenue and leveraging private capital for low carbon and adaptation activities besides accessing international financing (also providing a list of international funding opportunities) and mentions Clean Development Mechanism (CDM) and voluntary carbon markets as a potential source of revenue for public and private mitigation initiatives.¹⁰⁸ It also targets to build carbon trading capacity within the private sector to harness innovative funding opportunities provided by CDM and voluntary carbon markets. **GGCR-Action 7 addresses the promotion of green industry and private sector investment**, e.g., by **'transferring SEZs and industrial parks to sustainable ones, promoting water efficiency, the application of efficient and zero waste technologies**.

¹⁰⁵ IISD, 2020, NDC Update: Rwanda is First LDC in 2020, Andorra Commits to Carbon Neutrality by 2050, <https://sdg.iisd.org/news/ndc-update-rwanda-is-first-ldc-in-2020-andorra-commits-to-carbon-neutrality-by-2050/> (Accessed online 03 Nov. 2021).

¹⁰⁶ Rwanda Embassy, 2018, Rwanda in the next seven years (2017-2024), <https://rwandaembassy.org/rwanda-in-the-next-seven-years-2017-2024.html> (Accessed online 03 Nov. 2021).

¹⁰⁷ Republic of Rwanda, 7 Years Government Programme: National Strategy for Transformation, http://www.minecofin.gov.rw/fileadmin/user_upload/NST1_7YGP_Final.pdf; Government of Rwanda, 2018, National Strategy for Transformation and Green Priorities, <https://greengrowth.rw/wp-content/uploads/2018/12/AGGF-Presentation-on-National-Strategy-for-Transformation-and-Green-Priorities-by-Godfrey-Kabera-Ministry-of-Finance-and-Economic-Planning.pdf> (Accessed online 03 Nov. 2021).

¹⁰⁸ <https://www.greengrowthknowledge.org/sites/default/files/downloads/policy-data-base/RWANDA%29%20Green%20Growth%20and%20Climate%20Resilience%20-%20National%20Strategy%20for%20Climate%20Change%20and%20Low%20Carbon%20Development.pdf> (Accessed online 03 Nov. 2021).

The **Organic Law on Environmental Protection, Conservation and Management** regulates the protection of Environment in Rwanda. The law No57/2008 prohibits the manufacturing, importation, use and sale of polythene bags in Rwanda and has been extended to ban all types of carrier/shopping plastic bags and plastics for wrapping of goods. Law n° 17/2019 banned additional single-use plastics items (drinking straws, plastic plates, cups, and cutlery) and refers to an environmental levy for the import of goods packaged in plastics materials.

The **National Law on the Environment** (2018) addresses the management and disposal of solid waste, liquid waste, hazardous and toxic waste, and electronic waste and refers to the 'polluter pays principle'. The **National Environment and Climate Change policy** (2019) has the vision to “*promote the CE to advance sustainable consumption and production patterns*”, e.g., through incentivising organisations to align with the CE principles.

Summarizing GoR priorities the current developments and strategies (including Rwanda’s NDC and SDGs), provide an indication for national priorities for CE interventions:

- **Energy and urban planning:** Sustainable urban planning (incl. CE in construction) and public transport, clean fuel, and fuel efficiency.
- **Agriculture, Forestry and Other Land Use:** Sustainable agriculture, land & forest management, afforestation, reduction of fuel wood consumption.
- **Production and consumption:** green industry, particularly cleaner production, resource efficiency, renewable energy and energy efficiency, water recycling, waste management, promoting eco-industrial parks, transitioning from single-use plastic to sustainable alternatives and recovery schemes.
- **Waste management:** with focus on waste reduction, recycling, and reuse: e.g., production of biogas from 'organic waste'.
- **Cross-cutting theme:** Water-use efficiency across all sectors; mobilizing private sector engagement.

Those areas seem to well reflect priorities in Rwanda where CE can play an important role. Below, the sectors Urbanization, Construction (incl. energy related issues), and Production will be taken into focus regarding barriers and opportunities for CE.

3.1.3.1 Construction and urbanization

Construction Rwanda is one of the most densely populated countries in the continent (urbanization growth rate at 4% p.a.), which puts pressure on available urban ecosystems. Public transport in Kigali is rudimentary and airborne fine particles are steeply increasing due to highly dense traffic. Sustainable urbanization has been one of the country’s key development strategies and has contributed significantly to economic growth and structural change in Rwanda through the reallocation of labour from an agri-dominated sector to more industry and service oriented employment.¹⁰⁹ Until 2032 more than 300K+ new households will need to be accommodated in the seven largest cities.¹¹⁰ While more than half of the total population is living in Kigali, the **Urban Development Plan** seeks to develop secondary cities. Massive infrastructure projects will be established and will attract funding from DFIs. Besides the risk of land destruction (given small land size), **circular approaches should be considered in the construction sector**. This requires use of sustainable materials and recycled secondary materials in construction, as well as wise and intensified use of existing infrastructure (e.g., use of abandoned buildings, dismantling of unfinished buildings, etc.).

Urbanization A notably huge programme is the development of **Green City Kigali**, a modern city that will integrate efficient and renewable energy, e-mobility infrastructure, sustainable waste management, urban forests while tapping on local resources. With projected funding needs between USD 4 and 5 billion, Green City Kigali aims to provide 30,000 housing units (10% for low-income residents). Legal ground is the **National Urbanisation Policy** adopted? in 2015. The policy advocates integrated urban planning and management systems in order to achieve **resource efficient** and compact growth and underlines the efficient use of natural capital based on green economic development principles. Also, EDPRS 2 includes a **priority on green urbanization involving six secondary cities**. The policy promotes a “green economy” approach to economic transformation which favours the development of sustainable cities and villages. Key innovations include piloting a green city and attracting investors in green construction, and GoR intends to enhance these innovations by reinforcing partnerships that are crucial to implement the Green City Pilot in Kigali. To this end, a Memorandum of Understanding (MoU) between the relevant stakeholders has been signed.

¹⁰⁹ World Bank, 2019, Rwanda Systematic country diagnostic, [Link](#) (Accessed online 03 Nov 2021).

¹¹⁰ Kigali, Musanze, Rubavu, Rusizi, Muhanga, Huye, Nyagatare.

The NST1 that succeeds EDPRS 2, continues to prioritize sustainable urbanization through the development of flagship projects and implementation of master plans in secondary cities. A **National Roadmap for Green Secondary City Development (NR)** guides the planning of the six secondary cities that have been identified in EDPRS 2. The identified **pillars of green urbanization are building and construction, energy production and consumption, urban mobility, water production and distribution, water sanitation, and waste management**. In the **transport sector** (relevant to both: urbanization and construction) the main mode of mobility is public transport via busses. There are less than 100K cars in Rwanda (<0.01 cars per capita).¹¹¹ This is in line with the general line of sight by the GoR to foster public instead of private transport. **E-mobility sharing policies are under development**. Overall, green mobility received gradually attention and some international stakeholders are already involved (e.g., Volkswagen).

Info-box 1 – engagement of IFIs in selected urbanization projects

- **World Bank:** Follow up project *Planned Rwanda’s Urban Development Project 2 (RUDP2)* (Total USD 175.45 m grant and loan finance, funded by the World Bank, GEF, CIF, two Trust Funds and the NDF) will pilot nature-based solutions for **sustainable urban development**. This includes strategic planning and wetland restoration investments for integrating biodiversity and ecosystem values in urban development processes (provide access to basic services, enhance resilience, and strengthen integrated urban planning and management in the City of Kigali and the six secondary cities of Rwanda).¹¹²
- **GCF, IFC, KFW:** Pilot project for the **development of a new green city Kigali district**.¹¹³ Initially, a feasibility study has been carried out that lays down the main **principles of green urban planning and mobility** in Rwanda. Based on this study, an international architecture competition has been held to encourage participation from abroad for the detailed planning for the first 16 hectares of the site and for developing the master plan for this model city (for the area as a whole). Construction work is scheduled to start in 2023.

Recommended entry points/CE engagement opportunities in urbanization and construction

Based on the sector strategies and national priorities, identified entry points include the following, but are not limited to:

Circular design and production (up-hill)

- The establishment of functioning markets for non-virgin materials.
- Sustainable urban planning

Circular production (top-hill)

- Encourage cleaner production and resource efficiency practices in various industries

¹¹¹ <https://www.statistics.gov.rw/publication/statistical-yearbook-2019> (Accessed online 15 Nov. 2021).

¹¹² World Bank, 2020, Project Information Document: Second Rwanda Urban Development Project, (Accessed 03 Nov. 2021).

¹¹³ Urban development - Rwanda: a green district is being created as a model of sustainability, that includes the construction of environmentally sound housing and an extension of the public transport system, 620 h area, 1% of total Kigali at the heart of the capital. The green building agenda will integrate efficient and renewable energy, e-mobility infrastructure, sustainable waste management, and urban forests. The Green City can serve as a template for urban development in other Rwandan cities and elsewhere in Africa.

Table 15: Rwanda – Construction and Urbanisation Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers - Construction
Capacities	While public spending represents the lion's share of investments, generally more financing is needed to meet the GoR targets (e.g., add 400K new buildings).	One supportive activity is to contribute to knowledge dissemination and capacity building, e.g., through grant funding in form of TA/training/consultancy service by supporting the African Circular Economy Alliance (ACEA) and the National Circular Economy Forum (set up by the GoR) in its plans to develop a platform that fosters circular cooperation with domestic and international stakeholders. <ul style="list-style-type: none"> Support the development of a knowledge-exchange platform for secondary cities (e.g., within the structure of Rwanda Association of Local Government Authorities (RALGA). Capacities of districts decision-makers and technicians need to be developed (e.g., Grant funding (KPI-linked): continuous education program or the implementation of a direct coaching program targeting local technicians in charge of green/circular urbanization).
Capacities	There is low level of resource and energy efficiency standards in construction of domestic and commercial buildings. Lack of adequate standards for the usage of non-virgin materials. Non-availability of non-virgin materials Price advantage of non-organic, less eco-friendly materials	<u>Urbanization (up-hill)</u> Based on the National Urbanisation Policy in 2015, the GoR considers integrated urban planning and management systems to achieve resource efficient and compact growth. Plus, the National Roadmap for Green Secondary City Development shows governmental commitment for e.g., green city growth measures. This can be further strengthened via Grant funding/TA by: <ul style="list-style-type: none"> Support the establishment of nation-wide standards for circular construction material – also beyond the (pilot) Green City Kigali as secondary city development is GoR-priority as well. As indicated in the WAVES program¹¹⁴, there are vast natural resources available, and regulatory interventions are needed to ensure sustainability and prevent exploitation. -> Aim to make non-virgin materials available and attractive for the construction sector.
R&D	There is a huge import-export deficit for construction material and a huge lack of technologies to foster CE-practices in the domestic construction market.	<u>Construction (up-hill)</u> Facilitate R&D (via grant funding) to define and support the development (and implementation) of CE concepts for construction materials (e.g., see collaboration between University of Rwanda and the University of Applied Sciences Neu-Ulm ¹¹⁵). Concretely: <ul style="list-style-type: none"> Support the development of products with high-recycled content (material with high durability used in structural elements). Support the development of less “wet methods” in construction, but foster on mechanical connections (e.g., principle of design for disassembly (design construction products easy to separate into components that can be reused, reassembled, reconfigured, recycled). Shift from virgin non-metallic minerals (glass, cement, sands, ceramics) to recycled minerals. Optimize the material and construction supply chains by using locally abundant biomaterials instead of imported construction materials.
Fiscal policy	Lack of effective regulation that addresses natural resource exploitation. Non adequate pricing-in environmental damage or losses (e.g., deforestation), due to linear economic practices (e.g., there are no tax exemptions for repair and modularity).	Foster fiscal policies reforms that govern the construction sector with more CE related incentives (grant funding/direct consultancy services), (e.g., encourage a change from virgin materials to non-virgin materials) Adequate pricing-in environmental damage or losses (e.g., deforestation) is not happening, due to linear economic practices (e.g., air pollution leading to health issues by coal-based electricity). <ul style="list-style-type: none"> Evidence from World Bank WAVES reports could be used to showcase the economic costs, if environmental related costs are not addressed. Lead ministries are Rwanda Natural Resources Authority and the Rwanda Environmental Management Authority under the Ministry of Natural Resources, together with the Ministry of Finance and Economic Planning. Support introduction and up-scaling of Extended Producer Responsibility (EPR) (e.g., currently, only for plastic packaging, but also relevant for other critical sectors such as the regulation on e-waste, construction).

¹¹⁴ <https://www.wavespartnership.org/en/rwanda> (Assessed online 05 January 2022).

¹¹⁵ <https://www.hnu.de/en/research/institutes-and-competence-centres/africa-institute/circular-agro-economics> (Assessed online 05 January 2022).

	Barriers	Access to finance / Risk reduction - Instruments/mechanisms to respond to barriers – Construction
Access to capital / Risk reduction	<p>Lack of capital for large scale investments</p> <p>Risk-return line for investments by private sector actors is still in favour of traditional “linear” and short-dated productions. Given the non-availability of sufficient investment products, international levels of funding remain low.</p>	<p>Consider the development of (municipal and sustainability-linked) bonds for urban infrastructure development. Issuing of municipal bonds is gaining popularity (esp. in Kigali) to attract capital for large scale projects¹¹⁶. The Ministry of Finance and Economic Planning (MONECOFIN) are evaluating prospects to introduce municipal bonds to enable municipalities to issue bonds. The target objectives are investments for infrastructure projects (long-term projects with high public good character This financing instrument represents a vital opportunity to leverage private sector funding:</p> <ul style="list-style-type: none"> ▪ National Bank of Rwanda and private banks increase pace of issuing green bonds via its local capital market (tenor: +10 years) to develop large scale infrastructure.¹¹⁷ ▪ Boosting the skills and expertise around “Green Financing” is a priority of the Development Bank of Rwanda via issuing green bonds to finance green initiatives.
		<p>Support the Capital Market Authority in Rwanda and the Rwanda Stock Exchange (RSE) via grant funding in form of TA/training/consultancy service to establish environmental, social, and governance (ESG) standards in Rwanda to improve investor trust, attract capital, and grow strong capital markets. Core Indicators for Circular Economy and Eco-Efficiency Projects, include % increase in materials, components and products that are reusable / recyclable; increased proportion of circular materials produced as a % of the total material production of the project; Waste that is prevented, minimised, reused or recycled before and after the project in % of total waste; education or removal of harmful substances (persistent, carcinogenic, mutagenic, reprotoxic) used in %. For Top-hill/Downstream see <i>Suggested Impact Reporting Metrics for Circular Economy and/or Eco-Efficient Projects (June 2021)</i>¹¹⁸.</p> <p>Note, IFC and SSE are aiming to assist the national efforts to revise the development of an ESG Scorecard and Reporting Guidelines to improve the debt financing conditions for ESG investments. While IFC has developed draft indicators, including: Good governance framework, code of ethics, promotion of long-term sustainability, the Stock Exchange has not included any information regarding ESG interventions in its annual report 2020.¹¹⁹</p>
Access to capital / Risk reduction	Limited access to finance	<p>Facilitate FONERWA for green urban development, construction (also relevant for other areas of interest)</p> <p>The basket fund FONERWA has multiple credit lines that provides financing at slightly above 10% p.a., well below market rates which can facilitate CE business opportunities. This is the lowest cost of capital for debt in the country. FONERWA with assets of USD217 million under management, generated already 150K green jobs¹²⁰). In 2022 FONERWA and Rwanda Development Bank developing the Rwanda Green Investment Facility (RGIF) under the RCGIB: RGIF is designed as a “green bank” model addressing local market gaps in private finance using financial tools. Aims to ease the access to non-grant international finance resources. (<i>relates also to other parts such as Special Economic Zones</i>).</p> <ul style="list-style-type: none"> ▪ RGIF is still looking for further capitalization (Donors so far: UNEP, GCF, AfDB, KfW). -> <i>Validate the opportunity to further capitalize RGIF with e.g., equity injection.</i> ▪ One of FONERWAs/RGIF policies deals with “innovation grant mechanisms” and “green incubator programmes”. -> <i>Validate the opportunity to bring CE-principles in the policies.</i> ▪ In addition, FONERWA has a dedicated <i>Private Sector Strategy (PSS)</i>. So far, there are no specific principles directly mentioning CE. -> <i>Validate opportunities to add CE to the PSS.</i> ▪ The ambitions to turn FONERWA into the Rwanda Catalytic Green Investment Bank are not implemented -> <i>Validate progress with government and partners (ADB, Nordic Development Bank) and assess opportunities to support the establishment of a green bank.</i>

scope for private finance to deliver low-carbon transport systems in Kigali, Rwanda.

¹¹⁷ Note: First green bond raised 400m in 2013. Second green bond raised +600m in 2021 at a yield of 5.5% (10-year tenor).

¹¹⁸ <https://www.icmagroup.org/assets/documents/Sustainable-finance/2021-updates/GBP-IRWG-Suggested-Impact-Reporting-Metrics-for-Circular-Economy-andor-Eco-Efficient-Projects-June-2021-100621.pdf> (Assessed online 15 January 2022).

¹¹⁹ <https://www.rse.rw/media-and-publication/Annual-Reports/> (Assessed online 14 February 2022).

¹²⁰ <https://www.newtimes.co.rw/business/rwandas-green-investments-have-generated-150000-green-jobs> (Assessed online 02 Jan 2022).

3.1.3.2 Production

Over the last decades, the consumption level is continuously growing. Along with the strong population and economic growth, domestic material consumption is on the rise as well. The majority of business operations continue to operate within a conventional ‘take, make, dispose’ model of consumption without an appropriate awareness of CE related business opportunities. The manufacturing sector is still small but is growing gradually. With the objective to increase the domestic and foreign supply of manufactured goods, GoR has established a Special Economic Zone and 9 Industrial parks¹²¹, which provide infrastructure important for businesses.

Rwanda’s industrial policy prioritizes inclusive economic growth, including private sector-led development with a focus on high-value intensive agriculture and agro-processing, manufacturing, and ICT (in line with NST1). With the adoption of the National Industrial Policy in 2011; several relevant policy interventions and strategies have been developed, including the Made in Rwanda policy, the Entrepreneurship Development Policy (EDP), the Special Economic Zones policy, and the Domestic Market Recapturing Strategy (DMRS).

However, the Green Growth and Climate Resilience Strategy (GGCRS) can be seen as the core instrument that supports CE-related sector developments. It focuses among others on **green industry development** and mobilization of private capital for business and industry. One of its goals is to employ **efficient and zero waste technologies, practices, and design in Special Economic Zones (SEZ)** and provincial **industrial parks** - to stimulate **energy and water efficiency, green site preparation, building and design as well as waste treatment options** in the SEZ and industrial parks.

With the aim to **develop a strategy for the implementation of eco-industrial parks/zones in Rwanda**, UNDP, currently conducts an in-depth assessment study of the industrial zones on environmental management, investigating the existing environmental issues such as waste management, air pollution control, challenges regarding environmental degradation, and sustainability.¹²²

The before mentioned **Cleaner Production and Climate Innovation Centre (CPCIC)** is supported by various partners (including GGGI) and promotes CE-relevant activities and aims to become a drop-in-centre, which provides modern access to green technologies and business services. The Centre has already supported a number of companies in reducing operational costs, reducing their wastewater generation and energy use and their carbon emissions and material use. To **establish examples of good CE practice** – among others for industrial parks – NIRDA with CPCIC has scheduled technical audits and advisory services as well as capacity building (targeting e.g. resource efficiency and CE concepts) for 12 companies (e.g. for leather production, garments, textile).¹²³ NIRDA has further set up labs (J-Life Sciences/Huye & J-STEM/Kigali) to support product development e.g. in biotechnology, but also plans to support the commercialization and the access to finance.

One of the critical topics in terms of production (and consumption) is single-use plastics. As in other regions, the **use of and littering with single-use plastic items** strongly increases. Plastic waste in the environment contributes to flooding and hinders crops from growing as rainwater cannot penetrate the soil when it is littered with plastic and is associated with killing of livestock when ingested.

There is no primary **plastic bag production** in Rwanda based on prohibition laws from 2008 and a subsequent law in 2019. The GoR is committed to take key actions to eliminate (problematic and unnecessary) plastic packaging. The GoR will **encourage reuse models, incentivise the use of reusable, recyclable, or compostable packaging**, and will increase the waste collection rate. Notably, after the plastics ban in 2008, investors tapped into the opportunity and **established alternative packing industries** as well as **plastic recycling plants**. For instance, the company **Bonus Industries**, started producing paper bags for flour packaging, paper shopping bags, wax-coated paper for packaging bread, grocery paper bags, confectionary bags, seed bags and others, which are used by Rwandan supermarkets for packaging, according to the proprietor.

Currently, the Special Economic Zones still lack proper waste management, air pollution control, and major challenges regarding environmental degradation are present despite of various existing policies. Notably, the Green Growth and Climate Resilience Strategy mentions the promotion of green industry and private sector investment, e.g., by ‘transferring SEZs and industrial parks to sustainable ones, promoting water efficiency, the application of efficient and zero waste technologies.

¹²¹ In Bugesera, Rwamagana, Muhanga, Nyagatare, Musanze, Huye, Nyabihu, Rusizi, and Kicukiro.

¹²² https://procurement-notices.undp.org/view_file.cfm?doc_id=244750 (Assessed online 05 January 2022).

¹²³ National Circular Economy Forum, 2021, Advancing Green Growth in Rwanda.

Info-box 2 – engagement of IFIs in selected production and consumption projects

- **World Bank** supports the **Food Security Project (SAIP)** with USD 26.3 million for 5 years. It targets the farmer's use of improved agricultural technologies incl. the **use of organic fertilizer**, certified seeds a diversified and shifting cultivation including TA provided mainly by FAO. An important component of the project aims at **improving irrigation and water use efficiency** through grants for small-scale irrigation equipment and training on how to use the equipment effectively and efficiently to the farmers primarily for those in existing hillside sites without irrigation schemes¹²⁴ the World Bank has also implemented WAVES (**Wealth Accounting and the Valuation of Ecosystem Services**) to prepare Rwanda's first land accounts (1990 - 2015) with focus on assets and changes in land use, land cover, and land values and with overall aim of incorporating natural capital into national accounts to support better decisions.
- **E-waste recycling and refurbishing facility**. The plant is located outside of Kigali and is run in partnership with the GoR and a private company.¹²⁵

Recommended entry point/CE engagement opportunity in production sector

Based on the sector strategies and national priorities, identified entry points including, but not limited to:

Circular design and production (up-hill)

- Development of CE-aligned eco-industrial parks
- Development of plastic substitutes

Circular use (top-hill)

- Reshape business models for servitization to capitalize on longer use
- Re-think material ownership models (see chemical leasing service by CPCIC), to minimize waste residuals

Circular value recovery (down-hill)

- Promote environmentally friendly packaging from e.g., residual production

¹²⁴ GAFSP, 2020, projects, <https://www.gafspfund.org/projects/sustainable-agricultural-intensification-improved-livelihoods-food-security-and-nutrition> (accessed online 02 Nov 2021).

¹²⁵ Dubai-based waste management facility called Enviroserve. Source: <https://www.greenmatters.com/p/rwanda-e-waste> (Assessed online 23 November 2021)

Table 16: Rwanda – Production Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers – Production
Regulation	Lack of sufficient pricing-in of social and environmental costs	<p>Build on the Environment and Climate Change Policy. In this policy promoting CE is one of the policy's guiding principles and two policy actions target an institutional and legal framework and to incentivise the private sector to optimise the use of CE principles across various sectors of the economy.</p> <ul style="list-style-type: none"> ▪ Consider options to expand Extend producer responsibility (EPR) through respective policies. Currently, only levies for imported single-use plastic items and goods that come packaged in plastic. (offer grants for / or direct Technical Assistance) ▪ Promotion of development of environmentally friendly packaging¹²⁶ represents a business opportunity. ▪ Support the National Industrial Research and Development Agency (NIRDA) and the CPCIC in implementing the scheduled technical audits and advisory services and capacity building (targeting e.g., resource efficiency and CE concepts) for 12 companies (e.g., for leather production, garments, textile).¹²⁷
Capacity Building	Given the large import-export overhang, there is a lack of awareness for full value chain considerations.	<p>Support the GoR to facilitate the development of locally produced products and the CE concept:</p> <ul style="list-style-type: none"> ▪ The production sector is focused on raw material production (e.g., producing and exporting cow skin, instead of producing and selling leather belts for the domestic market). Only a few products (e.g., coffee, tea) are processed? at relevant scale. <p>A supportive option is to promote special economic zones (SEZs) and improve production conditions. Thus, promotion of CE activities in the SEZs / industrial parks. Provide capacity building on good practice of REMA's initiative to develop eco-industrial parks and UNDP's assessment study of the industrial zones, e.g., support the detailed SEZ/IP-audits/assessments in coop with REMA and CPCIC to define a concrete CE-Investment pipeline (incl. Resource efficiency, or stable electricity (e.g., there are problems in existing SEZs that electricity shortages occur frequently)).</p> <ul style="list-style-type: none"> ▪ Build on "Made in Rwanda" (by the GoR) initiative and increase domestic production (especially low hanging fruits are identified in agri sector), instead of imports, and facilitate resource efficiency and integrate CE principles. In line with the Rwanda Vision 2020 as the government is committed to expand and diversify the economic base
Capacity Building	Lack of CE-awareness	<p>Offer trainings to the Cleaner Production and Climate Innovation Centre to increase the supply/services of CE related activities.</p> <p>Promote public campaigns to overcome socio and cultural habits rooted prohibiting increase of second-hand materials as they are not desired by manufacturer and consumers.</p> <p>Promote the development of environmentally friendly packaging from, e.g.:</p> <ul style="list-style-type: none"> - residual production (consider food conflicts/securities) - improved product design by remanufacturing (extending end-of-life). - Potential companies for further collaboration are: UMUTI Paper^{128, 129} (using residual harvest-products such as banana leaves to create eco-friendly paper bags); or GreenPack¹³⁰ (focussing on sustainability, reliability and customization). - Potential governmental partners are REMA (high-level), but also the Rwanda Private Sector Federation (PSF) that launched a five-year Project (Sustainable Management of Single-use Plastics) where private sector actors are willing to mobilize finance, and REMA offers technical assistance. The project aims to mobilize between USD500,00 and 700,000 between 2021 and 2026. The project is in its early stage and further capitalization of the PSF fund can leverage proposed investments in collection, processing, and recycling of single-use plastics. From September 2021, fines will be issued to companies (around USD5,00).

¹²⁶ <https://www.foodcircle.com/magazine/sustainable-ecofriendly-food-packaging> (Accessed online 02 Nov 2021).

¹²⁷ National Circular Economy Forum, 2021, Advancing Green Growth in Rwanda.

¹²⁸ <https://www.newtimes.co.rw/business/startup-producing-packaging-bags-banana-trunks-lands-support> (Assessed online 14 Feb 2022).

¹²⁹ <https://gggi.org/rwanda-circular-economy-business-model-selected-to-compete-globally-in-the-2020-greenpreneurs-program/> (Assessed online 14 February 2022).

¹³⁰ <https://www.greenpack.co.rw/about-us/> (Assessed online 14 February 2022).

	Barriers	Access to finance / risk reduction - Instruments/mechanisms to respond to barriers - Production
Access to finance	Limited interest of private companies to engage with leasing concepts due to limited availabilities and unclear legal base	<p>Leasing/Sharing models:</p> <ul style="list-style-type: none"> - Support the chemical leasing services by the Cleaner Production and Climate Innovation Center (CPCIC) - Review sharing concepts for capital equipment and manufacturing. E.g., consider As-a-service unit for selected products (incl. electronic equipment)
Risk reduction	<p>Lack of an effective de-risking scheme to mobilize private companies.</p> <p>Risk-return calculations for investments by private sector actor is still in favour of traditional “linear” and short-dated productions.</p>	<p>Guarantees: Support the African Development Fund (by the AfDB) Partial Risk Guarantee to incentivize GoR to undertake policy and fiscal reforms necessary to mitigate performance-related risks with respect to CE-related activities. The guarantees protect private lenders against well-defined political risks related to the failure of a public authority to honour certain specified commitments, incl. political force majeure, currency inconvertibility, regulatory risks (adverse changes in law), and various forms of breach of contract¹³¹</p> <p>De-risk through shifting public activities away from substitute environmental harmful imports by domestic/local and more ecosystem-controlled activities (see WAVES programme by the World Bank. It addresses Natural Capital related issues (focus on land degradation and water) but offers important insights for domestic circular activities). This would improve the local CE, as ecological hazardous imports do not enter the ecosystem.</p> <p>Developing de-risking products via building on the well-regulated and organized financial sector (Rwanda has a very well-organized financial sector compared to neighbour countries)</p> <ul style="list-style-type: none"> - Offer (purchase) guarantees for CE-related and locally produced products - Offer (loan default) guarantee to for accessing commercial debt finance esp. for SMEs.
	Lack of experience with new technologies or production processes can lead to limited results (e.g., energy and water savings are lower than expected).	<p>Facilitate access to finance needs by promoting green bonds, meeting ESG standards:</p> <ul style="list-style-type: none"> - Currently in an early stage, but can be levelled to reliable international standards for attracting sustainability-linked investments (e.g., Green bonds, based on ICMA principles) <p>Developing green financing vehicles for channelling impact investment money using private capital. (e.g., set up of circular credit-line (debt instruments) with explicit criteria and the integration of CE concepts (KPI-linked loans) as e.g., Circular Economy Indicators (OECD Inventory). Note ESG standards are not approved but have been developed by IFC. Development of exclusion lists might be supportive as entry point to impact finance products.</p>
Reduce Risk	Lack of appropriate procurement regulations that leads to linear procurement practices	<p>Support the Rwanda Public Procurement Authority in the development of Circular Procurement Policy¹³², incl. focus on investments in SEZ-facilities.</p> <ul style="list-style-type: none"> - Promote the transition towards a circular economy by using procurement policy as a key lever to create demand for more circular activities in the construction sector - <p>Product service systems for the public sector, full life-cycle costing, are not always accommodated within procurement rules.</p> <ul style="list-style-type: none"> - Build on the outputs of the Public Procurement Trainings by GGGI¹³³ in 2019 and offer services to the Rwanda Public Procurement Agency (RPPA). - Potential best practice examples for “sustainable/circular procurement” in Rwanda provided by GGGI and respective workshops with RPPA, incl. switch to LED lighting; install occupancy sensors and daylight sensors; install rainwater collection tanks to reuse for landscape; irrigation; switch to efficient plumbing fixtures, etc. <p>One ongoing procedure by the RPPA is to incorporate green public procurement guidelines and develop implementation timeline in consultation with partners REMA, GGGI etc. (to be developed: Public Procurement Policy¹³⁴)</p>

¹³¹ <https://www.afdb.org/en/projects-and-operations/financial-products/african-development-fund/guarantees> (Assessed online 02 2022).

¹³² <https://gggi.org/gggi-rwanda-facilitates-the-green-public-procurement-gpp-guidelines-training-of-trainers-tot-workshop> January /?utm_source=rss&utm_medium=rss&utm_campaign=gggi-rwanda-facilitates-the-green-public-procurement-gpp-guidelines-training-of-trainers-tot-workshop (Assessed online 02 January 2022).

¹³³ Lilliane Uwanziga MUPENDE.

3.1.3.3 Waste management

Rapid urbanisation in Rwanda (Kigali population growth prediction 4% p.a.) leads to a high demand for public services including solid waste services. Around 300-400 tons (positive trend) out of 500-800 tons per day are transported to dumpsites in Kigali. Over the last decade, Rwanda has recognized poor solid waste management practices as a key impediment to sustainable development. This is reflected in the Solid Waste Management (SWM) targets at the national and city level. However, keeping up with demand for waste collection services and preventing environmental pollution is becoming increasingly problematic. There is only one landfill: the Nduba landfill in Kigali (open-air dumpsite) receiving approximately 35.8% of the overall waste generated in the city (remaining 10% illegally dumped or informally recycled). The recycling rate is estimated at a low 2-12%.

A household waste separation initiative in 2012 failed due to a lack of stringent guidelines and infrastructure. Landfills and waste collectors struggle with financing constraints due to high costs of delivering services and limited revenues earned. Low and middle-income households struggle with tariffs too high for them.¹³⁵

The major shortcoming in waste management is the Nduba landfill that faces several environmental problems including leachate, vermin, and spontaneous combustions. The City should devise a phased landfill operations to closure plan.

The transformation of waste to energy practices to more circular approaches represents a sensitive topic, as incineration business models in sub-Saharan Africa often represents a lucrative business and a legitimate method. While GGGI supports GoR to identify needs – a combination of different challenges (e.g., small sector, low level of collection rate, low level of enforcement, unattractive conditions given existing waste incineration concepts) hardly motivates the private sector.¹³⁶ Implementation comes with huge challenges in terms of access to finance and especially with capacity gaps moving from traditional system to innovative solution for waste management.¹³⁷

Waste collection in Kigali privatised since 2003. Waste is collected directly from households against fees (1-5 years contracts). The system is characterized by a high degree of non-payment. While all higher income households tend to pay for the service, only between 50-60% of middle-income households and 20% of lower income households pay for waste collection services.¹³⁸

Rwanda's Vision 2020, EDPRS II and its successor NST I prioritise SWM. Various policy and legal documents stress SWM principles such as the Waste hierarchy, and the polluter-pays-principal. There are guidelines for sanitary landfills and landfill operation protocols. Regulations are in place to manage waste disposal sites, waste recycling, e-waste, and hazardous waste. The National Sanitation Policy Implementation Strategy, 2016 targets a disposal rate of 60%/80% of domestic waste by 2020/2030, and a recycling rate for non-organic solid waste of 30% / 40% by 2020 /2030.

The GoR expects the private sector to take its responsibility and play a role in fighting single use plastics, e.g., by investing in **reusable alternatives** (incl. water dispensers, jugs, and glasses).¹³⁹ Some private sector players already started *Bralirwa Plc, Inyange Industries, Entreprise Urwibutso, Sulfo Rwanda Industries*.

¹³⁴ https://gggi.org/gggi-rwanda-facilitates-the-green-public-procurement-gpp-guidelines-training-of-trainers-tot-workshop/?utm_source=rss&utm_medium=rss&utm_campaign=gggi-rwanda-facilitates-the-green-public-procurement-gpp-guidelines-training-of-trainers-tot-workshop (Assessed online 02 January 2022).

¹³⁵ IGC, 2019, Assessing waste management services in Kigali, <https://www.theigc.org/wp-content/uploads/2019/11/Rajashekar-et-al-2019-paper.pdf> (Assessed online 01 January 2022).

¹³⁶ GGGI, 2019, Solid Waste Management in Secondary Cities of Rwanda, <https://gggi.org/report/solid-waste-management-in-secondary-cities-of-rwanda-muhanga-huye/> (Accessed online 08 Nov. 2021).

¹³⁷ On the other hand, e.g., for waste collection good policies are already in place. Private sector is well engaged here.

¹³⁸ IGC: Assessing waste management services in Kigali, C-38435-RWA-1 (July 2019) (Accessed online 15 Nov 2021).

¹³⁹ National Circular Economy Forum, 2021, REMA: Brief on single use plastics.

Info-box 3 – engagement of IFIs in selected waste projects

AfDB: the Development of a Green Growth Investment Program in Africa – in cooperation with the Korean Republic – focuses on **waste management and the CE**. The programme specifically unlocks opportunities for public, private, and public-private CE investment projects in Algeria, Ethiopia, and Rwanda. Currently, the programme **conducts comprehensive gap analysis** for each country to identify priority areas and of **viable investment opportunities for public, private and PPP interventions in the waste management and CE sectors**. The programme also serves as platform for other development institutions and potential co-financiers that are interested in collaborating with the Bank on CE initiatives, e.g., through the **Africa Circular Economy Facility (ACEF)**, a multi-donor trust fund that supports a five-year continental programme (2021-2025) to support the adoption of circular practices in the Bank's Regional Member Countries.

Recommended entry point/CE engagement opportunity in waste

Circular design and production (up-hill)

- Strengthen implementation of regulations (e.g., waste and environmental law, trade law, tax law)
- Establish built-in economic incentives to reduce waste generation (e.g., tax exemptions, polluter pays principle, Extended Producer Responsibility (EPR), subsidies)

Circular value recovery (down-hill)

- Support the development of a general waste separation in Kigali (currently all waste ends up at Nduba Site, where some manual sorting is undertaken)

Consider progressive waste collection scheme to activate the private sector (e.g., high income population pays higher waste collection fees)

Table 17: Rwanda – Waste Management Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers - Waste
Capacities	<p>Capacity gaps that prohibit from moving from a traditional waste system to an innovative and integrated waste management system</p> <ul style="list-style-type: none"> ▪ The lack of available collection and treatment options¹⁴⁰ (e.g., lack of waste treatment infrastructure) particularly for e-waste and plastic waste (leads to waste disposal of solids and liquids illegally in rivers, wetlands, ditches, roadsides, and other public spaces) ▪ Waste is collected directly from households against fees (1-5 years contracts). The system is highly inefficient due to high degree of non-payment ▪ Lack of proper logistics leads to high degree of food losses ▪ There is a need for proper and safe treatment practices for reusing and remanufacturing of e-waste - an opportunity for recycling of valuable materials and using recycled materials in an increased production of affordable electronic (equipment) 	<p>Build on results of AfDB’s Development of a Green Growth Investment Program in Africa that reviews investment opportunities (incl. approaches to mobilizing investment through public-private partnerships (PPP), blended finance, and other innovative approaches to enhance green growth and circular economy development.) in the waste management sector, and identify concrete opportunities for interventions, particularly with focus on value recovery, such as recycling and reuse; e.g.:</p> <ul style="list-style-type: none"> ▪ Support the transitioning from single-use plastic to sustainable alternatives and recovery schemes, e.g., investigate investment opportunities for environmentally friendly packaging, naturally biodegradable packaging solutions, like starch by combining efforts of industry and the AFOLU-sector ▪ Support recycling facility for plastic waste (in collaboration with manufacturing to use recycled materials) ▪ Support the production of biogas from urban, domestic, and industrial wastes (which relies on proper selection and collection of waste)
Policies and regulations	<p>Budget restrictions: Low-income population are forced to take the cheapest solution (i.e., illegal deforestation). Urban waste, illegal landfills are persistent because waste collectors struggle with financing constraints due to high costs of delivering services and limited revenues earned. In addition, consumers are dissatisfied with irregularity of waste collection services by private sector actors.</p>	<p><u>Solid waste (down-hill)</u></p> <ul style="list-style-type: none"> ▪ Consider progressive waste collection scheme to activate the private sector (high income population pays higher waste collection fees). <p>Address capacity gaps and reduce commercial risk for moving from traditional system to innovative solution for waste management.¹⁴¹</p> <ul style="list-style-type: none"> ▪ Support GGGI in its initiative with the GoR to identify needs – combination of different challenges the sector seems too small yet to motivate the private sector.¹⁴² Note: municipal solid waste management (MSWM) in Muhanga and Huye is at rudimentary levels, with collection coverage rates at less than 10%. Municipal waste collection services are provided by private companies that are facing challenges associated with limited physical and financial capacities due to limited local demand, and low willingness-to-pay for the service. <ul style="list-style-type: none"> ○ For the secondary city Huye, GGGI recommendations, including valorisation of the waste-to-resource value chain, with specific attention to plastics and organic waste; and Development of a viable and sustainable business model to generate income streams in waste management for the Huye district government ○ For the secondary city Muhanga, GGGI recommendations, including, Establishment of transit sites with decentralized waste composting facilities; and Development of a regulatory framework for waste collection services, pricing, and disposal at the district level

¹⁴⁰ The use of traditional system comes because of limited available/lack of innovative solution. This is underlined by a study of GGGI (2019), that shows the willingness to pay for service is 3,000 FRW (around 3 Euro) which falls in within the current waste collection fee structure. According to the GGGI there is a general lack of awareness on municipal waste collection services and households are unlikely to use services due to unaffordability and dissatisfaction with irregularity of the services.

¹⁴¹ On the other hand, e.g., for waste collection good policies are already in place. Private sector is well engaged here.

¹⁴² GGGI, 2019, Solid Waste Management in Secondary Cities of Rwanda, <https://gggi.org/report/solid-waste-management-in-secondary-cities-of-rwanda-muhanga-huye/> (Accessed online 08 Nov. 2021).

3.2 Dominican Republic

Abbreviations (Dominican Republic)

ADOZONA	Dominican Association of SEZs
ASOF	Athelia Sustainable Ocean Fund
CAMIF	Central American Mezzanine Infrastructure Fund
CCDP	Climate Compatible Development Plan (
CEI-RD	Export and Investments Centre of the Dominican Republic
CNC	National Council for Competitiveness
CNZFE	National Council of Free Trade Zones
CONARE	National Council for State Reform
CTCN	Climate Technology Centre & Network
DPCS	Directorate of Sustainable Production and Consumption
DR	Dominican Republic
FONDEC	Competitiveness Fund
FTZ	Free Trade Zones
IESC	International Executive Service Corps
GSTC	Global Sustainable Tourism Council
KAS	Konrad Adenauer Foundation
MESCYT	Ministry of Higher Education, Science and Technology
MICM	Ministry of Industry, Trade, Micro and SMEs
MoU	memorandum of understanding
NDS	National Development Strategy
PACE	Platform for Accelerating the Circular Economy Coalition
PNGIDS	National Programme on Integral Management of Solid Waste
PNCS	National Systemic Competitiveness Plan
PROMIPYME	National Council for the Promotion and Support of MSMEs
SIMV	Stock Market of the Dominican Republic
SWM	Solid Waste Management
USDA	United States Department of Agriculture
WEF	World Economic Forum

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3.2.1 Macroeconomic context

Dominican Republic (DR) is a Small Island Developing State (SIDS) and is considered an Upper-Middle Income country, with a GDP in 2020 of approximately USD 78.85 billion.¹⁴³ The island is located on the eastern side of the Caribbean and is shared with Haiti, occupying the western end. Three million out of the total of ten million people live in the metropolitan area of the capital city (Santo Domingo). Between 2015 and 2019, the annual GDP growth rate averaged 6.1%, with industries like tourism and telecommunications, but also remittances, foreign direct investment, mining revenues, free-trade zones, being the ones that contributed the most. Notably, in the 2010s, the Dominican Republic has highest growth rates among countries in Latin America and the Caribbean. Although it has experienced a remarkable period of robust economic growth, contributing to poverty alleviation and middle-class uprise, poverty rates are still high in rural areas due to inequality, especially related to income, placing women to face disproportionate challenges nationwide.

For 2021, a combination of economic recovery and improvements in the efficiency of public spending were projected to help return the fiscal deficit to a sustainable trajectory. The GDP was expected to grow by 5.5% - confirming its rapid economic expansion before the COVID-19 pandemic. Meanwhile, effective debt management and the development of local capital markets will become increasingly important to safeguard long-term debt sustainability and limit exposure to foreign-exchange risk. Investing in human resources is crucial for the nation to overcome the pandemic effects and the slipping competitiveness.¹⁴⁴ To enhance its economic competitiveness, the country must strengthen productive linkages between domestic and exporting firms, improve the reliability of electricity supply, expand access to credit and create space for other enabling entrepreneurial conditions to rise (e.g., update of business regulations).

The Dominican Republic is located in an area of intense hurricane activity, being constantly threatened by hydro-meteorological events such as tropical storms, droughts, and hurricanes, which directly affect human settlements and productive activities.¹⁴⁵ Both small and extreme climate related events have significantly contributed to economic losses. The most affected sectors have been agriculture, transportation, energy, housing, education, industry and trade, sanitation, drainage, health, and environment. It is ranked amongst the most vulnerable countries to climate change and floods are the most frequent climate-related hazard.¹⁴⁶ As a response, the government has enhanced its commitment to halt the effects of climate change, by increasing its NDC's¹⁴⁷ ambitions to a 27% reduction in GHG emissions compared to business as usual by 2030, being 20% conditioned to external finances. The national strategy for development 2030 has a component devoted to climate change with periodic targets and indicators (with baseline) to measure specific actions on adaptation and mitigation.¹⁴⁸

¹⁴³ World Bank Development Indicators, 2021.

¹⁴⁴ World Bank, Country partnership Strategy for the Dominican Republic, 2014.

¹⁴⁵ UNFCCC, 2015, Intended Nationally Determined Contribution of Dominican Republic.

¹⁴⁶ USAID, 2017, Fact Sheet, Climate Risk Profile.

¹⁴⁷ Nationally Determined Contribution, Dominican Republic, 2020.

¹⁴⁸ Law 1 -12 National Strategy of Development 2030, 2012.

3.2.2 Financial sector

Introduction

The banking sector represents one of the largest sectors. The banking industry fosters the production and export of products and services through **traditional and innovative financing mechanisms**, incl. capital market structures. The country maintained during 2020 strong access to markets. For instance, the government issued global bonds in local currency (Dominican pesos), that exceeded 2020 Covid-19 recovery needs, but also prefinanced part of the 2021 budget. It also bought back bonds maturing in 2021-2025—extending maturities and reducing short-term financing needs. Beginning of 2021, the finance ministry issued a USD2.5 billion bond at historically low yields to finance the 2021 budget.

Licensed financial services actors are 17 different **financial institutions and banks**, incl. commercial banks, mortgage banks, state-owned banks, and savings and loan institutions, **credit entities** (e.g. limited liability companies that collect money through savings), **savings and loan associations** (e.g. private, mutualized financial institution that aims to push savings and loans for the purchase, building or improvement of family homes), and **savings and credit cooperatives** (e.g. around 2,500). Notably, the five largest banks account for almost 75% of the total assets.

Due to legislative relaxations in the 2000s, the banking services, granted equal treatment to foreign financial intermediaries, and established parameters to control admission for investments in the Dominican Republic. In 2021, the IMF (Article IV consolidations) states, that the financial system remains resilient. Banks are well-capitalized, with adequate liquidity and profitability and are being supported by regulatory flexibilization, lower reserve requirements and other macro-financial measures. However, to maintain a resilient financial system the IMF recommends reforming the financial safety net, apply the Basel framework, and international accounting standards. In addition, stress-testing capabilities should be developed.

Recent trends in digitalization offers the banking sector various opportunities to increase financial inclusion through better access to financial services. Innovations can facilitate broader financial education in the community and help provide formal credit to a greater number of people. This can have a significant impact on the economy and the productive development of the country. In terms of innovative financial services, the Dominican Republic has strong focus on contactless transactions, online banking, and fintech applications including cryptocurrency opportunities.

Sustainable finance

In terms of supporting sustainable finance, in 2019, the Dominican Republic¹⁴⁹, endorsed the Helsinki Principles and the Santiago Action Plan, becoming members of the **Coalition of Finance Ministers for Climate**. In addition, the Dominican Republic's stock exchange **launched a green bond guide for issuers** to standardize good practices. In March 2020, the International Finance Cooperation (IFC) signed a memorandum of understanding (MOU) with the Superintendence of Securities and Stock Market of the Dominican Republic (SIMV), to express to cooperate in a project that comprises the **development of a taxonomy for climate change** (mitigation and adaptation), capacity building and coordination mechanisms for **green finance market development**. Since the subscription of the MOU, SIMV and IFC expanded the stakeholder reach, incl. the Ministry of Environment as an additional signatory of the project. Other government agencies have been involved as members of the taxonomy's steering committee, including the Superintendence of Banks and the Ministry of Finance. It is expected that the steering committee will lead the process of developing a consolidated taxonomy for climate change in the Dominican Republic.

3.2.3 Developments and areas of interest

Introduction

As a tourist destination, the Dominican Republic is a leader in the region. Within the last forty years, it is continuously developing a "sun, sand and sea" model. With recent (pre-Covid) occupancy rates over 75%, the island will develop new hotels and refurbish its existing hotel stock in the near future. In recent years, the **government** pushes ambitions to a further diversification of the large tourism sector to provide greater resilience to economic shocks. The plans propose alternatives to the current "sun, sand and sea" tourism model. Given the huge water

¹⁴⁹ And Mexico, Ecuador, Colombia, Argentina, Paraguay, Costa Rica, Guatemala, Panama, and Uruguay (in LAC).

footprint of the current conventional approach, the development of new tourism sectors can benefit from circular approaches already in the design phase.

Besides climate change, the Dominican Republic is **particularly vulnerable to increasing plastics pollution** which will significantly affect ocean-based sectors, such as tourism and fisheries.

Despite its success, the country still runs the risk of becoming an enclave economy with a highly productive and export-oriented sector permanently co-existing with informal and low productive activities. Furthermore, with an economy relying on tourism, remittances, and foreign direct investment (FDI), the country is highly exposed to the consequences of the current pandemic and global recession.

Key national institutions

The **Ministry of the Environment** developed the **Roadmap for a More Sustainable Tourism**, carried out through the Department of Sustainable Production and Consumption. The programme is called **Transforming the Value Chains of the Tourism Sector to accelerate resilience, efficient use of resources and low carbon emissions**.

The **Directorate of Sustainable Production and Consumption** (DPCS) within the Ministry of Environment and Natural Resources is in charge of **promoting and encouraging the application of practices and innovations for sustainable production, efficient use of resources and circular economy**. It aims to contribute to the competitiveness of productive sectors (by e.g., preventing pollution in the production process). The **Directorate of Climate Change** under the same ministry is in charge of promoting a society with a low-carbon development that adapts to the adverse effects of climate change. It promotes evaluations of plans and programs, and the application of methodological guides and other mechanisms. It is also responsible for Monitoring, Reporting and Verification System (MRV) on climate change that allows the transparent fulfilment of the commitments assumed in the framework of the United Nations Framework Convention on Climate Change (UNFCCC).

The **National Council for Climate Change** is the oversight institution of climate change considerations. It is chaired by the president of the Dominican Republic and is composed of representatives from various ministries.¹⁵⁰

The main responsibility in **facilitating public and private cooperation** is the **National Council for Competitiveness** (CNC). The CNC is chaired by the President of Republic and composed of eight ministries and eight representatives of the private sector. It was created to manage the **Competitiveness Fund (FONDEC)**. The FONDEC is financed by the IADB. It provides resources that required **private matching funds to set up industrial clusters**. From its inception in 2001 until 2012, the fund co-financed the creation of 45 clusters for a total of USD 13.5 million (16 clusters in agro-food, 15 in tourism, and 14 in manufacturing). **The co-financing from the private sector was 14% of the total investment**, lower than expected.

With support of the United Nations Development Program (UNDP), the country is in the process of preparing the **Roadmap for SDG12 Responsible Consumption and Production**.

The **CNC**¹⁵¹ prioritises the agro-food sector by devoting 65% of the total budget of the *Dominicana Competitiva* to it. Particularly, the subcommittee for **Agricultural Production Development and Exports**, oversight by the **Ministry of Agriculture**, defined three main objectives, five priority actions, and ten targeted agricultural products. The total proposed budget for implementation was USD360 million, between 2018-2020.

International initiatives

The recently launched **Latin America and the Caribbean Circular Economy Coalition**¹⁵² aims at creating a common vision for a circular economy transition and provides a platform for cross-sectoral collaboration and knowledge exchange to accelerate implementation. It is led by a steering committee composed of government representatives on a rotating basis, starting with Colombia, Costa Rica, Perú, and the Dominican Republic for the 2021-2022 period. The coalition is coordinated by UNEP and is supported by a group of eight strategic partners, including the Ellen MacArthur Foundation, Climate Technology Centre & Network (CTCN), the Inter-American

¹⁵⁰ Including the Ministry of Environment and Natural Resources, the Ministry of Economy, Planning and Development, the Ministry of Agriculture, the Ministry of Foreign Affairs, the Ministry of Finance, the Ministry of Industry and Commerce, the Ministry of Public Health and Social Assistance as well as from the Central Bank of the Dominican Republic, the National Energy Commission, the Transport Reform Office, Superintendence of Electricity, the Association of Industries of the Dominican Republic, the National Council of the Private Enterprise and civil society organisations.

¹⁵¹ <http://cnc.gob.do/index.php/en/terms-of-use/itemlist/user/370-cnc> (Assessed online 30 Nov. 2021)

¹⁵² <https://ellenmacarthurfoundation.org/news/latin-america-and-the-caribbean-circular-economy-coalition-launches> (Assessed online 1 December 2021).

Development Bank (IADB), the Konrad Adenauer Foundation (KAS), the Platform for Accelerating the Circular Economy Coalition (PACE), the United Nations Industrial Development Organization (UNIDO) and the World Economic Forum (WEF).

Key national strategies and policies with relevance for a circular economy

Policies and strategies that encompass circular economy principles and actions have been targeted as part of the effort to address the acknowledged transition towards a more sustained and resilient economy. However, there are **no legal instruments specifically devoted to a circular economy**, but mainly to residues/waste management.

One of the main challenges faced currently by the country is sustaining growth and making it more inclusive and resilient. **The 2030 National Development Strategy (NDS)** articulates public policies to promote the transformation to a sustainable production and consumption culture. However, the challenge is inherent given national circumstances, territorial conditions and environmental features that add to and exacerbate the challenges imposed by climate change.¹⁵³ This becomes even more important when considering the **economic dependency on the services sector**¹⁵⁴ (GDP 2020 contributions: services 57.2%, industry 30.28% and agriculture 6.04%), especially on tourism, its impact on land use and thus, a constant pressure on natural resources, leading to a higher vulnerability to the several climate change risks the country faces.

The **National Development Strategy (NDS) 2010-30: A Journey of Transformation Towards a Better Country** is the Dominican Republic's roadmap towards socially inclusive growth. The Strategy is built on the four axes of 1. the **competitiveness and investment agenda** led by the **CNC**, 2. the **industrial development agenda** of the Ministry of Industry, Trade, Micro and SMEs (MICM), 3. The agenda of the Ministry of Higher Education, Science and Technology (MESCT), and the 4. **sustainable agricultural vision** of the Ministry of Agriculture (MINAGRI).¹⁵⁵ The strategy is co-ordinated by the **Ministry of Economy, Planning and Development** in co-operation with the **National Council for State Reform** (CONARE). It lays out **priorities for public investment**. Until 2020, a growing number of institutions and ministries elaborated multiple sub-strategies for achieving its objectives.

Special attention is given to Sustainable Development Goal (SDG) 16 (peace, justice and strong institutions) and **SDG 11 (sustainable cities and communities)**. Policies to enhance productivity include the consolidation of the sustainable management of public finances, the reliable provision of energy at competitive prices and the development of a quality education system that responds to national development.¹⁵⁶

The **National Systemic Competitiveness Plan** (PNCS) is a public management tool that establishes the guidelines of the competitive policy of the Dominican Republic. It encompasses initiatives to improve the business climate; support for business associativity and training.

In 2018, the **CNC** formulated an agenda, **Competitive Dominican Republic** (Dominicana Competitiva), pointing to specific reforms needed to diversify domestic production and increase local value-added. The agenda has identified five priority areas and industries for the country and includes 37 priority actions with an estimated budget of USD542 million (0.7% of GDP), of which two-third is pegged to **Agro-food**, one-quarter in **Tourism** and the rest to **Industry**.

The mitigation goal established by the Dominican Republic in its **Nationally Determined Contributions (NDCs)** is expressed as a "Reduction of 25% of base year emissions by 2030", the base year being 2010, with national emissions estimated at 3.6t CO₂e per capita. The NDCs also identify adaptation as a constitutional priority for the country. The document does not identify any specific mitigation or adaptation actions but specifies that the NDC planning processes will be based on the National Development Strategy, the National Policy on Climate Change, the Climate Compatible Development Plan, and the National Adaptation Plan of Action. Based on the NDCs, an increase in energy efficiency and the participation of non-conventional renewable energies, is stated in a **draft bill on energy efficiency**.

The **Dominican Republic priorities** with relevance to a circular economy are the **tourism sector** (incl. Improve environmental sustainability; develop tourism in Santo Domingo; Attract new tourist from untapped regions such as Asia), the **industry sector** (incl. Facilitating financing for SMEs and exporting firms; improve the quality infrastructure system for standards and certification; Improve logistics and transport; Reduce red tape (e.g. ease bu-

¹⁵³ Intended Nationally Determined Contribution, Dominican Republic, 2015.

¹⁵⁴ Share of economic sectors in the gross domestic product (GDP), <https://www.statista.com/statistics/527505/share-of-economic-sectors-in-the-gdp-in-dominican-republic/> (Assessed online 30 Nov. 2021).

¹⁵⁵ <https://www.oecd-ilibrary.org/sites/f1bc1b72-en/index.html?itemId=/content/component/f1bc1b72-en> (Assessed 30 Nov. 2021).

¹⁵⁶ <https://www.oecd.org/dev/americas/Dominican-Republic-Country-Note-Leo-2019.pdf> (Assessed online 30 Nov. 2021).

reaucracy); foster skills and human capital; and promote exports) and the **Agro-food sector** (incl. the prioritization of export products¹⁵⁷ which have been chosen based on their production and export capacity coupled with their level of productivity and propensity to create employment¹⁵⁸).

Based on the identified priorities, this analysis focused on three areas of interest. First, tourism is considered as a holistic area tackling various entry points tailored for touristic activities, such as construction and transportation, but also waste and consumption. Second, industry specifically is covered targeting non-tourism fields of action such as the agro-food market. Third, waste management that deals specifically with lack of regulatory environment and capital infrastructure.

3.2.3.1 Tourism

The tourism industry is a vast and complex industry covering a variety of sectors and connecting with multiple other industries and value chains. Picturing the true impact of the industry is even more challenging, as tourism is deeply interlinked with every major industry. In current academic literature and discussions, the circular economy framework is predominantly associated with product manufacturing or resource intensive industries and value chains, and less so with service dominated industries such as tourism. However, services-dominated industries, like the travel value chain and ecosystem, are important consumers and/or users of materials, energy, and other resources such as land (destinations), buildings (construction materials), furniture, vehicles, fossil fuels, food, textiles, a wide range of consumables, etc. The travel industry actors have an important role as enablers within the circular transition – largely through how they source, use, or consume products, materials, and resources, and how they support and enable product, material, and resource recovery at the end-of-use. Tourism contributes largely to the national economy. Since the 2010s, the number of tourists more than doubled from 3.3 to 7.2 million. The country is now the main destination for tourism in the Caribbean, attracting 24.1% of the total number of visitors in 2018.¹⁵⁹ On the other hand, DR is more dependent on tourism than any other country in LATAM.¹⁶⁰ This leads to large dependency on external markets (international tourism) as tourism is considered as a general volatile sector.

The rapidly expanding growth of tourism and the hence growing consumption of resources (energy, water, land, and materials such as fossil fuels, minerals, metals, biomass) leads to an increasing generation of solid waste, sewage, and GHG-emissions. A footprint study conducted by the Ministry of Environment (2011) identified, that tourists demand three times as much water as domestic inhabitant and half of the vegetables produced in the country are consumed by the tourism sector. In addition, **lack of recycling of paper, plastics, metal and glass and food** waste it is contributing inadequately to the landfill capacity on the island. Pollution to ground water, river and marine from leachate at open, unsealed landfill sites are common. Lastly, air pollution from fires caused by methane emissions at landfill sites put pressure on local health conditions.

Also, in the near future, the traditional travel and tourism sector will have significant environmental and social impacts. Most planned investments in the tourism sector will take place in coastal areas, which are highly vulnerable to the effects of climate change (erosion of beaches, hurricanes, destruction of marine ecosystems, and salinization of coastal aquifers, among others).

The **Ministry of Tourism** is seeking for plans for further diversification to provide greater resilience of the tourism sector. The plans propose alternatives to the current “sun, sand and sea” tourism model. Proposals for health / adventure / eco / rural tourism have been put forward. The **Climate Compatible Development Plan (CCDP)** can be considered as the core document describing the vision and plan of the country in terms of low-emission economic growth. The CCDP highlights tourism as the key and strategic sector of the country’s economy and one of the “quick wins” sectors for implementing mitigation actions. It states that by 2030, the tourism sector can reduce its current annual GHG emissions by 35% relative to the BAU scenario. Besides mitigation, the government considers the tourism sector as a strategic sector for climate change adaptation.

¹⁵⁷ Avocado, Bananas, Cocoa, Sweet potato, Passion fruit, Coconut, Soursop, Mango, Pineapple.

¹⁵⁸ Cluster Consulting (2019), Análisis de Cadenas de Valor de productos Agrícolas, <http://competitividad.gob.do/index.php/es/noticias/item/781-presentan-resultados-del-estudio-y-diagnostico-de-cadenas-agricolas> (Assessed 30 Nov. 2021).

¹⁵⁹ https://www.oneplanetnetwork.org/sites/default/files/iki_country_report_dominican_republic_final.pdf (Accessed 30 Nov. 2021).

¹⁶⁰ https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3538902 (Accessed online 30 Nov. 2021).

Info-box 4 – engagement of IFIs in selected tourism projects

- The **UNEP Transforming Value Chains Project** aims to prioritise activities that contribute the most to critical environmental impacts. These activities aim to reduce GHG emissions and improve resource efficiency in key tourism sector value chains.
- The **Athelia Sustainable Ocean Fund (SOF)**, managed by Mirova is working on solutions for the safe disposal and recycling of single use plastics through its pipeline in multiple countries, **incl. the Dominican Republic**. For instance, they fund the company Blue Finance which signed a Public Private Partnership (PPP) agreement in 2018, for co-management of one of the largest Protected Area of the Dominican Republic. It aims to create new job opportunities in the Blue Economy sector for local populations, the conservation of critical ecosystems and basic financial returns.¹⁶¹
- The IDB and its **IDB Innovation Lab** are financing the **Green Fins Hub - Digital scaling for sustainable marine tourism** in the Dominican Republic. It will establish an online platform to empower marine tourism businesses to measurably improve compliance with internationally recognized environmental standards, safeguard biodiversity, and stimulate green tourism. Applicants are The Reef-World Foundation and Reef Check Dominican Republic.¹⁶²

Recommended entry point/CE engagement opportunity in tourism

The high degree of uncertainty and dependency on international tourism forces companies to focus on short-term profits. There is a persistent end-user in-difference / lack of CE mentality among supplier (e.g., hoteliers prefer to buy a new pool, instead of investing in less visible assets).

Based on the sector strategies and national priorities in the tourism sector, identified entry points (see below) are concentrated in the development of a more regulatory environment. However, next to public authorities, the private sector plays an important role for advocacy for public policies. Besides contributing to the strategic decision of the CNC as well as sitting on several councils such as CNFZE and ProIndustria, private sector actors can stimulate the public policy debate by proposing reforms and discussions within the business convention.

Circular design and production (up-hill)

- Address single use item problems, such as plastic packaging by proper regulation and infrastructure

Circular use / top-hill category:

- Support the plans to establish a **sustainability certification** for the tourism sector (e.g., hotels, resorts)
- Introduce **circular procurement practices** with focus on Re-Principles in the tourism sector
- Support alternatives to the traditional “sand-sea-sun” model, such as eco-tourism

¹⁶¹ http://blue-finance.org/?page_id=961 (Assessed online 1 Dec. 2021).

¹⁶² <https://www.iadb.org/en/news/idb-announces-results-its-beyond-tourism-innovation-challenge> (Assessed online 1 Dec. 2021).

Table 18: Dominican Republic – Tourism Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers - Tourism
Policies	Lack of incentives in the tourism sector to invest in resource efficient measures, incl. limited financial capacity for SMEs.	<p><u>Circular use (top-hill)</u> Revise policies (grant funding)</p> <ul style="list-style-type: none"> ▪ Incentivise the reduction of waste (e.g., tax refund for diverting biowaste from landfilling, discounted Waste Tax for donating food loss) and the integration of resource efficiency measures in the design phase (make use of the currently strong digitalization trend in DR and track and monitor resource consumption (electricity, waste, water)) ▪ Reflect environmental costs in price for plastic bottles to overcome single use plastic bottle dominated water supply. Promote re-usable bottles based on deposit return schemes. ▪ Subsidize food monitoring / tracking technologies for corporates/hotels to increase efficiency and enable KPI tracking. ▪ Support the plans to establish a sustainability certification for the tourism sector (e.g., hotels). Such a certification can be Global Sustainable Tourism Council (GSTC) approved. However, there might be the need to rather develop a specific CE certification scheme (e.g., reflecting the Re-Principles), instead of adapting established certificates. <i>(Note: Especially SMEs in tourism sector are generally, lacking any environmental or sustainable certification/accreditation.)</i>
Capacities	End-User in-difference There is a lack of CE mentality among supplier (e.g., hoteliers prefer to buy a new pool, instead of investing in less visible assets).	<p><u>Circular use phase (top-hill)</u> Facilitate capacity building (grant funding)</p> <ul style="list-style-type: none"> ▪ Promote public campaigns to raise awareness to tackle the lack of CE mentality (e.g., hoteliers prefer to buy a new pool, instead of investing in less visible assets). Target groups are public authorities meeting the rising demand to “go with the trend”, or SMEs (e.g., most SMEs have no certification at all and are short-term oriented),
Capacities	The dominant “sun sea sand” tourism model is resource intense and firmly established in the DR.	<p><u>Circular use phase (top-hill)</u> Facilitate capacity building (grant funding)</p> <ul style="list-style-type: none"> ▪ Promote sustainable procurement practices by private and public actors (e.g., commodities, infrastructure, hotel resorts), incl. due diligence guidance for responsible business conduct, and for alignment with environmental and social standards (e.g., available circular technologies and standards) and embed circular practices in the upstream phase of new accommodations by integrating re-use and high-value recycling of components and materials concepts. There are various actors to be consulted, such as: <ul style="list-style-type: none"> ○ The General Directorate of Public Procurement (DGCP) is the main body with competence for setting government procurement policy and enforcing compliance, and it is also vested with the power to oversee the bidding process. A dependency of the Ministry of Finance, the DGCP is a part of the central government. The DGCP has also the power to rule on bid challenges and its decisions can subsequently be appealed to the Superior Administrative Court. ○ The Inter-American Development Bank (IDB) regularly offers tender opportunities in the tourism sector¹⁶³. -> Validate the possibility to make procurement details (e.g., ToRs) based on circular principles. ▪ Support the plans by the Government to diversify the huge tourism sector to more eco-tourism concepts. (Note: Strong increase in demand for more low-impact touristic models is increasing (e.g., Generation Z, Millennials)). <ul style="list-style-type: none"> ○ Offer trainings and dialogues/forums for the Dominican Republic Sustainable Tourism Alliance (DSTA) to build on existing structures.
	There is missing awareness of post-harvest losses (agro-sector) and food waste (tourism sector) Missing infrastructure hinders unharvested food to flow in the value chain	<p><u>Down-hill</u> Facilitate capacity building (grant funding)</p> <p>Provide trainings to staff and management on avoidance of food waste and handling of food waste (e.g., improve planning of menus¹⁶⁴; cascading use of food through better distribution.¹⁶⁵)</p> <p>Establish local sharing platforms to distribute food before it perishes</p>

¹⁶³ <https://www.tendersontime.com/tenders-details/update--consultant-firms---formulation-strategic-plan-system-public-area-historical-center-santo-dom-394e5b8/> (Assessed online 15 January 2022).

	Barriers	Access to finance / Risk reduction - Instruments/mechanisms to respond to barriers - Tourism
Risk reduction	Limited incentives, incl. lack of public support mechanisms to invest in circular tourism business models	<p>Provide loan default guarantees for investments in activities directly contributing to a more circular economy in the tourism sector. Reducing underwriting risks for local banks, increases debt funding opportunities by facilitating guarantee schemes for corporates to invest in CE-related technologies.</p> <p><i>Up-hill</i></p> <ul style="list-style-type: none"> - Loan default guarantees for “heavy assets” (e.g., Hotels, Restaurants, infrastructure such as Airlines, Railway networks) to reduce lending risk for accessing commercial debt finance for investments pegged to e.g., KPI performance evaluation such as: Reduce their natural and social ecosystem impacts; Show accountability and transparency for true costs (incl. externalities / social costs) of travel services. <p><i>Top-hill</i></p> <ul style="list-style-type: none"> - Loan default guarantee for “light assets” (e.g., food service, groceries products, transportation services, rental services, tour guides) to reduce lending risk for accessing commercial debt finance for investment activities pegged to (e.g., KPI performance evaluation such as: Contributing to environmental; Social issues equality; Prevent local ecological / habitat destruction; no landfill end of life.
Access to finance	Limited access to capital, because of limited debt financing (short-termism, low level of fiscal space)	<p>Provide blended finance (concessional loans and non-reimbursable grants) via existing vehicles/development funds (e.g., CAMIF II, see below) to provide access to finance, but also to <i>de-risk</i> investments and therefore, increase opportunities for CE-related activities in the DR tourism sector (blending allows for efficient use of public funding and leverage private capital):</p> <ul style="list-style-type: none"> - Cover only early-stage costs via grants - Support private impact investors to enable implementation or increase project sizes.¹⁶⁶ <p>The private equity fund: Central American Mezzanine Infrastructure Fund II (CAMIF II, USD 250m¹⁶⁷) provides: Loans, Mezzanine, and Equity to small-to-medium infrastructure projects - currently with focus on traditional infrastructure, incl. transportation, but also for natural resources, health and education, real estate, manufacturing, and tourism. (-> Also relevant for Production, Special Economic Zones - SEZ).</p> <ul style="list-style-type: none"> - <i>Validate opportunities to provide e.g., first loss equity to the CAMIF II that is pegged to CE-indicators such as the mutualisation of resources, materials and of idle assets</i> (E.g., asset recirculation, sharing ‘intra-organisations’ sharing platforms, etc.); or the implementation of Environmental Management Systems (EMS) to monitor energy consumption, resource use, emissions, food waste and associated operational cost savings opportunities. <p><i>Validate the need to support IADB Innovation Lab financing the Green Fins Hub - Digital scaling for sustainable marine tourism in the Dominican Republic.</i></p>

3.2.3.2 Industry

In the DR, SMEs have not-exploited strong growth potentials (e.g., due to generally less export-oriented activities). However, SMEs employ 65% of the total work force, contribute to 40% of total value added and account for 23% of domestic exports (while for instance, the OECD average of SMEs account for 40% of total exports).¹⁶⁸ The produced and exported goods shifted from labour-intensive manufacturing (e.g., garment) to primary commodities (e.g., cash crops). The export of primary good account almost 50% of domestic exports, include gold, tobacco and fruits and vegetables (see section 1.3.4. on Agro-Food). The end of the garment trade framework and the start of new mining projects explain this shift.

An important institution is **ProIndustria**. Set up in 2007, it is in charge of **developing the local manufacturing industry** and hosts the business register and is in **charge of granting the incentives for the local industrial sector**. The **Export and Investments Centre of the Dominican Republic (CEI-RD)**, created in 2003, is responsible for attracting investment and export promotion. The National Council for the Promotion and Support of MSMEs (PROMIPYME), created in 1997, is in charge to **provide financing and technical assistance to MSMEs**.

¹⁶⁴ E.g., ‘waste-pulp’ from for example fresh juice can be put to use in cakes or sauces.

¹⁶⁵ Re-use of excess food through distribution to feed poor people (using food redistribution networks or food banks or through recycling of excess food into animal feed).

¹⁶⁶ IUCN, WWF, 2018. Increasing success and effectiveness of mangrove conservation investments: A guide for project developers.

¹⁶⁷ Succeder of the CAMIF I (USD210m).

¹⁶⁸ <https://www.oecd-ilibrary.org/docserver/1201cfea-en.pdf?expires=1638293241&id=id&accname=guest&checksum=ED6CBE89C718404453CEA621E77FA90E> (Accessed online 30 Nov. 2021).

The **Free Trade Zones (FTZs)** changed over time. They have been established in the 1960s to attract garment and electronic sectors. Since the 2000s, the share of exports from FTZs on total exports decreased from 80% to around 50%. The expiration of the multilateral system of apparel quotes radically altered the global trade conditions in the sector, inducing a reconfiguration of FTZs towards services and other activities. Therefore, the FTZs are not relevant for driving local development. Notably, on average, local sourcing has declined slightly since 2000s. Only around one fifth of inputs in the FTZs are sourced locally. In the case of some of the newly installed activities in the FTZs (after diminishing of garment industry), such as medical devices, there is no ready-made local industrial base from which to source.

The National Council of Free Trade Zones (CNZFE) is the independent authority under the MICM, which regulates the functioning of FTZs and approves the applications for firms willing to operate within their boundaries and rules. The Dominican Association of SEZs (ADOZONA), supports stakeholders involved in the development of SEZs such as operators, firms, and investors.

To simplify bureaucratic burdens, the government offered a new online platform with a one-stop shop (E.g., for administrative procedures) to start a business, under the auspices of the **National Competitiveness Council**.

Recommended entry point/CE engagement opportunity in industry

Based on the sector strategies and national priorities, entry points have been identified as follows:

Circular design and production (up-hill)

- Train financial sector actors (e.g., local banks)
- Improved **product design** (e.g., increased durability, ensure recyclability, use of recycled material)

Circular use (top-hill)

- Support re-verse supply chain management principles (re-used and re-manufactured)

Circular value recovery (down-hill)

- Develop integrated waste management system needed

Table 19: Dominican Republic – Industry Barriers and Instruments

	Barriers	Enabling environment - Instruments/mechanisms to respond to barriers - Industry
Policies	<p>Generally, there is a high degree of bureaucratic obstacles (e.g., red tape), esp. for industrial activities (Note: Government is aware and has already implemented some one-stop-shop solutions for e.g., FDIs and trade).</p> <p>Weak contract enforcement for corporates and very costly claims (almost 50% on average) of the total claimed value.</p>	<p>Revise fiscal policy landscape (grant funding in form of TA/training)</p> <ul style="list-style-type: none"> ▪ Support the central government to diversify tax-based revenues (currently one of the lowest (around 15% of GDP) in LATAM). e.g.: Reduce VAT for CE-linked activities; Increase VAT for unsustainable activities <p><u>Circular design phase (up-hill)</u></p> <p>Revise and facilitate policies and standards (grant funding)</p> <ul style="list-style-type: none"> ▪ Support increased contract enforcement for corporates. Right now, claims are very costly (up to 50% on average) of the total claimed value
Policies	<p>Limited skilled staff (e.g., auditors), which are required to identify appropriate resource savings measures. Limited incentives, incl. lack of public support mechanisms.</p>	<p>Review policies (grant funding in form of TA/training)</p> <ul style="list-style-type: none"> ▪ Establish sustainable procurement principles /guidance ▪ Eliminate the use of ‘unnecessary’ or ‘problematic’ plastics (e.g., via EPR) <p>Develop sharing concepts for capital equipment (see Grover example in Germany¹⁶⁹) that enables SMEs to share capital equipment effectively and save large upfront costs (key obstacle for SMEs to not invest in specific equipment/technology)</p>

¹⁶⁹ <https://tcrn.ch/3tgDp4F> (Assessed online 16 January 2022).

Capacity	<p>Private sector has not the capacity to identify relevant projects.</p> <p>There is lack of skills amongst local engineers, business owners, government officials and financiers</p>	<p>Facilitate capacity building (grant funding in form of TA/training)</p> <ul style="list-style-type: none"> ▪ Training for local banks to properly assess sustainable CE investment activities (better financing conditions for CE-related activities compared to linear business models because of future risk assessment, incl. interdependencies) ▪ Reflect CE concept in education (university and apprenticeships) together with National Institute of Technical-Vocational Training and ADOZONA that are active in tertiary training SEZ-workers. ▪ Provide trainings to ProIndustria (in charge of developing the local manufacturing industry, it hosts the business register and is in charge of granting the incentives for the local industrial sector) ▪ Support the raising of consumer awareness around the environmental and socio-economic impacts of fast-moving consumer goods (e.g., textiles, footwear), highlighting the significant externality costs of these low-priced items (e.g., resource use and labour practices). <p>DRs is very active in the field of (financial) technology (fintech applications) compared to other LATAM countries</p> <ul style="list-style-type: none"> ▪ Support digitalization trends for various circular opportunities and provide tracking tools for production companies to produce reliable information (e.g., tracking and monitoring of environmental footprint, savings compared to baseline). ▪ Foster “pay-by-use” and “product as the service,” leaving ownership of the materials to the supplier.
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	Barriers	Access to finance / Risk reduction - Instruments/mechanisms to respond to barriers - Industry
Access to capital	<p>No access to capital, because of limited affordable debt financing. Especially SMEs have limited fiscal space to invest in new technologies</p>	<p>Facilitate access to finance for upgrading companies / SEZs e.g., via a dedicated sustainable lending facility (incl. concessional loans) with CE parameters.</p> <p>Verify opportunity of mobilising refinance by issuing CE linked bonds:</p> <ul style="list-style-type: none"> ▪ Facilitate the issuing of green bonds in local currency and USD given the huge investors’ appetite for different currencies (<i>Note: slowly happening, Stock exchanges in LATAM, incl. Colombia and the Dominican Republic have published green bond guidelines</i>) ▪ Support investment affiliates, such as Fiduciaria Popular, to issue CE related bonds as recently done (<i>Note: End of 2021 was issued the first Dominican corporate “green bond” (100 million USD, max. 15-years, +5% yield) de-nominated to ICMA green bond principles, sold to the local market.^{170,171} in US dollars.</i> ▪ (<i>Multilateral sample: IDB invests in B-bond structures (bridge-bond), to crowding-in institutional investment, that typically prefer to invest in developed markets.¹⁷² The B-bond was sold to a special purpose vehicle (SPV -> reduce risk function) and privately placed with an institutional investor</i>

3.2.3.3 Waste management

The overall waste management applied in the country usually lacks an oriented focus towards a circular economy that would enable a full reintegration of products and their components in value chains at the end of life.¹⁷³

¹⁷⁰ The Haina Electricity Generating Company (EGE Haina) is the first Dominican company (wind parks) to set up a trust for the **issuance of fixed income securities with environmental impact “green bonds”**, for a total amount of 100 million dollars, structure was advised by the Investment Banking Area of Banco Popular Dominicano and will be launched on the market and managed by Fiduciaria Popular, subsidiaries of Grupo Popular. <https://dominantoday.com/dr/economy/2021/05/03/bank-power-company-issue-joint-us100m-green-bond/> (Accessed online 30 Nov. 2021).

¹⁷¹ The issuance program, structured under the guidelines of the SIMV and the International Capital Markets Association (ICMA), obtained an “A” risk rating, granted by the **Feller Rate Dominicana** rating agency. Compliance with the standards has been validated by Pacific Corporate Sustainability and has the first Climate Bond certification in the country, issued by the Climate Bonds Initiative.

¹⁷² IDB arranged a USD65million B-bond which was sold to a special purpose vehicle and then privately placed with an institutional investor. IDB Invest provided the remaining USD3.6m A-loan, thus raising USD68.6m for Invenergy – US based company deploying RE in Uruguay.

¹⁷³ National Programme on Integral Management of Solid Waste (PNGIDS) 2010 – 2021.

Although the legal framework in place to support circular economy aligned business initiatives, the public sector has not been interested to support more strongly the creation and development of such enterprises. Likewise, there are systemic conditions that limit entrepreneurship, such as high tax rates, high informality, bureaucracy, and access to financing.¹⁷⁴

The main legal policies, strategies and studies on waste management are e.g., the Policy on Integral Management of Municipal Solid Waste (2014), Policy on Solid Waste MGMT implemented by 'Dominicana Limpia' Program (2017-20); and the latest Law No. 225-20 of Integral Management and Co-processing of Solid Waste (2020). A greater attention should be drawn to the last two documents. The '**Policy on Solid Waste Management, 2017–20**' is the national policy for integral management of solid residues in DR's municipalities, regarding the collection, handling, and final destination of the same. The '*Dominicana Limpia*' Program started in 2017 in 17 pilot municipalities and its scope was planned to be expanded along its implementation. Recently launched, the **Law No. 225-20 of Integral Management and Co-processing of Solid Waste** is the legal framework to **promote reduction, reuse, recycling, use and recovery of waste**, including lubricating oils, pesticides, electrical and electronic, cells and batteries, tires, and containers and packaging. This law grants the Ministry of Environment and Resources Natural for guiding a Comprehensive Waste Management in the country. It also **stipulates a mandatory tax for every legal person, entity, and public institution**, with which it created a fund to mitigate the negative effects of the current waste disposal. Another feature of this Law is the placement of extended responsibility to the producer for specific products such as batteries, heavy capital equipment, electronics, packing, tires, and oils.¹⁷⁵

The '**Project for Strengthening Institutional Capacity in the Integral Management of Solid Waste**' aims to establish an Integrated Solid Waste Management system (MIRS) at the central and municipal government level in the Dominican Republic. Efforts to reduce the use of plastic bags have also been developed, which build up on regional partnerships such as the campaign '*Mares Limpios*', due to the need to implement actions to reduce the consumption of disposable plastics and eradicate the use of microplastics. Nevertheless, there are still cases in which **hazardous residues are transferred from Europe to the Dominican Republic**, serving as evidence of the flawed legal framework in place and its implementation strategies.

Info-box 5 –selected waste programme

- **UNEP, FAO, IADB, UNDP** implement the global **Implementing Sustainable Low and Non-Chemical Development in SIDS** programme¹⁷⁶ (GEF financed, 2020 - 2025) that seeks to implement a low and non-chemical development pathway in three SIDS regions (Africa, Asia/Pacific). It focuses among others on **safe management and disposal** of existing wastes posing an immediate risk to people and natural resources, systems for **future management of wastes** and chemicals, increased recovery of resources from wastes, and **sharing knowledge** and experience to stimulate inter regional cooperation to combat major challenges posed by wastes such as **plastics, electronics**, and other major pollutants. **Component 1** addresses e.g.: development of the **legislative and institutional framework** to support the environmentally sound management of hazardous chemicals in materials, products and wastes. A training programme to assist countries with implementing the Chemicals and Wastes Multilateral Environmental Agreements (MEA), National, institutional and technical capacity to reduce/control the current and future trade of chemicals and products containing hazardous chemicals is strengthened, capacity for the development and implementation of national and regional chemicals and products standards including GHS, promotion of sustainable Procurement to key stakeholders to reduce the manufacture/import of products containing hazardous chemicals.....In DR, the project will address priorities identified through **consultations and in the National Chemicals Profile** (2013), including the development of strategies for managing mercury and its compounds(also highlighted by the MIA), implementation of GHS, inventories and strategies for hazardous waste, pesticides and e-waste management and improved recycling and resource recovery. While the **ESM of marine plastics and microplastics will not be directly addressed, reduction in plastic wastes will be an indirect benefit of developed strategies for managing PVC plastics** (Output 3.4) and other related activities. Component 3 will **address EPR** and Regional Approach to manage WEEE pilot tested in three participating countries Capacities for ESM of ELVs and improved management of plastics (including PVC) through the life-cycle approach and coordination with the public and private sectors.

¹⁷⁴ Economía circular y políticas públicas: Estado del arte y desafíos para la construcción de un marco político de promoción de economía circular en América Latina, 2019.

¹⁷⁵ Economía circular en América Latina y el Caribe: Oportunidad para una recuperación transformadora, 2021.

¹⁷⁶ BCRC, 2021, Chemicals and Waste Management in SIDS (<https://www.bcrc-caribbean.org/our-projects/gef-islands/>). GEF Endorsement package (<https://www.bcrc-caribbean.org/wp-content/uploads/2019/10/GEF-ISLANDS-10279-CEO-Endorsement-Package.pdf>). (Accessed online 30 Nov. 2021).

Recommended entry point/CE engagement opportunity in waste

Based on the sector strategies and national priorities, entry points (e.g., lack of modern, regulate waste management infrastructure, incl. missing public-private coordination for collection and treatment of waste) have been identified.

Circular value recovery (down-hill)

- Support the development of better conditions for an integrated waste management system.

Table 20: Dominican Republic – Waste Management Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers – Waste
Policies / Capacity Building	Lack of proper waste regulations	<p>Revise policies (grant funding)</p> <ul style="list-style-type: none"> ▪ Validate opportunities to expand the legal base of Extended Producer Responsibility (EPR)¹⁷⁷ to address the waste issue, beyond foam and plastic bottles and based on the polluter-pays principle¹⁷⁸ ▪ Support the development of better conditions for an integrated waste management system by enclosing the still large share of informal waste management sector to the formal waste sector. This is important as the legal framework is already in place¹⁷⁹. <p>Provide trainings (grant funding)</p> <ul style="list-style-type: none"> ▪ Trainings to Generators, Producers, Importers and Merchants (e.g., actors that fall under Law No. 225-20 of Integral Management and Co-processing of Solid Waste from 2020) how to fulfil criteria, such as the subject to the principle of extended responsibility <p>→ Consider lock-in effects: Better prevent/reduce waste than cure (such as subsidies for waste collection), e.g., prevent contra-productive policies (e.g., incineration facilities and policies, such as increased landfill taxes and landfill bans) could make incineration more attractive to investors but reduce progress towards life cycle extension</p>
Capacities	Low level of legal enforcement of solid waste management	<p>Facilitate capacity building (grant funding in form of TA/training)</p> <p>Knowledge dissemination (technical assistance) to the Ministry of Environment and Resources Natural to properly implement the legal framework of Law No. 225-20 of Integral Management and Co-processing of Solid Waste (2021). The legal framework grants the Ministry to put mandatory tax for every legal person, entity, and public institution, with which it will be created a fund to mitigate the negative effects of the current waste disposal. A feasible goal by the technical assistance/trainings is to ensure that this waste tax is income elastic, and thus in favour of low-income households (e.g., no additional burden to the bottom of the pyramid).¹⁸⁰ A smart tax structure can enable other cascade effects (as the revenues of this tax are already planned to be channelled in a fund to mitigate the negative effects of the current waste disposal).</p>

¹⁷⁷ Producers of foam and plastic bottles will be obliged to join a specific program of extended producer responsibility to recover, treat and safely dispose of the waste generated (General Law 225-20 on Comprehensive Management and Co-processing of Solid Waste of the Dominican Republic, October 2, 2020).

¹⁷⁸ EPR schemes could come in form of product taxes, recycling requirements, deposit-refund schemes, and disposal fees and internalize the end-of-life management costs of materials, including collection and recycling (e.g., of packaging, electronic and electric equipment, batteries, tires and end-of-life vehicles, furniture, and textiles) and are usually set on a per-unit or per-weight basis. They should encourage manufacturers to take responsibility for the environmental impacts that are associated with their processes.

¹⁷⁹ Law No. 225-20 of Integral Management and Co-processing of Solid Waste (e.g., is the legal framework to promote reduction, reuse, recycling, use and recovery of waste).

¹⁸⁰ The design of such a waste tax can be regressive (higher burden to low-income population. E.g., each household is treated in the same way, but overall, the tax represents a higher income share of low-income population) or regressive (higher burden to higher income population. E.g., higher income has higher tax rates).

	Barriers	Access to finance / Risk reduction - Instruments/mechanisms to respond to barriers - Waste
Reduce risk and Access to finance	<p>Lack of investments in new technologies due to lack of 'circular infrastructures' (e.g., only open landfills available).</p> <p>No incentives for private sector to get engaged due to high upfront costs and uncertain revenue schemes, because the tax laws on waste are developing dynamically.</p>	<p>Improve waste management infrastructure through investments (direct finance such as equity injections, or establishment of PPPs). Investments are needed in the area of sorting and recycling / composting technologies (e.g., tracer-based-sorting, artificial intelligence, mechanical and chemical recycling, etc.).</p> <p>One option is to facilitate the development of a PPP (incl. SPV) for businesses (private) and municipalities (public) to partner in waste management infrastructure investments for e.g.:</p> <ul style="list-style-type: none"> ▪ Convenient return-from-hotels channels (e.g., collecting reusables through a curb-side collection process and returning to point of purchase for hotels to easily access again).¹⁸¹ ▪ PPPs might be a good partner, given the fact, that private actors play already an important role for advocacy for public policies. Besides contributing to the strategic decision of the CNC as well as sitting on several councils such as CNFZE and ProIndustria, it stimulates the public policy debate by proposing reforms and discussions within the business convention. However, Regulatory/Institutional framework, operational maturity, investment climate, financial facilities, and decentralization are overall under-performing in comparison with other LATAM countries. Currently, 38 PPPs¹⁸² are under implementation (major focus on electricity and transport infrastructure).

¹⁸¹ Currently, there are few private waste business models: Most of them do: 1. picking up garbage/solid waste from hotels with trucks; 2. Sorting waste in rudimentary facilities; and 3. Selling sorted/separated waste to export markets or to W2E.)

¹⁸² Based on the Law: Ley No. 449-06 que modifica la Ley No. 340-06 sobre Contrataciones de Bienes, Obras, Servicios y Concesiones.

3.3 Vietnam

Abbreviations (Vietnam)

EECP	(Vietnam) Energy Efficiency and Cleaner Production
EPT	Environment Protection Tax
FIs	Financial Institutions
FTAs	Free Trade Agreements
GCTF	Green Credit Trust Fund
GCPF	Global Climate Partnership Fund
ICED	Institute for Circular Economy Development
IWMS	Integrated Waste Management Solutions
MONRE	Ministry of Natural Resources and Environment
MPI	Ministry of Planning and Investment
MSWTE	Municipal Solid Waste to Energy
NATIF	National Technology Innovation Fund
NAP	National Action Plan
NGGS	National Green Growth Strategy
OCOP	One Commune One Product
PCIAW	Professional Clothing Industry Association Worldwide Ltd.
SBV	State Bank of Vietnam
SEDP	Five-Year Socio-Economic Development Plan
SOEs	State-owned enterprises
SWM	Solid Waste Management
STAR	Sustainable Textile of the Asian Region
VBCSD	Vietnam Business Council for Sustainable Development
VDB	Vietnam Development Bank
VCCI	Vietnam Chamber of Commerce and Industry
VCCE	Vietnam Centre for Circular Economy
VCSF	Vietnam Corporate Sustainability Forum
VEEIE	Vietnam Energy Efficiency for Industrial Enterprises
VEPF	Vietnam Environment Protection Fund
VITAS	Vietnam Textile and Apparel Association
VNCP	Vietnam Cleaner Production Centre
WTE	Waste to Energy
WWF	World Wildlife Fund

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3.3.1 Macroeconomic context

Between 1987 and 2017, the economy experienced average growth rates of 6.6% per annum, reaching over 7% in 2018 and 2019. For 2021, the GDP growth forecasts varied between 4.8% and 6.3% (despite the COVID-19 pandemic).¹⁸³ Simultaneously, Vietnam experienced a significant population growth (from 86.95 million in 2010 to 96.5 million in 2019) and rapid urbanisation. Environmental hotspots in Vietnam have been intensified through rapid economic and population growth and a sharp increase of urbanization in recent decades. The partly inefficient use of resources, increase in waste generation, but also an increase in pollution are main drivers of this development. There is a need to mobilise public and private funds for transforming growth towards a sustainable path, including an application of circular economy concepts.

3.3.2 Financial sector

Introduction

Vietnam's banking system plays a major role in supplying credits to the economy and comprises 28 commercial banks, four state-owned commercial banks, nine foreign-owned banks and 49 foreign bank branches, and three compulsory acquired banks, two joint venture banks, 26 finance and leasing companies, a cooperative bank, a social policy bank, a development bank and four microfinance institutions.¹⁸⁴ The State Bank of Vietnam (SBV), the Central Bank of the Socialist Republic of Vietnam executes e.g. the management of monetary and banking activities and foreign exchange, monetary services for the government, and safeguarding safe and sound banking operations, etc.

Despite the COVID-19 pandemic, the Vietnamese financial sector has not experienced significant negative impacts due to timely government interventions (incl. controlling inflation, lowering lending rates, promoting digital transformation and non-cash payments). Overall, the sector itself can be described as solid, despite **some remaining challenges**, such as **weak liquidity and capitalisation** (though gradually improving).

Another sector challenge is **insufficient financial inclusion**. More than 40% of firms – especially SMEs face difficulties in getting access to credits. Particularly, long-term finance is insufficient, which leads to maturity mismatch. A major **hurdle for SMEs to access to finance**, is the **use of secured assets as collateral**. Many **finance institutions are not aware about (sustainable) market potentials and the valuation of movable assets** (such as machinery).¹⁸⁵

Sustainable finance

In line with the ASEAN Sustainable Banking Principles, SBV has already implemented **several measures to promote green/sustainable banking**¹⁸⁶, for instance via **guidelines for issuing social and/or sustainability-linked**

¹⁸³ World Bank, 2021, Vietnam's economy is forecast to grow by about 4.8% in 2021/ KPMG, 2021, Investing in Vietnam 2021 and beyond.

¹⁸⁴ SBV, 2021, System of Credit Institutions (https://www.sbv.gov.vn/webcenter/portal/en/home/fm/socins/bks/cbks/socb?_af-Loop=13493719325768506#%40%3F_af-Loop%3D13493719325768506%26centerWidth%3D80%2525%26left-Width%3D20%2525%26rightWidth%3D0%2525%26showFooter%3Dfalse%26showHeader%3Dfalse%26_adf.ctrl-state%3D8y9bl3a8t_4) (Accessed online 30 Nov. 2021).

¹⁸⁵ IFC, 2021, Country private sector diagnostic, creating markets in Vietnam.

¹⁸⁶ Selection of decision; How to issue green bonds, social bonds, and sustainability bonds (2021) State Securities Commission of Vietnam with international partners; Decree No. 53 regulations on individual corporate bond offerings and transactions in the domestic market and corporate bond offerings in the international market (2020); Decision approving the Scheme on green bank development in Vietnam (No. 1640/QD-NHNN, 2018, SBV); Decision to set the Action Plan of the banking sector towards the 2030 agenda and Vietnam SDGs (No.

bonds.¹⁸⁷ In cooperation with the Ministry of Natural Resources and Environment (MONRE) and the Ministry of Finance, SBV develops a **taxonomy for sustainable finance**, which is expected to be **aligned with the EU Taxonomy** (incl. the promotion of resource resilience and transition to CE across many different sectors¹⁸⁸). The taxonomy was expected to be finalised in late 2021. Financial institutions are already requested to set up strategies and targets for capital allocation to sustainable assets, projects, or sectors and to develop and maintain internal staff capacity on sustainability. They are also asked to report publicly on their sustainability-focused activities and related impacts. The regulator monitors information that are reported by finance institutions.

With special focus on renewable energy and high-tech agriculture sectors, credit institutions started assessing ESG risks during the credit granting process.¹⁸⁹ A range of international organizations and financial institutions are already engaged in sustainable finance initiatives.

- **GIZ's** Macroeconomic Reform/Green Growth Programme supports the implementation of the Vietnam National Green Growth Strategy (NGGS) and provides consultation to its partners.¹⁹⁰ The programme's "**Green Financial Sector Reform**" component is pursuing the goal of reforming the country's financial system towards environmentally and socially sustainable development to support the implementation of national strategies in **green growth, climate change response and sustainable development** in Vietnam.
- **SECO** (Swiss State Secretariat for Economic Affairs) supported the establishment of the **Green Credit Trust Fund – GCTF** (2007 – 2017)¹⁹¹ – with the objective to promote long-term investments in **cleaner technology** and to overcome the challenges of SMEs in capital mobilization via credit loans from commercial banks (due to insufficient collateral) and enabled investment in cleaner technologies via ACB, VIB, Techcombank (while VNCPC, CSD were in charge of technical and environmental approvals).
- The **Vietnam Environment Protection Fund (VEPF)** is managed by MoNRE and provides long-term soft loans and grants for projects related to **the treatment of wastewater, hazardous waste, and solid waste from households as well as renewable energy**. For the period 2019-2021, the priority lied on building technical infrastructure for **environmental protection at industrial zones and clusters** and trade villages, **hazardous waste treatment, bio-fuel production**, and renewable energy. VEPF received capital from the World Bank (USD 20.47 million USD) to lend for investment in the construction of **centralized wastewater treatment stations for industrial parks in Ba Ria-Vung Tau, Dong Nai and Nam Dinh, Ha Nam** provinces. Another form of VEPF income are deposits for environmental rehabilitation in mineral exploitation from organizations permitted to exploit minerals and imported scrap.
- The **National Technology Innovation Fund (NATIF)**, subordinate to the Ministry of Science and Technology provides **soft loans and guarantees loans** or offers financial aid for enterprises, organisations, and individuals to research, apply, transfer, innovate, and complete innovative technology.
- **Global Climate Partnership Fund (GCPF)** signed with Nam A Bank and TP Bank a contract for a **USD 20 million** green credit loan for companies to access capital funds with **concessional interest rates for environmental protection projects**, but with focus on **energy efficiency and renewable energy**.
- **EIB** provides **refinance to Vietnam Development Bank (VDB)** for climate change mitigation projects¹⁹²:
 - in **industry** (e.g., exploitation and use of methane in coal mining and in oil extraction; use of alternative raw materials and reused waste heat),
 - in **agricultural sector** (e.g., exploitation and use of biogas; exploitation and use of methane obtained from wastewater treatment or use in energy production), and
 - other **energy-saving technologies** (e.g., solar water heater, high voltage AC, lighting; effective conversion of transportation types or upgrading of transport management).

1731/2018/QĐ-NHNN, 2018 SBV); Decision strategy for the development of the banking sector to 2025, incorporating green credit development (No. 986/QĐ-TTg 11. Handbook on Social and Environmental Risk Assessment, 2018, SBV); Decree 163/2018/ND-CP on corporate bond issuance, including green bonds (2018, MoF); Decree on government debt instruments (No. 95-201-ND-CP 2018); Directive on Promoting Green Credit Growth and Environmental and Social Risks Management in Credit Granting Activities (No. 03/CT-NHNN 2015, SBV); Decision on issuance of Action Plan of the banking sector to implement the national strategy on green growth toward 2020 (No. 1552/QĐ-NHNN 2015, SBV).

¹⁸⁷ In August 2021, Symbiotic announced that it arranged a USD 6.25 million and VND 234 billion (USD 10.1 million) Green Bonds for EVN Finance (a Vietnamese non-bank Financial Institution regulated by SBV) to fund green projects (renewable energy (C&I solar, roof-top solar), hydro power, and biomass energy).

¹⁸⁸ ASIAN Taxonomy Board, 2021, Asian taxonomy for sustainable finance.

¹⁸⁹ SBFN, IFC, 2021, Accelerating Sustainable Finance Together Global Progress Report of the Sustainable Banking and Finance Network Evidence of Policy Innovations and Market Actions across 43 Emerging Markets.

¹⁹⁰ Ministry of Planning and Investment, Central Institute for Economic Management, Ministry of Finance, State Bank of Vietnam, and State Securities Commission.

¹⁹¹ GCTF, 2021 <https://gctf.vncpc.org/en/introduction/insight/> (Assessed online Dec. 2021).

¹⁹² UNIDO, MPI, 2018, Handbook on how to access green financing in Vietnam.

- **AFD** provides a **USD 100 million** SUNREF credit line (non-sovereign concessional loan), including TA to BIDV to finance energy businesses (**renewable energy and energy efficiency sectors**)
- **World Bank** through the **Vietnam Energy Efficiency (EE) for Industrial Enterprises (VEEIE) programme** provides **loans (USD 156.3 million)** and **TA** via banks to industrial enterprises for EE investments with the objective to realise around 60 EE projects by July 2022. As part of the **Vietnam Scaling Up Energy Efficiency Project**, WB signed an USD11.3 million grant-agreement with SBV (incl. GCF funding and a USD 75 million **guarantee** for a risk sharing facility to reduce lending risks) to support the development of a commercial financing market for industrial EE investments – building capacities for the private sector and strengthening the policy framework and regulations to scale the Vietnamese’ EE market. Partial **credit guarantees** should support banks who may risk defaults on EE loans and should **mobilize around USD 250 million** of commercial financing for industrial enterprises and energy service companies (with low collateral requirements).¹⁹³
- **IFC’s Vietnam Energy Efficiency and Cleaner Production (EECP) financing programme**¹⁹⁴ has supported commercial banks (Vietinbank and VPBank), assisting them in developing strategies and financial products related to sustainability for corporates, that invest in capital equipment to achieve **higher EE, save production costs, improve productivity and product quality and reduce environmental impacts** (incl. generic energy equipment, e.g. lighting, HVAC, pumps, motors, boilers, compressors, etc., industry-specific process equipment and technologies and co-generation or tri-generation systems, and waste minimization and renewable applications). The programme also supports enterprises through capacity building on **EE and cleaner production** and by expanding a network of technical services providers (incl. the Energy Conservation Centre)
- **Vietnam Prosperity Joint-Stock Commercial Bank (VPBank)’s Green Loan Framework** has the objective to support: Renewable Energy, EE, Clean Transport, Eco-friendly and/ or circular economy adapted products, production, technologies (e.g., Steel recycling, processing seafood waste), water efficiency and wastewater treatment, sustainable construction, agriculture and forestry, and pollution control and prevention). Notably, the green loan has been assessed by Sustainalytics and confirms, that VPBank Green Loan Framework aligns with the four core components of the Green Loan Principles 2020.

3.3.3 Developments and areas of interest

Introduction

Over the last decades, Vietnam’s economy transitioned from an agricultural to industrial services focus due to a process of industrialization, modernization, and international integration. The process opened opportunities for improving technology, production, and competitiveness.

While the transition has increased wealth and consumption, it also increased exploitation of natural assets. The amount of waste and greenhouse gas emissions (partly due to rising dependence on fossil-fuelled power generation) is increasing. The integration in international trade, the dependence on investment flows and the tourism sector, made business particularly vulnerable to the COVID-19 pandemic.

Throughout the last years, Vietnam has built up an **institutional and regulatory framework for sustainable development**. Hereby, the Government of Vietnam (GoV), for instance, **plans for a circular economy by building on three pillars** of (1) designing and prolonging material lifespan, (2) reducing waste and emissions, and (3) restoring the ecological system.¹⁹⁵

A selection of relevant developments and drivers that will provide an orientation for different sectors include a.) national strategies and policies, but also b.) associated initiatives/institutions:

Key national institutions and initiatives

- The **Vietnam Cleaner Production Centre (VNCPC)** that has to objective to disseminate the cleaner production (CP) concept and is gradually integrating the CE concept in Vietnam’s industry. The **VNCPC** is based at the Institute for Environmental Science and Technology (INEST), Hanoi University of Science and Technology,

¹⁹³ World Bank, 2021, World Bank, Green Climate Fund provide Vietnam with USD 86.3 million to spur energy efficiency investments <https://www.worldbank.org/en/news/press-release/2021/03/08/wb-gcf-provide-vietnam-with-us863-million-to-spur-energy-efficiency-investments> (Accessed online 30 Nov. 2021).

¹⁹⁴ Vietnam Energy Efficiency and Cleaner Production Financing (https://www.ifc.org/wps/wcm/connect/3f2ee814-e140-43dc-b14a-c61b54c4e2bd/VN-EECP%2Bfactsheet_ENG.pdf?MOD=AJPERES&CVID=j5gQFTF Accessed online 30 Nov. 2021).

¹⁹⁵ The Voice of Vietnam, 2021, Vietnam aims at circular economy, green growth <https://vovworld.vn/en-US/news/vietnam-aims-at-circular-economy-green-growth-989348.vov> (Accessed online 30 Nov. 2021).

conducts a range of relevant services and products and implements projects¹⁹⁶. For instance, the promotion of supply and demand for Eco-fair agri-food processing products in Vietnam project implemented via VNCPC, VIRI, CCS, Funzi and supported by the EU (04/2020-04/2023) supports MSMEs in Vietnam’s **agri-food processing sector to improve the sustainability of production processes** and product quality. In 2020, VNCPC updated the **cleaner production guidelines for 7 targeted industrial areas** (pulp and paper, textile and apparel, steel arc–furnace processing, beer, paint, metal finishing and NPK fertilizer). More than 56 companies in the **industrial parks** Khanh Phu, Hoa Khanh and Tra Noc 1 and Tra Noc 2 have been assessed so far in terms of applicability of resource efficient and circular production (RECP) technology options. More than 220 technicians in industrial parks in Ninh Binh, Da Nang and Can Tho have been trained on characteristics and environmental aspects of technologies and production methods, as well as on assessment and implementation of RECP solutions.

- The **Vietnam Circular Economy Network/Hub**¹⁹⁷ has been introduced in October 2021 (with support from the Norwegian Embassy and technical support from the Dutch Embassy), with the objective to raise awareness and build capacities in adopting CE principles.
- The **Institute for Circular Economy Development (ICED)** established in July 2020 – a private/government/university collaboration – has the objective to propose e.g., policies in application and development of circular economy models for related agencies.
- The Vietnam Corporate Sustainability Forum (VCSF), the Vietnam Chamber of Commerce and Industry (VCCI) and the Vietnam Business Council for Sustainable Development (VBCSD) acknowledge the importance of the circular economy.
- The **National Technology Innovation Fund**, the **National Foundation for Science and Technology Development** and the **National Innovation Centre promote innovation**.
- Regarding **small-scale manufacturing** the Ministry of Agriculture and Rural Development has implemented the **One Commune One Product (OCOP) Program** for about three years to boost rural socio-economic development, unlock local potential and to develop distinctive products and industries based on local production advantages, raw material areas and traditional culture. For 2021-2025, the OCOP Program will be **linked to green products, circular economy, and environmental protection** among others by establishing centres that enable training, design, exchange and learning from experience (in Hanoi, Quang Ninh, Hue, or the Mekong Delta). The programme relies on **policies on product quality control** and collaborates with seven ministries in this purpose.

National strategies and policies

- The updated **Intended National Determined Contribution (NDC)**, with the commitment to reducing emissions by 9% by 2030 compared to the business-as-usual scenario (with international support, this could be raised up to 27%).
- The **National Action Plan (NAP) for the Implementation of the 2030 Sustainable Development Agenda** and the **Five-Year Socio-Economic Development Plan (SEDP)** for the period 2021 to 2025, and the **Vietnam Green Growth Strategy (VGGS)** for the period 2021 to 2030 with a vision towards 2045, addresses the improvement of energy efficiency, sustainable production, sustainable consumption and lifestyle, the **National Action Plan on Sustainable Production and Consumption (2021-2030)** that emphasizes the CE with concrete targets¹⁹⁸, e.g. for eco-friendly products and packaging and lists main tasks, the **Master Plan on development of Vietnam’s Construction Material industry** by 2020 with a vision towards 2030 sets the task of improving resource and energy efficiency, reuse and recycle of construction material and the **Strategy for Cleaner Production in Industries**.
- The **Law on Environmental Protection** (adopted in 2020) promotes CE as an economic model¹⁹⁹ and is encouraging clean energy, renewable energy, environmentally friendly products and reduce, reuse, recycle methodologies (companies are expected to use the *best available technology* to control pollution and limit

¹⁹⁶ <https://vncpc.org/en/projects/> (Accessed online 30 Nov. 2021).

¹⁹⁷ www.vietnamcirculareconomy.vn (Accessed online 30 Nov. 2021).

¹⁹⁸ E.g., By 2030, 7 – 10% decrease in resources and materials used by major production sectors such as textile, steel, plastic, chemical, cement, alcohol and beer, beverage, paper, seafood processing and some other production sectors.

¹⁹⁹ “Circular economy is an economic model in which design, production, consumption and service activities aim to reduce raw material extraction, extending the product life cycle, reducing generated waste and minimizing negative impacts on the environment.” — Article 142 of Vietnam’s Law on Environmental Protection 2020.

environmental impacts); the **National Strategy on Environment Protection**, with a vision toward 2030, details measures to enhance the reduction, reuse, and recycling of waste, and application of Cleaner Production models.

- The **Prime Minister's Decision No. 16/2015/QĐ-TTg** is regulating the recollection and treatment of discarded products, and the Resolution of the National Assembly Standing Committee No579/2018/UBTVQH14 sets a plastic bag tax.

The **Minister of Natural Resources and Environment** will draft a decree that provides for roadmap criteria and incentive mechanisms for the application of the CE model.²⁰⁰

- The **preferential tax treatments** (e.g., for environment, scientific research, high-tech, infrastructure development and software, economic and industrial zones) that were introduced to promote the industry and innovation²⁰¹, e.g., **Circular No128/2016/TT-BTC** clarifies export duty exemption and reduction for environment-friendly products and products made from recycling and waste management.
- The **Natural Resources Tax** (royalty tax) is imposed on the exploitation of natural resources (e.g., petroleum, mineral resources, forest products, seafood, and natural forest products, natural water, and natural aquatic products, etc.). Effective from 2012, the **Law on Environment Protection Tax (EPT)**, on goods that may cause damage to the environment (e.g., petroleum, coal, plastic bags, and restricted chemicals, etc.) is forcing polluters to bear responsibility for the costs of their polluting activities.

Despite the progress on institutional, policy and regulatory level, **fragmentation** (insufficient coherence) within **policy planning** remains high. The **private and public sector environment are not fully prepared to promote responsible investments on a long-term basis**. To ensure that Vietnam's growth momentum can be kept – also in a sustainable manner – **investments need to ensure efficiency and productivity gains across areas of interest**. Scarce **public sources** may be channelled to areas where the private sector cannot fully meet the national priorities, particularly socially sensitive sectors (such as water, sanitation, and health). Whereas **private investments** occur to be more suited in sectors, such as information and communication technology (ICT), energy, and construction.

Promoting private sector investments in sustainable production in general^{202,203,204}, it still needs:

- **Building on and implementing a national policy and strategy framework** on sustainability and, particularly a circular economy, e.g. supplementary efforts to implement economic policy reforms and further efforts in reducing regulatory burden on businesses (e.g. further State-owned enterprise (SOE) reforms and strengthening of the competition framework) and enabling and empowering the **private sector innovation**, sustainability labels for products (that reflect circular concepts), addressing governance challenges (particularly at the sub-national level)
- **Raising awareness among the business community**, e.g., building skills and managerial practices (integrate CE concepts in curricula of universities and vocational training programmes)
- **Raising awareness within the society**, e.g., environmental awareness and sustainable consumption
- **International cooperation on building a circular economy and transfer of technology and know-how**, incl. transfer and application of advanced technology, lowering high logistics and infrastructure costs, and promotion of value chain integration
- **Improving access to finance** especially for SMEs and **providing incentives for green growth** (e.g., via fiscal policy instruments and tools, e.g., green credit lines and green bonds)

²⁰⁰ VCCI, 2021, Conference regarding the policy consultation for and introduction of the national circular economy network <https://en.vcci.com.vn/conference-sheds-light-on-national-circular-economy-network> (Accessed online 30 Nov. 2021).

²⁰¹ Prime Minister's Directive No.16/CT-TTg May 2017 on "enhancing capacity towards Industry 4.0" and Prime Minister's Decision No. 844/QĐ-TTg April 2016 on the scheme "Supporting national innovation start-up ecosystem to 2025".

²⁰² IFC, 2021, Country private sector diagnostic, creating markets in Vietnam.

²⁰³ Circular Economy – a Perspective from Viet Nam "Aid-for-Trade Workshop - Circular Economy, Economic Diversification and Aid for Trade", WTO, June 10, 2021 https://www.wto.org/english/tratop_e/devel_e/a4t_e/vietnam_100621.pdf (Accessed online 30 Nov. 2021)

²⁰⁴ National Action Plan on Sustainable Consumption and Production (2021-2030).

Overall, the development and application of circular concepts are prioritized in following sectors:

- **Water sector** is highlighted as priority and elaborated on Action Plans/ Strategies, particularly Integrated Water Resource Management, but also via ecosystem protection²⁰⁵
- **Energy**, particularly energy efficiency and clean and renewable energy²⁰⁶
- **Agriculture and land use**, such as biodiversity protection, forest management, deforestation prevention, afforestation, mangrove protection and regeneration are priorities²⁰⁷
- **Production and consumption**, incl. sustainable transport, chemical, **cement, plastic, textile, paper, food & beverage processing**, steel. Here, efficient use of resources are priorities^{208,209}
- **Waste**, focusing on improved waste management, wastewater treatment, sustainable production and consumption, efficient use of resources, waste to energy development, recycling and reuse, and Methane recovery²¹⁰

With reference to development priorities and the current circular economy framework, Vietnam is targeting particularly **resource efficiency and waste management**.²¹¹ Thus, the following sub-sections provide brief introductions to Vietnam's **production – exemplary industrial zones, the electronics and ICT sector and the textile sector and the waste sector**.

3.3.3.1 Production / industrial zones/parks

Contributing to about one third of GDP, state-owned enterprises (SOEs) play a significant role in Vietnam. However, a large share (99%) of Vietnam's businesses (758,610) are private (operating in accordance with the Enterprise Law and Investment). They mostly operate in **trade, services, construction, industry, and craft production**. The export has a strong focus on telephones and parts thereof, computer, electronics, textile and garments, footwear and machinery and instruments.²¹² Foreign-invested enterprises are commonly large. They are drivers of manufacturing production and exports.²¹³ On the other hand, **domestic enterprises are mainly micro and small and are engaged in simple manufacturing** (with focus on the domestic market and low productivity) and relatively low productivity services (e.g., small retail and restaurants). Especially resource intensive industries are causing critical pollution, especially air pollution and wastewater discharge.²¹⁴ Compared to the global energy intensity benchmark, Vietnam's industry is especially energy intensive. The iron and steel sector and others, such as cement and textiles, use rather old technologies. For key industries, comprehensive **demand-side energy efficiency investments** are needed (around **USD 3.6 billion**).²¹⁵

Critical drivers for more sustainability are e.g., the participation in Free Trade Agreements (FTAs), incl. their favourable conditions like tax reliefs for certified sustainable production. The national legal **framework also requires more sustainable production in manufacturing** such as textile (including Law, 55/2014/QH13, Environmental Protection and Decree, 82/2018/ND-CP, Management of Industrial Parks and Economic Zones, the Decree, 54/2015/ND-CP, regulating privileges for water saving and efficient practices and the Decree, 38/2015/ND-CP, Management of waste and discarded materials).

Industrial zones

As of May 2021, the Ministry of Planning and Investment (MPI) reported **394 industrial parks** (in three key economic zones) that each comprise about 90 companies. In the first half of 2020, they attracted USD 6 billion in FDI.²¹⁶

²⁰⁵ NDC-SDG Connections, SDG 6: Clean water, sanitation – VT (<https://klimalog.die-gdi.de/ndc-sdg/sdg/6/VNM> (Accessed Nov. 2021)

²⁰⁶ NDC-SDG Connections, SDG 7: Affordable and clean energy - VT (<https://klimalog.die-gdi.de/ndc-sdg/sdg/7>). (Accessed Nov. 2021)

²⁰⁷ NDC-SDG Connections, SDG 15: Life on Land - VT(10.11.2021 via <https://klimalog.die-gdi.de/ndc-sdg/sdg/7>). (Accessed 30 Nov. 2021)

²⁰⁸ National Action Plan on Sustainable Consumption and Production (2021 – 2030).

²⁰⁹ NDC-SDG Connections, SDG 9: Industry, innovation, and infrastructure - Vietnam (10.11.2021 via <https://klimalog.die-gdi.de/ndc-sdg/sdg/9>). (Accessed online 30 Nov. 2021)

²¹⁰ NDC-SDG Connections, SDG 12: Responsible consumption and production (10.11.2021 via <https://klimalog.die-gdi.de/ndc-sdg/sdg/12>).

²¹¹ Circular Economy – a Perspective from Viet Nam “Aid-for-Trade Workshop - Circular Economy, Economic Diversification and Aid for Trade”, WTO, June 10, 2021 https://www.wto.org/english/tratop_e/devel_e/a4t_e/vietnam_100621.pdf (Accessed online 30 Nov. 2021)

²¹² General Statistics Office of Vietnam.

²¹³ IFC, 2021, Country private sector diagnostic, creating markets in Vietnam.

²¹⁴ <https://www.trade.gov/country-commercial-guides/vietnam-environmental-technology> (Accessed online 30 Nov. 2021)

²¹⁵ World Bank, 2016, Exploring a Low-Carbon Development Path for Vietnam

²¹⁶ Hanoi News, 2020, Vietnam draws USD6 billion in FDI to industrial and economic zones in H1.

Industrial zones produce industrial goods and provide services for the industrial production. They are classified into different types such as export²¹⁷, supporting²¹⁸, and ecological²¹⁹ industrial zones. The three economic zones (Northern Key Economic Zones²²⁰, Central Key Economic Zones²²¹ and Southern Key Economic Zones²²²) are established for the purpose of attracting investments, e.g., for promoting socio-economic development. They are classified into: Coastal economic zones established in the coastal area; and Border-gate economic zones established in onshore border-gate areas. There are initiatives (see Info-box below) fostering the implementation of eco-industrial parks. Originally, industrial zones had been considered as an effective way of improving synergies within the industry (e.g., for improving resource use efficiency, using shared infrastructure and services). While basic environmental legislation had been passed, the enforcement was not sufficient in the past.

Over the years of economic development, significant volumes of effluents from industrial zones have been directly discharged without prior treatment, unprocessed solid waste (incl. hazardous material) increased, and greenhouse gas (GHG) emissions increased due to high dependency on gas, electricity, and coal.

Info-box 6 – Selected organisations in related industrial zones activities

- **UNIDO** in cooperation with MPI implemented from 2014-2019 the pilot “**Implementation of eco-industrial park initiative for sustainable industrial zones in Vietnam**” initiative (supported by GEF and the Swiss Government) with the aim to **transform industrial parks (IP) into eco-industrial parks** (in Hanoi, Khanh Phu Industrial Park (in Ninh Binh), Hoa Khanh Industrial Park (in Da Nang) and Tra Noc Industrial Park 1 & 2 (in Can Tho). The project contributed to **resource efficiency through the reduction of raw materials, water, and energy, reduced GHG emissions and reduced waste through the promotion of cleaner production and the 3Rs** (reduce, reuse, and recycle). The project contributed to the preparation of Decree 82 (2018), with focus on conditions and requirements for recognition as eco-industrial parks, and prescribing the planning, establishment and operation of policies and management of industrial parks.
- In 2020, the **replication**, the “**Eco-industrial Park Intervention in Vietnam – Perspective from the Global Eco-Industrial Parks Programme**” project was launched²²³, with the aim to **create the foundation for the replication of this model** by targeting five industrial parks over three years (incl. DEEP C Hai Phong I (Dinh Vu Industrial Zone) in Hai Phong City (Quang Ninh Province) that already implement an environmental sustainability strategy on four pillars: power, water, waste, and green zone. The project will contribute to (i) enhancing policies and instructions for the implementation of eco-industrial parks and (ii) implementing technical interventions to transform selected industrial parks in Eco-industrial Park.

Recommended entry point/CE engagement opportunity in industrial zones

Facilitate the integration of the circular concept in Vietnam’s industrial zones and build on good practice of the Eco-Industrial Park Initiative. IFIs have implemented dedicated finance through the national banking sector to address energy efficiency and cleaner production. Also, the *Eco-Industrial Park Initiative* addresses a range of activities that reflect partly the CE concept, but with focus on the shared services and infrastructure of industrial zones. Other CE activities (e.g., product design) are not addressed. Moreover, a small number of industrial zones is targeted only. This leaves potential investment opportunities by **transferring remaining industrial zones to eco-industrial parks**, especially concerning:

Circular design and production (up-hill)

- **Building on concepts of sustainable shared services** (incl. transport, cleaning, and maintenance, monitoring and control of emissions)²²⁴, but also by
- **Integrating explicitly the CE concept**, particularly through improved **product design** (e.g., increased durability, ensure recyclability, use of recycled material) and **packaging** (e.g., eco-packaging design via material innovation)

Circular value recovery (down-hill)

Support the transfer of industrial zones into eco-industrial parks - addressing **sustainable infrastructure (incl. recycling, biogas plants, wastewater treatment)**

²¹⁷ Specialized in producing export goods and providing services to produce export goods and export activities

²¹⁸ Specialized in manufacturing auxiliary industrial products and rendering services

²¹⁹ Specialized in engaging in cleaner production and effective use of natural resources.

²²⁰ Particularly manufacturing of electronics, motorcycles, high technology products and machinery

²²¹ Particularly focusing on developing light industry in the main areas of food processing, apparel, construction materials and processing of paper and forest products

²²² Particularly focusing on rubber, plastics, and apparel industries. In addition, this area is suitable for machinery and equipment manufacturing and metallurgy.

²²³ UN Vietnam, 2020, Eco-industrial park – a model for sustainable industrial development of the Government of Viet Nam (<https://vietnam.un.org/en/101985-eco-industrial-park-model-sustainable-industrial-development-government-viet-nam>).

²²⁴ https://www.greengrowthknowledge.org/sites/default/files/Eco-Industrial_Park_Vietnam_Brochure_0_0.pdf

Circular support (cross-hill)

- Transfer of industrial zones into eco-industrial parks (e.g., VNCPC in collaboration with the Vietnam Circular Economy Network/Hub)

In order to engage in respective CE opportunities in industrial zones, the **enabling framework** (incl. capacities, research and development and policies and regulatory frameworks) **and access to finance** (incl. access to capital and risk reduction) needs to be improved to respond to barriers and spur investments as indicated hereafter.

Table 21: Vietnam – Industrial Zones Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers – Production and consumption
Capacities	<p>There is a lack of a circular mentality across stakeholders, such as manufacturers, but also financial institutions and consumers</p> <p>It needs more awareness, business models that are attractive (e.g., for consumers), but also some form of internalising of external costs</p>	<p>Contribute to human resources development/capacity building, e.g., through grant funding e.g., for TA and training.</p> <p>Provide tools for different stakeholders (incl. bank staff, industry, and trade departments, etc.) to enable investment screenings and decision making (e.g., improve traceability of CE -related KPIs).</p> <ul style="list-style-type: none"> ▪ Tackling a lack of circular mentality through general awareness rising (for manufacturers, but also consumer) - by e.g., public campaign, good practice samples (→ <i>cross-sectoral consideration, i.e., incl. electronics, textile and garments, footwear and machinery and construction, etc. to generate demand for CE-aligned products and services and interest in developing CE-aligned products</i>) ▪ Reflect the CE concept in curricula of technical and vocational education training as an enabling factor for CE production (→ <i>consider schools, and academic institutions as entry points for CE awareness, and thus, building capacities for production companies, and enable them to invest in CE concepts</i>) ▪ Enable industry players to use CE concepts and relevant management models (like the LEAN production, just-in-time (JIT) management, enterprise resource planning systems, and environmental and energy management systems, e.g., in cooperation with VNCPC, <i>as an enabling factor for CE production and investment in CE concepts</i>) ▪ Support industry players in implementing sustainable import/export activities (<i>ensure that their procurement practice and sales strategies along the value chain takes into account the CE concept</i>) ▪ Build capacity for sustainable finance (incl. CE concept) in banks via TA/training (to adjust strategic and operational functions and reflect financing needs for CE projects (→ <i>build on existing projects that promote sustainable finance</i>))
R&D	<p>Outdated technology/factories and (partly) small production scale comes in with lack of resources to invest in research and in more resource efficient technologies or recycling technologies</p> <p>Lack of resources for research concerning (1) new, renewable, and natural resources (materials) to replace unsustainable ones, and (2) sustainable / circular product design (reflecting recyclability, end-of-life procedures)</p>	<p>Facilitate R&D (via grant funding) and define and support the development (and implementation) of CE concepts and bankable business models for industrial zones – potentially, in collaboration with UNIDO and VNCPC - building on good practice of resource efficiency and eco-industrial parks and different sectors (a sample for textile is presented below):</p> <ul style="list-style-type: none"> ▪ Circular design: e.g., identify new, renewable, and natural resources (materials) to replace unsustainable ones, develop sustainable product design and eco-packaging design ▪ Circular use: e.g., introduce processes for the reuse, repair, refurbishing, repurposing, and remanufacturing of end-of-life products ▪ Circular value recovery: e.g., ensure post-consumer stage infrastructure match new materials/product design, and business models attractive for consumers ▪ Circular support: e.g., enable existing entities (e.g., the Vietnam National Cleaner Production Centre (VNCPC) and the Vietnam Circular Economy Network/Hub) to promote the CE concept in industrial zones

Policies and regulations	Lack of incentives for? and insufficient internalised environmental costs	<p>Facilitate the revision of policies and standards that govern the CE concepts in manufacturing, i.e., product design but also product use and packaging (incl. widespread adoption of plastics substitutes in single-use applications (grant funding / direct consultancy services):</p> <ul style="list-style-type: none"> ▪ Revise the fiscal policy landscape, incl.: consideration of incentives for CE practice (e.g., encourage a change from product consumption and ownership to service consumption and use in life/ Pay-per-service unit) and extend producer responsibility (EPR) to other critical sectors that are not addressed by current and pending regulations (→ <i>consider new regulations on e-waste, ELV and packaging waste management applicable from 2024</i>) ▪ Mandate ecological design and design-for-recycling standards (e.g., for all plastics, especially packaging) and create more data transparency, e.g., in the plastics market (→ <i>standards would request the production sector to respond, but also financial sector players to review clients' alignment with standards</i>) ▪ Facilitate labelling and certification of ecolabels (→ <i>ecolabels could be used as metrics/eligibility criteria for access to finance</i>)
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	Barriers	Access to finance / Risk reduction Instruments/mechanisms to respond to barriers – Production and consumption
Access to finance and risk reduction	<p>Insufficient access to dedicated finance with explicit criteria that encourage investment in green / CE production</p> <p>Limited access to finance for SMEs, e.g., due to lack of collateral</p>	<p>Address remaining investment / access to finance needs for upgrading industrial zones to eco-industrial parks: Compare investment needs with available funding (e.g. via IFC for cleaner production, AFD and World Bank for energy efficiency, and VEPF for environmental protection at industrial zones, the Green Credit Trust Fund, VDB and the National Technology Innovation Fund, etc.) that do not explicitly address CE, but “CE-relevant” investments (<i>as emphasized in first info-box above</i>) and assess capacities of financial institutions.</p> <p>Facilitate access to finance, e.g.:</p> <p>→ Loan and equity finance (a sustainable green credit line with explicit criteria and indicators that encourage green production and the integration of CE concepts, including CE product design, but also sustainable shared services, incl. transport, cleaning, and maintenance, monitoring and control of emissions)</p> <p>→ Assess the opportunity of building on existing lending facilities for resource/energy efficiency - instead of establishing new vehicles</p> <p>→ Ensure organisational and staff capacities can reflect CE concepts on strategic and operational level (→ <i>see also capacity building above</i>)</p> <p>→ Assess opportunity of alternative refinance sources, such as pension funds and government bonds (e.g., in cooperation with MoF, SBV): private pension funds could be considered as one form of long-term saving vehicles and funding mobilization via the capital market (taking environmental, social and governance (ESG) risks and opportunities into account) – e.g., the taxonomy for sustainable finance (SBV) need to be considered. Incentive schemes (incl. tax incentives) could be useful to rise interest in such schemes.</p> <p>→-Consider Product-as-a-service (PAAS) / Pay-per-service unit for selected products, incl. electronic equipment – on one hand together with VNCPC – but also in cooperation with SBV and directly with national financial institutions for financial product design (→ <i>assess opportunities for different sectors and underlying financial models → compared to financing for companies based on traditional business models, looking to develop PAAS concepts within banks, incl. procedures, because e.g. creditworthiness deserves more attention as PAAS models run the risk of attracting less creditworthy users, value creation in second hand markets can increase bankability → build on experience from leasing and factoring & supply chain finance</i>)</p> <p>Reduce risks:</p> <p>→ Provide loan default guarantee to reduce lending risk for accessing commercial debt finance for SMEs (<i>The WB grant-agreement with SBV (incl. a guarantee for a risk sharing facility via the Vietnam Scaling Up Energy Efficiency Project) serves as sample</i>)</p> <p>→ Review opportunities for implementing PPPs projects (incl. SPVs), especially for sustainable CE-aligned shared services in industrial parks (e.g., capital equipment, manufacturing machineries) – to spread risk, but also the sourcing of funding.</p>

3.3.3.2 Electronics and ICT

GoV has played an active role in developing Vietnam's digital economy (e.g., through the E-commerce Master Plan, the IT Master Plan, and the directives on transformation towards Industry 4.0, etc.), but also the private sector invested, especially in manufacturing facilities. Today, information and communications technology (ICT) is one of the fastest growing sectors and one of the top export sectors in Vietnam.²²⁵

So far, the hardware industry is the largest subsector. Two famous samples are the manufacturing plant of Intel computers and processors and factories by Samsung for smartphones, digital displays, and consumer goods. But also other international firms are present, including IBM, Siemens, Sony, HP, and Toshiba. In comparison, VNG is a local sample and specialises in digital content, entertainment, social networks, and e-commerce.

In recent years, also tech start-ups established themselves and are developing new apps, software, platforms, and services.

A **major barrier** is the **lack of a circular mentality** in terms of manufacturers, but also consumer. Thus, within the economy, there is an indifference and disinterest, and it needs more awareness, business models that are attractive for consumers. Increased internalisation of external costs can be achieved via tighter EPR regulations. Indeed, one **driver** for moving forward (at least in terms of recycling) will be the new regulations on e-waste, ELV and packaging waste management of Vietnam, incl. extended producer responsibility (EPR) rules and the provisions on the responsibility of producers and importers in the recycling and treatment of discarded products and packaging materials.²²⁶

Key challenges for EPR considerations in Vietnam are (1) to synchronise the resource cycle, for example in product design; (2) the collection, especially for plastic waste; (3) lack of recycling technology; and (4) problems with databases and information systems (e.g., connection between manufacturers, importers and users is still very limited). However, from 2024, producers and importers have the responsibilities for recycling, e.g., of electrical and electronic equipment, cells, and batteries (implement recycling of products and packaging materials by recycling themselves, outsourcing to recyclers, delegating to a third party, or paying to the Vietnam Environmental Protection Fund). Despite the increasing efforts in embracing environmental approaches, there is still a long way ahead to fully transform into a circular economy. The GoV must strengthen cooperation with the private sector through awareness campaigns and credible commitments in order to leverage business activities for a more sustainable economic development.

In order to spur circular economy opportunities in the Electronics and ICT sector, the **enabling framework** needs to be revised. Points raised in section above (production/industrial zones) apply here too, but specific needs of Electronics are as follows.

Recommended entry points/CE engagement opportunity in Vietnam's electronic and ICT sector

Facilitate the CE concept in Vietnam's electronic and ICT sector (including, but not limited to):

Circular design (up-hill):

- Designing for durability, adaptability, re-use and repairability, e.g., via modularity with spare parts and online available manuals

Circular use (top-hill):

- Improving transparency of pricing, product specifications, condition, and traceability

Circular value recovery (down-hill):

- Improve the automation of disassembling and refurbishment processes (e.g., buy-back or incentives for consumers).

Circular support (cross-hill):

- Increase product collection and return system (e.g., buy-back or incentives for consumers)

²²⁵ CSIRO, 2018, First report of the Vietnam's Future Digital Economy Project, Current profile and trends impacting Vietnam's economy and digital economy

²²⁶ MONRE, 2021, (<https://monre.gov.vn/VanBan/Pages/ChiTietVanBanDuThao.aspx?piD=257>).

Table 22: Vietnam – Electronics and ICT Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers – Electronics and ICT
R&D	Lack of resources for research concerning e.g., sustainable product design (reflecting recyclability, end-of-life procedures)	<p>Facilitate R&D (via grant funding, e.g., for TA) to define bankable CE opportunities along the value chain of Electronics and ICT, especially at:</p> <p>Circular design (up-hill): development of design to ensure durability, adaptability, re-use and repairability, e.g., via modularity with spare parts and manuals available online (sample: Fairphone), consider stronger use of cloud migration to reduce hardware requirements and reintegrate scrap (recycled) metal from manufacturing; assess market opportunities for repair/refurbishment services by technicians (sample. iPhone)</p>
Policies and regulations	Lack of incentives and (so far) insufficient internalised environmental costs (EPR beyond focus such as capturing plastic packaging waste)	<p>Facilitate the revision of policies (via grant funding) to promote particularly</p> <p>Circular use (top-hill): promote the reuse/second-hand market by improving transparency of pricing, product specifications, condition, and traceability (which also relies on IT-technology), certified refurbishment and remanufacturing activities:</p> <p>Circular value recovery (down-hill): From 2024, producers and Importers have the responsibilities for recycling, e.g., of electrical and electronic equipment, cells and batterie.</p> <ul style="list-style-type: none"> Ensure implementation (enable producers – incl. circular product design), but also review whether external costs are internalized sufficiently and whether incentives could encourage product collection and return system (e.g., Buy-back or incentives for consumers).

3.3.3.3 Textile and garment

With almost 15% of the Vietnam's total export turnover, the textile and garment sector is essential for the economy. The production is, however, energy intensive, resource intensive and a main source of pollution (such as water pollution due to chemical discharge).²²⁷ There is a need for **greening' the textile sector**, particularly through resource efficiency, decreasing waste release, stopping microfiber discharge, changing the way clothes are planned, produced, but also marketed to stop the 'throw away culture'.²²⁸ The volume of discharged materials needs to be reduced, harmful chemicals need to be replaced, and the product life need to be maximized. End-of-life-recyclability should be improved, which starts with the clothing design and continues with the collection and the reprocessing (incl. increasing utilisation of durable textiles, mechanical recycling facilities for cutting and re-sewing, unravelling (yarn recycling), shredding, and reprocessing, or melting and re-spinning of discarded textiles.

Sector-specific global **driving forces** for integrating the CE concept are **increasing consumer awareness and buyer requirements** (e.g., GAP, H&M, Levi Strauss & Co) that have started to reflect sustainability targets in their strategies and supply chains, including the *use of recycled materials, sourcing organic or sustainable raw materials, reducing energy consumption, and conservation of non-renewable resources such as water and fossil fuels*. **Environmental certifications** (e.g., the Global Recycled Standard, Better Cotton Initiatives, Cradle-to-Cradle, Global Organic Textile Standard, ISO 14001) are used for final products and request suppliers align with respective standards. Moreover, eco-tags or eco-labels are used (e.g., bluesign PRODUCTS, EU Ecolabel). With support of the **Vietnam Textile and Apparel Association (VITAS)**, Vietnam's textile and garment industry is gradually recognising the need to apply circular activities, emphasizing sustainable production, clean water management and fighting climate change.

Info-box 7 – Selected organisations involved in CE-relevant interventions and good practice

- **Vietnam Textile and Apparel Association (VITAS)** and **World Wildlife Fund (WWF)** Vietnam implemented a project (2018 to 2020) to improve sustainability of the textile and apparel industry with focus on better management of water and energy use (specifically on the Mekong and Dong Nai deltas, where more than half of Vietnam's apparel factories are located).
- **VNCPC** provides for **cleaner production guidelines for textile**. The *Textiles sector assessment and feasibility study to implement wastewater reuse in industrial parks (7/2020 –6/2021)*²²⁹, implemented together with SOFIES and ECOPIS and supported by the World Bank's 2030 Water Resource Group, assessed **potentials for recycling and reuse of wastewater for the textile sector** and **identified opportunities to implement public-private-partnerships (PPPs)** projects. Via the *Race to the Top program*, an IDH's initiative, e.g., **technical assistance on energy efficiency** has been

²²⁷ WWF, 2020, Guidelines for Greening the Textile Sector in Viet Nam.

²²⁸ Out of a about 50 million tonnes of textile products thrown away p.a., less than 3% are reused, the resource recovery rate is 12%, while the remaining 85% are burned or end up in landfills.

²²⁹ <https://vncpc.org/en/projects/> (Accessed online 30 Nov. 2021)

provided by VNCPC for **textile and footwear enterprises** to embed sustainable manufacturing practices (06 – 12/2020).

- The **textile testing, inspection, and certification company SGS provides** chemical conformance services to companies across the garment industry in order to support the textile and footwear industry to move towards the zero-discharge goal.

Recommended entry points/CE engagement opportunity in Vietnam's textile sector

Facilitate the CE concept in Vietnam's textile sector - building on good practice of cleaner production and resource efficiency and integrate the CE concept, e.g., in cooperation with VNCPC and the World Bank. While energy and resource efficiency has been gradually improved, the full potential for integrating the CE concept in Vietnam's textile sector is not fully explored in detail. List below shows general entry points (not-complete, only-indicative):

Circular design and production (up-hill):

- Change the way clothes are planned, produced,
- Improve resource efficiency, increase waste reduction and volume of discharged materials

Circular use (top-hill):

- Transform the way clothes are sold and used (partly retailer-perspective)

Circular value recovery (down-hill):

- Improve chemical processing (in combination with chemical leasing)

Circular support (cross-hill):

- Facilitate a coordinating vehicle that drives CE ambitions and standards in the textile sector

The **main challenges for CE implementation** are insufficient financial, technological, and human resources, besides end-user's culture and perception for purchasing and using textiles (short fashion cycle vs. high quality and durable products). **Barriers** for more sustainable (circular) textiles stop further progress.²³⁰

In order to spur CE opportunities in the textile sector, the **enabling framework and access to finance** needs to be improved. **Points in this regard raised in section above (for production / industrial zones) also apply for the textile sector**, but textile-specific needs are summarized hereafter:

²³⁰ WWF, 2020, Guidelines for Greening the Textile Sector in Viet Nam

Table 23: Vietnam – Textile and Garments Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers - Textiles
R&D	Investment potentials for circular concepts are not explored, and attractive business models to be economic viable are not defined for the textile sector	<p>In collaboration with VNPC and the Vietnam Textile and Apparel Association (VITAS):</p> <p>Facilitate sector assessments (via grant funding) to identify list of relevant CE interventions for the textile sector in Vietnam:</p> <ul style="list-style-type: none"> Conduct detailed assessment of the textile sector’s environmental impact and Review and compare good practice. <p><i>(Note: Previous/ongoing cleaner production initiatives do not address all companies and further have not integrated explicitly the CE concept (only some CE components, like resource efficiency are addressed and thus, bankable CE business cases are not identified/developed yet).</i></p> <p>Facilitate R&D (via grant funding) and define and support the CE-aligned product and process design - that are also bankable business cases, incl.:</p> <ul style="list-style-type: none"> New, renewable, and natural resources (materials and chemicals) to replace unsustainable ones (provide alternatives to current use-cases for textile waste and assuring supply of quality feedstock and demand for recycling output), and Design for a sustainable life cycle: design-in recyclability, end-of-life procedures, and remove obstacles relating to recyclable textiles for buyers, suppliers, and manufacturers who are looking at implementing these into their supply chain. <p><i>(Note: consider chemical leasing options during the product and process design, but also for the circular use and value recovery)</i></p>
Policies	Environmental costs are not internalised	<p>Facilitate the revision of fiscal policies (via grant funding) – particularly:</p> <ul style="list-style-type: none"> Extend producer responsibility (EPR) to textile to address harmful products and processes (incl. polyester-based garments, etc.)

Access to finance (points raised in section above for production (industrial zones) in general also apply for the textile sector – but specific needs are as follows)

	Barriers	Access to finance / Risk reduction - Instruments/mechanisms to respond to barriers - Textiles
Access to finance and risk reduction	Limited access to finance	Facilitate access to finance (incl. concessional loan finance and PPPs) for circular concepts described above (<i>for production in general</i>) - but for the textile sector recycling and reusing of wastewater is also crucial and may become one of the eligibility technologies – this could be in cooperation with VNPC and the World Bank (<i>building on results of a recent “Textiles sector assessment and feasibility study to implement wastewater reuse in industrial parks”</i>) – but also in cooperation with the National Technology Innovation Fund (NATIF) that already provides soft loans, guarantees or financial aid for organisations to research, apply, transfer, innovate, and complete innovative technology.

3.3.3.4 Waste management

In line with the economic growth, waste is increasing in Vietnam, particularly **domestic waste** (about 10-16% p.a.), but also **e-waste**, (marine) **plastic**, hazardous waste, and construction waste. However, the waste management infrastructure is not sufficient for current waste volumes. While waste management is regulated, waste is not separated at source and the collection rate in rural areas is still low (with 40-55%), compared to urban areas (85-85.5%).²³¹ While there is feasible potential to absorb domestic plastic, around 80% of raw materials for plastic are imported which puts enormous pressure on domestic capabilities. At present, only 15-20% of plastics in Vietnam are recovered and recycled – due to the challenges in recovering plastic waste (e.g., lack of waste segregation through the value chain).

The waste recycling rate is low (about 10%) and is mainly conducted by the informal sector with basic technology. About 75% of municipal solid waste (MSW) is landfilled (including domestic hazardous waste) and in rural areas unsustainable incineration can be found (without energy recovery). Most of the waste gets buried without treatment in landfill sites. This poses tremendous detrimental effects to the environment.

Informal waste workers

²³¹ Ministry of Natural Resources and Environment, 2018, report on solid waste management in Vietnam.

A large share of recycling is implemented through informal waste workers. In Ho Chi Minh City only, there are about 2,000 street waste pickers, 1,816 junk shops that buy recyclable materials, over 4,200 independent household waste collectors who also transport waste to transfer stations and remove recyclable materials (e.g., plastics for recycling). Informal waste workers face several challenges due to *low knowledge, lack of financial resources and have insufficient social protection, like health insurance*.

Plastic credits as a solution. The project developer TONTOTON²³² removes “no-value plastic” to generate a pilot plastic credit from “an independent protocol and 3rd party verification audit”. The credits are materialized through the Ocean Bound Plastic Neutrality Certification (from the French-based NGO Zero Plastic Oceans).²³³ The plastic credits create a significant environmental and social impact by focusing on non-recyclable plastics without any further demand in the commodity. It provides (partly informal) workers with an additional income.

Over the last years, the demand for **plastics** has grown quickly in consumer packaging, construction, household goods, and automotive industries. With a share of 6.7 % of the country’s GDP,²³⁴ plastic is an important component of the economy, particularly for industry and manufacturing – being (still) needed for packaging and construction, etc. Annually, about five million tonnes of plastic is produced and consumed in Vietnam.²³⁵ Vietnam still imports an enormous amount of plastic waste from industrialized economies, such as US/UK and especially Japan (more than 35%). For instance, around 75 million kilograms of plastic waste from the US in 2018. Particularly, single-use plastics and mismanagement of wastes are problematic. Only 33% of the total 3.9 million tons of plastics disposed annually in Vietnam are recovered and recycled.²³⁶ Vietnam is one of the top 5 countries contributing to the world’s unmanaged plastic waste entering the ocean. The national action plan for the management of marine plastic litter aims to reduce 75% of Vietnam’s marine plastic debris by 2030. But overall, recycled plastics need to become part of Vietnam’s circular economy. The GoV reiterated its plans in 2019 to phase out plastic imports as all scrap plastic will be barred beginning in 2025.²³⁷ Another challenging waste stream is **e-waste**. So far, a lack of specific e-waste legislation, stopped substantial progress in managing e-waste²³⁸.

Legal base

Import of E-Waste The Law on Environmental Protection prohibits the import and transfer of waste from abroad in any form but allows to import certain categories of scraps as material for production (E-waste is excluded).

Export of E-Waste Circular No. 36/2015/TT-BTNMT defines and classifies hazardous waste since July 2016, incl. fluorescence lamp, computer, printer, camera, camcorder, cell phone, scanner, Photocopier, TV, air conditioner, refrigerator, washing machine

Management of E-waste: Circular No. 34/2017/TT-BTNMT on recall and treatment of discarded products, regulates technical conditions for retrieval places of e-waste, accumulators/batteries, etc.²³⁹

In June 2021, MONRE invited for public consultation for new regulations on e-waste, ELV and packaging waste management of Vietnam (see also section on Electronics and ICT, 3.3.3.1). It provides for extended producer responsibility (EPR) rules -including the provisions on the responsibility of producers and importers in the recycling and treatment of discarded products and packaging materials.²⁴⁰

Info-box 8 – Selected organisations involved in circular interventions - and good practice in the waste sector

- Vietnam has started a trial Project (the **Vietnam Recycles**) in Hanoi inner city area and Ho Chi Minh to collect (from businesses and households) and treat collected **Electronic devices**, such as computers, laptops, screens, printers, fax-machines, scanners, mobile phones, tablets, photocopiers, televisions DVD-/ VD-/ CD-players, cameras and camcorders, electronic battery types, other accessories related to information technology
- The **Vietnam Centre for Circular Economy (VCCE)** chaired by the Vietnam Chamber of Commerce and Industry (VCCI), and Vietnam Business Council for Sustainable Development (VBCSD), implements the **Zero Waste to Nature initiative** to solve problems arising from plastic waste (first phase: *model of waste separation at source*, piloted in Tan Phu

²³² <https://tontoton.com/> (Assessed online 14 February 2022).

²³³ <https://climeco.com/worlds-first-plastic-credit/> (Assessed online 14 February 2022).

²³⁴ World Bank, 2021, Why Vietnam needs a circular economy for plastics (<https://blogs.worldbank.org/eastasiapacific/why-vietnam-needs-circular-economy-plastics>). (Accessed online 10 Dec. 2021).

²³⁵ Circular Economy Network, Approaching Circularity in the Plastics Economy in Vietnam (<https://circulareconomynetwork.co/network/plastics-economy-vietnam/>). (Accessed online 10 Dec. 2021).

²³⁶ IFC-World Bank, 2021, Plastics Circularity Opportunities and Barriers.

²³⁷ <https://resource-recycling.com/recycling/2019/04/02/officials-say-vietnam-to-end-plastic-imports-in-2025/> (Assessed 10 Feb 2022).

²³⁸ Journal of Material Cycles and Waste Management, 2018, Analysis of recycling structures for e-waste in Vietnam.

²³⁹ Vietnam Environment Administration (VEA), Ministry of National Resources and Environment (MoNRE), 2020, E-waste management in Vietnam (<http://www.iep-global.org/wp-content/uploads/2020/01/8.-Vietnam.pdf>) (Accessed online 10 Dec. 2021)

²⁴⁰ MONRE, 2021, (<https://monre.gov.vn/VanBan/Pages/ChiTietVanBanDuThao.aspx?piD=257>). (Accessed online 10 Dec. 2021)

district). VCCE establishes the **Centre of CE** (CCE) together with Unilever, Coca Cola Vietnam, and Dow Chemical Vietnam with the objective of (1) *Addressing issues arising from **plastic waste***, (2) *Build a road map to form and promote sustainable business models*; (3) *Development of a cyclical-oriented value chain as well as policy recommendations to facilitate the rollout of the circular economy in Vietnam*

- **Unilever** focuses on collaboration to improve **plastic waste** infrastructure (investing in the collection, together with the local waste management company URENCO) and using recycled material as input for new packaging, but also education for communities and businesses about the value of waste separation.
- Social enterprise **mGreen** applies a digital app and incentivises citizens to sort and recycle their waste in exchange for points to redeem rewards (in six provinces and cities as well as 30 residential areas and schools, serving more than 10,000 residents). They partner with companies, such as Unilever that provide discounts for users.
- The Vietnamese-based enterprise **PLASTIC-People** recycles any type of plastic waste and transforms it into new applications (e.g., pipes, flooring, and frames)
- **Upp!** (Dutch company operating in Vietnam) creates local products? out of plastic waste (especially durable and circular construction materials that are affordable and recyclable all over again.)
- An Phat Bioplastics and BASF are the two known major **bioplastic manufacturers** in Vietnam
- End of 2020, **MONRE** and **WWF-Viet Nam** launched in cooperation with the **Global Plastic Action Partnership a national collaboration platform for plastic pollution action (National Plastic Action Partnership)**. A **national action road map** with tangible action plans is in development. Five task forces dedicated to advancing progress on **policy, metrics, innovation, financing, and communication and education** are envisaged.
- **World Bank /IFC** are considering supporting policies and investments that could help build a circular economy by engaging stakeholders **across the plastic value chain**. This engagement includes the development of upstream analytics and targeted interventions to address both the stock and flow of plastics
- **GGGI: Finance Facility for Municipal Solid Waste to Energy in Vietnam (01/2021-01/2024)**, the main waste treatment method is landfill dumping. There is only 1 Waste to Energy (WTE) project in operation. The project supports GoV to scale up Municipal Solid Waste to Energy (MSWTE) investments. The project will address policy barriers to MSWTE investment (FITs, tipping fees for the right technologies, master-planning guidelines for MSWTE projects), in partnership with MOIT/MOC and MONRE. Provincial MSWTE master plans will be developed (which will identify potential projects in coordination with provincial investment departments and developers themselves)
- Circular economy is an important part of UNDP's project **Scaling up a Socialized Model of Domestic Waste and Plastic Management (DWP5C)**. It has the objective to develop integrated, green, and fair models to improve domestic waste and plastic management, in five Vietnamese cities, incl. improvement of citizens' awareness on waste and plastic, increase of corporate regulations on sustainable production and consumption of materials, local regulations on waste or plastic adopted/strengthened, and acceleration of innovation on circular economy for waste and plastic management
- **ADB's Viet Nam Secondary Green Cities Development Project** targets economically competitive, environmentally sustainable, and socially inclusive development for Vinh Yen city (Vinh Yen), Hue city (Hue) and Ha Giang city (Ha Giang). It is expected that the project with green and climate resilient development approaches will be scaled up for nationwide green secondary city development

Recommended entry point/CE engagement opportunity in Vietnam's waste sector

Facilitate the circular concept in Vietnam's waste sector - increase and modernize nationwide waste management infrastructure. Provide funding for better waste sorting, collection, transport, and recycling - by applying integrated waste management solutions, incl. improved waste treatment facilities and recycling infrastructure and treatment of biodegradable waste (incl. composting), improved plastic waste management (with improved plastic recycling by reorganizing the value chain and waste return systems) - consider PPPs to maximize resources, create more data transparency in the plastics market. So far, insufficient sorting of waste at household level could not be addressed by recycling promotion campaigns and asks e.g., for easy and accessible recycling systems. Ensure that the 3Rs-concept (reduce, reuse, and recycle) can be implemented, e.g., recycling facilities need to be easy to use and accessible for end-users.

Specific considerations for production and disposal stages of the **plastics lifecycle**

- Enable plastics circularity via underlying decrees and circulars e.g., to incentivise the phase out of plastics and develop a reuse and delivery model²⁴¹
- Increase waste collection and sorting efficiency of plastics: as part of an Integrated Solid Waste Management (ISWM) system, such as consumer waste disposal, separate collection, transport, and sorting of materials from mixed sources, increase recycling (mechanical and chemical) capacities and discourage disposal of plastics

²⁴¹ World Bank, 2021, Market Study for Vietnam: Plastics Circularity Opportunities and Barriers (<https://www.worldbank.org/en/country/vietnam/publication/market-study-for-vietnam-plastics-circularity-opportunities-and-barriers>).

- Engage with the National Plastic Action Partnership and its five task forces (on policy, metrics, innovation, financing, and communication and education) to promote the CE concept (e.g., via research and development and access to finance)

Specific considerations for e-waste

- Dismantling is mainly done by the informal sector by hand (using backward technology and rudimentary equipment). Existing recycling process is ineffective and leads to a loss of natural resources
- Collect e-waste generated from the ‘end of life’ of their products in line with the principle of EPR. Ensure that e-wastes are channelized to registered refurbish, dismantling or recycling entities. Set up collection centres or take back system - either individually or collectively for all electrical and electronic equipment at the end of their life.
- Improve the automation of disassembling and refurbishment processes (especially for e-waste) to increase quantity and quality for recycling products.

In order to integrate the CE concept in Vietnam’s waste sector, the **enabling framework and access to finance** needs to be revised.

Table 24: Vietnam – Waste Management Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers - Waste
Capacities	<p>Insufficient sorting of waste at household level. So far, campaigns to promote recycling behaviour were not successful. (Recycling is not perceived as easy and accessible.)</p> <p>Lack of transparency / enforceability, e.g., Customs procedures are not fully transparent, Customs officials and police do not have required knowledge to detect illegal-waste import, insufficient human resources, and capacities to ensure control functions of the environment police forces</p>	<p>Support feasibility assessments and project design for selected waste management infrastructure and cover transaction costs (incl. feasibility assessments, permitting and technical documentation) during the project preparation phase, through grant funding/seed capital (e.g., in case assessments conclude projects’ bankability, seed capital may turn into returnable grant funding)</p> <p>Contribute to human resources development/capacity building (grant funding) and address insufficient sorting of waste at household level and the treatment of waste (especially for the informal waste management sector that needs to be enabled to develop and implement bankable business cases)</p> <p>→ Specific considerations for electronic waste:</p> <ul style="list-style-type: none"> ▪ Support customs officials/police regarding discovery of illegal-waste import ▪ Increase awareness and develop detailed guidelines for stakeholders in the e-waste management system (targeting producers/manufacturers, importers, consumer, collectors/recyclers, and government organizations)²⁴² (which would increase e.g., the need the recycling capacities and respective investment needs) ▪ Create awareness through publications, advertisements, posters, or by any other means of communication and information booklets and developing detailed guidelines for stakeholders in the e-waste management system (including producers/manufacturers, importers, consumer, collectors/recyclers, and government organizations) ▪ Ensure that all electrical and electronic equipment are provided with a unique serial number or individual identification code for tracking their products in the e-waste management system. ▪ Organize a system to meet the cost involved in the environmentally sound management of e-waste generated from the ‘end of life’ of its own products and historical waste. <i>Such financing system shall be transparent.</i> <p>→ Specific considerations for the plastic-waste:</p> <ul style="list-style-type: none"> ▪ Create data transparency in the plastics market and support capacity building across stakeholders, particularly recycling firms

²⁴² MONRE, 2020, Country report on e-waste in Vietnam (http://bioie.oie.go.th/oieqr/uploadFile/oie621360278_1459684422.pdf).

Policies and regulations	<p>- Policies / regulation do not set the target of collection (e.g., for e-waste)</p> <p>- Policy / administration (red tape): collaboration and information flow among national authorities (central and local) are not always effective (often still paper-based)</p>	<p>Collaborate with the Ministry of Natural Resources and Environment (MONRE) - to facilitate the enabling environment for modernizing waste management and integrating the circular concept, e.g.:</p> <p>Review policies and regulations (grant funding for TA/training)</p> <ul style="list-style-type: none"> ▪ The <u>Circular value recovery (down-hill) stage</u> would benefit from revised waste management policies and laws - this should include National Decrees (via Government) and Circulars (via Ministers) with <u>clear sector targets for a circular economy and circular economy-aligned waste management and responsibilities</u> and improved collaboration and information flow among national (central and local) authorities (→<i>targets would increase investment/finance needs</i>) ▪ EPR that hold producers and importers of plastic packaging responsible for their waste management could be complemented, e.g., by promoting a secondary market for recyclables - through <u>obligatory recycled content</u> for certain products ▪ Formalise the informal waste management sector to improve dismantling that is currently using backward technology and rudimentary equipment (<i>investment in modern CE-aligned technology will require access to finance that can be mobilised by formalized businesses only</i>) ▪ Connect with the <u>circular design</u> stage - needs to reflect the CE concept to be usable for the down-hill stage e.g., assure supply of quality feedstock but also demand for recycling output in different sectors (e.g., such as Textile) ▪ The government should lead by adjusted public procurement principles that prioritizes products with recycled content. <p>(additional) specific considerations for plastic waste</p> <ul style="list-style-type: none"> ▪ Facilitate the production and disposal stages of the plastics lifecycle: Enable plastics circularity via recycling standards and underlying National Decrees (via Government) and Circulars (via Ministers), e.g., discourage disposal of plastics, incentivise the phasing out of plastics and develop a reuse and delivery model (encourage the use of recycled content across all major end-use applications)²⁴³ ▪ Create data transparency in the plastics market <p>(additional) specific considerations for e-waste</p> <ul style="list-style-type: none"> ▪ Set target for e-waste collection (<i>which would increase e.g., the need the recycling capacities and respective investment needs</i>) ▪ Increase transparency in customs procedures concerning illegal-waste import ▪ Ensure that all electrical and electronic equipment are provided with a unique serial number or individual identification code for tracking their products in the e-waste management system ▪ Incentivise product collection and return systems ▪ Indicate an envisaged lifespan of used units when importing used equipment and bear responsibility for this by ensuring that take back mechanisms are in place
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	Barriers	Access to finance / Risk reduction Instruments/mechanisms to respond to barriers - Waste
Access to finance and risk reduction	<p>Insufficient and in-transparent access to dedicated finance (on both public sector side and private sector side)</p>	<p>Facilitate access to finance for integrating the circular concept in Vietnam’s waste sector (e.g., in cooperation with the Vietnam Environment Protection Fund (VEPF) / MoNRE that provides long-term soft loans and grants for projects related to waste management, but also commercial banks, etc.):</p> <p>Strengthening transparency and quantity of concessional debt finance and equity finance to increase and modernize nationwide waste management infrastructure - for better waste sorting, collection, and transport and by applying integrated waste management solutions (IWMS), e.g., for SMEs, incl.:</p> <ul style="list-style-type: none"> ▪ Improved consumer waste disposal ▪ Dedicated collection facilities (Remove obstacles relating to recyclable textiles or plastics for buyers, suppliers, and manufacturers who are looking at implementing these into their supply chain) ▪ SME-recycling projects to increase recycling (mechanical and chemical) capacities - improve effectiveness of existing recycling process and install new adequate recycling infrastructure (incl., mechanical recycling facilities for cutting and re-sewing, unravelling (yarn recycling), shredding, and reprocessing, or melting and re-spinning of discarded textile) etc. ▪ Improved waste treatment facilities (for the treatment of biodegradable waste, incl. composting, but also considering special needs of plastic substitutes) <p>Assess opportunity of alternative refinance solution - building on good practice of pilot green municipality bonds (in cooperation with MoF and SBV – and potentially GGGI – however, their current focus lies on Waste to Energy)</p> <p>Reduce risks: Consider PPPs for engaging the private sector and to maximize resources when increasing and modernizing nationwide waste management infrastructure (e.g., for collection, treatment, and recycling). Provide loan default guarantee to reduce lending risk for accessing commercial debt finance for SMEs.</p>

3.4 Albania

Abbreviations (Albania)

AKTI	Agency of Research, Technology and Innovation
BSG	Brewery Spent Grain
CDM	Climate Development Mechanisms
CPF	Country Partnership Framework
DCM	Decision of the Council of Ministers
ERA	Ecosystem Revitalization Agriculture
GOA	Government of Albania
IMWGCC	Inter-Ministerial Working Group on Climate Change
ISWM	Integrated Solid Waste Management
NC3	Third National Communication
NEA	National Environmental Agency
NSDI-II	National Strategy for Development and Integration 2015-2020
PPE	Plastic Process Equipment
SWM	Solid Waste Management

²⁴³ World Bank, 2021, Market Study for Vietnam: Plastics Circularity Opportunities and Barriers (<https://www.worldbank.org/en/country/vietnam/publication/market-study-for-vietnam-plastics-circularity-opportunities-and-barriers>).

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3.4.1 Macroeconomic context

Albania is classified as a middle-income country and has a population of 2.9 million people (2019) with an annual population growth rate at -0.4% (2018). Most studies project that the demographic decline will continue and reach 2.3 million people by 2050.²⁴⁴ However, Albania is fairly densely populated, with an average population density of 99.7 inhabitants per km² (2018).²⁴⁵ An estimated 69.5% of the country's population currently resides in urban areas, which is expected to increase to 78.2% by 2050.²⁴⁶ The country has a GDP of 15.2 billion USD (2019), growing at a rate of 2.2% annually, as of 2019.²⁴⁷

Over the last 30 years, the country has realized strong economic growth performance, growing from the poorest nation in Europe to middle income status. To increase economic competitiveness, the Government of Albania has embarked on a broad-based reform program focused on macroeconomic and fiscal sustainability, financial sector stabilization, energy concerns, pensions, and territorial administration.^{248 249}

However, in the midst of the reconstruction efforts, the COVID-19 crisis forced Albania to put key economic sectors in lockdown. With tourism being a key driver of growth, the economy was hit especially hard. In the second quarter of 2020, employment declined by 3.6% year-on-year.

Overall, natural resources particularly, the quality of water, land, forest, and environmental resources are under increasing pressure, partly due to climate change, but also due to ineffective management in the areas of power production and energy use, (waste)water and waste management and flood risk reduction, leading to water and air pollution, land degradation/soil erosion, biodiversity losses.²⁵⁰

3.4.2 Financial sector

Albania's financial sector consist of 12 banks that hold about 90% of total financial sector assets, which is primarily (70%) foreign owned and **is well capitalized**.²⁵¹ For banks, deposits remain the main source of financing. Their credit portfolio is diversified (in 2020, it comprised about two third business loans, 29% working capital financing, 18% new equipment financing, 18% real estate finance and 9% consumer loans. The main challenges of banks are particularly their FX denominated portfolio and a high non-performing loan level (8% in 2020).

Next to banks, the sector also comprises 30 non-bank financial institutions, 538 foreign exchange bureaus, 14 savings and loan associations (SLAs) and one union of SLAs.

²⁴⁴ The World Bank Group. Climate Change Knowledge Portal. Climate Change Overview. Albania, Country Summary. [WBG Overview] <https://climateknowledgeportal.worldbank.org/country/albania> (Accessed online Nov. 2021).

²⁴⁵ UNFCCC 2021 Revised NDC.

²⁴⁶ Climate Risk Profile: Albania (2021): The World Bank Group. World Bank Group. <https://climateknowledgeportal.worldbank.org/sites/default/files/2021-06/15812-Albania%20Country%20Profile-WEB.pdf> (Assessed online Dec. 2021).

²⁴⁷ The World Bank Group. Climate Change Knowledge Portal. Climate Change Overview. Albania, Country Summary. <https://climateknowledgeportal.worldbank.org/country/albania>. (Accessed online 26 Nov. 2021).

²⁴⁸ The World Bank Group. Climate Change Knowledge Portal. Climate Change Overview. Albania, Country Summary. [WBG Overview] <https://climateknowledgeportal.worldbank.org/country/albania>. (Accessed online 26 Nov. 2021).

²⁴⁹ United Nations Framework Convention on Climate Change. Albania Revised NDC (2021).

<https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Albania%20First/Albania%20Revised%20NDC.pdf> (Assessed Dec. 2021).

²⁵⁰ UNECE, 2020, Albania identifies key sustainability challenges and opportunities using UNECE's Water-Food-Energy-Ecosystem Nexus approach

²⁵¹ BSTDB, 2021, Overview of the financial sector in Albania.

Sustainable finance

In the past, the Albanian banking sector focused on CSR, when considering sustainability, but only in rare cases, banks promoted “eco” and “green” finance products. The Bank of Albania is aware about the need to proceed with sustainable finance (signed e.g., the Resolution on Global Sustainable Development), but sector guidelines or standards that would promote sustainable finance are not set yet.

EBRD is actively working with the Albanian banking sector. For instance, with the Western Balkan’s **Green Economy Financing Facility (GEFF)**, EBRD provides together with advisory services, a credit line to participating banks (e.g., Union Bank and Fondi BESA) for on-lending to invest in green economy projects, such as energy efficiency, renewable energy, resource efficiency (including water, material, and waste minimisation), resilience to the effects of climate change and reducing pollution and protecting natural assets. In Albania, GEFF has however, a focus on decreasing energy consumption in the housing sector.

With a EUR 60 million **Albanian Infrastructure and Tourism Enabling Facility**, EBRD is financing municipal infrastructure (green transport) and other tourism-enabling projects throughout the country.

The upcoming **Circular Economy Regional Initiative (CERI)** managed by EBRD will provide incl. **concessional co-financing** via partner banks among others in Albania for (i) improving management of raw materials during the full lifecycle of products and diverting waste from landfills and the marine environment, (ii) reducing/avoiding “GHG” emissions, (iii) eliminating, preventing and improving management of harmful chemicals - specifically Persistent Organic Pollutants (POPs) and unintended Persistent Organic Pollutants (UPOPs).

The **GGF (Green for Growth Fund)** has also reached out to Albania’s financial sector with the opportunity to provide medium to long-term financing for energy efficiency and renewable energy products/projects to partner finance institutions to lend to households, household associations, small and medium enterprises, large business, municipalities, public sector entities and renewable energy projects.²⁵²

3.4.3 Developments and areas of interest

In the Republic of Albania, the concept of Circular Economy is still at an early stage and a number of challenges need to be addressed scale-up circular investments. The current legal framework (including national regulations and national strategic documents and action plans) does not provide sufficient basis for implementing the concept of the Circular Economy in the country. There is an **urgent need for improvements in the current legal and policy framework** that will increase the country’s ability to better utilize its resources and prolong the lifecycle of materials, products, and services.

One entry point in starting to implement Circular Economy principles might be Albania’s sensitivity to climate change, as the country is vulnerable to the impacts of climate change. The country is prone to numerous natural hazards, including, hydro-meteorological hazards (floods, droughts, forest fires, and landslides) and also at high-risk to geophysical hazards such as earthquakes. Greenhouse gas emissions originate mostly from Energy and Transport (44.85%), Land Use Change and Forestry (19.35%), Agriculture (15.83%), Industrial (12.61%), and Waste (7.37%).²⁵³ Yet, Circular Economy as an instrument to reach climate goals is not addressed systematically in national strategies.

Over the last years, the government has made significant reforms to ease trade and encourage foreign direct investment, including in administrative procedures, customs, business registration, licensing, payment of taxes, e-services, and e-procurement. Gradually, the economy transitioned from an economy focused on raw materials, agriculture, and industry, into an economy where the service sector plays a leading role. The economy represents significant opportunities for foreign countries for investments and to export their goods to Albania across a wide range of sectors, including energy, healthcare, tourism, telecommunications and ICT, infrastructure and construction, and food processing.²⁵⁴ However, this means that **Albania imports many of its’ waste problems together with the products**, e.g. regarding packaging, electronic or plastics and at the same time has little means to affect them regarding design for circularity.

²⁵² Ministry of Tourism and Environment, 2021, Albania’s First Biennial Update Report July 2021.

²⁵³ Climate Risk Profile: Albania (2021): The World Bank Group. World Bank Group. (Access at: <https://climateknowledgeportal.worldbank.org/sites/default/files/2021-06/15812-Albania%20Country%20Profile-WEB.pdf> Accessed online 26 Nov.2021)

²⁵⁴ International Trade Administration. Albania – Country Commercial Guide. U.S. Department of Commerce (Oct 2021).

<https://www.trade.gov/country-commercial-guides/albania-market-overview> // <https://www.trade.gov/country-commercial-guides/albania-market-challenges> // <https://www.trade.gov/country-commercial-guides/albania-market-opportunities> // <https://www.trade.gov/country-commercial-guides/albania-market-entry-strategy> (Accessed online 26 Nov.2021).

Because of the economic context, the waste management sector contains important levers to implement circular principles. The concept of Circular Economy has been used earlier in the draft Strategy of Integrated Waste Management (2018-2023) which was developed over the vision or perception of the concept of "zero waste", so that the waste is collected and treated as raw materials, and thus, becoming part of a circular systems. However, in the waste management sector, technological and economical lock-in effects have been established in the last years (see chapter below on 'waste management'), e.g., by focusing on new incinerators.²⁵⁵ While this decreases waste volumes, it contradicts long-term oriented (circular) system approaches to reduce the production of waste in the first place and creates unintended consequences and lock-in effects (see Annex Sector Description 'Waste Management').

One main driver for GDP development was the **construction sector**, which is expected to remain strong, thanks to reconstruction and new infrastructure projects. This dynamic can be beneficial to **implement circular strategies into infrastructure solutions like building and construction as well as connected public services** (e.g., healthcare facilities). However, if the momentum is not used in large investment projects, linear business as usual solutions can be locked-in for a long time.

Despite a sound legal framework and progress on e-reform to circumvent corruption, foreign investors perceive Albania as a difficult place to do business. Corruption, particularly in the judiciary, a lack of transparency in public procurement, unfair competition, informal economy, frequent changes of the fiscal legislation, and poor enforcement of contracts as continuing problems are perceived. Enforcement of court decisions remains problematic. Property issues complicate doing business.²⁵⁶ Such circumstances make it difficult to rely on long-term contracts, especially when it comes to service or sell-and-buy-back contracts regarding circular buildings and regarding parts, as well as other infrastructure or capital equipment.

Poor cost-benefit analyses and a lack of technical expertise in drafting and monitoring Public-Private Partnership (PPP) contracts are ongoing concerns. Foreign investors are challenged by corruption and the perpetuation of informal business practices. The increasing use of (PPP) contracts has reduced opportunities for competition, including by foreign investors, in infrastructure and other sectors.²⁵⁷ This also hampers long-term circular (service) contracts for capital equipment and also significantly reduces its value as collateral for banks in Product-Service-System.

Selection of national strategies and policies supporting economic development

The **National Strategy for Development and Integration 2015-2020 (NSDI-II)** is the key national planning document. This strategic document reflects the vision, priorities, objectives and means for social and economic development of the country up to 2020. About 37 sectoral strategies complement the NSDI-II, which is organized around 13 cross-cutting foundations on good governance, democracy, and rule of law, and four main sectoral pillars:

- growth through macroeconomic and fiscal stability;
- economic growth through enhanced competitiveness and innovation;
- investing in social capital and social cohesion and
- growth through sustainable use of natural resources and territorial development.

The overarching goal of **NSDI-II** is the **accession to the European Union (EU)**. After the EU's decision in March 2014 to open accession talks with the country, Albania is advancing the **EU integration agenda**. As part of the process, the country is transposing and implementing parts of the EU legislation - most national plans or actions, including in the **environmental domain, are now designed to take into account policies and directives of the EU**.

²⁵⁵ United Nations Framework Convention on Climate Change. Albania Revised NDC (2021). Access at: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Albania%20First/Albania%20Revised%20NDC.pdf>

²⁵⁶ International Trade Administration. Albania – Country Commercial Guide. U.S. Department of Commerce (Oct 2021). <https://www.trade.gov/country-commercial-guides/albania-market-overview> // <https://www.trade.gov/country-commercial-guides/albania-market-challenges> // <https://www.trade.gov/country-commercial-guides/albania-market-opportunities> // <https://www.trade.gov/country-commercial-guides/albania-market-entry-strategy> (Accessed online 26 Nov.2021).

²⁵⁷ International Trade Administration. Albania – Country Commercial Guide. U.S. Department of Commerce (Oct 2021). <https://www.trade.gov/country-commercial-guides/albania-market-overview> // <https://www.trade.gov/country-commercial-guides/albania-market-challenges> // <https://www.trade.gov/country-commercial-guides/albania-market-opportunities> // <https://www.trade.gov/country-commercial-guides/albania-market-entry-strategy> (Accessed online 26 Nov.2021).

Albania is considering the EU's strategies and plans for the Western Balkans of which Albania is part, such as ²⁵⁸

- the **EU Economic and Investment Plan for the Western Balkans**, adopted in October 2020, ²⁵⁹
- the **EU Green Deal for the Western Balkans**, adopted in November 2020²⁶⁰, and the
- Decision Nr. 90, date 17.2.2021 « On approval of **National Plan for European Integration, 2021–2023**²⁶¹

Albania's **NDCs** focus on key sectors, such as energy, industrial development, agriculture, public health, and biodiversity. The measures are committed to develop long-term, carbon reduction strategies and hence are to address the vulnerabilities and prioritize adaptation efforts through integrated policy, research, and investment in key areas such as protection of ecosystems, urban planning and in general in increasing awareness to climate change risks.²⁶² A National Climate Change Strategy and corresponding national mitigation and adaptation plans were approved (2019).

According to the EU Low Carbon Economy Roadmap, significant investments and technological transfers will be needed, in particular in new low-carbon technologies and the energy sector, but also in the **sectors construction and tourism**. Albania's institutional setup provides some organisational strength, that can be utilized to successfully promote Circular Economy measures. For instance, Albania benefits from Units of Information, Technology and Communication and the Agency of Research, Technology, and Innovation (AKTI). While in some sectors, there is no need for important technology transfer (Agriculture, FOLU), the **waste sector, relies on a technology transfer**.²⁶³

Selection of national institutions and initiatives as entry point for circular solutions^{264 265}

- The **Ministry of Tourism and Environment** is responsible for Albania's climate change related activities, scientific evaluations, and leadership. It is the highest governmental body responsible for environmental protection and formulation of environmental policy and legislation in the country. The Albanian Government has made climate change adaptation and development within the country a high priority.
- In 2014, an inter-ministerial **Working Group on Climate Change (iMWGCC)** was established by the government as a permanent coordinating body for climate change issues. It is headed by the Deputy Minister of Environment at the political level and supported by nominated technical focal points in each and every related institution. The iMWGCC coordinates all institutions involved in climate change processes and facilitates the integration of climate change into relevant new and existing policies, programs, and activities.
- The **Climate Change Unit (CCU)** is the national UNFCCC focal point and collaborates with an interdisciplinary and inter-institutional technical team established to fulfil the countries duties as a UNFCCC member.
- The **State Environmental Inspectorate** identifies and responds to issues related to environment and climate change.
- The responsibilities of the **National Environmental Agency** include permitting, environmental impact assessment, and public information and to support the retrofit and expansion of the country's the existing observational network of weather and hydro-met stations.
- Additional institutions in Albania play significant roles in the implementation of environmental policy, including implementation of climate change and Climate Development Mechanisms (CDM), such as the Ministry of Industry, Ministry of Agriculture, Rural Development and Water Administration, Ministry of Infrastructure and Transport, and the Ministry of Urban Development and Tourism.

²⁵⁸ UNFCCC. Albania Revised NDC (2021) (Access at: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Albania%20First/Albania%20Revised%20NDC.pdf>).

²⁵⁹ UNFCCC. Albania Revised NDC (2021) (Access at: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Albania%20First/Albania%20Revised%20NDC.pdf>).

²⁶⁰ Guidelines for the Implementation of the Green Agenda for the Western Balkans (Oct 2020). https://ec.europa.eu/neighbourhood-enlargement/system/files/2020-10/green_agenda_for_the_western_balkans_en.pdf

²⁶¹ UNFCCC. Albania Revised NDC (2021) (Access at: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Albania%20First/Albania%20Revised%20NDC.pdf>).

²⁶² The World Bank Group. Climate Change Knowledge Portal. Climate Change Overview. Albania, Country Summary. [WBG Overview] <https://climateknowledgeportal.worldbank.org/country/albania>. (Accessed online 26 Nov.2021)

²⁶³ UNFCCC. Albania Revised NDC (2021).

²⁶⁴ Climate Risk Profile: Albania (2021): The World Bank Group. World Bank Group. (Access at: <https://climateknowledgeportal.worldbank.org/sites/default/files/2021-06/15812-Albania%20Country%20Profile-WEB.pdf> Accessed online 26 Nov.2021)

²⁶⁵ UNFCCC. Albania Revised NDC (2021).

Selection of initiatives supporting economic development

While the concept of Circular Economy is still at an early stage, various developments provide the basis for proceeding with a circular development approach. For instance, the **Country Partnership Framework (CPF) for FY15–20**, guided by the World Bank provided support to restore macroeconomic balances, create conditions for accelerated private sector growth and strengthen public sector management and service delivery.²⁶⁶ Moreover, a **Fiscal and Growth Development Policy Loan** in the amount of USD80 million was disbursed in spring 2021. The operation focused on critical structural reforms to support restructuring and a resilient recovery. This operation also aimed to help the country crowd in and leverage private sector financing by providing an anchor for critical structural reforms and acting as a signal of Albania's continued commitment to fiscal sustainability and growth.

Albania has recognized the importance of digital trade as an opportunity for economic development. Hereby, Albania is partnering e.g., with the World Bank to **build on this digitalization momentum**. The World Bank prepared an e-commerce diagnostic in December 2020 that reviewed the current state of digital trade in Albania and identified key reform priorities.

Recommended entry points/CE engagement opportunities in Albania

Regarding the investments in **infrastructure**, circular strategy opportunities exist for the use of heavy construction machinery, as well as for **buildings and constructions** like roads, railway, airports, tunnels, and ports. In addition, ongoing and future investments *in construction-waste treatment* and processing offer potential *for closing resource loops* in the building and construction sector.²⁶⁷

The modernization of the **public health care sector** as well as the **growth of the private healthcare sector** provides an increased demand for advanced medical devices and equipment. This opens up circular business model opportunities tailored for capital equipment, like *sell-and-buy-back or advanced maintenance schemes*.

Also, the pandemic is shifting many businesses toward modernization of their operations and infrastructure, driving up the demand for more **IT equipment and services**. Modernization of government operations, including significant advancements in the government's Digital Revolution Agenda that foresees almost all public services would be available online, have all created opportunities for the implementation of circular product requirements into *public procurement* for IT equipment and services, as do continued investments by telecommunication operators, and internet providers offer opportunities for exports of equipment and services (e.g. *Product-as-a-Service schemes or Design for Circularity requirements*).

Considering that Albania largely imports finished products²⁶⁸, the country is bound to manage the end-of-life side of imported products (e.g., packaging or electronics). Regarding a transition to a Circular Economy, that leaves Albania, for example, with the following steppingstones:

- Regulate the import of non-circular conform products, materials, or services (e.g., PPP that lock-in linear practices)
- In certain sectors, aim to increase the involvement in international value chains and such influence the design for circularity in those sectors. For example, Albania used to play a much larger role in the textile and parts of the food industry. Also, the tourism sector opens a large selection of opportunities to implement circular paradigms.
- Close the loop of nationally/locally produced and consumed products or services, like to-go packaging, independent slow-fashion textile brands, locally produced food products or community infrastructure projects.
- Improve waste management sector and implement circular principles at yet underdeveloped processes.

²⁶⁶ Climate Risk Profile: Albania (2021): The World Bank Group. World Bank Group. (Access at: <https://climateknowledgeportal.worldbank.org/sites/default/files/2021-06/15812-Albania%20Country%20Profile-WEB.pdf> Accessed online 26 Nov.2021).

²⁶⁷ International Trade Administration. Albania – Country Commercial Guide. U.S. Department of Commerce (Oct 2021) <https://www.trade.gov/country-commercial-guides/albania-market-overview> // <https://www.trade.gov/country-commercial-guides/albania-market-challenges> // <https://www.trade.gov/country-commercial-guides/albania-market-opportunities> // <https://www.trade.gov/country-commercial-guides/albania-market-entry-strategy> (Accessed online 26 Nov.2021)

²⁶⁸ While Albania is part of the up-hill process in the textile sector, there is little influence on the decision making in value chain.

3.4.3.1 Waste management, incl. organic (household) waste

In 2019, in Albania 78 % of the total amount of waste was deposited in landfills.²⁶⁹ However, there exist only three active landfills that comply with minimum regulatory standards – Bajkaj (Saranda), Bushat (Shkodra), and Sharra (Tirana). Beyond that, there are still 199 landfills that do not comply with any minimum standards – most of them illegal – according to a counting in 2018 done by the Ministry of Tourism and Environment.²⁷⁰ The principal method of disposal is still illegal dumping. There are no collection systems in rural areas and small towns. Most of the waste from these areas is disposed of by dumping in ditches, ravines, or at the side of roads where it is washed and blown onto other land and ultimately into water courses. The GHG emissions of the waste sector are mainly due to landfills (in 2016, CH₄ emissions from landfills represented almost 80% of total waste emissions).²⁷¹

Info box 9 - Landfill gas as renewable energy source²⁷²

When waste is first deposited in a landfill, it undergoes an aerobic (with oxygen) decomposition stage when little methane is generated. Then, typically within less than one-year, anaerobic conditions are established, and methane-producing bacteria begin to decompose the waste and generate methane. Instead of escaping into the air, landfill gas can be captured, converted, and used as a renewable energy resource.²⁷³ In accordance with a Circular Economy approach, the captured gas can be reasonably connected to energy demanding systems of communities to support energy autarky, or circular projects that produce synergistic value for economy, e.g., to fuel greenhouses that grow food on circular agriculture principles.²⁷⁴

In most cities, urban solid waste collection systems are in place. The coverage level of the population with municipal waste management services in 2019 was 87.9 %, marking an increase by 22.2 % compared to the previous year. But only little recycling of waste is undertaken. In 2019, 18.7 % of the total amount of waste was recycled.²⁷⁵

The informal sector in Albania plays a very important role in supplying the recycling industries with waste resources. Based on the National Environmental Agency (NEA 2013), the informal waste sector in Albania comprises around 12,000 individuals, mostly from the Roma minority, that collect waste all around the country. The waste is thereby mostly collected directly from rubbish bins and landfills under bad health and safety conditions.²⁷⁶

Privatization in waste management is slightly on the increase. In 2017, the share of waste managed by public enterprises established under the local government structure decreased rapidly to 47%, with 49% being managed by private companies and 4% by private persons.

In 2016, the average waste management service fee was 12.4 EUR/family/year, whereas the fee collection rate at municipal level amounted to 63 % of households. Therewith, only 34 % of the operation and maintenance costs could be covered. To cover the entire collection and maintenance costs, it would be necessary to increase the fee collection rate to 90 % and at the same time to increase the service fee from 12.4 EUR/family/year to 23 EUR/family/year.²⁷⁷ Between 2014 and 2016 the budget of the municipalities has almost doubled but remains at a low level.²⁷⁸

In the composition of urban waste, the main component is organic waste. In 2019, organic waste accounts for about 58.4 % of the total amount of waste, compared to 61.2 % that was in 2018.²⁷⁹

²⁶⁹ INSTAT. Institute of Statistics. Urban Solid Waste. Tirana, Albania (2020). Access at: <http://www.instat.gov.al/media/7502/eng-mbetjet-e-ngurta-urbane-ne-shqiperi-20119-ref-18-pres-relase.pdf>

²⁷⁰ Thiel, S.; Thomé-Kozmiensky, E.; Winter, F.; Juchelková, D. (Eds.): Waste Management, Volume 9 – Waste to Energy. Albania – the First Balkan Country with an Incineration Plant. Lulzim Baumann. Thomé-Kozmiensky Verlag GmbH. Neuruppin 2019.

²⁷¹ UNFCCC. Albania Revised NDC (2021).

²⁷² <https://www.epa.gov/lmop/basic-information-about-landfill-gas>

²⁷³ <https://www.ccacoalition.org/en/activity/landfill-gas-capture-and-use>

²⁷⁴ All in the light of exploiting existing (illegal) landfills while phasing them out, without creating lock-in effects.

²⁷⁵ INSTAT. Institute of Statistics. Urban Solid Waste. Tirana, Albania (2020). Access at: <http://www.instat.gov.al/media/7502/eng-mbetjet-e-ngurta-urbane-ne-shqiperi-20119-ref-18-pres-relase.pdf>

²⁷⁶ Thiel, S.; Thomé-Kozmiensky, E.; Winter, F.; Juchelková, D. (Eds.): Waste Management, Volume 9 – Waste to Energy. Albania – the First Balkan Country with an Incineration Plant. Lulzim Baumann. Thomé-Kozmiensky Verlag GmbH. Neuruppin 2019.

²⁷⁷ INSTAT. Institute of Statistics. Urban Solid Waste. Tirana, Albania (2020). Access at: <http://www.instat.gov.al/media/7502/eng-mbetjet-e-ngurta-urbane-ne-shqiperi-20119-ref-18-pres-relase.pdf>

²⁷⁸ Thiel, S.; Thomé-Kozmiensky, E.; Winter, F.; Juchelková, D. (Eds.): Waste Management, Volume 9 – Waste to Energy. Albania – the First Balkan Country with an Incineration Plant. Lulzim Baumann. Thomé-Kozmiensky Verlag GmbH. Neuruppin 2019.

²⁷⁹ INSTAT. Institute of Statistics. Urban Solid Waste. Tirana, Albania (2020). Access at: <http://www.instat.gov.al/media/7502/eng-mbetjet-e-ngurta-urbane-ne-shqiperi-20119-ref-18-pres-relase.pdf>

While organic waste is relatively easy to collect separately, its value is still highly underestimated. Seen as a whole, the biocycle economy plays a critical role in global economic, human, and environmental systems. Especially in emerging countries, the proportion of the overall economy is even more significant. With modern agricultural practices, however, nutrition flows are disrupted, and soil fertility decreases. As nutrients are lost, farmers increasingly turn to the use of synthetic fertilisers.²⁸⁰

The value of organic waste

Organic waste has high economic value potential. It forms a resource for organic soil improvers, fertilisers, growing media component and bio-based products. These secondary products can replace fossil-based products such as mineral fertilisers, peat, and fossil fuels. After use, the residues of these products can flow back safely into the biosphere, thereby closing carbon and nutrient cycles. The first and preferred option for bio-waste recycling shall be compost production.²⁸¹ It is easy, and cost-effective to implement at local, regional, or supra regional level. Compost production can go hand in hand with production of biogas, i.e., via processes of anaerobic digestion, if organic material with high biogas-potential is available. This could increase the economic value generated per tonne of bio-waste. There is also considerable potential for expansion of bio-waste management, which will have a positive impact on the labour market. Potential direct jobs in the biowaste sector: 1 Job / 1380t biowaste; urban areas 1 Job / 4500t biowaste.^{282, 283}

Selection of national strategies and policies with potential relevance for CE

The major determinants of sustainable waste management in Albania currently are the EU targets and its directives. In summer/autumn 2019, the Government approved the new **National Waste Management Strategy**, which will set the frame for the future of Albania's waste management. Thereby, targets for waste management in Albanian laws and national strategies are guided by EU requirements: It was planned that, until 2020, 55 % of municipal waste shall be recycled and composted. Furthermore, until 2025, 15 % of municipal waste shall be used for energy generation and the waste that goes into landfills shall be reduced by 90 %. Another target is the increase of the minimum collection percentages for batteries, accumulators, and their waste at national level from 25 % in 2015 to 65 % by 2025 (based on the Decision of the Council of Ministers (DCM) No. 866 On batteries, accumulators, and their waste, dated 04/12/2012). Waste collection services have significantly improved in many municipalities of Albania but remain very far from reaching EU standards.

Quality legislation on waste management is sufficient in Albania. However, the main challenges lie in the implementation, the development of sustainable institutional and operational plans, the lack of financial means and a clear definition and division of mandates between the responsible central and local institutions.

Info box 10 - Waste incineration in Albania – current example of 30-year lock-in of linear mismanagement

Instead of institutionalising collection, sorting, and recycling, Albania started the construction of 3 incinerators of urban waste in Elbasan, Tirana and Fier. The first one entered in operation in 2017 to perform tests and all the incinerators should be operational in 2023. With exception to a certain amount of plastic and metal, there is no segregated waste collection system in place yet, which is required by law since several years now. In the country, there are established waste recycling industries mainly for plastics and metals.²⁸⁴ Energy should be just a by-product. The construction of incinerators in Albania – at least at this point in time – is not in line with the National Waste Management Strategy, according to which the EU goals on reduction, reuse and recycling have to be met before investments in the construction of incinerators are undertaken.

Law No.10 463, dated 22.09.2011, on the **integrated management of waste** has been drafted based on the EU Waste Framework Directive (Directive 2008/98/EC of the European Parliament and of the European Council in 19/11/2008). Article 12, point 2 of this law constitutes a **legal obligation for every municipality in Albania to draft a local plan for the waste management** in the territory under their jurisdiction, in accordance with the Integrated Waste National Plan. Accordingly, **Albanian municipalities must ensure the collection**, transport, storage and treatment of municipal solid waste (Article 23, point 10) and further, **need to set a fee** that covers service costs (Article 9, point C/b); are supposed to set the standards at the same level or higher than the national

²⁸⁰ Urban Biocycles, Ellen MacArthur Foundation, March 2017.

²⁸¹ Industrial composting, however, usually aims for the production of biogas first. While regarding fermentation residues are used on agricultural areas, they are basically treated as residues that need to be safely disposed of. The focus lies on the regulation of pollutant content (e.g., heavy metal or plastic residues) instead of nutrient content and value creation. <https://www.umweltbundesamt.de/daten/ressourcen-abfall/verwertung-entsorgung-ausgewaehlter-abfallarten/bioabfaelle#verwertungswege-biogener-abfalle> (Assessed online Dec. 2021)

²⁸² <https://www.compostnetwork.info/policy/circular-economy/> (Assessed online Dec. 2021)

²⁸³ <https://www.sciencedirect.com/science/article/pii/S1871678420301941> (Assessed online Dec. 2021)

²⁸⁴ UNFCCC Albania Revised NDC (2021).

level (Article 22, points 2 and 3), while the national government should subsidize them when the national standard is financially unachievable by the municipalities.²⁸⁵

On the differentiated collection of solid waste, this obligation, however, was not met by the municipalities: While the majority of municipalities so far did not show any effort on the waste separation at source, serious efforts by Tirana Municipality in cooperation with the Italian city of Verona were undertaken in terms of waste separation but eventually failed, due to lack of awareness raising in citizens and lack of maintenance.

Info-box 11 – Selected organisations and IFIs involved in CE-relevant interventions²⁸⁶

- Donor engagement in the waste sector in Albania has significantly increased according to the increasing interest of the Albanian Government in improving waste management, particularly since 2016. **Germany is one of the main donors to Albania** in the sector of waste management – particularly via its implementing agency, the German KfW Development Bank. In 2016, the Albanian Government appointed Germany as a lead donor for the waste sector, which means that Germany has the mandate to prepare the agenda of donor meetings and to support the Albanian Government in coordinating donor programs in the waste sector.
- In August 2018, with support of **KfW**, the Albanian Ministry of Infrastructure and Energy published the jointly prepared Sector Study for Investment Demand in Integrated Solid Waste Management (ISWM) in Albania – Final Sector Study Report (Albanian Ministry of Infrastructure and Energy, 2018). The document comprised an investment plan, and determined adequate technology, costs, and tariffs. A three phases plan was entailed from 2018 to 2032. For each of the phases, the specific need for regional facilities is pointed out, the average operation costs are estimated, and concrete projects are suggested.
- With support of the German **KfW Development Bank**, the rehabilitation of Volloder Waste Dump in Saranda was planned, as well as the construction of a sanitary landfill for the region of Gjirokaster. Since 2016, the GIZ (Gesellschaft für Internationale Zusammenarbeit), the second implementing agency of the German Government, furthermore, has an ongoing project with three municipalities in Southern Albania with a focus on composting organic matter and increasing waste separation and recycling.
- Since 2017, the **Swiss Government** is supporting Albania in setting up an urban solid waste management in the region of Berat
- The **EU** has made waste management a priority for its cooperation with Albania under IPA II (focus: alignment with EU law).

Recommended entry points/CE engagement opportunity in Albania's waste sector

There is a high need to modernize the Albanian waste management. and incorporate necessary circular practices. This requires the closing and making use of (illegal) landfills and implementing a sound waste collection and sorting system, but also tap into the underestimated circular opportunity of exploiting organic waste. As such loops are fairly local, independent and of low complexity, that strategy offers economically very viable circular opportunities to *close resource loops, connect with other sectors and foster local economy*. The technological opportunities of composting hold immense environmental and economic circular potential, which in most countries are not exploited sufficiently.

To 'at least' integrate modern recycling standards e.g., for plastics etc. could lead to a lock-in effect of currently state-of-the art downcycling practices, which should be avoided. Any of the urgently necessary implementations of waste collection, selection and separate treatment must not establish economic dependencies on this kind of inferior waste streams²⁸⁷. To establish good recycling practices, the sector depends on "designed for recycling products". As Albania imports many of its goods, the country depends on exporters' progress in that matter.

While waste collection, separation and treatment are urgently necessary, avoiding lock-in effects has to be seen as condition for any following recommendation.

Circular Value recovery (and pollution prevention) (down-hill)

- Phase out illegal dumping and landfills and make the best of existing ones by capturing landfill gas, and instal circular business solutions to make use of the energy
- Improve (separate) waste collection and sorting efficiency without locking-in the dependency on inferior waste streams (transitional solutions, until country can import or provide products fit for circular management)

²⁸⁵ Thiel, S.; Thomé-Kozmiensky, E.; Winter, F.; Juchelková, D. (Eds.): Waste Management, Volume 9 – Waste to Energy. Albania – the First Balkan Country with an Incineration Plant. Lulzim Baumann. Thomé-Kozmiensky Verlag GmbH. Neuruppin 2019.

²⁸⁶ Thiel, S.; Thomé-Kozmiensky, E.; Winter, F.; Juchelková, D. (Eds.): Waste Management, Volume 9 – Waste to Energy. Albania – the First Balkan Country with an Incineration Plant. Lulzim Baumann. Thomé-Kozmiensky Verlag GmbH. Neuruppin 2019.

²⁸⁷ E.g., composite plastic packaging, not designed for recycling.

- Collect organic (household) waste separately and implement technologies that aim for compost production first and biogas production second – and set up the plants as circular solutions (e.g., part of the energy could be used to power a cooperative-owned connected farming facility)
- Collect food waste, by-products, or organic residues separately as pure waste streams to be provided to third-party innovators, start-ups and/or product manufacturers. (consider good practice samples from other economies, such as the food collection in the city of Milan^{288, 289}, or Latvia Getlini.²⁹⁰ or transforming food by-products into new products²⁹¹)

Circular Support (cross-hill)

- Support and finance businesses and innovations that collect organic (household) waste or food waste/by-products, as well as such which use regarding resource streams as input material or find other circular applications.
- Support cross-sector circular innovation and closed-loop solutions by e.g., by connecting stakeholders of different sectors (e.g., organic waste sector, AFOLU and Food, packaging and/or textile or energy sector).

²⁸⁸ <https://emf.thirdlight.com/link/ptejjhurhaj5-iigai0/@/preview/1?o> (Assessed online Dec. 2021).

²⁸⁹ The **city of Milan** collects food waste directly from commercial sources like restaurants. Considering the level of organic waste collection unsatisfactory, the government started a programme to produce compost and biogas from residential waste separated at source and sent to an anaerobic digestion and composting facility. By January 2015, the total separated collection rate had risen to 54%, with food waste being the main contributor. Milan’s scheme now covers the whole population of 1.4 million, making it the largest kerbside organics collection scheme in the world (<https://ellenmacarthurfoundation.org/circular-examples/effective-organic-collection-systems>) (Assessed Dec. 2021)

²⁹⁰ The largest landfill in **Latvia, Getlini landfill**, has served residents in the city of Riga and the surrounding municipalities since 1972. As part of an effort to improve waste management throughout the country, the landfill was upgraded in 2001-2002 to capture landfill gas, and now produces both electricity and heat—products that are used to offset power costs onsite and to heat a nearby greenhouse. Revenues are generated through a combination of electricity sales and heat used in a local greenhouse to produce tomatoes which are sold at the local market (Financing Landfill Gas Projects in Developing Countries, Urban development Series, Knowledge Papers, World Bank, Sept. 2016, No. 23).

²⁹¹ Inedible food by-products and other organic waste streams are usually sent to landfill as waste or incinerated. **De Clique** keeps materials in use by collecting and separating the waste to turn into high-value products that stay in the economy. Using cycle couriers and electric vehicles, De Clique collects food by-products like coffee grounds, orange peels and other food waste from businesses. Collected as pure waste streams, these by-products are then sold on by De Clique to third party innovators and product manufacturers, who transform them into new products like fertilizers, food ingredients, cosmetics, and biomaterials (<https://ellenmacarthurfoundation.org/circular-examples/de-clique>, Assessed online Dec. 2021).

Table 25: Albania – Waste Management (including agriculture and food) Barriers and Instruments

	Barriers	Enabling framework - Instruments to respond to barriers - Waste
Policies and regulations	<p>No collection system in rural areas and small towns. Most waste is disposed of in illegal landfills, ditches, ravines, or at side of roads (then washed and blown into environment and water courses).</p> <p>Solid waste collection system in place in most cities. But little recycling is undertaken. Principal method is dumping. Despite required by law, hardly a segregated waste collection system in place yet. Waste collection fees („cleaning tariff“) are usually low.</p>	<p>Revise fiscal policies (e.g., via grant support) to make separate waste collection economically attractive for waste providers e.g., by providing incentives for separate waste collection, support the development of market prices for organic residues, etc. and make separate collection of pure organic waste streams or residues attractive for collectors. Use fiscal instruments to economically compensate “inexpensive” virgin material with secondary material: bonus system for environmental sound packaging design:</p> <ul style="list-style-type: none"> - Establish economic build-in incentives for post-consumer waste avoidance²⁹² and better waste treatment (e.g., landfill/incineration charges/taxes, penalties for illegal dumping/burning) - Promote a tax-privileged (based on income group) formal waste collection and disposal systems that reflects real economy/society. Careful to incentivise waste <i>collection</i>, not huge amount of waste <i>creation</i>! - Establish functioning markets and price competitiveness (level playing field) for materials and services for cascaded products by introducing various instruments, including tax reduction on circular products, suspension of income tax for start-ups that develop circular/sustainability enabling solutions. <p>Revise the regulatory framework (e.g., via grant support) to:</p> <ul style="list-style-type: none"> - Ensure the controlled disposal of waste in state-of-the-art facilities, especially in rural areas and small towns²⁹³ - Extend affordable collection services to all in society, irrespective of income level (e.g., fiscal transfers from central governments to help fund municipal waste collection and treatment, etc.) - Formalise the informal waste collection sector. Introducing formal waste collection and disposal systems in a way that is sensitive to the economic realities of existing informal sector workers and enable collaboration between local government and the informal sectors, to ensure that existing workers are fully integrated into the new formal system (e.g., provide legal, eventually tax-privileged, income schemes, establish formal profession to enhance reputation or establish freelance employment schemes, etc.). That way, collection could be more attractive than dumping.
Capacity	<p>Lack of knowledge about use cases/business case development for separate waste collection.</p> <p>Lack of finance for research, development, collaboration on and implementation of circular solutions (materials, products)</p> <p>Need for collaboration and innovation: designing new business cases requires inclusion of and collaboration between many stakeholders</p>	<p>Build capacities and strengthen scientific research and mainstream extended-loop solutions, e.g., for biowaste, etc. (e.g., via grant support).</p> <ul style="list-style-type: none"> - Support technology and circular solution knowledge transfer to and between potential collaboration partners like municipalities/public authorities, businesses, lenders, setting up circular innovation hubs and foster entrepreneurship, provide finance, etc.). Bring together potential stakeholders and innovators (potential customers and entrepreneurs), e.g., via innovation incubators, circular economy hubs, hackathons, etc.) - Building capacity by increasing knowledge levels, enabling innovation hubs, supporting bankability of circular solutions, creating collaboration networks, etc. - Educate lenders (e.g., banks) on circular business models, their risks, challenges, and success factors.

²⁹² ‚Pay-as-you-throw‘-schemes are usually recommended at this point. However, they seem to be contraindicative, as communities already struggle to collect minimum service fees („cleaning tariffs“), society feels strong economic pressure, and illegal landfills and ditches are a low-barrier solution to this dilemma.

²⁹³ The recommended ‚pay-as-you-throw‘ principle does not seem expedient here.

	Barriers	Access to finance - Instruments to respond to barriers - Waste
Access to finance	No established infrastructure for regarding waste collection. Lack of technology to sort, separate or treat waste streams Uncertain bankability due to innovation status.	Enable and finance start-ups (e.g., circular innovation hubs, etc.) and support project development for new integrated waste management facilities /help to increase bankability of projects, e.g., with Seed capital / grant support .

3.4.3.2 Agriculture

Agriculture is a highly climate-sensitive sector in Albania and it contributes with 22.6% to its GDP, with livestock accounting for over 50% of production value, field crops such as wheat and maize accounting for 30%, and fruit production accounting for 20%.²⁹⁴ The leading sub-sectors are meat, grains, cereals, animal feed, dry fruits, sugar, farm machinery and food processing equipment.²⁹⁵ It is also the main source of employment for the country's rural population (agriculture at subsistence-level). While the sector has experienced moderate growth over the past decade, structural challenges, such as underdeveloped infrastructure and lack of effective irrigation networks, have undermined its wider development.

Present agricultural land fragmentation has hindered the effective organization of production, reduces productivity and increases the cost of using agricultural mechanics. As such, agricultural land is not currently utilized at full capacity due to limited investment in the agricultural sector.²⁹⁶

Albania has committed to improvements in the highly climate-sensitive sector regarding conservation agriculture, watershed management, and nutrient and crop management as well as the improved diversification of crops. Market development can be enhanced to better support changing harvest timeframes. Education for farmers can be supported by extension services and training programs can increase awareness of risk and adaptation options for farmers. **Those commitments to improvements of the infrastructure and the awareness rising can be used to implement additional circular solutions regarding post-harvest closed-loop solutions.**

The agricultural sector is considered a best prospect industry sector for Albania. The government hopes to boost agricultural production by providing financial support to farmers and facilitating private investment in the agro-processing sector. Over the last years, the government allocated significant amounts to support the development of fruit and olive orchards, vineyards, greenhouses, and crop storage facilities, and to support projects in the agro-processing industry. Just in 2020, the government invested about USD 55 million for drainage and irrigation infrastructure, direct support for agricultural and livestock production expansion, and food safety and consumer protection.²⁹⁷ **The momentum of growth and climate mitigation can be used for circular transformation changes.**

The government plans to modernize and consolidate the agricultural sector (agriculture and food processing), which may spur demand for (capital) farm equipment and services.²⁹⁸ It furthermore opens opportunities to close viable resource loops and **foster new business opportunities** (e.g. *paper/packaging production from agricultural waste or grass*) and tap into **bioeconomic opportunities** for organic by-products to be used for cosmetics, animal food or human food production (e.g. *muesli bars from residues from beer brewing process*).

²⁹⁴ The World Bank Group, Climate Risk Profile: Albania (2021) (Access at: <https://climateknowledgeportal.worldbank.org/sites/default/files/2021-06/15812-Albania%20Country%20Profile-WEB.pdf>)

²⁹⁵ International Trade Administration. Albania – Country Commercial Guide. U.S. Department of Commerce (Oct 2021).

²⁹⁶ The World Bank Group, Climate Risk Profile: Albania (2021).

²⁹⁷ International Trade Administration. Albania – Country Commercial Guide. U.S. Department of Commerce (Oct 2021).

²⁹⁸ International Trade Administration. Albania – Country Commercial Guide. U.S. Department of Commerce (Oct 2021)

<https://www.trade.gov/country-commercial-guides/albania-market-overview> // <https://www.trade.gov/country-commercial-guides/albania-market-challenges> // <https://www.trade.gov/country-commercial-guides/albania-market-opportunities> // <https://www.trade.gov/country-commercial-guides/albania-market-entry-strategy> (Accessed online 26 Nov.2021)

Selected agri and food projects (circular case examples: at the core transferable to Albania)

Globally, less than 2% of organic waste is valorised. There is great unrealised potential in the high volumes of discarded food waste and by-products that flow out of the agriculture sector.

- In Italy, 700,000 tonnes of citrus by-product are generated each year. The Sicily start-up **Orange Fibre** succeeded to produce **textile fibre from orange peels**. The fibre is used at the luxury retailer Salvatore Ferragamo.²⁹⁹
- **Wine production** resides in large amounts of a **by-product** called ,marc'. For every four litres of wine produced, one kilo of marc is generated. Together with research institutes, the company **Vegea** succeeded to produce ,**grape leather**' from this residue. The company now experiments to produce fabric, polymers and yarn from agro-industry biomass and residues, especially from wineries. The products are used in fashion, furniture, packaging, automotive & transportation.³⁰⁰
- The Dutch company **PaperWise** produces **paper** and board from **agricultural waste** for offices, printing, and packaging. The environmental impact of PaperWise products is 47% lower than paper made from trees and 29% lower than recycled paper. At the same time, the company supports economic sustainability of rural communities in India and South America.³⁰¹
- The **Balbo Group** grows organic sugar. They use modified machinery and restore natural processes to reduce sugarcane farming's impact on the environment and revive ailing crops and land. To **rebuild natural capital**, rather than deplete it, the farm developed a **harvesting system called Ecosystem Revitalization Agriculture (ERA)**. ERA combines the principles of regenerative agriculture with technical innovation to replicate the resilient ecosystem of uncultivated land. To valorise all material flows, a system to recycle organic by-products was put in place. The solid residue from juice filtration, the ash from the boilers, and the liquid residue left over after ethanol distillation, is collected, applied back to the fields, and dry matter is fed directly into a furnace, producing 200 tonnes of steam per hour. Some of this is used to extract sugar from the cane and the rest creates thermo- electricity which powers the mill and other buildings, with any excess sold to the grid. The Balbo Group has increased their land's productivity by 20% since they stopped using chemicals and mechanical irrigation. "It is the first time that an organic, large-scale initiative has produced a higher yield than conventional agriculture!"³⁰²
- The company **ReGrained** makes a business case by using Brewery Spent Grain (BSG), a by-product from beer brewing, to produce granola bars and puffed snacks.³⁰³

Recommended entry points/CE engagement opportunity in Albania's Agri and Food sector

Organic residue and food loss contain a lot of un- or underused environmental and economic potential. By connecting and closing resource loops with other sectors, the agriculture and food sector can be material to a (start of a) transition into a circular economy.

Circular production (up-hill)

- Connect agricultural residues and waste to business models and use them as (innovative substitute) input material (e.g., in other sectors) to replace virgin resources for e.g., conventional packaging material
- Identify (and map) food losses and agricultural waste and by-product streams along the harvest and post-harvest infrastructure, research potential use cases and support regarding circular innovation business cases.

²⁹⁹ <https://orangefiber.it/> (Accessed online 26 Nov.2021).

³⁰⁰ <https://www.vegeacompany.com> (Accessed online 26 Nov.2021).

³⁰¹ <https://paperwise.eu/en/> (Accessed online 26 Nov.2021).

³⁰² <https://ellenmacarthurfoundation.org/circular-examples/the-balbo-group> (Accessed online 26 Nov.2021).

³⁰³ <https://www.regrained.com> (Accessed online 26 Nov.2021).

Table 26: Albania – Agriculture Barriers and Instruments

	Barriers	Enabling framework - Instruments to respond to barriers
Capacity	<p>Unavailability of input material to be processed into high-quality compost. In particular:</p> <ul style="list-style-type: none"> - High-quality organic agricultural waste, waste-water and agricultural residues is not available, as it is not collected (separately) nor processed to be a high-nutrition product. - No collection and treatment infrastructure available. 	<p>Facilitate the development of viable business cases for using agricultural waste products (e.g., via grant support):</p> <ul style="list-style-type: none"> - Identify and map food losses and agricultural waste and by-product streams along the harvest and post-harvest infrastructure, e.g., as research project at the university, funded project from sector or trade association, as part of funded circular/climate innovation project, community development project, etc. - Make separate collection of pure organic waste streams or residues attractive for collectors, e.g., by supporting the development of businesses/business cases for collecting enterprises/start-ups. - Support development of (small) enterprises along organic agricultural waste stream collection and treatment, e.g., circular innovation hubs, help to increase bankability of projects, etc.

3.4.3.3 Infrastructure

Circular infrastructure

In 2018, construction contributed 9.2% to the Albanian GDP. Major ongoing and expected infrastructure projects in the tourism, transportation, and energy sectors were expected to drive construction spending over following years. Despite Covid-19, the construction sector was one main driver for the GDP to recover quickly, and is still expected to remain strong, due to reconstruction and new infrastructure projects. Major construction projects include finalization of the Trans Adriatic Pipeline, a USD 50 million stadium in Tirana, several hydro power stations, major road corridors, and a new international airport in Kukes. In 2018, the GOA announced the pre-qualification stage for a EUR 90-million tender to rehabilitate a 35-km railway line from Tirana to Durres, and a new 5-km line linking the railway with Tirana International Airport.³⁰⁴

Additional infrastructure projects, such as the proposed Tirana-Durres-Rinas railway and prospects for a new international airport and new marinas, have garnered attention from domestic and foreign investors. Government-financed infrastructure projects focus mainly on roads, water supply, and sewerage. As such, demand for heavy machinery, equipment, and services is expected to increase.

Overall, the domestic production of primary construction materials has increased significantly in recent years. The cement plants in Albania are mostly foreign subsidiaries and contribute to severe emissions, e.g., from energy consumption.³⁰⁵ However, the cement plants decrease the need to import cement. A wide range of construction materials, however, needs to be imported. High-end residential and commercial properties and construction of tourism resorts is expected to increase demand for quality supplies, especially energy-efficient materials like windows, doors, flooring, suspended ceilings, dry wall, insulation materials, adhesives, paints, cements, heating and ventilation systems, air conditioning, refrigeration, and cooling systems.

Infrastructure would benefit from circular solutions (as indicated in info-box below), which could be realized by:

- Implementing circularity into public procurement procedures
- Bringing together stakeholders and set up industry standards
- Providing a reliable political and legal framework that allow for long-term contracts (e.g., communities together with banks financing sustainable constructions)
- Financing research and pilot projects and/or provide long-term guarantees

³⁰⁴ International Trade Administration. Albania – Country Commercial Guide. U.S. Department of Commerce (Oct 2021)

³⁰⁵ UNFCCC Albania Revised NDC (2021).

Info-box: Circular construction case examples as inspiration for Albania^{306 307}

Design buildings for disassembly: In Brummen in the Netherlands, a new town hall was needed, but because of shifting local government boundaries, there was concern that the building may not have a function in the near future. The municipality therefore decided to commission a building with a fixed service life of 20 years. The architect responded to the project brief by designing a Lego-like structure where 90% of the materials could be dismantled and reused after a service life of at least 20 years. To achieve this ambitious reuse rate, irreversible concrete was avoided, favouring instead high-quality prefabricated timber elements, with design tweaks introduced by the supplier, allowing for maximisation of future reuse. The town hall also received the world's first materials passport that records information related to the building's materials, components, and products. In this way the town hall exceeded its primary function becoming, as the German architect Thomas Rau describes, "a material depot" for future buildings. The modular construction method also significantly reduced the construction period leading to cost savings.

Design for flexible, long-lasting buildings: In Boston, a new approach has been adopted in the waterfront area, where years of gradual economic growth are anticipated, catalysed by the completion of a new convention centre. At the start of this growth period, the area required a 1,500-vehicle parking structure to accommodate conference visitors. The local authority decided to commission a design with a view to a change in building function, for example, due to the expected expansion in public transport networks so that the need for parking gradually phased out. The design approach was to specify a universal structural typology, comprising a number of features not usually included in parking lot design. These included higher ceilings, the use of standard building grids, pre-emptive service corridors for future utility networks, and deconstructible steel ramps located on the structure's perimeter. These interventions only represent small deviations from the normal garage layout, but together allow for a more economic transformation when local circumstances call for a building function change.

Recycling concrete: The company **Büscher** developed a methodology to recycle concrete from demolition sites to substitute concrete input materials gravel, sand, and grain to 100%. The newly produced concrete then contains to 75% of recycled material.

Buildings as a service in Albania

Albania's healthcare system focuses predominantly on public hospitals, although the government in recent years has granted several major public hospital service concessions through a public private partnership model, including for laboratory services, provision of sterile surgical instruments, medical waste treatment. Albania's public healthcare sector has 22 district hospitals, 11 regional hospitals, and four university hospitals. The country also has one trauma university centre, two psychiatric hospitals, and the National Centre on Child Development and Rehabilitation. The system is financed by the state budget and public institutions directly purchase equipment, pharmaceuticals, and services. The Law on Public Procurement requires open electronic tenders for all purchases of goods and services. The private sector is also developing at a fast pace. The number of clinics for specialized and the number of private hospitals is growing. Tirana has four major private hospitals and several other smaller hospitals and clinics. The dental sector is entirely private. The number of dental and orthodontic clinics has increased significantly over the last decade and clinics often invest in the latest technology. Dental tourism is also growing. The COVID-19 pandemic has significantly increased the demand of the public healthcare sector for additional ICUs as well as COVID-19 related equipment and devices, including PPE.³⁰⁸

Circular solutions for the healthcare sector can include to not only focus on the circularity of the equipment used in the facilities, but also to make the buildings and facilities themselves circular, for instance by:

- Making product service models part of public procurements
- Providing a legal framework to define ownership for product service systems that become integral part of buildings³⁰⁹
- Developing bankability frameworks for integrated service units (e.g., regarding collateral)
- Supporting financing of long-term contracts and/or make communities part of the group of stakeholders.

³⁰⁶ <https://ellenmacarthurfoundation.org/articles/building-lighthouses>

³⁰⁷ https://www.muensterland.com/wirtschaft/wirtschaftsstandort-muensterland/innovationen/innovation-stories/recycling-beton/?fbclid=IwAR3HbFeNszGXn-fFhisd9eK8k3fXpNBYSB9OY11sknsesF0MPhbR_I4wSj0

³⁰⁸ International Trade Administration. Albania – Country Commercial Guide. U.S. Department of Commerce (Oct 2021).

³⁰⁹ In theory, product to service models lead to the fact, that the supplier remains the owner of the product and includes it in its own balance sheet. However, legal issues can restrict that. Accession, for example, implies that if products become part of a larger good, the product automatically belongs to the owner of the larger good. If for example a light or air-conditioning system or elevator is installed in a building, it becomes part of the superstructure of the building, and ownership automatically turns over to the owner of the building, which usually is also the user of the service. That is, while ownership is intended to remain with the supplier of the service, it in fact turns over to the user of the service. This limits the value of the asset as collateral, as the financier can no longer claim ownership to collect collateral. This, however, will decrease the creditworthiness of the supplier to a bank.

Info-box: Building as a service case examples as inspiration for Albania

Philip Healthcare set up refurbishing solutions for high-end healthcare products. The products are refurbishable by design, and the pre-owned components are given a second life and reuse vital components. In a demonstrator project, a refurbished MRI systems includes a fully refurbished 3000 kilo magnet certified for serviceability of at least 10 years. The MRI system is also fully upgradeable and can deliver a 50% reduction in energy consumptions vs. comparable systems.³¹⁰

Mitsubishi Elevator Europe are among the best of the market, with a long product life and low operation costs. Being also amongst the most expensive elevators - when it comes to a linear sales model - there are often not the first choice for project developers, despite their low maintenance costs. But being offered as an annual professional service model, in a Circular Economy they are the cheapest solution. As the manufacturer is responsible for maintenance and repair, and e.g., the replacement of parts, he has a financial incentive to make the life of its product as long as possible. At the same time, with a long product life, his material and production costs become lower and lower. Additionally, this kind of service model helps to build up a long-term customer relationship.³¹¹

The furniture company **DESKO** buys back its products three times ('three tier buy back system'). After the end of the first use cycle, DESKO buys back the office furniture from its first owner for 10% of the initial price. After refurbishing the furniture, it is sold a second time for 50% of the initial price and - after the end of that use phase - bought back a second time for 5% of the initial price. DESKO then refurbishes the furniture again and sells them a third and last time for 25% of the initial price. After this last use phase, DESKO does not buy the product back, but offers to dispose of them and also recovers certain parts that are still able to be refurbished or repaired for use in some of the other products.³¹²

The company Miele is known for high quality, durable and repairable household products, like washing machines, dryers, or vacuum cleaners. They are also known for high end-consumer prices, which narrows their offer to a certain target group. Due to the quality of Miele's products, they are predestined for 'pay per use' service offers, that exploit the benefits of product with a long lifetime. That would also cut the high initial investment costs for private customers and would open Miele's market to a wider target group. That is, what the company **Bundles** offers. It enables companies like Miele to provide Product Service Systems. Bundles provides an application - the Bundles Buddy -, that allows to manage the operation of electronic products, including use cycles and additives. In collaboration with Miele, Bundles provides 'Pay per wash' offers to private customers. The customer pays a fixed price per wash cycle resp. kilo of laundry and Miele takes care of the functionality of the washing machine (maintenance and repair), and is responsible for the consumption volume of energy, water and washing detergent.³¹³

Recommended CE engagement opportunities in Albania's infrastructure sector

Around infrastructure and capital equipment, decisions are made that impact the economy and the environment for a long time. At the same time, this long-termism can be an obstacle to implement circular solutions, especially for infrastructure projects. Therefore, to address system change, governmental interference, and risk-taking (-sharing) will be necessary, as well as the identification of project and experimentation pockets, that allow for trusting and narrow stakeholder collaborations.

Circular design and production (up-hill)

- Identify and support use of sustainable input materials (e.g., open-loop re-use or recycling materials like recycling concrete or used window frames, alternative materials like natural insulation or clay plaster, closed-loop recyclable materials)
- Identify and support material reduction opportunities (e.g., avoidance of over-specification)
- Design buildings for alternate use, working together with communities and urban development

Circular use (top-hill)

- Intensify use of existing infrastructure (e.g., re-assignment of use)
- Develop building-as-a-service models (like e.g., public hospitals), to allow total cost of ownership perspective and make the projects more bankable
- Support intensified and longer use of capital equipment (e.g., as product service systems) for e.g., construction equipment, hospital, or office equipment like MRIs Infrastructure, and building services like elevators.
- Enable businesses to develop circular business models.

³¹⁰ <https://www.philips.com/a-w/about/sustainability/sustainable-planet/circular-economy/refurbished-medical-products.html> (Assessed online Dec. 2021).

³¹¹ <http://circularhotspot.pl/en/netherlands/40> (Assessed online Dec. 2021).

³¹² <https://www.circle-economy.com/case/desko/#.XZtKm2ZCQuU> (Assessed online Dec. 2021).

³¹³ <https://bundles.nl/en/> (Assessed online Dec. 2021).

Table 27: Albania – Infrastructure and Capital Equipment Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers
Capacity	Lack of awareness across public and private stakeholders (incl. associations, banks, municipalities, etc.) about circular infrastructure/construction (e.g., regarding recycled materials, or concerning underused capacity in used buildings (no use during the night, etc.) and lack of ideas how to use it)	Promote awareness and the development of business cases (e.g., via grant support): <ul style="list-style-type: none"> - Provide information and knowledge transfer (e.g., for already successful case examples) e.g., to promote product usage intensity and life extension (e.g., extended life incentives). - Support research and development regarding products/material use, but also digitalization, and support the creation of enabling networks, hubs, and knowledge bases for designing new business models for construction materials.
Policy and regulations	Lack of standards for sustainable infrastructure/construction Insufficient integration of circular economy principles on public or organisation procurement	Revise fiscal policies (e.g., via grant support) to incentive circular construction and promote purchase of refurbished or remanufactured equipment (sell-and-buy-back schemes) or support implement product-as-a-service solutions (e.g. by favourable taxation schemes). Revise standards and regulations (e.g., via grant support): <ul style="list-style-type: none"> - Revise building standards/code to reflect circular products and design. - Revisit procurement guidelines, reconsidering specifications that prevent circularity and integrating tender instruments to reward circular solutions, as well as circularity criteria that need to be tracked by value-based metrics (e.g., adjust public procurement guidelines and processes to effectively integrate circularity).

3.4.3.4 Textiles

One of the most important sectors in Albania are textiles and clothing. Until the 1990s, the clothing industry ranked among Albania's strongest sectors. When state factories were privatized in the 1990s, the industry, together with the process of production, changed significantly. Was the sector before managing the whole production chain and even produced a significant quantity of the raw material internally, Albania does now not produce raw materials anymore. However, the factories manufacture clothing which then heads to prominent brands in markets situated in western Europe. Albania's clothing and textile sector has been re-positioning itself and the sector is advantaged by a highly skilled workforce as well as low wages and very poor working conditions. More and more local companies in Albania are moving away from the 'cut, make and trim' processes to providing complete package service to external consumers in Europe. In Albania, there are also more firms with the capability to produce finalized items, which means items they have processed from the beginning to the end.^{314, 315}

With that influence on the up-hill process, the sector could address any design for circularity opportunities. However, as most of the textiles are sold in foreign (EU-)countries, Albania's textile industry is highly dependent on the circular demands of their customers.³¹⁶ As the importing countries are then responsible for any down-hill processed, Albania could specialise on services that allow their customer for easy re-use and recycling processes.

³¹⁴ <https://www.torial.com/denis.giessler/portfolio/328568> (Accessed online 28 Nov. 2021).

³¹⁵ World Atlas. The Biggest Industries in Albania. <https://www.worldatlas.com/articles/which-are-the-biggest-industries-in-albania.html> (Accessed online 28 Nov. 2021).

³¹⁶ A far more urgent matter for local workers would be to improve working conditions and phase out harmful substances.

Case examples as inspiration for Albania:

Currently less than 1% of all garments are recycled to a high quality. The rest are downcycled, incinerated or landfilled, translating into a loss of USD 100 billion worth of material annually. There are many factors that contribute to the low rate of garment recycling. One key contributor is the high cost associated with disassembly, which due to complicated and durable designs is a predominantly manual process. Furthermore, according to industry research including data from garment recycling companies in Pakistan, between 30 - 52% of denim is lost during disassembly. The Belgium company **Resortecs** has developed an innovative solution – dissolvable stitches - that helps the industry to recycle garments more effectively. In the Resortecs® process only 10% maximum of textile material is lost, and the integrity of the textile is not damaged, meaning that new garments can use a higher percentage of recycled material. Furthermore, the process makes the garment dismantling process much easier and five times faster. This improves the effectiveness and economic viability of recycling, particularly in countries where labour costs are high.³¹⁷

The potential of the excess materials thrown away in production, with pre-consumer waste averaging 10-30% for every production. The company **Looptworks** only uses materials that already exist. They repurpose used and excess materials into new products with higher value, keeping materials in use and avoiding landfill or incineration. Since 2014, Looptworks has partnered with companies, offering an alternative solution to revalue their products. Looptworks worked with Southwest Airlines to remodel their planes and achieve zero waste to landfill in the process through diverting the leather from the old planes into high quality goods such as handbags, duffel bags, and rucksacks. Since then, Looptworks has had further partnerships with Delta Airlines, Nike, Adidas, Patagonia, Timberland, and the NBA.³¹⁸

Recommended entry points/CE engagement opportunity in Albania's textile sector

Being a smaller supplier in the international textile industry, Albania currently has a weak position in the international value chain. Their ability to influence manufacturing or quality of clothing depends on the demand of their international customers. In general, in the long-term, Albania needs to strengthen their position in the global textile value chain and make it a valuable player. Short-term, however, there are some entry points that Albania could address right now. One is to focus on circular design for their local textile industry (resources flowing inside the country like small labels) and second to pro-actively provide innovations to increase recyclability for the foreign down-hill value chain.³¹⁹

Circular design and production (up-hill)

- Design for (local) circular use and for recycling (e.g., for local resource flows and small brands, with narrow and controllable resource flows)
- Provide design for recycling innovation for international textile value chains, like dissolvable or easy-to-unravel stitches)

Circular use (top-hill)

- Support and finance local businesses to provide circular use models (e.g., clothing as a service, sell-and-buy back, product longevity schemes, etc.)

However, to implement circular solutions, it needs:

- Strengthen Albania's position in the global textile value chain and make them a valuable player
- Invest in research and technology to design (for recycling)
- Strengthen local entrepreneurs and brands to set-up circular textile/clothing schemes
- Connect textile industry with entrepreneurs that develop alternative materials (see agriculture – use of organic waste products)

³¹⁷ <https://resortecs.com/>

³¹⁸ <https://www.looptworks.com/>

³¹⁹ Problem: tapping into the profits along the down-hill value creation without being part of the international value sharing architecture.

Table 28: Albania –Textile Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers
Capacities	<ul style="list-style-type: none"> - Insufficient resources for research, development, collaboration on and implementation of circular solutions (materials, products) - Lack of circular mentality in society, e.g., consumers are not accustomed to certain kinds of new products and often do not approve. - Designers and decision makers still know little about parameters for circular design. Limited access to circular design know-how. 	<p>Promote awareness and the development of business cases (e.g., via grant support):</p> <ul style="list-style-type: none"> - Provide information and knowledge transfer (e.g., for already successful case examples) e.g., to promote circular resources, design, and use (specialised education and training e.g., for textile designers, recyclers, purchasing, etc.). - Strengthen the development of circular business model (e.g., enabling innovation hubs, creating collaboration networks, etc.).
Policy and regulations	<ul style="list-style-type: none"> - Designers and decision makers have no incentives to promote circular material and design 	<p>Revise fiscal policies (e.g., via grant support):</p> <ul style="list-style-type: none"> - Set economic incentives (e.g., compensate inexpensive virgin material vs. secondary material e.g., via bonus system for environmental sound design).

3.5 Colombia

Abbreviations (Colombia)

ANLA	National Environmental Licensing Authority
APC	Agency of International Cooperation
BORSI	National Bag for Residues and By-products
CAEM	Business Environmental Corporation
CCCS	Colombian Council for Sustainable Construction
CDW	Construction & Demolition Waste
CNPMLTA	Centro Nacional de Producción más limpia y tecnologías ambientales Colombia
EELA	Energy efficiency in brick production
EPR	Extended Producer Responsibility
FENALCO	National Federation of Merchants
Fiducoldex	Colombian Trust of Foreign Trade
GACERE	Global Alliance on Circular Economy and Resource Efficiency
LEED	Leadership in Energy & Environmental Design
ICIPC	Instituto de Capacitación e Investigación del Plástico y el Caucho
MIF	Multilateral Investment Fund
MINCIT	Ministry of Industry, Trade, and Tourism
Minhacienda	Ministry of Finance and Public Credit
MinTIC	Ministry of Information Technologies and Communications
NDP	National Development Plan
OECD	Organisation for Economic Cooperation and Development
PROURE	Programme for the Rational and Efficient Use of Energy
PTP	Productive Transformation Program
RECPnet	Resource Efficient and Cleaner Production network
RedES-CAR	Sustainable Business Network programme
PGRS	Solid Waste Management Plan
SWM	Solid Waste Management
TNA	Technology Need Assessments
WEEE	Waste Electrical and Electronic Equipment

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3.5.1 Macroeconomic context

Colombia's total area equals 1,141,748 km² with a population density of 46/km².³²⁰ Although 94% of the territory can be considered rural³²¹, the level of urbanization in the country reaches 81%³²². This high percentage corresponds to the complex interaction of socio-environmental factors such as a protracted armed conflict, lack of investment in rural areas, drug trafficking, and natural disasters. Over the last fifteen years, the average economic growth of Colombia has reached 4.26% p.a. In general, the improvement in its economic performance had led to a decrease of the proportion of people living in poverty.³²³ In May 2018, Colombia joined the Organisation for Economic Cooperation and Development (OECD), after major reforms to align its labour policies, the justice system, corporate governance of public enterprises, and trade rules with OECD standards. Notwithstanding, the country still has a long list of recommendations from the OECD to follow.³²⁴

Rising temperatures and water scarcity are of particular concern in the Andean region, where 75% of the population lives. 80% of Colombia's GDP is generated in the basin of the two largest rivers running through this area: Magdalena and Cauca, where climate change impacts are exacerbated due to giant hydroelectric projects. Their vulnerability to climate change becomes evident during El Niño and La Niña phenomena, which occur more frequently and with more drastic environmental, social, and economic consequences (e.g., infrastructure damages, electricity shortages, and harvest loss). **Droughts and forest loss** reduced water levels to record limits and increased sedimentation. These conditions triggered major electricity crises and a sharp increase in the use of thermal plants.

Conversely, the 2010–2011 La Niña (positive phase of El Niño³²⁵) affected approximately 9% of the total population and caused economic losses of about USD 7.8 billion, related to the destruction of infrastructure, flooding of agricultural lands, and payment of government subsidies.³²⁶ La Niña in November 2020, tropical storms and the hurricanes Iota and Eta affected the Pacific and Caribbean coast and caused floods around the country. In Providence Island, 98% of the infrastructure was destroyed.

3.5.2 Financial sector

The Colombian financial system is made up of around 56 credit establishments (e.g., banks, financial corporations, financial cooperatives), 58 financial services institutions (e.g., pension funds, stockbrokers, trust funds), and other financial institutions (e.g., special official institutions and insurances). For the most part, these institutions have been grouped through financial conglomerates (13 in total by 2019³²⁷), which a large share of international firms. After the financial crisis of the late 1990s, this sector has been strengthened by, among other factors, national regulation, and the Financial Superintendence, improving profitability, risk, and solvency.³²⁸

Voluntarily, in 2012, 22 national commercial and development banks, together with the National Planning Department (DNP for its acronym in Spanish) and the Ministry of Environment have signed the **Green Protocol**, whose objectives are: 1) To move towards **sustainable and low-carbon growth**, 2) **To protect and ensure the**

³²⁰ World Population Review, 2020 <https://worldpopulationreview.com/country-rankings/countries-by-density> (accessed Nov 2021).

³²¹ Semana Rural, 2018 <https://semanarural.com/web/articulo/el-censo-2018-revelo-que-hay-menos-gente-viviendo-en-el-campo-/1013>

³²² Statista, 2020 <https://www.statista.com/statistics/455795/urbanization-in-colombia/> (accessed October 2021).

³²³ World Bank, 2020, <https://data.worldbank.org/topic/poverty?locations> (accessed November 2021).

³²⁴ OECD, 2020 <http://www.oecd.org/latin-america/countries/colombia/> (accessed November 2021).

³²⁵ Known as the period with cooler-than-normal sea surface temperature in the equatorial Pacific.

³²⁶ N. Hoyos, J. Escobar, J.C. Restrepo, A.M. Arango, J.C. Ortiz, 2013. Impact of the 2010–2011 La Niña phenomenon in Colombia, South America: The human toll of an extreme weather event. *Applied geography*.

³²⁷ La República, 2019. <https://www.larepublica.co/especiales/lr-65-anos/el-sistema-financiero-paso-de-95-bancos-a-13-conglomerados-2833081> (Assessed online Nov. 2021).

³²⁸ Banco de la República, 2013. El sistema financiero colombiano: estructura y evolución reciente.

sustainable use of natural capital and improve environmental quality and governance, and 3) **To achieve resilient growth and to reduce vulnerability by providing lending for green projects and improve environmental screenings and performance**. This Protocol also aligns with the UNEP FI, Equator Principles, UN Global Pact, among others.³²⁹ Additionally, some banks have already issued **green bonds**.³³⁰ In 2017, Bancolombia, the largest commercial bank, was awarded the most sustainable bank in the Americas and fifth in the world according to the Dow Jones Sustainability Index.³³¹

Public second-tier banks such as Findeter, Bancoldex and Finagro play a key role in implementing the Green Growth Policy and have already gained experience in relevant fields.³³² Nevertheless, **there are no specific financial products for the circular economy (CE)**. Therefore, the companies that have already set ambitions on CE are large with available capital and sustainability strategies that want to profit from fiscal benefits and improved cost-benefit ratios.³³³

Currently and since March 2020, the Ministry of Environment and Sustainable Development (MADS), the Ministry of Finance and Public Credit (Minhacienda), the National Statistics Department (DANE), the DNP, and the Superintendence of Finance, together with representatives from the financial sector are working on the development of a **green finance taxonomy**. With the EU Sustainable Finance Taxonomy as the main reference, the focus areas of Colombia's taxonomy are³³⁴: 1. Climate change mitigation; 2. Adaptation to climate change; 3. Ecosystems and biodiversity; 4. Water management; 5. Soil management; 6. **Circular economy**; and 7. Pollution prevention and control. The set of activities and technical screening criteria for the CE are not being developed yet as for the first phase, components 1 to 5 were prioritized.

3.5.3 Developments and sectors relevant for circular economy interventions

Introduction

The economy is highly resource-intensive, with low levels of innovation and weak interinstitutional coordination. A Green Growth Potential Assessment revealed that **the current economic development model is depleting its resource base and generating high costs for the environment and society estimated at more than 16.6 billion Colombian pesos, equivalent to 2.08% of GDP in 2015**.³³⁵ In November 2015, Colombia started the “**Green Growth Mission**”³³⁶ which consisted of a diagnosis phase, design of a roadmap, and the adoption of a policy.³³⁷ In terms of material intensity, the Mission found out that the competitive disadvantage of the country is 2.8 times higher than the average of the OECD.

In 2018, the **Green Growth Policy** was adopted to **foster productivity, growth and economic competitiveness while ensuring the sustainable use of natural capital and social inclusion compatible with the climate by 2030** (i.e., NDC and SDG aligned).³³⁸ **The CE is one of the pillars of this Policy. The Government's Green Growth Long-Term Policy is also reflected in the Development Plan 2018-2022.**

The Strategic lines of action of the Green Growth Policy aim at reconverting and developing a resource-efficient and low-carbon production, with a focus on **CE**, bioeconomy, forest economy, and the **greening of sectors such as agriculture, housing, industry, non-conventional renewable energies, and electric transport (i.e., efficient use of water, land, and energy)**.

The ambitious objectives set by this Policy rely on the development of science and technology, innovation, strengthening of human capital, consolidation of financing instruments, formalization of the economy, generation of information, and implementation of intersectoral coordination mechanisms at the national and regional levels.³³⁹ **Nine financial and economic instruments were prioritized to finance the Policy**³⁴⁰ and to foster the

³²⁹ Asobancaria, 2012. Protocolo Verde.

³³⁰ CDKN, 2017 Bonos verdes para el financiamiento climático en Colombia.

³³¹ Bancolombia, 2020 <https://www.grupobancolombia.com/wps/portal/about-us/corporate-information/sustainability/recognitions>

³³² National Planning department (DNP), Documento CONPES 3934 Política de Crecimiento Verde.

³³³ La República, 2021 <https://www.larepublica.co/responsabilidad-social/la-economia-circular-ya-se-implementa-en-300-empresas-de-27-sectores-3250834> (accessed November 2021)

³³⁴ Minhacienda, 2021 <https://www.irc.gov.co/webcenter/portal/TaxonomiaVerdeColombia> (accessed November 2021)

³³⁵ National Planning department (DNP), Documento CONPES 3934 Política de Crecimiento Verde.

³³⁶ GGGI, AFD, the World Bank, IDB, KfW, GIZ, the English Embassy, UNEP, Fondo Acción, Korea Green Growth Partnership, the Ministry of Finance, Climate and Development Knowledge Network (CDKN) supported the Green Growth Mission.

³³⁷ Gómez, José Hernando. National Planning department (DNP), 23/05/2018. Misión de Crecimiento Verde, Avances y Resultados

³³⁸ National Planning department (DNP), Documento CONPES 3934 Política de Crecimiento Verde.

³³⁹ DNP, 2019. Resumen Política de Crecimiento Verde.

³⁴⁰ Econometria and Grupo de Financiamiento Climático LAC, 2017. Instrumentos económicos e incentivos financieros para crecimiento verde y fuentes de financiamiento internacional para cambio climático en Colombia.

allocation of private resources: **Deposit-refund system to boost a CE** (like the bottle refund in Germany), incentive to rural capitalization (RCI) for silvopastoral systems, financial incentives for GHG emission mitigation measures (e.g. preferential rates for **technological conversion**), support for bioeconomy initiatives, projects financed by royalties (adaptation criteria), carbon tax, and scaling the replenishment of the cargo fleet.

As a way to implement the Green Growth Policy, a **National Strategy on Circular Economy** was released in 2019 by the MINCIT and MADS. The strategy serves as a guideline to support the transition towards a CE in the **six prioritized sector lines**:

1. **Industrial material flow and massive consumption products**: Development of new regulation, research, post-consumption use, and integrated waste management. Subsectors: Steel and tyres.
2. **Material flows from packaging**: Socialization of the 1407 Resolution (2018)³⁴¹, research, development of an eco-labelling strategy (2020), review of current legislation on packaging and incentives, and development of a new tariff framework for public cleaning by 2020 (street cleaning and waste collection).
3. **Biomass flow**: By 2022, the country should have a National Plan on Residual Biomass Use in place.
4. **Sources and energy flows**: By 2022 Colombia should have a national database on auto-generation, an international cooperation programme on Smart Metering and Edge Computing. Additionally, energy providers should develop energy efficiency programs.
5. **Water flows** pilot projects to measure nutrient levels in wastewater, rainwater use, and domestic wastewater reuse.
6. **Construction/building materials flow**: Characterization studies, technical guidelines, and three instruments to incentivize reuse, recycling, and processing of building debris.

The National Strategy on Circular Economy is accompanied by support activities, such as the **development of CE concept standards and indicators** and the **national CE information system** that provides input for decision-making and evaluation of public policies. The first **national CE report**³⁴² is based on systematic environmental and economic accounting (incl. productivity indicators and pollution and intensity indicators for energy, forest products, water, and material flows, as well as indicators related to environmental activities, such as ecological protection expenditures).

Additionally, the **draft policy paper for the post-pandemic recovery** has a strong focus on sustainability and has prioritized economic diversification, employment generation, and business growth in fields such as the bioeconomy, **CE**, forest economy, ecotourism, and alternative energy sources.³⁴³

The new **E2050** Long-term Climate Strategy of Colombia³⁴⁴ has included **CE** as a pillar to achieve carbon-neutrality by 2050. The authorities considered that CE is fundamental to strengthen the carbon-intensive sectors by promoting the replacement of products by services and the creation of new goods. Other propositions of the strategy are:

- By 2050, Colombia will be a climate-resilient country that prioritizes human well-being, biodiversity conservation and water security. It will have a **competitive, circular, and carbon-neutral economy**.
- Colombia will have a CE, which generates new business opportunities and jobs, reduces waste generation and GHG emissions, and allows for more efficient and environmentally and environmentally friendly production systems.
- By 2050 Colombia wants to include CE as part of education and training campaigns to the general public and workforces.
- Colombia sees CE as an opportunity to reduce environmental degradation and generate green jobs.

Currently, it is possible to access fiscal incentives with circular relevant activities for the cases listed below. Nevertheless, more clarity is needed on how to make the benefits effective:³⁴⁵

- Reduction in water, energy, raw material, or fuel consumption
- Improved quality of discharges, air emissions, or wastes
- Reduction in the generation of air emissions, discharges, or wastes

³⁴¹ On December 24th, 2020, Ministry of Environment and Sustainable Development issued Resolution 1342 of 2020 (the "Resolution") which modifies Resolution 1407 of 2018 which establishes the environmental management of waste from paper, carton, plastic, glass, and metal packages. <https://cms.law/en/int/expert-guides/plastics-and-packaging-laws/colombia> (Assessed online 14 February 2022).

³⁴² Available on <https://www.dane.gov.co/index.php/actualidad-dane/5413-economia-circular-tercer-reporte-y-foro-semana> (Assessed online Nov. 2021).

³⁴³ DNP, 2020. Draft (no published) policy paper for the Green Economic Reactivation Post-COVID19.

³⁴⁴ E2050 – Climate long-term strategy.

³⁴⁵ Ambientalmenet, 2021 <https://ambientalmente.com/obten-incentivos-tributarios-por-las-estrategias-de-economia-circular/> (Assessed online Nov. 2021).

- Reduction in the use of transport and hence air emissions from associated vehicles
- Management of information on behavioural variables of renewable natural resources (water, air, fauna, flora, wind, sun), or know the state of quality or behaviour of environmental variables (temperature, pH, the concentration of metals, concentration of chemical elements, concentration of suspended solids, particulate matter, etc.), associated with discharges, emissions, or waste.

Good practice that promotes the development of a CE in Colombia (exemplary):

- There are two recent **initiatives on research and capacity building**: 1) A platform called **BORSI** (National Bag for Residues and By-products) to promote the exchange of material among companies, and 2) a National system of biomass use to gather information on biomass availability, composting technologies, and quality certification of projects. Also, events such as the International Environment Fair (FIMA) and Bio-expo are spaces to exchange information, network, and showcase successful cases³⁴⁶.
- Several companies have started developing their own circular projects independently or through a network. For instance, the **Sustainable Business Network programme (RedES-CAR) is an alliance between the public, private and academic sectors**, which began in Colombia in 2013 and promotes the productive transformation of companies by applying strategies such as cleaner production, industrial symbiosis, and Integrated Water Management. It currently involves 590 private entities. Besides, there are **at least 40 private initiatives on CE**. For example, Ecopetrol, Colombia's largest oil company is developing CE pilot projects in line with the National Strategy³⁴⁷.
- **GIZ is supporting the Government of Colombia throughout the transition to a CE (2019-2023)** with focus on improving waste recycling and promote collaboration between the state, the private sector and civil society, e.g., to identify innovative business models in the recycling industry and change consumer behaviour. The areas of work of this project are³⁴⁸:
 - Increase recycling of specific wastes in project cities.
 - Creation of enabling national conditions for the actors of the circular economy strategy.
 - Improvement of the range of qualification measures for the circular economy.
- The **EU** has been an active partner in the transition towards circularity. Particularly, its initiative **Switch to Green** has contributed to promoting eco-industries and developing the National Strategy on Circular Economy. In 2017, the country participated in a Circular Economy Mission involving more than 50 EU companies who shared experiences with the Colombian Administration and business community. The work has also involved the capacity building of 60 government officials of various ministries and national offices, as well as the publication of a **country case study**³⁴⁹
- Currently and as part of the **Global Alliance on Circular Economy and Resource Efficiency (GACERE)** led by the **EU** and included in the Circular Economy Action Plan (part of the European Green Deal), there are two initiatives announced in key partner countries including Colombia:
 - **Reducing Plastic Waste in the Americas**: EUR 5 million to be implemented in 36 months in Brazil, Chile, Colombia, and Canada. The tendering process was due to start in June 2020.
 - **Low Carbon and Circular Economy Business Action in the Americas**: EUR 20 million to be implemented in 36 months in Brazil, Mexico, Argentina, Chile, Colombia, and Canada from 2020.
- EU has provided **technical assistance** (including but not limited to: SWITCH to Green Facility by DG INTPA)³⁵⁰ for:
 - the implementation of the country's CE strategy, including the identification of appropriate economic instruments
 - the facilitation of access to finance
 - the formulation of the national plan for the sustainable management of single-use plastic
 - the elaboration of policies and measures related to packaging and containers, waste management and reuse
- EU has provided **financial assistance** (SWITCH to Green Facility):
 - budgetary support for the "Sector Reform Contract for Sustainable Local Development in Colombia"
 - budgetary support to scale existing programmes, such as Fábrica de Productividad and InnovaCluster
 - funding of the "Sustainable production and trade" project and of the "Low Carbon and Circular Economy Business Action in the Americas" regional programme.

³⁴⁶ Ministry of Env. and Sustainable Develop., Ministry of Trade, Industry & Tourism, 2019. Estrategia Nacional de Economía Circular.

³⁴⁷ RedES-CAR, 2020. <http://www.redescar.org/> (Assessed online Nov. 2021).

³⁴⁸ GIZ, 2020 8 <https://www.giz.de/de/weltweit/89472.html> (Assessed online Nov. 2021).

³⁴⁹ Switch to Green, 2021 <https://www.switchtogreen.eu/colombias-ce-path/> (Assessed online Nov. 2021).

³⁵⁰ DG INTPA (Directorate-General International Partnerships), supported by the SWITCH to Green Facility, explored the circular economy transition processes at a national level to produce insights on selected country experiences in Africa, Asia and Latin America <https://europa.eu/capacity4dev/file/122573/download?token=36eBSsAd> (Assessed online 14 February 2022).

3.5.3.1 Production and consumption

Introduction

Textiles, chemical products, metallurgy, cement, cardboard packaging, plastic resins, and beverages stand out in the industrial sector. The tertiary industry accounted for 69.5% of GDP, with the importance of services, especially tourism dynamics. In 2020, due to the pandemic, non-resident visitors (1.38 million) decreased by 69.4% compared to 2019. The development rates in the technology sector are very low, while the service sector (health, education, consulting, etc.) is growing.³⁵¹ In order to achieve the goals of the Strategy, Colombia has highlighted the necessity to **cooperate with international partners**. For instance, the Colombian Presidential Agency of International Cooperation (APC) and the Ministries will coordinate programmes and projects with international cooperation agencies such as IDB, Andean Development Bank (CAF), the Directorate-General for Environment of the European Commission. Additionally, Colombian Embassies will search for technical assistance. Similarly, export agencies like **Procolombia**, local promotion agencies, and associations like **Analdex** can promote products, services, and technologies at international markets, as well **attract foreign investment in projects that promote the transition towards a CE**. For this, collaborators should get involved in the roundtables and training programs on CE opportunities.³⁵²

The government plans to strengthen the governance arrangements and economic instruments that support this transition and align public and private finance.³⁵³ Even though not all the enabling conditions are in place, the private sector is expected to provide about 69% of the financial flows for the recovery.³⁵⁴ Notably, although resolutions are binding constraints to some extent, there is dynamic in recent years to derogate or adjust the legal base (e.g., new elected governments).

The **National Plan for the sustainable management of single-use plastics**³⁵⁵ was issued in May 2021. It sets time-bound goals to prevent the negative impacts caused by plastic and microplastic waste plastics and microplastics waste on all ecosystems. For instance, by 2030, 100% of single-use plastics placed on the market are reusable, recyclable, or compostable. The Plans builds on the concept of **extended producer responsibility (EPR)**, which has been applied in Colombia since 2009 - though it does not cover all materials and its enforcement should be verified and improved. In this regard, the Resolution 1407 from 2018, obliges producers to formulate, implement and keep updated an **Environmental Management Plan for Containers and Packaging Waste**, which must be submitted to the National Environmental Licensing Authority (ANLA) for its monitoring and control. The Plan seeks to follow up the implementation of pilots to implement that resolution, evaluate the need to adjust the norm and expand the EPR to other materials. The promotion of projects on eco-design is also part of the Plan.³⁵⁶ Other regulatory developments include a bill to prohibit the single-use plastics currently discussed by the Congress and the 2021 Resolution 1257 on Integrated Management of Construction and Demolition Waste, which will be introduced in section 2.

A range of **general barriers hamper progress**, such as policies that do not necessary translate into financial benefits and harmful incentives remain (misguiding signals). There is also absence of a coherent regulatory framework free from “grey zones” or lack of specifications and a **lack of technical standards on CE activities**. Sectoral coordination to avoid ambiguity and contradictions is missing. Sustainability is still nascent in education centres and companies. The same applies to up-to-date and robust information systems (e.g., material consumption and waste production). Exchanges of experiences at the international level requires sponsorship, ambitious? laws and strategies lacking enforcement and the corresponding enabling conditions.

To boost the transition towards CE, all areas would benefit from **knowledge exchange**. This is of special importance because Colombia’s goals can profit from international experience in topics such as recycling, research, and product innovation. Colombia can hereby benefit from **fostering research and technology transfer**. More work, however, is needed to **provide for an enabling environment** (including coherent policies; a responsive fiscal framework that promotes sustainable actions), to set up **dedicated financing schemes**³⁵⁷ (e.g., **soft loans for piloting activities at small businesses** to foster innovations), to **address consumption and social systems** (via

³⁵¹ Mincomercio, 2021. OEE Perfil de Colombia.

³⁵² Ministry of Env. and Sustainable Develop., Ministry of Trade, Industry & Tourism, 2019. Estrategia Nacional de Economía Circular.

³⁵³ DNP, 2020. Draft (no published) policy paper for the Green Economic Reactivation Post-COVID19.

³⁵⁴ Based on direct exchange with the EU Delegation Colombia.

³⁵⁵ Ministerio de Ambiente y Desarrollo Sostenible, 2021. Plan Nacional Para La Gestión Sostenible De Los Plásticos De Un Solo Uso.

³⁵⁶ Ministerio de Ambiente y Desarrollo Sostenible, 2021. Plan Nacional Para La Gestión Sostenible De Los Plásticos De Un Solo Uso.

³⁵⁷ Garcia, C; Cayzer, S., 2019, Assessment of the Circular Economy Transition Readiness at a National Level The Colombian Case.

educational and raising awareness initiatives) and to **improve the recycling system** (for safe and profitable recovery of materials).

Since 1997 through the **National Cleaner Production Policy**, Colombia started defining a pathway towards a more sustainable industry. Subsequent development plans and initiatives have focused on channelling investments to increase productivity, save resources, and improve competitiveness. Currently, the Ministry of Industry, Trade, and Tourism (MINCIT) is leading the action in this field.³⁵⁸ Attached to this ministry, the Foreign Trade Bank (Bancoldex) promotes trade and industrial development. Complementarily, MINCIT has two main programs: 1) **Colombia Productiva** was launched in 2008 as an entity to enhance the efficiency and quality of the industry. It offers technical assistance for companies to adopt international methodologies, specialized training, guidance, and financing to obtain international certifications.³⁵⁹ 2) The **Productive Transformation Program** (PTP, 2013) is operated through Colombia Productiva to develop sustainable initiatives for Colombia's industry, with a particular focus on promoting industrial innovation and competitiveness, developing productive, efficient, and sustainable supply chains in the sectors of manufacturing, service, and agribusiness, while strengthening regional development, creating clusters and business corridors, and enhancing the internationalization of Colombian products. The prioritized value chains of these programmes are chemicals, fashion, metal-mechanics, agri-food, and 4.0 industries (software, IT, and Business Process Outsourcing – BPO).³⁶⁰

Besides, the National Federation of Merchants (**FENALCO**) coordinates activities jointly with the MADS to facilitate the incorporation of sustainability criteria by its members, aimed at improving production efficiency and reducing the consumption of natural resources as well as decreasing the production of solid waste and wastewater.³⁶¹ FENALCO also offers a tool to measure the CO2 footprint of companies.³⁶²

At the international level, Colombia has been a member of the **Platform for Green Industry** and seeks to increase efficiency in the use of resources, improve waste management, better utilize renewable energy, support research and innovation for a green industry, and promote new green industries and green jobs.

On a granular level, the **Resource Efficient and Cleaner Production network (RECPnet)** promotes *eco-innovations*, supporting especially manufacturing SMEs. In Colombia, the *Centro Nacional de Producción más limpia y tecnologías ambientales Colombia* (CNPMLTA) is a partner of the network. The CNPMLTA was founded in 1998, in collaboration with the Swiss government and public and private Colombian institutions, in response to the need to support sustainable business development by promoting better terms of productivity, competitiveness, and sustainability. Some of its services are education and training, technical assistance, and the promotion of the transfer of clean technologies.³⁶³

Based on the current legal base³⁶⁴ there are various ways to get **tax and financial incentives** as corporate/SME, by activities, including: reduction in water, energy, raw material, or fuel consumption; Improved quality of discharges, air emissions, or wastes; Reduction in the use of transport and hence air emissions from associated vehicles; management of information on behavioural variables of renewable natural resources (water, air, fauna, flora, wind, sun).

Good practice to build on / projects that promote efficiency³⁶⁵ (exemplary)

Energy efficiency in brick production (EELA) in Latin America. Back in 2016, the project implemented by Swisscontact and Business Environmental Corporation (CAEM), of the Chamber of Commerce of Bogotá addressed material and energy savings, new technologies and environmentally-friendly raw materials, optimized process controls, and environmental standards.

Key learnings of the project:

- System approaches have great potential in achieving substantial and sustainable economic and environmental impacts.
- Regional programmes have more potential if they align with the regional reality of market systems and promote synergies and economies of scale.

³⁵⁸ UNIDO, 2016. Putting industrial policy to work for resource efficiency in developing countries.

³⁵⁹ Colombia Productiva, 2020. <https://www.colombiaproductiva.com/conozcanos/que-hace-ntp> (Assessed online Nov. 2021).

³⁶⁰ MINTIC, 2020. <https://www.mincit.gov.co/minindustria/estrategia-sectorial/programa-transformacion-productiva-regional> (Assessed online Nov. 2021)

³⁶¹ UNIDO, 2016. Putting industrial policy to work for resource efficiency in developing countries.

³⁶² Fenalco, 2020. <https://www.fenalcosolidario.com/calculadora-huella-de-carbono> (Assessed online Nov. 2021)

³⁶³ RECPnet, 2020. <https://www.recpnet.org/members/> (Assessed online Nov. 2021)

³⁶⁴ Ambientalmente, 2021. <https://ambientalmente.com/obten-incentivos-tributarios-por-las-estrategias-de-economia-circular/> (Assessed online Nov. 2021)

³⁶⁵ Climate and clean air coalition, 2018. Training manual brick sector in Latin America.

A selection of IFIs was or are engaged in energy efficiency relevant interventions:

Building on its Technology Need Assessments (TNA), Colombia has developed a medium-sized project with the **GEF Trust Fund implemented by the IDB**. With a total cost of five million USD, the project's goal is to reduce GHG emissions from the freight transport sector. The project focuses on training local staff, freight transport stakeholders, and truck drivers in more efficient and cleaner driving practices, developing and implementing a pilot program for a freight broker service, and designing, developing, and improving the existing freight information systems at the Ministry of Transport.

Another project financed by the IDB in 2010 is the “**mitigation of GHG emissions through energy-efficient investments in hotels and clinics/hospitals (non-reimbursable technical cooperation, 10 years amortization of the credit)**”. Its goal was to support Colombia’s efforts to enhance the competitiveness of the hotel and clinic/hospital sub-sectors, while reducing GHG emissions by piloting an innovative financing model for EE projects. It aimed at increasing EE investments in hotels and clinics/hospitals. To achieve that objective, a complimentary activity helped to build up the awareness and capacities of Bancoldex, LFI, and other relevant market actors on the structuring, financing, monitoring, and evaluation of competitiveness-enhancing of EE projects.³⁶⁶

The government sets some incentives and facilities to support private innovation and entrepreneurship initiatives that serve all sort of activities, including CE:³⁶⁷

- **INNPULSA**: This Colombian government entity finances entrepreneurship and innovation initiatives. Its thematic areas are innovation, entrepreneurship, development, and culture. INNPULSA has financed several initiatives in the field of bioeconomy, through the Programmes MAS Competitiva, Red CLUSTER 2 in bioenergy (region of Valle del Cauca) and Support for the Growth of Bio-companies 2015-2016 (in Spanish Apoyo al Crecimiento de Bioempresas 2015-2016).
- **Fondo Emprender** (Entrepreneurship Fund) and **TECHNOVA**, the local operator for the Department of Antioquia. This entity provides seed capital to finance business initiatives linked to the National Learning Service (SENA). In the field of bioeconomy, Fondo Emprender financed the company “Hecho en Café” (Made in Coffee) and TECHNOVA did the same with the company TECH LIFE SAVING and with the project Jarabes Azucarados (Syrups), of the University National of Colombia.
- **Ruta N**³⁶⁸ is a public joint venture between the mayor's office of Medellín, UNE y EPM (public companies). It develops programs and projects in science, technology, and innovation by promoting the strengthening of institutions, companies, research groups, investors, entrepreneurs, students, and citizens, in Medellín (the second largest city). The services include innovation lab, corporate venturing, and special funding lines (e.g., women entrepreneurship).
- **Creame, business incubator**³⁶⁹: It was created in 1996 by 29 academic, government, and business institutions, and has received international support of organization such as **CAF, IDB, World Bank, and GIZ**. It has programmes in 80 municipalities in 19 departments of Colombia and pursues sustainable development.

In 2010, Ruta N, Creame, the IDB, and the Multilateral Investment Fund (MIF) founded a network called “**Network of Investor Angels**” (Red de Ángeles Inversionistas)³⁷⁰. At the departmental and regional levels, networks or angel investor clubs have also been created. The network has six main initiatives: a) The Caribbean Angels Network; b) HUG BOG Network, c) Andes Angels Network; d) Bogota Chamber of Commerce Angels Network, e) Network of angels of Santander, and f) Network of angels of the coffee region³⁷¹.

There are also public and private finance institutions fostering activities concerning the circular economy. For instance, **Bancoldex**, the main second-tier banking mechanism that serves as a development bank for micro, small and medium enterprises, provides financial and non-financial services for productive insertion, entrepreneurial escalation, and internationalization. Within Bancoldex, between 2018 and 2019, Fiducoldex has contracted **advisory services on readiness activities for companies in the field of CE**.³⁷² Regarding **private capital**, the most prominent providers are **ENDEAVOR** Colombia, **Capitalia**, and **Nazca Ventures** Colombia. ENDEAVOR finances companies in the consolidation phase; CAPITALIA promotes growth and expansion of SMEs; and Nazca

³⁶⁶ IDB, 2013. CTF-IDB Energy efficiency financing program for the services sector, Colombia Energy Efficiency.

³⁶⁷ Comisión Económica para América Latina y el Caribe (CEPAL), 2019. El financiamiento de la bioeconomía en América Latina. Recursos naturales y desarrollo, serie 193.

³⁶⁸ Ruta N, 2020. <https://www.rutanmedellin.org/es/oferta> (Assessed online Nov. 2021).

³⁶⁹ Creame, incubadora de empresas, 2020. <https://www.creame.com.co/nosotros> (Assessed online Nov. 2021).

³⁷⁰ Ángeles inversionistas, 2019. <https://angelesinversionistas.com.co/web/index.php> (Assessed online Nov. 2021).

³⁷¹ Comisión Económica para América Latina y el Caribe (CEPAL), 2019. El financiamiento de la bioeconomía en América Latina. Recursos naturales y desarrollo, serie 193.

³⁷² <https://www.fiducoldex.com.co/search/node/circular> (Assessed online Nov. 2021).

Ventures is a fund that invests in high impact. The financing received by Ecoflora Agro and Agrofuturo companies is noteworthy (ENDEAVOR Colombia) and that of PROGAL BT (CAPITALIA).

Private actors have also proactively initiated CE projects, a relevant example is led by ACOPLÁSTICOS a non-profit association of companies in the chemical sector (e.g., plastic, rubber, fibres).³⁷³ ACOPLÁSTICOS founded GoPlastic a call to **foster the development of businesses that avoid plastic production via capacity building and funds mobilization**. For this, GoPlastic offered in 2020 a set of virtual workshops on CE, concepts opportunities and normativity. Interested entrepreneurs got support to build a strong business case to present to investors. GoPlastic also shares information (research, innovation, and legislation) on plastics through its Plas-TIC platform.³⁷⁴

Recommended entry points/CE engagement opportunity in production

Support the establishment of green businesses and improve the environmental performance of SMEs – in line with the National Circular Economy Strategy (e.g., prioritizes action in 6 material / resource flows: packaging, building, industrial materials, mass consumption products, as well as natural resources - based on durability, reusability, reparability, and recyclability). There is generally a need for **improving environmental management** (especially for SMEs as they are more price sensitive - due to a lack of financial capacities - to extra-work related to environmental considerations) and **integrating the CE concept in production**. The most pressing issues across sectors are **material intensity and resource** inefficiency (incl. water and energy) and **waste management** (reducing waste and recycling).³⁷⁵ The Green Growth Policy has explicitly set goals to scale the bioeconomy, improve water productivity, and enhance water treatment to reintegrate the resource in the production loop (circularity).³⁷⁶ However, so far, there are not enough resources.

Circular design and production (up-hill)

- **Reduce the level of material intensity and waste and use recycled material**
- **Promote eco-design**, development and manufacturing of biopolymers and sustainable packaging products for the consumer goods industry (e.g., food and cosmetics)
- Opportunities exist in developing biomass valorisation scenarios/biomass conversion technologies (e.g., second-generation biofuels and other bio-based economy applications)

³⁷³ <https://www.acoplasticos.org/index.php/mnu-nos/mnu-nos-nta-aso> (Assessed online Nov. 2021).

³⁷⁴ <https://www.plas-tic.org/> (Assessed online Nov. 2021).

³⁷⁵ Ministry of Env. & Sustainable Development, Ministry of Trade, Industry & Tourism, 2019. Estrategia Nacional de Economía Circular.

³⁷⁶ National Planning department (DNP), Documento CONPES 3934 Política de Crecimiento Verde.

Table 29: Colombia – Production and Consumption Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers – Production and consumption
Capacities	<p>Poor intersectoral coordination</p> <p>Lack of knowledge of managers about environmental management</p> <p>Lack of knowledge and awareness for sustainability and possible strategies for sustainable operation</p> <p>Manufacturers have a strong “Take-Make-Dispose” view. Some SMEs (e.g., textile industry) pointing out ignorance on the relationship between business strategies and product as a service opportunities.</p>	<p>Facilitate capacity building across stakeholders (grant funding):</p> <ul style="list-style-type: none"> - Improve intersectoral coordination between different institutions (e.g., to manage information) - Develop guidelines that improve the performance of various sectors (incl. optimize natural resources in production and consumption) - Train and raise awareness among SMEs how to integrate CE approaches in the production sector: Share knowledge and good practice on how to overcome the linear product to consumer view that is dominating, how to improve environmental management, raise awareness on environmental hotspots/pressure in the industry (e.g. footwear and leather industry), promote new technologies, positioning green and sustainable businesses concepts as profitable businesses³⁷⁷ (→ <i>increased capacities can increase ability to develop bankable projects that are eligible for finance</i>) - Internalize the CE concept in current services, such as education and training, technical assistance, e.g., coordinating and promoting the transfer to CE concepts, e.g., via: <ul style="list-style-type: none"> o the Centro Nacional de Producción más limpia y tecnologías ambientales Colombia (CNPMLTA) - besides existing services in the field of cleaner production - support activities such as environmental audits and implementation of CE concepts - build on initiatives like the Sustainable Business Network programme (RedES-CAR) - an alliance between the public, private and academic sectors³⁷⁸ - that promote good CE practice - support the Colombian Trust of Foreign Trade (Fiducoldex) through budget support in its mission (<i>It is in charge of contracting advisory services on readiness activities for companies in the field of CE</i>)³⁷⁹ - Build capacities among the Chambers of Commerce that should incentivize the knowledge exchange along the supply chain. Fairs and other local events can help companies network and join forces. - Support the LATAM CE Coalition (that aims to support access to financing by governments and the private sector) to close missing guidelines to identify and implement CE-related activities (such as a taxonomy) for businesses and financial sector players - Provide capacity building to public authorities (reflecting CE concepts in planning and procurement policies - in line with the National Circular Economy Strategy, etc.) - Train financial institutions (commercial and development banks), e.g., to reflect the CE concept in strategic and operational planning and implementation, incl. loan officers to consider future risks in the calculation of cost of capital and assess CE business cases (→ <i>reflect recent “green finance taxonomy” developments – the process is promoted by the MADS, Minhacienda, DANE, the DNP, and the Superintendence of Finance</i>)
R&D	<p>Low levels of (technical) innovation</p> <p>Lack of capital available for R&D</p>	<p>Support the research and development (via grant funding) of</p> <ul style="list-style-type: none"> - new economic opportunities through natural capital (e.g., building up a bio-economy) - sustainable industrial material flow and massive consumption products (identify suitable standards) - CE-aligned packaging
Policies and regulations	<p>Public policy defining sustainable practice (incl. CE) is not exhaustive and does not include complementary activities and the definition of new business lines. For instance, CE by-products/activities are often not regulated and cannot be introduced to the market.</p>	<p>Revise policies and regulations (via grant funding)</p> <ul style="list-style-type: none"> - Review fiscal policies (such as tax incentives) and increase clarity (translation to economic activities for corporates/SMEs), on how to make the benefits effective (e.g., Simplify the requirements and procedures of FENOGE tax incentives for non-conventional RE and EE projects to improve their coverage³⁸⁰ → <i>FENOGE could be considered extending the scope of services to other sustainable activities incl. the CE concept</i>) - Assist development of certification schemes for sustainable CE practices (build on existing eco-labelling) (→ <i>eco-labelling criteria can be used by banks for defining eligibility for dedicated financial products</i>) - Review current legislation on packaging (reflect the CE concept) – e.g., set standards, support the development and introduction of a deposit-refund system to boost a CE concept e.g., for

³⁷⁷ Besides, there are at least 40 private initiatives on CE. For example, Ecopetrol, Colombia’s largest oil company is developing CE pilot projects in line with the National Strategy RedES-CAR, 2020 <http://www.redescar.org/> (Assessed online 03 January 2022).

³⁷⁸ They promote the productive transformation of companies by applying strategies such as cleaner production, industrial symbiosis, and Integrated Water Management. It currently involves 590 private entities.

³⁷⁹ <https://www.fiducoldex.com.co/search/node/circular> (Assessed online 02 January 2022).

³⁸⁰ Econometria and Grupo de Financiamiento Climático LAC, 2017. Instrumentos económicos e incentivos financieros para crecimiento verde y fuentes de financiamiento internacional para cambio climático en Colombia.

	<p>Incentive system is not transparent</p> <p>Missing guidelines to identify CE-related activities (taxonomy)</p> <p>Business informality reaches approximately 60% and only formal businesses are part of the few existing programs and benefits</p> <p>Environmental costs are not priced sufficiently</p>	<p>packaging, like bottles (→ <i>legislation can increase the demand for finance to invest in CE-business cases and guide banks when assessing loan applications</i>)</p> <ul style="list-style-type: none"> - Support government efforts to formalize businesses, incl. a review of legislation (but also dedicated information campaigns, incentives and consolidation of online registrations tools aimed at facilitating the registration process)³⁸¹ - Review extended producer responsibility (EPR) to reflect environmental costs of critical sectors (<i>broadening and optimizing</i>) (→ <i>Adjusted EPR will rise awareness for environmental management and the need for finance to invest in CE- aligned activities</i>)
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	Barriers	Access to finance / Risk reduction Instruments/mechanisms to respond to barriers – Production and consumption
Access to finance and risk reduction	<p>Shortage of financial capital in SMEs, partly because of the difficulty of accessing finance (e.g., high interest rates) Limited access to funds by producers (demanding paperwork and financial instruments do not reflect the nature of the activity and the creditors)</p> <p>Lack of an investment pipeline and a green taxonomy to define sustainable practices and match them with financial incentives.</p> <p>Lack of targeted financial instruments to stimulate CE investments</p> <p>No experience within the financial sector to assess CE business cases / Innovative practices are perceived as risky</p> <p>The legal framework is in place for corporates to issue green bonds¹ However, Colombian issuers have not really tapped international markets; almost all issuances across all sustainability-linked are denominated in Colombian Pesos (By mid-2021 Colombia has issued USD1.3billion across sustainability-linked bonds).</p>	<p>Facilitate access to finance:</p> <ul style="list-style-type: none"> - Equity Co-funding is needed for an existing project concept that (CABEI) has developed for Economic Integration for a Private Equity Fund for Implementing Hybrid Low-Carbon Systems to Improve Energy Supply and Energy Efficiency while Mitigating Climate Impact for SMEs in Colombia, Honduras, and Panamá (→ <i>while CE-relevant activities are envisaged, such as sustainable waste management solutions, additional criteria in line with the CE concept could be included</i>). - Provide equity funding for CE-related private capital providers such as Endeavor (focus: consolidation phase), Capitalia (focus: growth and expansion of SMEs), and Nazca Ventures (focus: high impact). -> also relevant for Construction - Facilitate the set-up of Crowdfunding activities (e.g., regulated through Decree 1357 of 2018¹). Respective Decree establishes the administration, operation and use of electronic platforms for the financing of investment projects through the issuance of securities representing debt or social capital. <p>Facilitate risk reduction (e.g., loan default guarantees) for lending to SMEs - to develop and implement CE-related business approaches – potentially in cooperation with public second-tier banks ¹</p> <p>Promote green bonds with CE-criteria (targeting the international market) – potentially in cooperation with public and private banks</p>

³⁸¹ <https://www.mipymes.gov.co/programas/formalizacion-empresarial>

3.5.3.2 Construction and demolition waste

In Colombia, the construction industries group several productive links (minerals, materials and elements, construction, and commercialization) and subsectors (e.g., edifications and infrastructure). Between 2002 and 2017, the construction sector had the highest economic performance, which is based on extensive use of natural resources and a material recycling rate of just 2%.³⁸² The positive economic trend slowed down recently since the COVID-19 pandemic has heavily hit the sector. Most of the materials and components required have become more expensive, and disruptions in the supply chains have delayed deliveries.³⁸³ This landscape justifies the necessity to explore CE models that reduce the adverse impacts of construction on nature and its dependence on expensive supplies in national and international markets.

In acknowledgement of the challenges, Colombian legislation has been recently updated as envisaged? in the **2018-2022 National Development Plan (NDP)**. The Resolution 1257 from 2021 modifies the one from 2017 (0472) on **Integrated Management of Construction and Demolition Waste** in line with the National Strategy on Circular Economy (i.e., promoting by-products usage and material cycle closure). This resolution applies to major waste generators (i.e., construction projects needing a license on an area equal to or above 2000 m²) to set up industrial symbiosis with other companies to exchange material flows. Major waste generators should prepare, implement, monitor, and report on a Construction and Demolition Waste Management Program.³⁸⁴ The resolution sets material usage goals per material category for 2023, 2026, and 2030. Another complementary resolution is the 0549 from 2015 on **sustainable construction** which adopts the guidelines on water and energy savings in buildings.³⁸⁵

Info box 12 – Good practice project that promotes sustainable construction and demolition³⁸⁶ (exemplary)

- The **Circular Economy and Sustainable Construction Project** (2018-2020) was part of the **Colombia+Competitiva program** of the Swiss development cooperation. This project was implemented by the Chamber of Commerce of Bucaramanga in five municipalities of the Santander department. The objective was to increase the productivity of companies in the construction sector through training, application and appropriation of available technologies and knowledge on **sustainable construction**.³⁸⁷

While legislation has been developed to drive the circular transformation of the sector in the last years, it is difficult to estimate the extent to which this has contributed to a positive shift. Qualitative and quantitative analysis should be carried out to acknowledge progress, if any, and make the necessary adjustment in the light of the targets set in national strategies, plans and policies. What seems to have more accountability, at least quantitatively, is the implementation of voluntary certifications, the most used in Colombia are:

- The **Leadership in Energy & Environmental Design (LEED)** is the world's most widely used certification system for the design, construction, maintenance, and operation of sustainable buildings. LEED evaluates aspects such as integrative design process, Efficient use of water and materials and resources. According to the scores, projects get a certification in different categories (platinum, gold, silver and certified). By 2018, Colombia had 151 certifications, with about 72 certified as “gold”.³⁸⁸
- The **Colombian Environmental Label (Sello Ambiental Colombiano -SAC)** though developed by several ministries including MADS and regulated through Resolution 1555 from 2005, it is voluntary.³⁸⁹ A product with this certification must have the following characteristics: make sustainable use of natural resources, apply energy efficiency or use renewable energy sources, consider aspects of **recyclability, reusability or biodegradability, use packaging materials preferably recyclable, reusable or biodegradable and in minimal quantities, and utilize clean technologies or technologies that generate a relatively lower impact on the environment and indicates to consumers the best ways of disposal**. To date, 125 companies have obtained this label, 10 of them operate in the construction sector.³⁹⁰

³⁸² National Planning department (DNP), Documento CONPES 3934 Política de Crecimiento Verde.

³⁸³ Camacol, April 2021. Informe económico 110.

³⁸⁴ República de Colombia, Resolución 1257 de 2021.

³⁸⁵ República de Colombia, Resolución 0549 de 2015.

³⁸⁶ Climate and clean air coalition, 2018. Training manual brick sector in Latin America.

³⁸⁷ <https://www.colombiamascompetitiva.com/construccion-sostenible-y-economia-circular/> (Assessed online Nov. 2021).

³⁸⁸ <https://www.cccs.org.co/wp/capacitacion/talleres-de-preparacion-leed/> (Assessed online Nov. 2021).

³⁸⁹ <https://www.minambiente.gov.co/asuntos-ambientales-sectorial-y-urbana/sello-ambiental-colombiano-sac/> (Assessed Nov. 2021).

³⁹⁰ CYNTHIA VANESSA. RAMÍREZ VARGAS, 2021. CARACTERIZACIÓN DE LA ECONOMÍA CIRCULAR EN EL SECTOR DE LA CONSTRUCCIÓN MEDIANTE SU ANÁLISIS E IMPLEMENTACIÓN EN LA CIUDAD DE BOGOTÁ – COLOMBIA.

- **CASA Colombia** is a certification standard for housing. It assesses aspects such as water, energy and other materials efficiency, construction sustainability, wellbeing, and social responsibility. According to Resolution 463 from 2018, projects getting this classification can access tax benefits.³⁹¹

The application of certification schemes has been supported by the **Colombian Council for Sustainable Construction (CCCS)**. Which is a non-profit private entity founded in 2008 to promote sustainability in the building sectors. Its strategic allies are the World Green Building Council, World Resources Institute, U.S. Green Building Council, the Green Business Certification Inc. (GBCI) and the Building Energy Efficiency Accelerator Program.³⁹² The latter seeks to implement an action plan to improve the Bogota's energy efficiency, increase its resilience to climate change and reduce the city's urban footprint by 2030.³⁹³

Recommended entry points/CE engagement opportunity in construction and demolition waste

The main barrier for improving CDW is the lack of reuse markets and supply chains, which is commonly underlined by a perceived risk of using recycled materials (e.g., quality, effort to source). To promote CDW, the enabling framework needs to be adjusted and access to finance improved. Circular actions in the construction sector have the potential to drive significant change as 96% of construction and demolition waste could be recycled.³⁹⁴ It is vital to support the introduction of CE in construction and the re-incorporation of construction & demolition waste (CDW) in construction processes, which can be reached by the enforcement of regulation (with the pre-condition of formalizing businesses) and capacity building campaigns.

Specific interventions are required as follows:

Circular design and production (up-hill)

- **Reduction of material stage** (e.g., besides resource efficient processes, there is a need for reusing or using CDW as raw materials and as mineral filler)
- **Sustainable purchasing** (e.g., by working with supplies to minimize harmful impacts=)
- **Support the re-incorporation of CDW in construction processes** (e.g., reduction of material; pre-construction; collection and distribution; End-of-life stage)

Circular value recovery (down-hill)

- Improve selective deconstruction and deconstruction and demolition audits
- CDW processes are required, such as material recovery and production via reuse, recycling, recovery, and backfilling to recover the value from discarded materials in buildings
- Especially mid-sized cities need local and regional collection systems and recycling solutions to address illegal dumping

³⁹¹ <https://www.cccs.org.co/wp/casa-colombia/> (Assessed online Nov. 2021).

³⁹² <https://www.cccs.org.co/wp/acerca-del-cccs/> (Assessed online Nov. 2021).

³⁹³ <https://www.cccs.org.co/wp/plan-de-accion-2017/> (Assessed online Nov. 2021).

³⁹⁴ Colombia Productiva, Centro Nacional de Producción más Limpia, 2020. Guía Empresarial Economía Circular.

Table 30: Colombia – Construction and Demolition Waste Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers – Construction and Demolition Waste
Capacities	<p>Lack of knowledge on how to close the loop of building materials, starting at the design phase (eco-design)</p> <p>Perceived risk in specifying reused materials</p> <p>Reuse of materials are judged as more expensive given lack of reuse markets and supply chains</p> <p>Composite construction (structural steel: concrete and metal deck flooring with shear studs connected to steel floor beams)</p> <p>Lack of reuse markets and supply chains</p> <p>Time constraints which favour demolition over deconstruction; and inaccessible/irreversible joints</p>	<p>Support Information and capacity building for public and private sector players (via grant funding) by improving data, indicators and accounts on resource efficiency and waste (e.g., based on material flow accounts) R&D, and improving knowledge on the environmental impacts and costs of material resource use, environmental labelling and information schemes, voluntary agreements, and other private sector initiatives: e.g.:</p> <ul style="list-style-type: none"> - Improve construction/building materials flow, via characterization studies, technical guidelines, and fiscal policy instruments (e.g., Tax incentives) to incentivize reuse, recycling, and processing of building debris - Offer trainings to public and private stakeholders to value natural resources, incl. full cycle costing and natural capital accounting (e.g., see World Bank WAVES programme), improve awareness on true cost accounting in the construction sector. - Promote among SMEs composite construction (for structural steel: concrete and metal deck flooring with shear studs connected to steel floor beams) - Improve financing decision-making and increase understanding of the long-term benefits of circular products - Use digital tools to control the inventories of the different worksites in order to transfer surplus between them and minimize losses (e.g., establish virtual warehouses)
R&D	<p>Lack of knowledge on material recycling</p> <p>Lack of capital available for R&D</p>	<p>Support R&D activities (via grant funding) to produce knowledge on material recycling methods, development of circular management tools. Researching opportunities to use traditional and sustainable use can also benefit the transition towards CE.</p> <p>Finance corporates to carry out a financial evaluation to identify opportunities for saving materials and increasing profitability. Thus, de-risk investment decisions through transparency and awareness building³⁹⁵.</p>
Policies and regulations	<p>Weak and slow enforcement of regulations and policies</p>	<p>Revise the policy framework via grant funding and ensure environmental damage is reflected in EPR and CE-aligned investment are incentivized (e.g., via Tax rabats)</p> <p>Support the ongoing efforts of developing the Taxonomy³⁹⁶ via grant funding and promote good practice for CDW. (In the first draft (request for public consultation between 17 Sept-22 Oct 2021), the CE-concept has been reflected in the construction sector under the SPECIFIC COMPLIANCE REQUIREMENTS and the CONSTRUCTION OF NEW BUILDINGS <i>“Try to reuse materials recovered from work and use recycled / recyclable materials.”³⁹⁷</i>)</p> <p>Support legal base to increase recycling rate via grant funding. In 2020, more than 95% of CDW is not yet recycled. Reincorporation of CDW in construction processes is needed via reusing or using CDW as raw materials, and processing of CDW to be converted into mineral aggregates for concrete and asphalt.</p>

³⁹⁵ <https://circulareconomyleaders.ca/wp-content/uploads/2021/10/WCEF-Financing-the-Circular-Economy-What-We-Heard-Report-20211015-EN1.pdf> (Assessed online 03 January 2022).

³⁹⁶ With the EU Sustainable Finance Taxonomy as the main reference, the focus areas of the Colombia taxonomy are: 1. Climate change mitigation; 2. Adaptation to climate change; 3. Ecosystems and biodiversity; 4. Water management; 5. Soil management; 6. Circular economy (CE); 7. Pollution prevention and control. The set of activities and technical screening criteria for the CE are not being developed yet as for the first phase, components 1 to 5 were priorities. The Colombian Government presented Phase 1 of the country's Green Taxonomy for comments (public consultations). The Taxonomy seeks to facilitate the identification of projects with environmental objectives, develop green capital markets, and promote the effective mobilization of private and public resources towards investments that allow the fulfilment of the country's commitments.

³⁹⁷ Original: requisitos de cumplimiento específicos -> construcción de nuevos edificios: procurar hacer reutilización de materiales recuperados de obra y utilizar materiales reciclados / reciclables.

	Barriers	Access to finance / Risk reduction - Instruments/mechanisms to respond to barriers - CDW
Reduce risk	Limited access to finance especially for SMEs due to lack of track record	Risk mitigation Offer loan default guarantees for corporates/SMEs to make circular activities financially attractive in the construction sector ³⁹⁸

3.5.3.3 Waste management

After AFOLU and energy sectors, waste is the largest source of CO₂ emissions. Even though waste management was not explicitly prioritized in the NDCs, the country did prepare a **Sectoral Mitigation Action Plan on wastewater and solid waste**. Institutional coordination is partially at MADS, but it also depends on the sectors and the administrative level, which leaves a high level of responsibilities at the municipalities. This plan is framed in the Low-Carbon Development Strategy and has goals set by 2020, 2030, and 2040. Some of the goals are³⁹⁹:

- Review with the MADS the appropriate guidelines to encourage electricity generation and sale activities in landfills with high **biogas production** without affecting the tariff framework in the sanitation service provision (2030-2040).
- Supporting private sector initiatives on **waste co-processing** pilots (e.g., cement plants) (2018-2040).

The Green Growth Mission emphasized in the analysis an inclusion of **waste management as part of the CE component of the Green Growth Policy**. As the first critical issue in waste management, the policy's assessment identified the excess of roles and agency of the actors, disarticulated standards, lack of institutional coordination mechanisms, and systemic vision. These problems generate uncertainty in the pursuit of the transition to a CE and transmit confusing signals to economic operators and society in general⁴⁰⁰.

The Green Growth Policy sets the following strategic lines, incl. the development of infrastructure and logistic instruments (e.g., the Ministry of Housing, City and Territory should have prepared the collection and processing centres guidelines by 2020). The policy aims to increase the recycling rate to 17.9% (reference level 8,6, 2015) and the percentage of solid waste effectively reused of 30% (reference level 17%, 2015).

Info box 13 – Good practices on sustainable waste management in Colombia (exemplary):

- The ANDI has launched the “Visión 30/30” initiative, whose goal is that by 2030 at least 30% of the produced paper, cardboard, plastic, glass, and metals are reincorporated into production systems. So far, 186 companies in 24 sectors are participating (more can join voluntarily). The ANDI offers **technical assistance to support the transition of the companies towards a circular model**, in line with the extended producer responsibility principle* (the bill has been presented to the congress). The initiative integrates all the chambers of the association and supports innovation in materials, creating opportunities to start businesses in glass sub-sectors, new business chains, and alternative use of materials. It is necessary to work on neuromarketing tools for people to recycle and separate waste. **It is also required to exchange information with countries that are more advanced in these issues.**

The contribution of the participants finances this initiative. Nevertheless, **IDB has provided USD 150,000** to support **campaigns on behaviour changes, attract future investments, and design an information system to calculate the amount of material placed on the market**⁴⁰¹.

- **Development of National Capacity for the Environmentally Sound Management and Disposal of PCBs.** This project is being funded by the **Global Environmental Facility (GEF)** and other partner institutions (total funding over USD 16 Million). This project is directly related to SDGs 9 and 12. The Project's objective is to protect human health and the environment by the phase-out of 600 tonnes of contaminated material. The long-term development objective of the project is to establish a sound polychlorinated biphenyl (PCB) management system in Colombia through the strengthening of institutions for analysing, quantifying, and controlling PCB, the implementation of an inventory at a national scale, and the promotion and development of technologies for PCB treatment and disposal⁴⁰².

³⁹⁸ <https://www.mdpi.com/2071-1050/13/3/1350/htm> (Assessed online 05 January 2022).

³⁹⁹ <https://www.minambiente.gov.co/index.php/component/content/article/470-plantilla-cambio-climatico-26> (Assessed online Nov. 2021)

⁴⁰⁰ DNP, GGGI, 2019. Misión de Crecimiento Verde: Documento síntesis de los resultados de estudios técnicos.

⁴⁰¹ ANDI, 2020. Visión 30/30 Avances and the website of the initiative: <http://www.andi.com.co/Home/Pagina/1040-vision-3030-gestion-de-envases-y-empaque> (Assessed online Nov. 2021)

⁴⁰² UNDP, 2020. Sound Chemicals and waste management for sustainable development.

- The National Policy on Integrated Solid Waste Management, introduced in 2016, defined the **extended producer responsibility** as follows “the producer’s responsibility for a good placed on the market extends throughout its life cycle. Thus, a shift of responsibility (physical or economic; total or partial) to the producer should be generated, as well as providing incentives to producers to incorporate environmental considerations in the design of their products (eco-design).”⁴⁰³

Recommended entry points/CE engagement opportunities in waste management

Support developments of establishing an integrated waste management system, incl. the CE concept. Improve cooperation between private and public actors, raise awareness among stakeholders, improve landfill technologies, increase efficiency in waste transport/logistics, improve separation and recycling technologies and enforce and expand the EPR concept⁴⁰⁴.

Build on good practice of recent and current initiatives (such as the GIZ project on waste management) and collaborate with the EU and the World Bank (that consider recycling of plastics and organic waste) for better management and use of waste in municipalities and of large industries (especially plastic waste, electronics (e-waste), metals, cement/concrete (construction and demolition) and textiles).

- Specifically for the processing of **organic waste** from municipal, but also industrial and agricultural sources, specific recovery/recycling technology and infrastructural solutions are needed, e.g., for composting and biogas generation - with scope for energy recovery from urban organic waste and residual biomass, especially agricultural and agro-industrial waste
- **Knowledge** on the production and application of high-quality compost and biogas **is needed** (incl. capacities for developing biomass valorisation scenarios, biomass conversion technologies, e.g., second-generation biofuels and other bio-based economy applications)
- It needs efficient technologies for **plastic** material recovery/recycling, e.g., chemical recycling (Note: there is currently only mechanical recycling)
- Specific recovery/recycling technologies are also needed for **textile, packaging (incl. plastic), tires and Waste Electrical and Electronic Equipment (WEEE)**, such as refrigerators: The EPR-systems for tire, WEEE and packaging waste come with high recycling targets and private companies operating these systems requires quality equipment to improve activities along their value chain, i.e., collection, separation, and recycling and upcycling (good sample: private companies together with local authorities are preparing for a plastics recycling plant near Bogotá and a glass-recycling plant)

Major barriers: Waste is disposed in landfills. Individuals or firms carry out recycling without official directives and protocols. Generally, there is insufficient technical knowledge and infrastructure and access to finance. Moreover, the services provided by **waste pickers is Informal**.

Waste management plans are considered inflexible, being prepared for 10-year periods, and do not adjust to dynamic changes. Municipalities are in charge of controlling, updating, optimizing, and improving the specific actions included in the plan to make the provision of the waste management service more efficient, but lack capabilities.

⁴⁰³ Documento CONPES 3874, 2016. Política nacional para la gestión integral de residuos sólidos

⁴⁰⁴ National Plan for the sustainable management of single-use plastics sets a timeline to expand ERP regulation on other materials.

Table 31: Colombia – Waste Management Barriers and Instruments

	Barriers	Enabling framework - Instruments/mechanisms to respond to barriers ⁴⁰⁵ - Waste
Capacities	<p>Low waste management rates</p> <p>Weak institutional coordination</p> <p>Lack of appropriate logistics and infrastructure for recycling and reuse (waste recovery)</p> <p>Absence of information systems on waste production and recycling rates.</p> <p>Recycled materials are not constantly supplied (so far), and prices fluctuate⁴⁰⁶</p> <p>Plastics and other materials are contaminated and not separated at the source (logistic challenges)</p>	<p>Facilitate capacity building (via grant funding)</p> <ul style="list-style-type: none"> ▪ Provide trainings for improved (CE-aligned) waste management to sub-national actors (municipalities) as they lack capabilities for planning, but are in charge of controlling, updating, optimizing, and improving waste management services. (→ <i>Leveraging the role and capacities of cities and sub-national municipalities will increase demand for finance</i>) ▪ Develop training programs with the public sanitation service providers in each city to teach waste generators about the optimal source separation processes and its benefits. ▪ Support the Colombian Ministry of Information Technologies and Communications (MinTIC) in coordinating a commercialization and distribution model through digital platforms (previously designed according to the sector's needs). ▪ Increase the participation of research centres and universities, such as the Institute for Training and Research in Plastics and Rubber (Instituto de Capacitación e Investigación del Plástico y el Caucho (ICIPC), and thus improve knowledge management with the different actors along the waste chain.
Policies and regulations	<p>Lack of incentives for private investors</p> <p>It is necessary to review the public sanitation tariff scheme to promote the incorporation of alternative methods to landfills</p> <p>Lack of enforcement of laws of sustainable waste management</p> <p>Plastics are commercialized illegally</p> <p>Not all players along the waste supply chain are formalized</p>	<p>Revise fiscal policies: While there are some tax incentives associated with discharges, emissions or waste, more clarity is needed how to materialize the mentioned incentives, moreover, a revision is needed to promote additional environmental management (in line with CE concept), providing incentives to producers to incorporate environmental considerations in the design of their products (eco-design), encouraging recycling activities in all sectors, offering retributive rates and tax benefits, such as income tax reductions, sales tax rebates, and sales tax refunds.</p> <p>Revise regulation: formalize waste supply chain e.g., illegal waste pickers (their number is the highest in Colombia across LATAM).</p> <p>Taxonomy development: Offer knowledge transfer from EU Taxonomy development to Colombia Taxonomy – especially for the CE-objective.</p> <p>Support the government in updating the Solid Waste Management Plan (PGRS) for Colombia, with a clear goal to reduce the amount of waste going to landfills and dumps.</p>

	Barriers	Access to finance - Instruments/mechanisms to respond to barriers - Waste
Access to finance / Reduce risk	<p>Lack of access to finance particularly for recycling facilities</p> <p>Insufficient private sector engagement through public sector entities in charge of waste management</p>	<p>Facilitate access to finance</p> <ul style="list-style-type: none"> ▪ Promote concessional debt and equity finance (e.g., in cooperation with a development bank), e.g., for CE-aligned recycling and waste treatment facilities but also for acquiring technology for processing recycled plastic. <p>Facilitate the reduction of risk:</p> <ul style="list-style-type: none"> ▪ Consider PPPs for engaging the private sector and to maximize resources when increasing and modernizing nationwide waste management infrastructure (e.g., for collection, treatment, and recycling).

⁴⁰⁵ See also Mendoza, R. et al., 2020, Análisis de la cadena de valor del reciclaje de plástico. Un caso de estudio en el departamento del Atlántico (Colombia). Revista Espacios Vol. 41 (25).

⁴⁰⁶ Mendoza, R. et al. 2020. Análisis de la cadena de valor del reciclaje de plástico. Un caso de estudio en el departamento del Atlántico (Colombia). Revista Espacios Vol. 41 (25) 2020 • Art. 14

Through the Switch to Green EU Initiative, a series of recommendations were formulated, and they can help address the barriers previously identified.⁴⁰⁷

Solid political leadership: has been fundamental to Colombia's transition to a CE; a clear vision has been set by both the President and the Vice-President and has been shared across several ministries and departments. Thanks to the MADS, significant focus was put on the CE and its potential to generate new jobs and identify new investments. This can be achieved by establishing a team of professionals dedicated to the CE at the government level and by bringing CE matters to high-level national agendas. For instance, close coordination with the ANDI is recommended since this association clusters a large portion of the companies. It has relevant initiatives in this field (e.g., *Visión 30/30*) with possibilities to engage for policymaking and enforcement via knowledge, experience, and challenges exchange.

Mobilizing resources and investments – seize the momentum: After the peace process and OECD membership accession in 2020, Colombia has mobilized investments resulting in rapid economic growth and a shift towards more sustainable models. Commitment to international agreements (e.g., the Paris Agreement, where the Colombian Government announced ambitious reduction targets of 51% by 2030 compared to the projected baseline) and close cooperation with international partners (notably the EU) have positioned the country as a front runner on sustainable development and the CE in high-level global and regional dialogues. Increased **financing lines and technical assistance** are currently supporting the design of economic instruments with an environmental perspective, and there is space and impact potential for more. This is of particular importance considering the intention to include CE as part of the green recovery and the importance of private finance to materialize such plan (most of the green recovery finance should be private – public funds should help leverage).

Awareness and dissemination: increasingly, more awareness campaigns are targeting the public, the private sector and academia engaged a significant number of key actors, who created and exchanged ideas on the integration of CE approaches across different sectors. In a relatively short period, a critical number of businesses had been persuaded of the competitive advantages of adopting circular economy approaches. It is crucial to take advantage of this interest to pilot initiatives and promote **exchange experiences among German and Colombian enterprises**. Here, take advantage of existing initiatives, networks and organizations presented in this assignment.

⁴⁰⁷ Switch to Green, 2021. Circular economy: A paradigm for Colombia's future

I. Annex: Stocktaking – Reports / Publications

Over the last years, the CE concept has gained the attention of various stakeholders and thus, a fast number of publications is also available. A short selection of relevant publications is described in the **Annex 1**, but the pending work packages will take into account additional publications.

Overall, the development of **CE working definitions and classification systems** is an ongoing process.

Notably, the EU is bringing the CE to the forefront by prioritising, but also defining the CE concept. The **EU Taxonomy Regulation** (adopted in June 2020) provides a common classification of economic activities substantially contributing to environmental objectives, using science-based criteria. It will define how an economic activity shall qualify as contributing substantially to the transition to a CE. With the **Sustainable Finance Disclosure Regulation** (applied since 2021) and the Corporate Sustainability Reporting Directive (proposed in April 2021), it provides for a comprehensive disclose regime for non-financial and financial institutions to provide investors with the information necessary to make sustainable investment choices.

The core criteria as to how an economic activity will substantially contribute to CE are discussed in Table 1 below.

Table 32: EU Taxonomy - Double materiality approach for the perspective of financial institutions

From the financial institutions' perspective, the **double materiality approach** is applied, considering both financially material sustainability risks (outside-in) and sustainability impacts (inside-out) in financial decision-making processes.

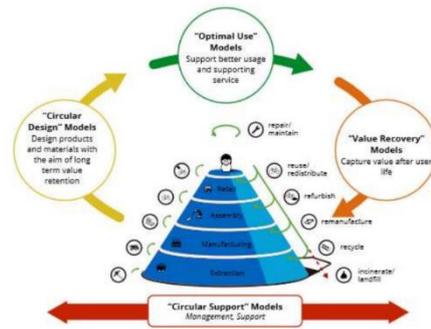
Resource efficiency	Durability + reparability	Hazardous substances	Secondary raw materials	Prolong use of products	Prevention + reduction
Use of natural resources, incl. sustainably sourced bio-based and other raw materials, in production more efficiently.	Increase durability, reparability, upgradability, or reusability of products, in particular in designing and manufacturing activities.	Substantially reduce the content of hazardous substances and substitute substances of very high concern in materials and products.	Increase the use of secondary raw materials and their quality, including by high-quality recycling of waste.	Including through reuse, design for longevity, repurposing, disassembly, remanufacturing, upgrades, and repair, and sharing products.	Prevent and reduce the generation of waste from the extraction of minerals and waste from the construction and demolition of buildings.

The Delegated Act will outline specific criteria with specific metrics, thresholds etc. For enterprises that are part of, for example, agriculture, energy, and manufacturing as well as transport and construction and real estate sectors.

The European Commission proposes a CE Categorisation System that consists of 14 circular categories organised in four high level dimensions (extraction, manufacturing, assembly, and retail) – taking into account the circular design, optimal use, and value recovery and thus, reducing the amount of resources / waste to incinerate or going to landfills.

Relevant for this Study:

- The CE Financing Expert Group provides recommendations on **how to improve access to finance** for CE projects
- One key outcome of the Expert Group, is the recommendation to **prefer energy environmentally options over landfill disposal / waste incineration**
- The Expert Group calls for a **sector agnostic CE categorisation system** that defines categories of activities substantially contributing to a CE



→ Regarding the CE categorization, the Project Team suggests to focussing on the approach by the Ellen MacArthur Foundation, which is similar to the Value Hill diagram that focusses on Business Model Categories.

Ellen MacArthur Foundation (Financing the Circular Economy)⁴⁰⁹

The Foundation’s focus is on private sector finance and value creation potential for investors and banks. **It highlights that the CE can help meet demands from regulators and other stakeholders.** Building CE expertise and know-how can help financial institutions to engage with corporate clients, for who the CE has increasingly become a boardroom topic.

Governments can directly invest in CE activities and innovation, set direction and level the playing field through, for example, pricing externalities. They can **enhance transparency by mandating disclosure and standardising definitions and metrics for circular activities, such as in the EU Taxonomy.** Central banks and financial regulators can integrate CE concepts in risk assessments and modelling and could explore integrating them in less conventional methods such as green quantitative easing. Blended finance solutions, combining public, private, and philanthropic capital, can fund harder-to-finance CE infrastructure and long-term innovation.

Better data will be required to underpin the shift. If capital is to be reoriented at scale, more transparent and consistent data on circularity performance (both historical and forward-looking) will be crucial. There is a strong increase in the creation of debt and equity instruments related to the CE (incl. green bonds).

Relevant for this Study:

- Major barriers and opportunities are presented
- Innovative investment instruments are highlighted

⁴⁰⁸ <https://op.europa.eu/en/publication-detail/-/publication/ca9846a8-6289-11ea-b735-01aa75ed71a1> (Assessed online 24 October 2021).
⁴⁰⁹ <https://ellenmacarthurfoundation.org/financing-the-circular-economy-capturing-the-opportunity> (Assessed online 24 October 2021).

The document confirms that the relevance of financial considerations is growing as the financial sector allocates more capital to stimulate economic growth through the transition from a linear to a CE, contributing to more sustainable consumption and production as well as the 2030 Agenda more broadly. However, substantial financial resources are needed to induce structural change in production and consumption alongside technology change to enhance economic efficiency and optimize use of financial capital.

Recommendations for banks, insurers, and investors to accelerate financing circularity include:

- Integrate transition into your organizations strategy; 2. Manage linear and circular risks (risk policies, product development); 3. Develop sectoral competences; 4. Monitor job creation and destruction from the transition; 5. Awareness raising of resource efficiency; 6. Evaluation how to contribute under key financial industry frameworks; 7. Measure CE finance on your balance sheet and grow the CE finance footprint of lending, investment, and insurance activities. And 8. Contribute to standardisation of CE metrics and financial instruments.

Recommendations for policymakers, financial industry regulators and supervisors to address barriers and stimulate opportunities include:

- Integrate measures into existing and planned climate policies rules and regulations; 2. Build back better with circularity; 3. Implement transition related policies, laws and related instruments.

The UNEP circularity approach is using the **9-R concept (Reduce, Refuse, Redesign, Reuse, Repair, Refurbish, Remanufacture, Repurpose, Recycle)**.

Financing for circularity covers any type of financial service where money is exclusively used to finance, re-finance, invest in or insure in part or in full, new and/or existing companies or projects that advance the circularity of our economies. However,

- Funds need to be earmarked in financial institutions for the allocation to be considered “exclusively” used to finance companies and projects contributing to a more CE. If the amount is not identifiable, its real-world impact cannot be assessed.
- To mainstream the 9-Rs in existing financial instruments, it needs to become an opt out rather than an opt in in mainstream financial instruments.
- Circularity needs to be embedded in environmental, social and governance (ESG) criteria mainstreamed in assessing business performance.

Some sustainable financial instruments already integrate circularity, including green bonds and green loans use of proceeds clauses; transition bonds; and sustainability ESG Linked Loans (SLL).

There is a need for targeted risk management The contribution of financial institutions to the transition from a dominantly linear to a CE system is not yet mainstream. Barriers include the perceived complexity of circularity and of the balance between risks and returns, including:

- Higher perceived risk of circular business models as the new-kid-on-the block. Circular business models are considered risky with uncertain returns and require de-risking through public-private collaboration in the form of first-loss guarantees, government backed loans or participation;
- Lower perceived risk related to the linear economy. Economic risk management does often not pre-empt in a timely manner the effects of policy changes or crisis on existing, mainly linear financial portfolios (link to Transition Risk); and
- Physical risks such as noise, environmental damage, air pollution, hazardous materials affecting ecosystems are insufficiently priced into the risk profile of linear production systems

Overall, digital innovation can be used for addressing circular economies.

Relevant for this Study

- The document refers to a range of suitable “innovative” financing instruments
- Framing of recommendations

⁴¹⁰ https://www.unepfi.org/wordpress/wp-content/uploads/2021/03/UNEPFI_DemystifyingFinanceCircularity-2020-2.pdf (Assessed online 24 October 2021).

EIB (Circular Economy Guidelines)⁴¹¹

The guideline builds on the Butterfly Diagram of the Ellen MacArthur Foundation as well as the business model of the Value Hills. CE **Drivers** (1. Resource constraints; Technological development; 3. Socio-economic development) and CE **Opportunities** (for companies in the EU) are described (1. De-risk/hedge future commodity supply uncertainty and price volatility; 2. Reducing manufacturing costs; 3. Avoided costs and new revenue streams; and 4. New business opportunities and new markets).

The EIB CE financing and advisory refers to a *range of financing products and instruments*:

- Traditional financing instruments: Medium, and long-term direct loans with fixed or variable interest rates as well as indirect financing (through local banks and other intermediaries).
- Innovative financing instruments: the European Fund for Strategic Investments, the InnovFin-EU Finance for Innovators and risk management products.

Relevant for this Study

- The document refers to a range of traditional and innovative financing instruments.
- Drivers and opportunities useful for the Gap analysis

RNE (Zirkuläres Wirtschaften: Hebelwirkung für eine nachhaltige Transformation)

While the focus of this document is not lying on LDCs, RNE's recommendations provide good practice, e.g.:

- Adjust objectives to aim for absolute reduction of primary raw material consumption
- Establish a policy mix of incentives, support measures and regulations (control mechanism)
- Anticipate structural change processes and social security instruments
- Set standards and norms and avoid the distortion of competition
- Promote transparency through coherent sustainability reporting and strengthen CE in international trade
- Use economic opportunities and support viable CE business models
- Consider the recyclability throughout the product life cycle, starting with Product design
- Strengthen comprehensively manufacturers' responsibility
- Avoid pollutant inputs into ecosystems (instead of *end-of pipe solutions*)
- Empower consumers in their freedom of choice and To implement measures for acceptance
- Expand education and research in the field of CE
- Strengthen international partnerships and technology transfer

Equally important publications that will be considered during the assessment are:

- ABN Ambro *Circular Economy Finance Guidelines*
 - that refers to the Use of instruments (e.g., impact investment, exclusion, and conditions), the Process for project evaluation + selection (e.g., communication to stakeholder / project financial portfolio and the Management of investment (e.g., transparency, traceability))
- Circle Economy *Linear Risks*
 - *How business as usual is a threat to companies and investors* refers to the internalisation of externalities (traditionally largely excluded from company's risk profiles and the measurements of corporate value or income statements). It highlights CE drivers (e.g., regulations and standards (i.e., industry standard), stakeholder actions, but also market dynamics)), but also defines linear risks (legal, operational, market, business). Their recommendations to address linear risks are e.g., collaborations to deepen the understanding of 'Linear Risks', investigating the short-term and long-term implications of these linear risks, establishing forums with investors and business stakeholders and last but not least, addressing the disclosure of challenges concerning 'Linear Risks'.
- EIB *Access-to-finance conditions for projects supporting CE*
- EIB *The Ocean Plastics Reduction Guide, chapter on ocean finance*
- Circle Economy *The Circular Gap Report 2021*
- KfW *Innovative Development Finance Toolbox*
- Friends of Ocean Action *The Ocean Finance Handbook*
- GSDRC *Micro levies for global public goods*
- G20 Infrastructure Working Group (IWG) *Roadmap: Infrastructure's Transition to a CE (in progress)*
- State of Finance for Nature *Tripling investments in nature-based solutions by 2030*

⁴¹¹ https://www.eib.org/attachments/thematic/circular_economy_guide_en.pdf (Assessed online 24 October 2021).

II. Annex: Country selection

In total there are **16 countries in the long-list**. The long-listed countries have been developed according to political priorities of the GIZ and the BMZ. The country selection aims to select 4 to 6 countries for closer consideration.

The country selection follows a two-step approach

1. Line of sight

In the first step key quantitative indicators are defined and weightings for relevance will be factored in the quantitative results. The quantitative indicators are used to ensure comparability within all long-listed countries. In Table 2, all indicators are listed, including a short description demonstrating the relevance and respective recommendations by the Project Team.

2. Typology

In the second step, the countries are corrected based on a typological ordering. Qualitative indicators (i.e., broader context, experience, recent developments) have been taken into consideration to streamline the results. Therefore, adjustments have been made to ensure regional coverage to get a list of balanced short-listed countries. Excluding and Including factors are considered here.



As described in the line of sight, quantitative indicators have been considered in the evaluation. Based on the key indicators of the European Commission to monitor the progress towards a CE. These indicators capture the main elements of a CE. While the list is designed for the tracking of European statistics, the key sectors are undergirded with suitable indicators (Figure, right side) for low- and middle-income countries. In addition, further indicators have been added to the list (Figure, left side). The data sheet of the quantitative indicators is shown in the table below

Indicators towards a circular economy



Note: Only indicative, non-exhaustive. Circle diagram drawn from Eurostats.⁴¹²

Weighting indicators for Line-of-Sight approach.

Table 33: Relevant Indicators for Circular Economy – Country selection

Indicator	Explanation	Frankfurt School initial recommendations
(1) Global Sustainability Competitiveness Index	The Global Sustainable Competitiveness Index (GSCI) is based on 127 quantitative and qualitative indicators across various dimension that shape a countries sustainable competitiveness, including natural capital, resource efficiency, social capital, intellectual capital, governance performance. The GSCI is the most accurate reflection of country performance & development. Compared with conventional credit ratings (i.e., Moodys, Fitch, S&P) which are only considering economic and fiscal numbers and valuation of political developments into account, the GSCI accounts for fundamentals leading to economic numbers or social/environmental developments that shape the future. A higher internal focus/ranking gives more weight to countries with higher level of sustainable competitiveness.	Low. It is an important indicator. We would rate this with a low importance given the huge potential of countries with a low GSCI. Especially for CE interventions, it would be of interest to increase their sustainability competitiveness. As discussed during a meeting in October 2021: changed to “medium”
(2) Environmental Performance Index	The EPI indicates, if a country’s Ecosystem, biodiversity, and health of their environment and understand the value of such resources. It marks the environmental performance of a state's policies. A higher focus/ranking gives more weight to countries with a higher environmental performance.	Low. Same explanation as for the GSCI indicator above. As discussed, changed to “medium”
(3) Ease of doing business	The Doing business index presents quantitative indicators on business regulations and the protection of property rights. Regulations affecting 12 areas of the life of a business are covered: starting a business, dealing with construction permits, getting electricity, registering property, getting credit, protecting minority investors, paying taxes, trading across borders, enforcing contracts, resolving insolvency, employing workers, and contracting with the government. A higher focus/ranking gives more weight to countries with more developed investment environments (World Bank Ease of Doing Business).	Low. We assume that the entry points for the GIZ is at public interventions first. The business environment is important for private sector mobilization (esp. in climate mitigation result areas). We would not recommend to overemphasis business opportunities in the overall ranking compared to other indicators and rank this as low. As discussed, changed to “medium”
(4) Corruption Index	The greater the institutional capacity, including a competent rule of law and lower levels of corruption will help and enable sustainable business environment where the implementation of green policy reform are necessary. A higher focus/ranking gives more weight to countries with a lower level of corruption (!)	Very High. Considering the set of CE options, (esp. soft concepts, such as enabling environment) is not appropriate in set ups with high corruption levels. Therefore, we recommend focusing on countries with low level of corruption.
(5) Access to Electricity	A low share of electrification correlates generally with low stage of industrialized economy. A low electrification of the population represents huge potential for new green field investments that are potentially more feasible to implement than retrofitting a running system. A higher focus/ranking gives more weight to countries with a lower Access to Electricity (!)	Medium. Overall, this represents an important indication for the next decade. Resource exploitation for energy generation represents huge improvements through sustainable ways of electrification. As discussed, changed to “low”

⁴¹² <https://ec.europa.eu/eurostat/web/circular-economy/indicators> (Accessed online 24 October 2021)

(6) Small country	The population size of a country affects the impact of the intervention in terms of signaling and progress. Small countries can be interpreted as "Circular Labs". There is evidence available, that smaller countries have a tradition of collaborating, simply because they're smaller and more agile. A higher focus/ranking gives more weight to smaller countries (!)	Medium. Outcome of interventions is more visible in smaller countries.
(7) Resource Efficiency	Resource Efficiency Scoreboard indicators illustrate the progress towards increased resource efficiency of individual countries (low number -> low Res. Eff.) A higher focus/ranking gives more weight to countries with a higher degree of RE generation.	Medium. Indicator replaced with "Resource Efficiency, and changed "high"
(8) Air pollution, mean annual exposure	Population-weighted exposure to ambient PM2.5 pollution is defined as the average level of exposure of a nation's population to concentrations of suspended particles measuring less than 2.5 microns in aerodynamic diameter, which are capable of penetrating deep into the respiratory tract and causing severe health damage. Exposure is calculated by weighting mean annual concentrations of PM2.5 by population in both urban and rural areas. A higher focus/ranking gives more weight to countries with a higher degree of Air Pollution, namely countries that has serious issues with air pollution (!)	Very High. Urgent sustainable and self-sufficient action IS needed to ensure water security with i.e., CE concepts. In addition, it indicates the high demand for integrated water management solutions. Indicator replaced with "Air pollution"
(9) Frankfurt School Country Experience	FS has work experience in all of the long-list countries, however, with a focus on broad financial sector development. Based on other assignments, there is in-house capacity for some countries (Colombia, Ethiopia, Jamaica, Kenya Peru, Rwanda) in the context of investment opportunities in CE and natural capital objectives. A higher focus/ranking gives more weight to countries that has been previously assessed already.	Medium. The project team can build on the experience of the Frankfurt School. Reform country partners added accordingly. Changed to "Very high"
(10) Estimated Population Growth	Countries expected to have faster population growth will have an increasing impact on the environment. A higher focus/ranking of this indicator gives more weight to fast growing countries (Population).	High. High relevance b/c of fast-growing countries. In addition, as more resources are needed, correlated with more intense consumption patterns in LMIC. Social and cultural driver.
(11) Estimated Real GDP Growth	Economic growth is a precursor for an economy focussed on green outcomes. A higher focus/ranking of this indicator gives more weight to fast growing countries (GDP growth in %).	High. High relevance b/c of fast-growing countries
(12) GAIN Index	Impacts of climate change represents a serious threat for vulnerable countries. The GAIN Index captures Vulnerability (i.e., measured by a country's exposure, sensitivity, and capacity to adapt to the negative effects of climate change), and Readiness (i.e., measured by a country's ability to leverage investments and convert them to adaptation actions). A higher focus/ranking gives more weight to countries with a high GAIN Index, namely countries which are already very vulnerable to climate change.	Medium. In case of high vulnerability, it is a fundamental base for spurring CE. In addition, well designed CE can contribute to readiness (i.e., climate-resilient waste and water management).

Table 34: Long list and applied quantitative indicators

Country	Capital	Region	GSCI	EPI	Doing Business	CPI	Electricity	Country Size	Resource Efficiency	Air pollution	Pop. Growth	GDP growth	GAIN Index	Ranking
Unit:			Rank	Rank	Rank	Rank	% of Pop.	Million	% Energy	% of Pop.	%	%	Rank	
			(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(10)	(11)	(12)	
Albania	Tirana	Europe	69	62	68	104	100,00%	2,85	5,67	18,20	-3,16%	3,70%	50	13
Bosnia-Herz.	Sarajevo	Europe	42	78	65	111	100,00%	3,30	4,00	27,75	-4,69%	3,04%	50	15
China	Beijing	Asia	39	120	78	78	100,00%	1397,72	5,67	52,66	1,60%	5,26%	54	12
Colombia	Bogota	Latin America	70	50	70	92	99,77%	50,34	5,67	16,53	4,98%	3,76%	48	4
Ethiopia	Addis Ababa	East Africa	75	134	48	94	48,27%	112,08	3,00	38,98	26,08%	8,18%	37	3
Ghana	Accra	West Africa	60	168	60	75	83,50%	30,42	5,67	34,71	21,76%	5,44%	44	2
Indonesia	Jakarta	Asia	68	116	70	102	98,85%	270,63	5,00	16,50	9,39%	5,46%	47	16
India	New Delhi	Asia	127	168	71	86	97,82%	1366,42	6,00	90,87	8,96%	6,70%	42	8
Jamaica*	Kingston	Latin America	124	66	70	69	99,38%	2,95	4,67	13,40	2,93%	3,50%	49	9
Kenya	Nairobi	East Africa	81	132	73	124	69,70%	52,57	3,67	28,58	23,58%	6,02%	38	15
Mexico	Mexico City	Latin America	83	51	72	124	100,00%	127,58	4,67	20,92	9,26%	2,22%	49	6
Peru	Lima	Latin America	49	90	69	94	98,35%	32,51	6,00	24,79	9,28%	4,00%	49	7
Rwanda	Kigali	East Africa	139	137	76	49	37,78%	12,63	6,33	43,21	25,34%	7,18%	43	1
Tanzania	Dodoma	East Africa	113	150	54	94	37,70%	58,01	4,00	29,08	32,53%	5,06%	38	10
Vietnam	Hanoi	Asia	91	141	70	104	99,40%	96,46	4,33	29,63	7,01%	6,82%	47	5
Zambia	Lusaka	Southern Africa	148	132	67	117	43,00%	17,86	3,67	27,44	32,32%	1,46%	40	11

Note: For the ranking (1-4): The higher the number the lower the performance. The ranking prefers higher rankings (low numbers) over lower rankings (high numbers). For (12) the higher the rank, the stronger its weight in the scoring (China ranks at the bottom, Ethiopia at the top). **Technical guidance:** For the analysis, the quantitative indicators (1) to (12) are normalized to 100%. This means that each indicator is equally weighted. The weighting can be adjusted accordingly to preferences. For specific weightings, the Project Team has made suggestions (Low to Very High. See **Annex 3**, right column) to what degree each indicator is weighted in the overall ranking. The weighting ranges from No Ranking (factor multiplied by: x0), Low (x1), Medium (x2), High (x3), and Very High (x4). After consultation with GIZ (21 October 2021), the indicators have been discussed and adjustments are incorporated (see **Annex 3**, right column red and bold notes). **Not listed:** Frankfurt School Experience and German reform partner country list. *Jamaica has been replaced by Dominican Republic.

Combining quantitative indicators with the suggested weighting the result ranking is listed in Table 3, left column. Countries in light blue selected based on the first step quantitative line of sight assessment. Countries highlighted in light green based on second step typology selection. The list of recommended countries is shown in the **table 34**. The short-listed countries are: Rwanda (i.e., +25% population in the next five years, Africa), Jamaica (i.e., small country, circular lab, Latam), Colombia (i.e., German reform partner country, Latam), Vietnam (i.e., +8% p.a. GDP growths in the next 5 years, Asia), Albania, (and India if six countries are requested).

Country Selection: Including and Excluding Factors

Excluding Factors: A minimum level of Sustainable and Environmental Performance is considered as necessary (Excluding Zambia, Ethiopia, Tanzania, and India). Countries with highest corruption perception are excluded as well (Kenya, Mexico).

Including Factors: High population and economic growth represent a critical dimension for long lasting development pathways. **Rwanda** (+25% population in the next five years) and **Vietnam** (+8% p.a. GDP growths) represents a good match. Small countries can represent incubator roles. Having at least one small country in the sample **Albania** (also because of the regional coverage) and **Jamaica** are preferable compared to huge countries such as China and India. Finally, reform partner countries (incl. **Colombia**) of the German Development Cooperation and BMZ2030 represents a useful knowledge assimilation/acquisition for future synergies.

Notably, each country has unique specifics and focus areas when it comes to CE activities. The Project Team is aware, that the quantitative comparison has considerable weakness points, but highlights, that the proposed method represents a consistent approach country selection. Finally, the suggested short-listed countries cover 1 African countries, 1 Asian countries, 1 Country from Latin America and 1 from the Caribbeans, and 1 European country, representing a solid balance of various sectors, various levels of enabled environments and various stages of development.

Table 35: Results quantitative country performance, and final country selection

Country	Ranking* (Quant.)	Adjustments	Country
	<i>First step</i>	<i>Second step</i>	
Rwanda	1	->	Rwanda
Ghana	2		
Ethiopia	3		
Colombia	4	->	Colombia
Vietnam	5	->	Vietnam
Kenya	6	->	Jamaica
Peru	7		
India	8	->	(India)
Jamaica	9		
Tanzania	10		
China	11		
Zambia	12	->	Albania
Albania	13		
Indonesia	14		
Bosnia-Herz.	15		
Mexico	16		

Note: *Results based on ranking as indicated in **Table 34**: Quantitative Indicators for country selections and Frankfurt School Recommendation.

The findings can be reproduced and adjusted in the enclosed excel-based tool (Filename: **211008_CE_country_selection.xlsx**), based on the above-described method and criteria. The excel tool is deliberately designed in a way that parameters can be adjusted – based on discussions with the project counterparts and to reflect additional political dimensions of the GIZ and the BMZ.

Table 36: Short-listed country briefs (non-exhaustive, illustrative)

Rwanda

Rwanda targets to become a middle-income country by 2035. Rwanda's **political environment is stable, its economic growth high** (among the highest in the continent) and the inflation rate low. Rwanda is one of the leading African countries to align its economic transformation with environmental and conservation protection and is at the forefront of fostering CE in the region. Rwanda has taken a strategic decision to pursue a green growth approach to development. Its National Environment and Climate Change Policy provides directions to climate change adaptation and mitigation and sustainable environmental management including promotion of CE. This policy is designed within the context of national, regional, and global development commitments (e.g., Vision 2050 aspirations, **National Strategy for Transformation (NST1)**, **Green Growth and Climate Resilience Strategy** (GGCRS), Nationally Determined Contributions (NDCs), Sustainable Development Goals (SDGs), Agenda 2063, East African Community - EAC Vision 2050, etc.). It also provides a policy framework to tap into opportunities of a green growth led and climate resilient economy. In addition, in 2011, a national **Green Growth and Climate Resilience Strategy** was introduced to guide Rwanda to become a developed, low carbon economy by the year 2050.

Colombia

Colombia is an upper middle-income economy with comparable low growth rates and high public debt rates. Colombia has been a member of the Platform for Green Industry and seeks to increase efficiency in the use of resources, improve waste management, better utilize renewable energy, support research and innovation for a green industry, and promote new green industries and green jobs. There is a **National Strategy on CE** (released in 2019) by the MINCIT (Ministerio de Comercio) and Ministry of Environment and Sustainable Development. The strategy serves as a guideline to support the transition towards a CE in the six prioritised sector lines: 1. *Industrial material flow* (i.e., new regulation, research), 2. *Material Flows from packaging*, 3. *Biomass flow*: (i.e., planned National Plan on Residual Biomass Use by 2022): 5. *Water flows* (i.e., measure nutrient levels in wastewater, use of rainwater), and 6. *Construction materials flow* (i.e., technical guidelines).

Vietnam

Economic and political reforms have spurred rapid economic growth within the last 30 years, transforming what was then one of the world's poorest nations into a lower middle-income country. Along with the development, the country is now faced with the **increase of waste in many types**, especially the domestic waste, while the infrastructure for waste management is still inadequate. Vietnam has not any specific term on CE; nevertheless, the necessity of circle the natural resources has been emphasized in many momentous legislation documents and also found in many actual sub-models for recycle and reuse of waste. In fact, the volume of recycled materials in Vietnam is still small comparing to the input of the economy, and still far from its target on reducing the landfill rate of collected waste. In accordance with the **Law on Environmental Protection (2020)**, the Government is working to build regulations on criteria, roadmaps, and mechanisms to encourage the development of the CE in the country.

Albania

Albania is a low-income country by Western European standards, with GDP per capita lower than all countries in the EU. Regarding the situation in the Republic of Albania, the concept of CE is still at an early stage. The concept of CE has been used earlier in the draft **Strategy of Integrated Waste Management (2018-2023)** realised in January 2018. The **revised Integrated Waste Management Strategy** is developed over the vision or perception of the concept of "zero waste", so that the waste is collected and treated as raw materials and management is done in accordance with the concept of circulatory systems, serving the criterion of use and preservation of raw material resources. The current legal framework, including national regulations and national strategic documents and action plans, does not provide the basis for implementing the concept of the CE in the country. Therefore, there is an urgent need for improvements in the current legal framework that will increase the country's ability to better utilize its resources and the lifecycle of materials, products, and services.

III. Annex: Financial Instruments for a Circular Economy

On a global level, it is estimated that currently only 8.6% of the global economy can be defined as circular (in terms of tonnes of material use that is cycled).⁴¹³ According to this low level of circularity, the Circularity Gap Report 2020 estimates a USD 4.5 trillion additional economic output opportunity by 2030 for circular businesses.⁴¹⁴ This opportunity is already acknowledged by many stakeholders, inter alia the financial services industry: Investment managers started to launch specialised circular equity funds, for example, the US-based BlackRock and Swiss peer RobecoSAM. Index providers have launched specialist products, for example, ECPI launched a circular economy equity leader index⁴¹⁵, Solactive established a sharing economy focused index, and MSCI introduced a circular economy and renewable energy index. The asset management arm of the French bank BNP Paribas created an **exchange-traded fund** (ETF) that tracks the ECPI Circular Economy Leaders Index. In summary:⁴¹⁶

- Managed assets in **public equity funds** with a circular economy focus have grown 26-fold in less than two years from USD 0.3 billion to USD 8.0 billion in 2021.
- The issuance of **corporate and sovereign bonds** focussed on a circular economy have grown around five times from 4.5 billion USD to 21 billion USD in 2021.

Main observation on the global level: Circular investment potentials are largely connected to the Sustainable Development Goals (SDGs) and Nationally Determined Contributions (NDCs). Those high-level guiding priorities are providing a good indication for qualitative investment needs such as building capacities and an enabling investment environment, and quantitative investment needs such as measurable infrastructure investments of countries in different sectors.⁴¹⁷ National development goals and SDG priorities confirm different circular-related investment priorities which **require a mix of instruments** across sectors and actors. This document does not provide a silver-bullet guidance for circular economy finance but calls attention to the set of options that can be implemented in order to generate investments which are needed to promote a more circular economy. Overall, the successful use and application of financial instruments **depend on national framework conditions and parameters** (see Table A, panel a.) and will need to consider the time frame and the amount of required capital.

Tremendous circular-related investment needs can be observed across the globe, but there are barriers due to **market imperfections** (e.g., unpriced externalities for partly public good services (waste treatment) lead to comparative disadvantages against short-sighted, profit-only oriented services (waste treatment)), and vice versa (e.g., lack of regulation leads to negative externalities). This prevents fast progress on a global, national, and sub-national level. Therefore, the attractiveness of various circular economy investments is still falling prey to short-sighted linear business practices.

- Existing imperfections include positive and negative externalities⁴¹⁸, imperfect capital markets⁴¹⁹, lack of information and/or asymmetric information⁴²⁰, and other market distortions (such as corruption, or subsidies to other sectors). For a full barrier analysis see Section 1 in the final report.

⁴¹³ Circle Economy (De Wit, M. et al), 2020, Circularity Gap Report 2020.

⁴¹⁴ Accenture, 2015, Waste to Wealth: Creating Advantage in a Circular Economy.

⁴¹⁵ Categories comprise: Circular Supplies, Resource Recovery, Product Life Extension, Sharing Platforms, Product as a service. One of the rated organisations is Waste Management Inc rated EE (EEE is being the highest grade). Performance factsheet (31 January 2022): https://www.ecpigroup.com/wp-content/uploads/factsheet/ECPI_CIRCULAR_ECONOMY_LEADERS_EQUITY.pdf

⁴¹⁶ <https://emf.thirdlight.com/link/29wifcw68gx1-yw31dj/@/preview/1?o> (Assessed online 17 December 2021).

⁴¹⁷ However, it is also recommended to look beyond NDCs, because not all reflect the full range of needs. For instance, a range of water stressed countries do not mention IWRM in their NDCs but focus primarily on infrastructure priorities while management and governance lack attention. (Global Water Partnership (GWP), 2018, NDCS AND WATER – IMPLEMENTING THE PARIS AGREEMENT - Emerging insights from GWP’s analysis of 80 NDCs from a water perspective, in conjunction with the UN’s 2018 progress report on implementing SDG 6).

⁴¹⁸ CE activities can provide benefits to the broader society (e.g., waste management). Private sector actors are commonly motivated by (increasing) returns. All benefits may not directly accrue to the private sector actor, while the costs are carried by that organization/individual. This may reduce the attractiveness of making the investment.

⁴¹⁹ Lack of a liquid, long-term capital market may curb CE investments.

⁴²⁰ Incomplete and/or asymmetric information may lead to a suboptimal allocation of capital in the economy, e.g., as it may prevent the private actors from making optimal investment decisions. This might lead to a too high-risk perception by the financial intermediaries, which might keep them from lending to CE projects for which they do not have full knowledge of the risk and return. This issue gets more pronounced in the case of long-term loan contracts, where information asymmetries – and hence the risks for the lender – are particularly large, which can result in the lack of a market for long-term debt.

- Existing market imperfections reduce the profitability of circular activities either via a reduced return of investments or via increased risks associated with the investment for investors, and consequently lead to underinvestment in sustainable circular activities – compared to a situation without barriers or market imperfections. Barriers that trigger financial market imperfections include:
- Investments requiring **large upfront costs** (esp. challenging for MSMEs, which are more sensitive than large enterprises);
- lack of **financial resources, budget constraints** and **access to credit facilities** (esp. for MSMEs and municipalities);
- lack of available blending instruments (e.g., **risk mitigation instruments**);
- and market and political **uncertainties** (e.g., return-based finance requires a degree of certainty that the project/promoter can generate cash flows in the future)
- Missing credible commitments by public authorities (governments) are posing additional risk on (long-term) investment decisions for private sector actors.

To overcome market failure and its obstacles, needs and responding mechanisms, as explained in Table 37, can be differentiated in two types: **Investments in enabling frameworks** to correct systemic market failures through regulation and policy targeting (Table 37, panel a.) and/or **investments in assets** to compensate the project owner/stakeholders for the effects on the risk/return profile on the project level through project-level assistances (Table 37, panel b.).

Table 37: Different needs ask for different mechanisms and financial instruments

	Needs to overcome investment barriers	Responding mechanisms and instruments
Investment need	<p>c.) Investments in Enabling Frameworks (targeting policies / regulation and capacities)</p> <ul style="list-style-type: none"> Modify institutional, regulatory and policy framework (correct systemic market failures), Adjust or develop new policies and regulations, Information and capacity building. 	<p>Internalizes environmental costs; provide incentives for applying circular concepts via market and regulatory instruments, including:</p> <ul style="list-style-type: none"> National strategies, regulation, standards and codes, and other policies (e.g., facilitating Extended Producer Responsibility), Financial regulation (e.g., implicit taxes, monetary policy), Fiscal policies (e.g., virgin material or landfill taxes, reduced value added taxes and reform of environmentally harmful subsidies). <p>Address capacity building needs, including:</p> <ul style="list-style-type: none"> Technical assistance and programmatic and tailored training (e.g., adjusted curricular in universities, trainings for local bank officers).
	<p>d.) Investments in Assets (targeting project-level assistance)</p> <p>Facilitate investment and management of assets to compensate investors for effects on the risk/return profile, reduce risks and provide access to finance.</p>	<p>Provide funds for development at different stages (transaction and scaling financial mechanisms), including:</p> <ul style="list-style-type: none"> Access to finance: loan finance, equity investment, leasing (particularly <i>for profit</i>) and public finance instruments, grants (particularly <i>for non-profit</i>), and Risk mitigation: such as loan default guarantees.

Opening the space of responding mechanisms options, different financing instruments will be an option with different levels of suitability due to underlying barriers. For all financing instruments, the stage of development (or the level of bankability) is a crucial cornerstone in the instrument selection. While grant funding is recommended in the development phase of technologies (e.g., R&D for a modular built environment sector) (Table 38, Grants: Proof of Concept), which is far away from commercialization, it is not recommended to distort scaled-up markets (e.g., electric vehicles) with non-reimbursable grant instruments. Financial market interventions must

be studied with care, especially reflecting dynamics in the interaction (esp. leveraging potential) with private capital. Thus, grants can serve in the development phase as a risk mitigation part and leverage equity or debt markets but can crowd out private sector actors in scaled-up markets due to public subsidies.

Important for choosing the 'right' finance instrument is considering the stage of development, which is indicated in the following Table 38. Public sources are limited and hence, there is a need to find the adequate degree of concessionality, or grant element (if any), that a project or programme should receive. The degree of concessionality should increase proportionally to the magnitude of the barriers to implementation. However, some barriers are often associated with the development stage. Thus, when defining instruments, one critical step is to consider different stages of development as they also determine the opportunity for revenue-making of investments. The three stages of development are:

- Proof of Concept (PoC): Grants and VC financing are used when an innovative project, targeting new technology, product, or service (e.g., R&D) does not generate revenue.
- Commercialization: A combination of grants, equity financing and subordinated loans are typically relevant.
- Scale-up: Equity and debt financing (potentially with preferential conditions) are typically relevant.

Locating the instrument on the value hill is only an indication, further analysis is needed for verification. Financial instruments mapping is only-illustrative and non-exhaustive as it heavily depends on project circumstances which cannot be fully captured in Table 6. In addition, Table 38 locates the financial instrument and its stage of development partly on the value hill. Although the mapping is incomplete, it provides insights for potential future work and project pipeline development in this field.

Table 38: Stages of development and the choice of instruments (Marker: + common choice, - less common choice)

	Degree of bankability	Proof of concept (PoC)		Commercialisation		Scale-up	
		Choice	Value Hill	Choice	Value Hill	Choice	Value Hill
Access to finance	(E) Private equity	+		+		+++	All
	(E) Venture capital	++	All	+		+	
	(E) Public markets	--		-		+	
	(D) Commercial loans	---		+		+++	All
	(D) Concessional loans ⁴²¹	-		+++	All	--	
	(D) Green/Social bonds			++	Top	+++	All
	(E/D) Peer-to-peer lending	+		++	Top	-	
(E/D) Payment for success	++	Top	++	Top	+		
Reduce risk	(G) (Loan) Guarantees ⁴²²	++	All	++	All	+	
	(G) (Purchase) Guarantees ⁴²³	-		+		+	
	Grants ⁴²⁴	+++	Up / Down	---		---	
	(G) Insurances ⁴²⁵	-		+		++	All
	Leasing options			++	Top	++	Top / Down
Enabling environment	Capacity building (training)	+++	Up / Down	+		-	
	Define sustainable standards	-		+		++	Up
	Fiscal policy development ⁴²⁶	+		++	Up	++	Up

Note: Simplified depiction. Overlapping possible. (E)=Equity; (D)=Debt; (G)=forms of guarantees TA=Technical Assistance. Only illustrative, non-exhaustive.

3.6 Access to finance

Equity

For small projects, own funds might be enough to invest in project assets such as efficiency equipment. In case of large projects and limited own funds, project developers need to mobilize sufficient equity, e.g., via interested investors (private equity) or through listing of the company on the public markets (public equity). Equity investments have the potential for high returns but are associated with higher risks. Managed assets in public equity funds with a circular economy focus have grown 26-times in less than two years from USD 0.3 billion to USD 8.0 billion in 2021.⁴²⁷

Private equity funds invest generally in existing companies, particularly in firms with a more **mature technology** that need an equity injection to realize a specific (sustainable) project, introduce new products / product types or expand their production. These investors look for a positive return on investment in the double-digit range. This implies that private equity investors are also **ready to absorb higher risks**.

⁴²¹ Ad hoc subsidised financing for investor.

⁴²² Offering guarantees to a credit line to reduce needed collateral.

⁴²³ Offering guarantees for private companies or investors, e.g., purchase guarantees to assure that the products will be bought.

⁴²⁴ Offering capital subsidies, grants, or rebates as one-time payments to cover a percentage of capital cost investments.

⁴²⁵ Business models include peer-to-peer sharing and business to consumer rentals.

⁴²⁶ Offering a long-term credible commitment that sales in repair and remanufacturing must pay less taxes.

⁴²⁷ <https://emf.thirdlight.com/link/29wifcw68gx1-yw31dj/@/preview/1?o> (Assessed online 17 December 2021).

Private Equity and Circular Economy (selected samples)

- BlackRock, Candriam, Crédit Suisse and ROBECO, amongst others offer **private equity** targeting CE projects, particularly in Europe through equity funds. Also, BNP Paribas provides a CE-based exchange-traded fund (reflecting the CE Leaders Equity Index). The private equity **Leadership Fund by Closed Loop Partners** targets USD 300 million and focuses on **acquiring CE-relevant companies** (incl. recycling, packaging, organics). The private equity fund of **Circularity Capital** (USD 78 million) invests in (European) circular SMEs (e.g., Grover, Winnow).
- The global equity fund **DWS Concept ESG Blue Economy** invests primarily in companies that contribute, e.g., to reduce ocean acidification and marine pollution, and to conserving the use of marine resources as well as sustainable fishing.
- **Public-driven equity** is initiated among others by the European Commission and European Investment Fund that launched the **BlueInvest Fund** to provide financing to underlying equity funds and supporting companies in the marine environment to land-based businesses producing goods or services that contribute to the maritime economy (objective: improve access to finance and investment readiness for start-ups, **early-stage** businesses, and SMEs active in the Blue Economy).
- The **Moringa Partnership Fund** is a private equity fund but also fed via public investors (including different development finance institutions) for larger scale profitable and sustainable agroforestry projects (with integrated smallholder farms/value chain partners) in Latin America and Sub-Saharan Africa.

Venture capital (and **angel investors**) may also target interventions at the proof-of-concept stage, focus on companies at a (very) early stage of development at which new technologies are developed, or new markets are explored. This involves a high risk of failure, which consequently leads to highest return expectations. The return expectations must be seen in light of the fact that only a small fraction of the start-ups will actually succeed, and that the number of failed investments is high. The typical investment horizon is less than 10 years which are not in favour of circular activities, given their naturally long-term materialisation of revenues. The amounts invested are typically smaller than for private equity funds (e.g., in the sphere of around USD 10 million per start-up). Business models with no track records and limited profitability may benefit from equity injections to bridge the gap from pilot to growth stage.

Venture Capital and Circular Economy (selected samples)

- Investing in early-stage innovations that may require long-time horizons is offered by e.g. the VC private equity **Plastics Fund 1** by **Archipelago Eco Investors** which targets EUR 100 million for impact investments in SMEs that are developing alternatives to single use plastic packaging or recovering value by recycling in a circular economy model (enabling businesses to transition from pilot to growth), the **Blue Oceans Partners'** venture capital support to circular economy innovators (primarily for reusing, recycling, and replacing plastics); and the **Closed Loop Partners'** **Closed Loop Venture Fund** that provides early-stage capital for companies (for increased product and packaging recycling), etc.
- The American finance company MSCI has established a **World Circular Economy and Natural Capital equity Index** to assess the performance of 30 stocks, etc.
- Singapore-based Circulate Capital (private investment firm) with more than USD 100 million in its **Circulate Capital Ocean Fund**, invests in companies in South and Southeast Asia focusing on improving recycling and waste management capabilities, and has USD 25 million in its climate tech fund **Circulate Capital Disrupt**.

Debt (loans)

Debt finance instruments (e.g., lending) typically consist of loans provided by banks/financial institutions. Institutional investors and bonds (securities) issued by corporates or (sub-national) public authorities and sold to investors raise fixed-income capital. In general, lenders are more risk-averse than equity investors. While commercial loans tend to focus on more conservative risk/return calculations, concessional loans with more favourable terms (e.g., longer-term maturity, longer grace period) offer opportunities for circular business models. Concessional loans represent a subsidised financing for investors. For instance, traditional finance methods typically calculate the financing costs based on pure future cash-flows which is naturally not in favour of progressive circular activities, as it requires a more complex (e.g., considering full-cost accounting for the product life cycle and EPR) and broader (e.g., public good character) consideration.

Currently, very few dedicated circular credit lines or lending products with underlying CE metrics are available. However, associated initiatives that target for instance energy efficiency in manufacturing and housing do exist. For the scaling of viable CE concepts via lending, either **CE metrics and principles should be built into existing (efficiency) actions and credit lines**, or new CE credit lines or lending products should be developed and built on good practices (incl. networks and relationships with on-lending banks and final beneficiaries like SMEs).

Loan Finance and Circular Economy (selected samples)

- **EBRD's Circular Economy Regional Initiative (CERI)** includes **concessional co-financing** in Turkey, Albania, Bosnia-Herzegovina, Montenegro, North Macedonia, Serbia for improving management of raw materials during the full lifecycle of products and diverting waste from landfills and the marine environment, reducing/avoiding GHG- emissions, eliminating, preventing and improving management of harmful chemicals – specifically Persistent Organic Pollutants (POPs) and unintended Persistent Organic Pollutants (UPOPs).
- **EBRD's** credit line “The Mongolian Sustainable Energy Financing Facility” enables partner banks in Mongolia to finance businesses seeking to invest in energy efficiency⁴²⁸ and on-lends to private enterprises (Senior Loan USD 10 million equivalent to the local XacBank).
- **EIB** reports about EUR 2.5 billion in lending for circular projects over the last five years, such as collection and recycling infrastructure for Waste Electrical and Electronic Equipment (WEEE); or the chemicals company Indorama Ventures that has committed USD 1.5 billion for investments in plastics recycling infrastructure.
- **IFC** has provided a sustainability-linked loan to Corsan in Brazil to reduce water losses and decrease the loan's interest rate when the target is achieved.⁴²⁹ This is the first sustainability-linked loan in the Brazilian water sector⁴³⁰.
- The **Italian Intesa Sanpaolo banking group** (private financial institution) manages **Plafond**, a dedicated credit facility (EUR 6 billion) with a focus on **innovative CE projects** – it includes (especially Italian) company solutions for lifetime extension of goods and materials, the regeneration of natural capital (e.g., restoration of degraded soils), and circular design with focus on reducing waste and pollution).

Debt (bonds)

When a bank loan is insufficient to finance corporates or (sub-) national governments, bonds can provide an alternative to attract capital. Bonds are debt securities sold to investors. While still in their infancy, new types of thematic bonds have emerged and include sustainability-linked, climate-aligned, or transition bonds. Internationally acknowledged are green, social, and sustainability-linked bonds, defined by the International Capital Market Association (ICMA)⁴³¹. For each type of bond, the ICMA has developed principles⁴³² which serve as voluntary best practice guidelines, and which are updated regularly. Those thematic bonds are specifically earmarked to be used for thematic sustainable/social projects. Thus, “Green” is a bonus feature to the bond where the “greenness” of a bond is defined by the projects the proceeds are financing and not by the issuer. The issuance of corporate and sovereign bonds focused on a circular economy have grown five times from USD 4.5 billion to USD 21 billion in 2021.⁴³³ Notably, with the development of sustainable finance and the increasing integration of climate-related risks into portfolio management, green bonds are highly attractive as investment opportunity.

To guarantee the “greenness” of green bonds, several policy initiatives have been set up to support their issuance and development such as Green Bond Standards by the International Capital Market Association (ICMA), but also taxonomies incl. the Climate Bonds Taxonomy, the Green Bond Endorsed Projects Catalogue, or the proposed EU Taxonomy for sustainable activities. There is no established Circular Bond Guide available. However, the Circular Economy Practitioner Guide refers to the proximity to the ICMA Green Bond Principles as several of these opportunities cover elements of the circular economy, including energy efficiency (including efficient buildings), sustainable waste management, sustainable land use (including sustainable forestry and agriculture), clean transportation, and clean water.

⁴²⁸ While activities for renewable energy generation and energy efficiency are excluded from the circular economy categorization system, the Commission Expert Group on Circular Economy Financing and the EIB describe sustainable energy as significant for supporting the transition to a circular economy. (EIB Circular Economy Guide, 2020).

⁴²⁹ <https://www.gihub.org/articles/private-sector-financing-can-accelerate-a-green-recovery-for-cities/> (Assessed online 03 January 2022)

⁴³⁰ The Brazilian sustainable financing market is evolving from green bonds to sustainability linked products, which already account for more than USD10 billion.

⁴³¹ Defined by the International Capital Market Association (ICMA): **Green bonds** are any type of bond instrument where the proceeds will be exclusively applied to finance or re-finance projects with clear environmental benefits, and which are aligned with the four core components of the Green Bond Principles. **Social bonds** finance projects that directly aim to address or mitigate specific social issues and/or seek to achieve positive social outcomes, especially but not exclusively for a target population(s). **Sustainability-linked bonds** are any type of bond instrument where the proceeds will be exclusively applied to finance or re-finance a combination of Green and Social Projects, and which are aligned with the four core components of the Green Bond and Social Bond Principles.

⁴³² Green Bond Principles are: 1. Use of Proceeds; Process for Project Evaluation & Selection; Management of Proceeds; Reporting. In addition, it is recommended to apply the Green Bond Framework and have External Reviews in place. German Translation: https://www.icma-group.org/assets/documents/Sustainable-finance/Translations/German_GBP-06-2021-301221.pdf (Assessed online 05 January 2022).

⁴³³ <https://emf.thirdlight.com/link/29wifcw68gx1-yw31dj/@/preview/1?o> (Assessed online 17 December 2021).

Bond Finance and Circular Economy (selected samples)

Corporate bonds

- **BASF's green bond** (EUR 1 billion) enables CE-adapted products and processes.
- Kaneka **chemical corporation promotes** developing and manufacturing a bio-based polymer, which can contribute to circular plastics if it is biodegradable or recyclable.
- **PepsiCo's green bond** (USD 1 billion) funds activities that lead e.g. to a reduction of virgin plastics.
- **Haina Electricity Generating Company** (EGE Haina) recently issued the first Dominican corporate "green bond" (USD 100 million, max. 15-years, +5 per cent yield) de-nominated to ICMA green bond principles and sold pre-dominantly to local market actors.⁴³⁴ The issuance program obtained an "A" risk rating by the Feller Rate Dominicana rating agency showcasing a strong market trust. Notably, the compliance with the standards has been validated by Pacific Corporate Sustainability and presents the first Climate Bond certification in the country, approved by the Climate Bonds Initiative.

Public international financial institutions

- **EBRD's green transition bond** (USD 500 million) finances investments that enable circular manufacturing (incl. chemicals, cement, and steel production).
- **EIB's first Sustainability Awareness Bonds (SAB)** (EUR 500 million) earmark partly CE-related lending (incl. waste prevention and recycling), and the **Sustainability Bond** (EUR 750 million). On January 2021, EIB issued a new EUR 1.5 billion SAB due to 2041 allocated only to environmental and social projects contributing substantially to EU sustainability objectives. Notably, the SAB extends its objectives to "protection and restoration of biodiversity and ecosystems".
- **World Bank's Sustainable Development Bond** (USD 10 million), also referred to as blue bonds, targets plastic waste pollution in oceans.
- The **Inter-American Development Bank (IDB)** invests in B-bond structures to crowd-in institutional investors, who typically prefer to invest in more developed markets. The B-bond is sold to a special purpose vehicle and privately placed with an institutional investor agreement.

The Circular City Funding Guide highlights the relevance of social impact bonds⁴³⁵ (SIBs are also known as 'pay-for-success bonds', 'social benefit bonds', or just 'social bonds'). for circular city development. SIBs provide opportunities for e.g., city governments to raise funds to invest in innovative circular city initiatives without financial risk. SIBs are issued by (sub-) national authorities and there is no established standard yet.

Generally, a SIB is an innovative agreement between a public authority (e.g., government), a service provider (e.g., non-for-profit organization), and the bond-issuing organization (e.g., financial institution). It is essential for the agreement that outputs (better: outcomes) are clearly defined. There are several actors with specific characteristics. First, a social impact entity that provides services against payments. Second, private investors with respective capital for circular impact. Third, a governmental entity who can sign effective performance-based contracts. Forth, a bond-issuing organization that represents the intermediary between investors, service providers, and public authorities. Finally, an independent evaluation actor might be used to confirm results. Thus, an investor funds a non-profit organization to produce a social outcome via the bond-issuing organization, which disburses the invested funds to the service providers for financing operating costs. The governmental entity pays the bond-issuing organization if circular outcome targets are met. The bond-issuing organization uses these payments to reimburse the private investors and potentially provide the investors with a return on their initial investment.

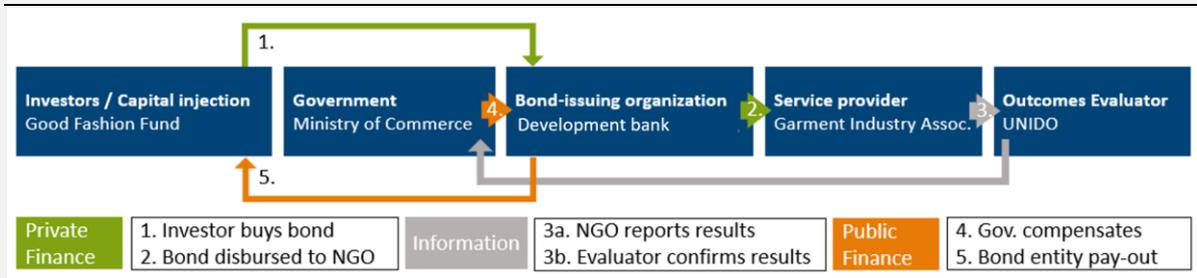
⁴³⁴ <https://dominantoday.com/dr/economy/2021/05/03/bank-power-company-issue-joint-us100m-green-bond/>.

⁴³⁵ Social impact bonds are also known as 'pay-for-success bonds', 'social benefit bonds', or just 'social bonds'.

Hypothetical Impact Bond Circular Economy example

Service provider (non-for-profit): Garment industry association; Circular-Impact-Bond Issuing Organization (CIBIO) (e.g., International Finance Institute); Private capital (e.g., Good Fashion Fund); Government (e.g., Ministry of Commerce); Evaluation Unit (e.g., UNIDO, pioneer in chemical leasing). Output target: Specific number of trainings for the business model chemical leasing to SMEs in the textile sector. Needed framework contract: A public authority signs a prepared contract with the CIBIO and the service provider (additionally, the outcome evaluator may be part of the contract for specifying technical details).

Figure 11: Practical example of a circular impact bond for the garment industry after the framework contract has been signed



The bond-issuing organization issues the respective SIB. An investor buys liabilities from the CIBIO (individual contract between CIBIO and the investor). The CIBIO disburses the invested funds to the service provider. The service provider starts with the trainings. The outcome evaluator confirms the results to the governmental focal point. The government compensates the CIBIO with the agreed amount. The CIBIO buys-back the liabilities from the investor and money flows back to the investor (incl. profit if agreed). This basic mechanism can be adjusted accordingly. For instance, government and investor (in case of philanthropic motives) can agree on splitting the required investment. Notably, the governmental actors must pay only after successful implementation but play a key role in the framework contract.

Reduce risks

Leasing

Leasing options can be seen as precursor of the large “as-a-service” movements (esp. in digital services). The leasing commodity industry has been established in recent decades and is at the most favourable position to support circular activities. As-a-service models focus on allowing customers to efficiently access the equipment they need to run their business, rather than owning it. A crucial characteristic is the point of ownership in leasing models, as the lessors retain ownership of an asset throughout its lifecycle. This momentum is essential in a more circular thinking, as it maximizes the **EPR** principle. The lessors take the responsibility for extending its useable life, recovering it for reuse and remanufacturing. In doing so it maximizes its economic utility while minimising its environmental impact.⁴³⁶ The **pay-per-service unit** model (e.g., chemical leasing model⁴³⁷) defines the payment (tied to the quantity or quality of service) and ownership (product manufacturer or retailer is responsible for installation). Sharing models are a variation of leasing, but the usage is typically shorter, and the pool of users is larger (e.g., for vehicle ride sharing, tools and equipment). For financial institutions “**finance lease**” models are partially known. In this commercial arrangement, the lessee (e.g., borrower, user) and the lessor (e.g., financing entity) agree on terms and conditions (T&C) of using an asset (e.g., equipment, vehicle etc.). The lessee (s)elects the asset. The lessor purchases (!) the asset. Based on the T&C, the lessee pays the leasing fees. The ownership of the asset remains at the finance company. The contract period is defined in the T&C. After the contract termination, the asset can be returned to the lessor or retained by the lessee.

Certain enabling factors are needed for leasing options. It is essential to allow secondary use of exempt assets for leasing. In addition, innovative thinking, and applicability of best practices how to deal with financial risk insurance is needed. A strong political commitment in the development of secondary markets for equipment by introducing standards and codes spurs the development of leasing options.⁴³⁸ To **facilitate** the **leasing** concept, it needs to be considered during product design and for the end-of life cycle (incl. proper dismantling, and reuse or recycling of valuable parts or general refurbishment). Technical assistance for the development of a legislative environment that facilitates the development of leasing services in countries and promotes leasing in financial institutions is needed.

⁴³⁶ <https://leasing.nridigital.com/leasing-life-feb20/is-leasing-the-unsung-hero-of-the-circular-economy> (Assessed 16 December 2021).

⁴³⁷ UNIDO [Chemical Leasing](http://www.chemicalleasing.org). <http://www.chemicalleasing.org>

⁴³⁸ <https://www.tandfonline.com/doi/full/10.1080/20430795.2020.1784681?scroll=top&needAccess=true> (Assessed 16 December 2021).

Leasing and Circular Economy (selected samples)

- **BNP Paribas** provides Leasing Solutions (together with 3 Step IT) that tracks the life cycle of corporate technology equipment (incl. computers, smartphones, printers, software, healthcare) to avoid waste and encourage refurbishing and reuse, focusing rather on service than on the product. BNP Paribas Leasing Solutions proposes rental contracts of 4 to 5 years. Solutions are offered to manufacturers of charging stations which deal directly with companies such as electricity fitters (e.g., propose equipment with services), companies (e.g., propose long-term car rental packages), energy providers (e.g., lease charging points to customers), and vehicle manufacturers (e.g., offer cars with charging stations).⁴³⁹
- **Philips Healthcare Partnership** is a business model that builds on upgradable equipment, system refurbishment and re-use of parts to reduce the total lifecycle costs of equipment and extend equipment lifetimes.⁴⁴⁰
- **Signify, formerly Philips Lighting, offers the ‘Pay per Lux’ service** – selling lighting service rather than light bulbs, incentivising durability.⁴⁴¹

Guarantees

Guarantees are not direct financing as such but are offering protection against associated risks (loan defaults) and can help to access funding sources with improved financial terms and conditions. Public guarantees (endorsed by public authorities) are especially powerful in mobilising private financing for sustainable (but not yet commercially viable) activities. Guarantees can compensate for limited collateral from circular business models and strongly activate traditional debt and equity investors. Guarantees typically cover a portion of the losses to the financier if default events materialize.

Generally, the guarantees do not cover all potential losses, as this would remove the incentive to conduct an extensive due diligence from the investor’s perspective. The split of losses might relate to, for example, protecting the financier against extreme losses, or the expected appetite of the financier to better manage their risks over time. In the case of a government-backed guarantee, a government agency guarantees that it will purchase the debt from the lending financial institution and take on responsibility for the loan.

Guarantees and Circular Economy (selected samples)

- The **Multilateral Investment Guarantee Agency (MIGA)** provides political risk insurance and credit enhancement for private sector investors and lenders and thus protects investments against non-commercial risks and can help investors obtain access to funding sources with improved financial terms and conditions; e.g. in 2013, MIGA issued guarantees for covering equity investments by Suez Environment, Infilco Degremont, Inc. (IDI), and Morganti Group Inc. (Morganti) for the AS Samra Wastewater Treatment Project in Jordan for up to 20 years against the risk of breach of contract.
- **Multilateral IFC Blended Finance Fund**, supported by a sovereign guarantee from Sweden’s SIDA and separately a USD 1 billion green bond fund by IFC and Europe’s Amundi asset manager, buys green securities (issued by developing country banks financing local currency climate investments).
- **EIB (COVID-19 response) guarantee schemes** have been expanded, e.g., a EUR 25 billion **European Guarantee Fund** has been created to support up to EUR 200 billion of financing (debt and equity) for companies throughout the EU. At least 65% of the financing will go to SMEs. Other relevant European public guarantee initiatives are e.g., the **COSME – Loan Guarantee Facility**⁴⁴² (e.g., guarantee 80% of loan amount), **EaSI Guarantee**⁴⁴³ (range of EUR 25K – 500K), **InnovFin Guarantees**⁴⁴⁴, **InvestEU – Guarantees**⁴⁴⁵, the **Modernization Fund**⁴⁴⁶ or other National public guarantees schemes.
- **ABN AMRO** asks suppliers to issue a **lifetime guarantee** covering the functionality of a product or a specific part. If it breaks down earlier than expected, ABN AMRO pays for the repair on a pro-rata basis. Such an agreement incentivizes suppliers to look more critically at their products’ lifespan and try to extend it using innovative and new solutions. In addition, the bank asks suppliers for a **buy-back guarantee**. The duration of this depends on the technical life cycle of the product.

⁴³⁹ <https://leasingsolutions.bnpparibas.com/en/bnp-paribas-leasing-solutions-finances-electric-charging-stations/> (Assessed 16.12.2021).

⁴⁴⁰ Philipps, Why circular design is essential for better healthcare (Access 16.12.2021).

⁴⁴¹ <https://signify.com/en-gb>

⁴⁴² <https://pfr.pl/en/offer/cosme-guarantee.html> (Assessed online 29 December 2021).

⁴⁴³ <https://evpa.eu.com/eu-funding/easi-guarantee-instrument> (Assessed online 29 December 2021).

⁴⁴⁴ https://www.eif.org/news_centre/publications/eif_flyer_innovfin_sme_guarantee_en.pdf (Assessed online 29 December 2021).

⁴⁴⁵ https://ec.europa.eu/commission/presscorner/detail/en/MEMO_19_2135 (Assessed online 29 December 2021).

⁴⁴⁶ <https://www.circularcityfundingguide.eu/funding-types-and-their-applicability/guarantees/public-guarantees/modernisation-fund-guarantees/> (Assessed online 29 December 2021).

Public-private-partnerships (PPPs)

Partnerships among governments, private sector, and civil society organizations (CSOs) are often useful to explore new business models and/or co-ordinate different economic activities. Core criteria are formalized partnership, risk-sharing mechanism, and financial incentives for private parties.⁴⁴⁷ Implications for circular economy activities are multifold. Generally, Key-Performance-Indicators (KPIs) are linked to time, labour, resource efficiency indicators and not specifically to circularity-related criteria. Unless the PPP project itself is based on circular economy principles (e.g., see the Guwahati waste management PPP in India), it is not common for a public sector client of a PPP project to explicitly incorporate circular economy principles into the KPI framework. As the principles of the circular economy become increasingly relevant, as well as the corresponding benefits, more and more governments take the opportunity to combine benefits of the circular economy with the **procurement of major infrastructure and utilities** through partnerships with private sector actors. PPP models could be considered to structure public and private contributions and to balance the early-stage (risky) character of projects as well as the limited risk appetite of the private sector. **PPP procurement** for circular projects can provide an “ideal contractual environment” which embeds circular economic principles in infrastructure and utilities projects. Governments should also be mindful that bid documentation and KPIs which encourage, and reward innovation must be both **pragmatic and implementable** – prescribing unfamiliar new technologies, practices and materials can likely increase risk and inevitably decrease sponsor and lender appetite.⁴⁴⁸ Thus, circular innovation requires flexibility.

PPP and Circular Economy (selected samples)

- **KfW's eco. business Fund in Latin America** focuses on PPPs and the mobilization of private funding towards preserving biodiversity and the sustainable use of natural resources.
- **ExpoLAB** from the Netherlands formed a PPP to apply the Cradle-to-Cradle principles and exploit the circular economy concept in the built environment e.g., for the Venlo city hall (comprising a raw-materials databank based 'passport', detailing production and origin of materials and determined for high-grade reuse when reaching the end of their useful life.⁴⁴⁹
- Different PPPs are used e.g., as a procurement model by the public sector to address waste management challenges, e.g., to recycle construction and demolition waste.⁴⁵⁰

Enabling Environment

The transition to circular economy entails the emergence of new and innovative business models incl. product-as-a-service via leasing, or tailored insurance for business-to-consumer rentals. However, those business models are often perceived as very uncertain given the lack of track record and the deviation from the standard linear business. Consequently, circular business models are considered as risky with uncertain returns given hardly predictable future outcomes. **Strong enabling framework conditions** are needed to create a level playing field for circular business models.

Public sector planning and finance plays a crucial role for mainstreaming **circular principles** (incl. resource efficiency and material recovery, etc.) **across national policies**.⁴⁵¹

A **policy mix** including economic instruments, regulations, information-based and voluntary approaches (e.g., green share reporting), environmental labelling (e.g., building codes), and public financial support (e.g., budget allocation) is needed to internalize environmental costs and provide incentives for applying circular concepts. Policy instruments can be grouped in three main categories:

- **Market instruments** can be used to generate public revenues, but also to internalize environmental costs to facilitate resource efficiency (e.g., taxes on virgin material, environmentally motivated subsidies for incentivizing the re-use of materials and recycling, pay-as-you-throw schemes, tradable landfill permit schemes),

⁴⁴⁷ Gardiner, A. (2015): Public-Private Partnerships for Climate Finance, (<http://dx.doi.org/10.6027/TN2015%E2%80%90577>).

⁴⁴⁸ <https://www.nortonrosefulbright.com/en/knowledge/publications/ab20952f/sustainable-cities-ppps-and-the-emergence-of-the-circular-economy-in-the-middle-east#autofootnote1> (Assessed online 29 December 2021)

⁴⁴⁹ European Circular Economy Stakeholder Platform (<https://circulareconomy.europa.eu/platform/en/contributor-category/public-private-partnership>).

⁴⁵⁰ Gorbachev, N.; Zenchanka, S., 2020, Current Approaches to Waste Management in Belarus (International Business, Trade, and Institutional Sustainability (pp.151-165).

⁴⁵¹ OCED, 2021, Towards a more resource-efficient and circular economy, The role of the G20.

to reform environmentally harmful subsidies. Generally, the use of market instruments requires a full reflection of possible outcomes to prevent contra-productive policies (e.g., incineration facilities and policies such as increased landfill taxes and landfill bans, which could make incineration more attractive to investors, but reduce progress towards recycling).

- **Regulatory instruments** may comprise recycling targets, product (quality) standards (eco-product design mandates), recycled content requirements, requirements on the reparability of products, requirements for recyclability, lifetime warranties, bans and restrictions, and deposit-refund systems (DRS).
- **Other instruments**, incl. information programs and campaigns or specific public procurement policies.

Groups of instruments can slightly differ across disciplines. Thus, the list is only illustrative, overlapping, and different allocation is possible.

Within the set of market and regulatory instruments, the following are particularly relevant to enable a circular economy:

- **Extended Producer Responsibility (EPR) schemes** based on the polluter-pays principle internalize the end-of-life management costs of materials, including collection and recycling (e.g., of packaging, electronic and electric equipment, batteries, tires and end-of-life vehicles, furniture, and textiles) and are usually set on a per-unit or per-weight basis. They should encourage manufacturers to take responsibility for the environmental impacts that are associated with their processes and products. They can include benefits such as waste prevention; reuse and recycling; use of recycled material; generation of economic value and reduced incineration.⁴⁵²
- **Green and Circular Public Procurement** incl. due diligence guidance for responsible business conduct, and for alignment with environmental and social standards. An example represents the OECD Due Diligence Guidance for Responsible Supply Chains in the Garment and Footwear Sector.⁴⁵³
- **Information and capacity building** for improving data, indicators and accounts on resource efficiency and waste (e.g., based on material flow accounts), R&D, and improving knowledge on the environmental impacts and costs of material resource use, **environmental labelling and information schemes**, voluntary agreements, and other private sector initiatives.

As instruments, such as trainings and policy-based support are not generating direct revenue streams, **grant funding and policy-based lending** are important levers for shaping an enabling framework for circular economy.

- Generally, grants⁴⁵⁴, as one-time payments / upfront instalments, cover a percentage of capital cost investments and can therefore function as an enabler by financing non-revenue generating parts (e.g., R&D, technical assistance). Grant financing in the area of soft costs investment, such as the creation of a suitable regulatory environment, including sectoral reforms, can be a prerequisite for the supply of commercial financing for the deployment of technologies.⁴⁵⁵
- To shape enabling environments such as policy reforms and institutional changes, policy-based loans (PBLs) are provided by multilateral and bilateral development finance institutions. Often, PBL projects are designed as multi-donor programmes and in combination with other financing instruments.

⁴⁵² For instance, ABN AMRO ask the supplier to issue a lifetime guarantee covering the functionality of a product or a specific part. If it breaks down earlier than expected, ABN AMRO pay for the repair on a pro-rata basis. Such an agreement incentivizes suppliers to look more critically at their products' lifespan and try to extend it using innovative, new solutions. In addition, the bank asks suppliers for a buy-back guarantee, the duration of which depends on the technical life cycle of the product.

⁴⁵³ [OECD-FAO Guidance for Responsible Agricultural Supply Chains](#)).

⁴⁵⁴ potentially in combination with other instruments

⁴⁵⁵ Osama et al. 2021 for African countries

IV. Annex: Financial Instruments along the Circular Value Hill

Up-hill categories

It is often repeated, that decisions made during the design phase of a product are responsible for about 80% of the environmental impact. With a proceeding implementation of a circular economy this proportion might shift in the times to come. However, the decisions made about sourcing of the substances and design of a product will keep determining the potential of a product regarding an intensified and extended product and material life cycle. Therefore, the first of the four high level category groups consist of the following five categories. In the first category, key activities are mainstream resource efficiency across value chains and enable industrial symbiosis; maximise repair, reuse, and remanufacturing activities; encourage eco-design that allows products to be repaired, reused, and recycled.

Up-hill categories	Examples of projects ⁴⁵⁶	Selected instruments	
<p>1a. Design and production of products and assets that enable circular economy strategies through e.g. (i) increased resource efficiency, durability, functionality, modularity, upgradability, easy disassembly, and repair; (ii) use of materials that are reusable, recyclable, or compostable</p>	<p>Research and Development interventions, incl. pilot and demonstration facilities, enabling activities under CE categories</p> <p>Scale-up and deployment of new technology at commercial scale supporting activities under circularity categories</p> <p>Design/construction of new buildings and infrastructure incorporating circular products, materials, construction processes and technologies</p>	<p>Enabling framework function (Section 2.5)</p> <p>Use grant funding for capacity building (incl. TA/training/guidelines) to set an enabling framework as a prerequisite for scaling-up and commercializing CE business models, across sectors, incl.:</p> <ul style="list-style-type: none"> ▪ Develop and enforce standards and codes, product passports to enable multiple use cycles for products and components ▪ Develop and promote information and eco-labels (incl. certification processes) ▪ Reflect circular thinking in educational curricula (schools, universities, apprenticeships, etc.) ▪ Upgrade / Set up research and development institutions for CE solutions (across CE categories) ▪ Enable authorities, e.g., as regards the consideration of waste prevention requirements when issuing licenses), revise public circular procurement, condition public staff to procure more circular ▪ Revise regulation, e.g., in favour of product usage intensity and life extension, for take-back or buy-back programs ▪ Revise fiscal policies, e.g., reduce value added taxes for CE-related activities, tax exemptions and fiscal compensation for recycled content and the use of secondary materials, increase taxation for environmental harmful activities and on raw / virgin materials (e.g., for sand, gravel, rock used in the construction industry) ▪ Relevant for taxation and financial models can be adjusted depreciation/accounting methods for circular products (due to its increased value), e.g., for buildings based on secondary materials (and verified with a material passport) ▪ Revise EPR to encourage e.g., the use of recycled materials ▪ Support innovations (R&D) along the value chain of the electronics industry to increase refurbishment, reuse, repurposing (and eventually reduce e-waste) and for the redesign of packaging models that require less packaging material or zero packaging (especially for plastics as recyclability is not always an ideal criterion – particularly when recycling facilities are incompatible 	<p>Access to capital function (Section 2.3)</p> <p>In the early-stage phase (e.g., new innovative technology) consider equity financing - if VC capital is available, results-based-payments, sustainable bonds, and/or concessional loans (soft loans):</p> <ul style="list-style-type: none"> ▪ Leverage short-term government support to drive circular solutions and commitments e.g., through conditional/concessional loans ▪ Result-based-payments for e.g., digital solutions (increase product traceability, product passports) to implement data tracking (e.g., waste) for regulatory changes associated with EPRs ▪ Offer KPI-linked loans to companies, that needs to showcase efficiency measures compared to baseline business as usual ▪ Provide equity or debt finance to “home” companies which promote circular solutions in global markets ▪ Offer blended finance (incl. concessional loans, commercial loans, and de-risking via guarantees) to facilitate private capital for e.g., modular construction and housing solutions <p>Reduce risk function (Section 2.4)</p> <ul style="list-style-type: none"> ▪ Establish product guarantee system for construction materials ▪ Consider loan guarantees to an intermediate bank (e.g., for loan default) ▪ Consider PPP procurement guidelines incl. circular principles <p>Selected corporate sample:</p> <ul style="list-style-type: none"> ▪ Renault offers battery-leasing arrangements for its electric vehicles <p>Selected IFI samples:</p> <ul style="list-style-type: none"> ▪ Nefco provides (conditional) loans and equity capital to Scandinavian SMEs and
<p>1b. Development and deployment of process technologies that enable circular economy strategies</p>	<p>Corporate samples:</p> <p>Nestlé committed up to USD 2.2 billion until 2025 to shift from using virgin polymers to sourcing food-grade recycled plastics</p>		
<p>1c. Development and sustainable production of new materials (including bio-based materials) that are reusable,</p>	<p>Hewlett-Packard partnered with Sintronics to recover and create value out of end-of-use</p>		

⁴⁵⁶ Based on EIB, 2020, The EIB circular economy guide supporting the circular transition.

Up-hill categories	Examples of projects ⁴⁵⁶	Selected instruments	
recyclable, or compostable	electronic equipment	with the type of plastic or the current local markets for secondary plastics do not exist)	midcaps for green investments in global markets ⁴⁶⁰
1.d Substitution or substantial reduction of substances of concern in materials, products, and assets to enable circular economy strategies	<p>Caterpillar's re-manufacturing programme produces "same-as-new" components and replacement parts for a fraction of the cost of new parts (for more than 7,600 products)</p> <p>IBM operates asset-recovery centres (dismantle used electronics and harvest parts for reuse)</p> <p>Rolls-Royce uses predictive analytics for life cycle engine care and enables up to 95% of used engine parts to be recovered or recycled</p> <p>Jaguar Land Rover recycles aluminium from end-of-life vehicles back into high-quality materials for the manufacture of new vehicles⁴⁵⁷</p>	<p>Regarding building and construction environment⁴⁵⁸:</p> <ul style="list-style-type: none"> ▪ Develop standards and norms and building passports for the use of more eco-materials and for non-virgin construction materials, allow for reuse and/or reassembly of building components and materials, restrict harmful materials (e.g., prohibition of hydrofluorocarbons), requirements for demolition (e.g., recycle rate, waste laws) ▪ Foster good practice, e.g., built in regeneration concepts (green roof) and mechanical connections (and reduction of "wet methods") <p>Regarding plastics and packaging and other fast moving consumer goods (e.g., textiles):</p> <ul style="list-style-type: none"> ▪ Incentivize / support circular product design ▪ Develop standards and norms for secondary materials to increase sourcing and use of recycled materials <p>Regarding food:</p> <ul style="list-style-type: none"> ▪ Support and finance partnerships to build capacity of farmers, especially smallholders, to adopt locally appropriate regenerative methods and technologies that increase land productivity sustainably <p>Selected samples for enabling framework functions:</p> <ul style="list-style-type: none"> ▪ Tax on virgin plastics, e.g., €450/ton in Italy⁴⁵⁹ ▪ EPR bills for the rubber tyre production in Chile and Argentinian require management systems for used tyres and circular design principles to ensure recovery of rubber and other tyre components as a secondary material. ▪ Brazil's EPR bills stimulate the use of biodegradable plastic and avoidance of hazardous materials in product design. ▪ In Chile, law 20.920, enacted in 2016, established a legal framework for waste management and introduced EPR schemes for six priority products: lubricating oil; car batteries; electrical and electronic products; tyres; batteries; wrapping and packages. 	<ul style="list-style-type: none"> ▪ EIB loan-finance for SAICA's investment in new technologies to improve production lines at its factory producing paper for corrugated cardboard in El Burgo de Ebro, Zaragoza - enabling the use of more recycled fibre as raw material, improving the management of natural resources, following the principle of the circular economy ▪ EIB loan-finance for Novamont S.p.A. for the development of an integrated supply chain for the development of innovative biodegradable and compostable bioplastics and biochemicals (by applying renewable sources and reusing by-products from local agriculture) – to be used in industry (e.g., biodegradable lubricant oils for vehicles) and for consumer goods (e.g., base for carrier bags and packaging).⁴⁶¹ The project comprises R&D and the installation of new production lines.
1.e Substitution of virgin materials with secondary raw materials and by products			<p>Selected private finance sector samples:</p> <ul style="list-style-type: none"> ▪ Circulate Capital Ocean Fund (CCOF I) provides debt and equity finance to waste management, recycling, and circular economy start-ups in Asian frontier markets, incl. Vietnam. The <i>Circulate Capital Disrupt</i> is a companion venture and private equity fund to CCOF that invests globally in disruptive technologies at the nexus of climate tech and circular plastics. These include innovative materials, alternative delivery models, advanced recycling technologies and deep technologies that apply big data and artificial intelligence to expand circular supply chains ▪ ING Bank have supported several green and sustainability bonds in support of the circular economy ▪ Cassa Depositie Prestiti (CDP) manages a climate change investment platform that enables risk-sharing together with the Italian national promotional bank. The Platform focuses on circular economy projects sourced by intermediary commercial banks and is supported by a guarantee under the European Fund for Strategic Investments.

⁴⁵⁷ <https://www.treasurers.org/hub/treasurer-magazine/five-minutes-financing-circular-economy> (Assessed online 23 December 2021).

⁴⁵⁸ Tool to Optimise the Total Environmental Impact of Materials (TOTEM) is an online open-access calculation tool aimed at supporting architects, designers, and builders in improving material and energy performance of buildings and at assessing the environmental impact of building materials.

⁴⁵⁹ UNEP, 2020, Financing Circularity: Demystifying Finance for the Circular Economy.

⁴⁶⁰ <https://www.nefco.int/financing-options/financing-for-companies/?fbclid=IwAR0ioGqDpCllgEFM2N8cvan6SnMNHZ-DADLv00Pm5HK559MBjLgLiXkmB0Ec> (Assessed online 23 December 2021)

⁴⁶¹ EIB, 2021, Projects to be financed. Novamont renewable chemistry (accessed Nov 2021 via: <https://www.eib.org/en/projects/pipeline/all/20150447>) (Assessed online 03 January 2022)

Top hill categories

Keeping products or resources in use for longer (long life loops) or tapping into un- or underused capacity of a product or resource during their life cycle (intensifying loops) are possibilities to extract more resource value from a particular product. Strategies to keep a product performing on consistent or evolving standards or performance are such as maintenance, repair, refurbishment etc. Strategies to intensify a product use or to facilitate its subsequent can be sharing, co-use or cascading. Consider the **extend products durability** (tangible or intangible), by using it more intensely. This can be done through a servization (as-a-service products, sharing models, platforms). Generally, a re-thinking of product ownership can significantly improve the life-cycle of products. Support and finance development and piloting (R&D) of digital solutions to increase product traceability and transparency (building on standardized indicators).

Top-hill Category	Examples of typical investments/projects	Selected instruments	
2.a Reuse, repair, refurbishing, repurposing, and remanufacturing of end-of-life or redundant products, <u>movable assets</u> and their components that would otherwise be discarded	<p>Refurbishment, retrofitting and remanufacturing of end-of-life or redundant products/movable assets</p> <p>Construction, expansion or retrofitting of manufacturing facilities, ancillary equipment, and technology for refurbishing and remanufacturing purposes</p> <p>Establishment of organisations for the reuse and repair of consumer products (e.g., bicycles, household appliances)</p> <p>Establishment of organization that manages tools and equipment for communities (shared-spaces, shared garage, shared tools)</p>	<p>Enabling framework function (Section 2.5)</p> <p>Use grant funding for capacity building (TA/training) to set an enabling framework as a prerequisite for commercialization across sectors:</p> <ul style="list-style-type: none"> ▪ Revise public procurement (guidelines) to ensure circular criteria in evaluation processes and waste prevention ▪ Revise fiscal policies: lower VAT for repair, refurbishing, and remanufacturing activities and certain CE products, lower labour tax for certain activities, reduce income tax for CE start-ups ▪ Develop quality standards for reuse (e.g., assess policy options to make repair and reuse more economically attractive consumers) ▪ Develop buy-back programmes including appropriate incentives for market participants (e.g., develop buy-back programmes, safe data cleansing options, deposit schemes, take-back via parcel service, door-stepping campaigns, solution building on digital technology, etc) ▪ Raise awareness across public and private sector players to transform consumption modes and to increase market demand for circular products and services <p>Regarding plastics and packaging and electronics</p> <ul style="list-style-type: none"> ▪ Revise fiscal policies: consider schemes to address cost barriers for consumers e.g., by providing targeted subsidies that address premium pricing on reuse options, with a focus on reuse items with the most significant environmental impact (e.g., tax reduction, beneficiary depreciation models, subsidies, etc.) <p>Selected sample for enabling framework functions</p> <ul style="list-style-type: none"> ▪ Tax-reduction to stimulate the repair of goods in Sweden⁴⁶² 	<p>Access to capital function (Section 2.3)</p> <p>Offer leasing options to:</p> <ul style="list-style-type: none"> ▪ End-consumers (finance lease) ▪ Manufacturer within the value-chain <p>Incentivise business models through concessional lending (KPI-linked; result-based):</p> <ul style="list-style-type: none"> ▪ offer inexpensive repair services ▪ trade in old phone for a new one <p>Reduce risk function (Section 2.4)</p> <p>Provide for loan guarantee schemes (e.g., government backed) to facilitate commercial loans for SMEs that invest in:</p> <ul style="list-style-type: none"> ▪ Repair and reuse business models ▪ Digital platforms for sharing and services ▪ Facilitate insurance options to de-risk for ▪ services-based sharing business models ▪ independent repair providers <p>Selected commercial sample:</p> <ul style="list-style-type: none"> ▪ Swedish Insurance Fintech Omocon protects the actual owner of the circular/shareable good or asset that needs protection against damage⁴⁶³ ▪ Free repair services (e.g., Patagonia) ▪ Trade in old phone for a new one (e.g., Apple)
2.b. Refurbishment and repurposing	Refurbishment (including retrofitting) of end of design life	<p>Enabling framework function (Section 2.5)</p> <p>Use grant funding for capacity building (TA/training) to</p>	<p>Access to capital function</p> <ul style="list-style-type: none"> ▪ Mix of blended instruments (equity and debt, incl. result-based finance) given country

⁴⁶² UNEP, 2020, Financing Circularity: Demystifying Finance for the Circular Economy.

⁴⁶³ UNEP, 2020, Financing Circularity: Demystifying Finance for the Circular Economy.

Top-hill Category	Examples of typical investments/projects	Selected instruments	
<p>of end of design life or redundant <u>immovable</u> assets (<u>buildings/infrastructure/facilities</u>)</p>	<p>or abandoned/unoccupied residential buildings for the purpose of bringing them back into use as residential buildings</p> <p>Refurbishment (including retrofitting) of abandoned/ unoccupied commercial or industrial buildings and facilities, bringing them back into use with the same or different purpose, including residential.</p>	<p>set an enabling framework for building and construction:</p> <ul style="list-style-type: none"> ▪ Revise construction sector strategy/policy – ensure (public) commitment, e.g., refurbishment and retrofitting in construction sector are based on a long-term vision, establish the use of material passports and building material databases to reduce and prevent demolition waste, reduce the use of building materials and construction waste and promoting secondary materials for the design of new buildings ▪ Revise/Develop building standards and codes for construction and for demolition (e.g., recycle rate, waste laws) ▪ Revise fiscal policies, incentive businesses and manufacturers, that voluntarily establish reverse logistics and extended life ▪ Develop retrofitting and renovation approaches through selective separation, instead of full demolition 	<p>circumstances and stage of development (early-stage vs commercialization)</p> <ul style="list-style-type: none"> ▪ Concessional loans for eco-friendly construction concepts (e.g., improve access to capital for product use extension business models), incl. long-term, low-interest loans for MSMEs to finance construction and building activities using circular approaches (e.g., non-virgin materials) ▪ Sustainable-linked bonds (with long tenor) for infrastructure projects (e.g., KPI-linked bond and circular procurement principles) <p>Reduce risk function (Section 2.4)</p> <ul style="list-style-type: none"> ▪ Set up SPVs and PPPs to foster private sector mobilization <p>Selected IFI sample</p> <ul style="list-style-type: none"> ▪ EBRD's green transition bond (USD 500 million) with finance being directed toward investments that enable circular manufacturing (incl. chemicals, cement, and steel production)
<p>2.c Product-as-a-service, reuse and sharing models based on, inter alia, leasing, pay-per-use, subscription, or deposit return schemes that enable circular economy strategies</p>	<p>Investments in businesses applying product-as-a-service, reuse and sharing models based on, amongst others, leasing, pay-per-use, subscription or deposit return schemes</p> <p>Develop digital sharing platforms (user/member owned)</p>	<p>Enabling framework function (Section 2.5)</p> <p>Use grant funding for capacity building (TA/training) to set an enabling framework across sectors, especially for fast-moving consumer goods and packaging:</p> <ul style="list-style-type: none"> ▪ Revise policies/regulations: Promote as-a-service business models and (deposit) refund schemes (e.g., consumers pay a deposit when they purchase an item which is refunded when they return the used item) ▪ Revise fiscal policies: develop tax models to incentivize both: supplier (service provider “owner” of the equipment) and demand side (service taker). ▪ Revise (public) procurement: encourage as-a-service business models ▪ Raise awareness across stakeholders regarding the use of circularity approaches (e.g., in the manufacturing/electronics process). <p>Selected commercial sample:</p> <ul style="list-style-type: none"> ▪ ABN AMRO ask suppliers to issue a lifetime guarantee covering the functionality of a product or a specific part. If it breaks down earlier than expected, ABN AMRO pay for the repair on a pro-rata basis. Such an agreement incentivizes suppliers to look more critically at their products’ lifespan and try to extend it using innovative, new solutions. In addition, the bank asks suppliers for a buy-back guarantee, the duration of which 	<p>Access to capital function (Section 2.3) and Reduce risk function (Section 2.4)</p> <p>Offer favourable debt/equity instruments and leasing options to facilitate as-a-service business models, e.g., for:</p> <ul style="list-style-type: none"> ▪ Electronic equipment (e.g., weekly payment for rental of home electrics etc.) ▪ Pay-per-kilometre options (rental cars) ▪ Pay-per-page (Office equipment) ▪ Pay-as-you-throw schemes <p>Develop subscription-based finance models for sharing business models (e.g., for fashion rental)⁴⁶⁴ and reflect in loan assessment (Shifting from large upfront investment to servitization models enable SMEs instead of traditional business models - with large CAPEX).</p>

⁴⁶⁴ Pay-by-use, product as a service (e.g., leaving ownership (of the materials) to the supplier, Introduce bring-back policies in contracts at the end-of-use of equipment (UNEP, 2020, Financing Circularity: Demystifying Finance for the Circular Economy).

Top-hill Category	Examples of typical investments/projects	Selected instruments	
		depends on the technical life cycle of the product.	
2.d Rehabilitation of degraded land to return to a useful state and remediation of abandoned or underutilised brownfield sites in preparation for redevelopment	Investments aimed at the rehabilitation or remediation of land for subsequent reuse/redevelopment. The refurbishment/repurposing of existing buildings and infrastructure on the site shall qualify as a circular activity where it meets the criteria for circular category 2.b. Replacements with new buildings and infrastructure shall qualify where it meets the criteria for circular category 1.a.	See 2 a, b, c Enabling framework function (Section 2.5) <ul style="list-style-type: none"> ▪ Use grant funding for capacity building (TA/training) to incentivise models of retrofitting instead of total demolition and new construction. ▪ Revise fiscal policies: tax exemptions for specific activities, incentives for environmental-friendly architecture Use grant funding for capacity building (TA/training) to set an enabling framework for food /agriculture : <ul style="list-style-type: none"> ▪ Revise policies: Develop multi-stakeholder partnerships to take a value chain approach to increase availability, affordability, and use of climate smart storage, preservation, and cold chain technologies in farmer and distribution networks in low- and middle-income countries, ▪ Develop auditable standard for data quantification that builds on the Food Loss and Waste Protocol in coordination with the private sector 	See 2 a, b, c

Downhill categories

Down-hill business models for **value recovery** aim for **reducing wastage** and **conserving resources** by **maximising recovery and recycling** of products and materials to be used for new products, e.g., by returning products to the production side (reverse logistics). Business models differentiate **downscaling activities** that result in lower quality and/or lowered functionality, and on the other hand; and **upscaling activities** that transform by-products/waste into new products of better value.

Technology solutions and concepts are available that enable an integrated waste management approach considering a CE concept, i.e., by also promoting waste prevention and zero waste. However, this indispensable (solid) waste management is commonly an **expensive service** and relies on **formal adequate waste collection and treatment services** that are also **accessible and affordable** for all. The actual (financial) management of waste services is, however, commonly in the hand of the municipalities (based on a service or rental fee). There is on one hand the financing required for associated **collection services** (incl. waste containers, their emptying, and the transportation of the collected waste) and on the other hand, the investments into appropriate **waste management infrastructure** (the establishment, operation and aftercare of waste deposits and treatment facilities). The costs caused by the management of waste should be recovered from those who generate the waste and benefit from the disposal efforts (polluter pay principle).⁴⁶⁵ Commonly, there is a lack of finance. Insufficient technical knowledge or capacity are also common barriers for setting up or extending waste services and for implementing (resource efficiency) policies - especially in less developed countries. To **promote value recovery business models**, government policies must control the enforcement of environmental objectives, which refers partly to financial means⁴⁶⁶. **Enabling framework conditions** need to be addressed – among others by **formalising** the informal waste sector or, where relevant, integrating informal waste services into formal waste management systems, but also by addressing **framework conditions for the materials cycle** (*Up-hill* incl. promotion of *design-out waste*) to move away from disposal and to improve material recovery. It needs a **mix of environmental policies** (e.g., subsidies and tax exemptions to incentivise CE approach and to address contamination with liability rules that the polluter pays⁴⁶⁷, incl. pollution levies/fines, environmental tax (waste disposal, packaging, commodity). Overall governance, transparency and accountability should be promoted across the value chain. Lock in effects e.g., by promoting waste to energy incineration need to be prevented as the can compromise and slow down recycling. Besides, to enable required investments, capital needs to be made available, but by offering a **mix of financial instruments**, e.g.,

⁴⁶⁵ Next to the willingness-to-pay, the affordability-to-pay is a key element in the marketing of solid waste services.

⁴⁶⁶ OECD, 2019, Environmental Performance Reviews Waste Management and the Circular Economy in Selected OECD Countries (Investment and financing mechanisms for waste management).

⁴⁶⁷ The costs caused by the management of waste should be borne(recovered) from those who generated the waste and benefit from the disposal efforts.

via blended financing instruments for mobilizing commercial investment by de-risking. By **utilizing PPPs**, investments can be also facilitated for the scaling of CE in waste management. The public sector, however, needs to keep playing a key role in promoting investments.

Down-hill categories	Examples of typical investments/projects	Selected instruments	
<p>3.a Separate collection and reverse logistics of wastes and redundant products, parts, and materials, enabling circular value retention and recovery strategies</p>	<p>Physical equipment, transport and building infrastructure to organise the take-back and reverse flow of products and materials to relevant facilities for repair, refurbishing, remanufacturing, or recycling, e.g.:</p> <p>Expand affordable <u>collection</u> facilities to all in society (regardless of income) and formal waste collection and disposal structures (integrating interest of local government and of informal sector).</p> <ul style="list-style-type: none"> Segregate (<i>hazardous</i>) waste materials, to facilitate reuse, remanufacturing and recycling. 	<p>Enabling framework function (Section 2.5)</p> <p>Use grants for capacity building (TA/training) to set an enabling framework as a prerequisite for commercialization:</p> <ul style="list-style-type: none"> Revise regulations: Facilitate (and enforce) deposit refund systems (<i>take-back schemes</i>) and collection to support return and reuse of products and (plastic) packaging and increase the collection of recyclables and re-evaluate the classification and treatment of used products. (<i>also relevant for 3b</i>) Revise policies: Include (informal) waste market players and advance acceptable work opportunities to improve waste collection and management of recyclables, and safeguard the rights of collectors and recyclers (<i>also relevant for 3b</i>) Facilitate separation, ban collection of food waste in urban mixed waste collection systems, to increase composting rates and alternative uses Revise fiscal policies: consider reduced VAT rate for repair and reuse activities and increase taxes on non-repairable products or non-economically recyclable material Implement the polluter pays principle and establish Extended Producer Responsibility (EPR) schemes and landfill taxes (ensure net costs of collection, treatment and recycling are covered by producers, consider EPR schemes for all relevant waste streams (i.e., beyond e-waste and packaging) and based on transparent and adjusted criteria for setting fees, such as the properties of the products (incl. toxic content, durability, reparability and recyclability) (<i>also relevant for 3b</i>) and progressively increase taxes on landfill and incineration (<i>also relevant for 3b</i>). Develop mandatory Pay-As-You-Throw systems for municipal solid waste to promote separation of recyclable and compostable waste <p>Regarding fast moving consumer goods, e.g., textiles</p> <ul style="list-style-type: none"> Develop and enforce quality and safety standards for sorting and recycled textiles outputs and support advancing of textile tracking systems to increase transparency 	<p>Access to capital function (Section 2.3)</p> <p>Facilitate access to finance: <i>Ensure sustainable financing for waste management infrastructure e.g., by promoting (selected) CE business models, such as leasing or sharing</i></p> <ul style="list-style-type: none"> Consider the use of fiscal transfers from central governments to support fund municipal waste collection and treatment (-> <i>Also Enabling Framework Function</i>) Cover transaction costs (incl. feasibility assessments, permitting and technical documentation) during the project preparation phase, through grant funding/seed capital Long-term, low-interest loans for MSMEs to finance collection and segregation systems Consider grant funding and PPPs-based funding for separate collection and segregation systems (-> <i>Refers also to Risk Reduction</i>) <p>Specialised private sector producers may provide corporate waste financing for collection, but also for treatment and recovery (e.g., in case of mandatory collection of electrical and electronic equipment waste)</p> <p>Selected public and IFI samples</p> <ul style="list-style-type: none"> EU funds supported the separate collection of MSW, e.g., in Estonia (external public grant financing for waste investments) An EIB-loan-finance for the Romania Recycling and Circular Economy enabled investments to increase the collection of recyclable materials, the production of Polyester Staple Fibre from PET flakes and the recycling of waste electric and electronic equipment to support the transition to a circular economy and meet national recycling targets

Down-hill categories	Examples of typical investments/projects	Selected instruments	
		<p>Selected regulatory samples:</p> <ul style="list-style-type: none"> ▪ Brazil's Buenos Aires Recycling Cooperatives of informal recyclers became part of the city's inclusive recycling, being contracted by the government to run the door-to-door collection and the processing of recyclable materials. The recycling concept based on social inclusion is part of the "zero-waste" law. ▪ Philippines' San Fernando passed the Ecological Solid Waste Management Act, with focus on recycling and composting through the setup of decentralised Materials Recovery Facilities in each district, to reduce the amount of waste that needs to be disposed. ▪ Indonesia's Yayasan Pengembangan Biosains dan Bioteknologi (YPBB) developed a zero-waste plan for household waste and offers door-to-door waste collection and composting of organic waste and thus reducing the flow for landfills. Due to the effectiveness of the plan, the local governments started increasing financial support for decentralized waste management. The success was among others possible due to extensive awareness rising to address the attitude and behaviour of households. ▪ Colombia's EPR bill for the collection and treatment of packaging waste by waste management systems makes producers responsible for collection and recovery. 	
3.b Recovery of materials from separately collected waste in preparation for circular value retention and recovery strategies (excluding feed-stock covered under 3.c)	<p>Material recovery facilities (MRF), process technology and mobile equipment, involving manual, semi-automated and/or fully automated mechanical processes (dismantling, separation, sorting, crushing, shredding, cutting, post-treatment technologies, etc.), e.g.:</p> <p>Ensure controlled treatment and disposal of waste, and facilitate opportunities towards higher R's (i.e., reduce, reuse,</p>	<p>Enabling framework function (Section 2.5)</p> <p>Use grants for capacity building (TA/training) to set an enabling framework as a prerequisite for commercialization:</p> <ul style="list-style-type: none"> ▪ Raise awareness: train public authorities to stop investments in (harmful) solutions, such as Waste-to-Energy Incineration to prevent lock-in effects (that wastes recyclable materials) ▪ Revise fiscal policies: Introduce and develop landfill levies, ▪ tax exemptions and subsidies for CE related activities ▪ Improve data management for food brands and retailers (e.g., provide their food waste data to support transparency; Support calculation of costs of wasted materials, and prove the economic and environmental value of repurposing them) <p>Selected fiscal policy samples:</p> <ul style="list-style-type: none"> ▪ In Israel, landfill levies were collected into a dedicated environment fund that is used to finance municipal and private sector waste management activities and build needed waste infrastructure 	<p>Access to capital function (Section 2.3)</p> <ul style="list-style-type: none"> ▪ Cover transaction costs (incl. feasibility assessments, permitting and technical documentation) during the project preparation phase, through grant funding/seed capital. ▪ Provide long-term, low-interest loans for SMEs to finance recycling facility and technology investments, e.g., for fast moving consumer goods such as electronics (e.g., for adjusting recycling processes to complement design for recyclability (e.g., to optimize recovery of materials at high rates and quality levels), such as sorting and pre-processing technology (disassembly robots able to use dismantling commands stored in product passports, and intelligent sorting systems). For fast moving consumer goods such as textiles (e.g., technologies for digitally sharing product information and/or for automated, sensor-based sorting). ▪ Provide project finance -> SPVs and PPPs, incl. public equity co-investments directly into an operating company <p>Selected public and IFI samples</p> <ul style="list-style-type: none"> ▪ In Colombia, World Bank and bilateral aid programmes have provided external resources to support waste investments.

Down-hill categories	Examples of typical investments/projects	Selected instruments	
	<p>recycle) where possible and avoiding lock-ins into lower-value loops or linear systems, where waste is not transformed into resources</p> <p>Chemical recycling plants involving various types of technologies and processes (e.g., depolymerisation, solvolysis, gasification, pyrolysis, etc.) and to manage hazardous waste streams separately in environmentally sound facilities</p>	<ul style="list-style-type: none"> ▪ Since 2001, the Government of Colombia has provided tax exemptions for investments in recycling ▪ In Japan, the Eco Town Programme addressed town planning and community recycling and provided financing for recycling investments. Subsidies (on average about one-third of investment costs) were available for private companies for innovative recycling projects for MSW and for organic waste, plastic waste and Waste Electrical and Electronic Equipment (WEEE) ▪ The investment initiative in Africa and Asia FINILOOP (Financial Inclusion and Improved Livelihoods Out of Plastics), builds local capacities in facilitating loans to redesign and improve municipal management of plastics (improving recycling infrastructure, plastics recycling business development, and waste segregation at source) 	<ul style="list-style-type: none"> ▪ In Poland, the Czech Republic, Hungary and Slovenia, grants from EU funds (for low-income regions) supported a broad range of waste treatment investments, including integrated waste facilities that combined sorting, recycling, and composting for MSW., plus EIB loans for Poland and Estonia to finance waste treatment investments. ▪ In Poland, revenues from environmental taxes and charges (the National Fund for Environmental Protection and Water Management and regional environmental funds) were used for low-interest loans (e.g., for integrated waste management facilities in Pomerania). ▪ Improved Management of E-waste and Healthcare Waste to Reduce Emissions of Unintentionally Produced POPs (UPOPs) in Egypt: (Improved Management of E-waste, via GIZ and KfW) ▪ EIB excludes incineration as a contributor to a CE⁴⁶⁸ <p>Reduce risk function (Section 2.4)</p> <ul style="list-style-type: none"> ▪ Provide (De-risking) Loan guarantee schemes that are backed by governments facilitate and encourage commercial banks to offer loan finance to SMEs that invest in circular solutions but are unable to obtain loans, due to the high risk involved or lack of collateral (e.g., in form of blended finance). ▪ Provide (De-risking) Political risk insurance e.g., via national export credit agencies to mitigate risks arising from the adverse actions of governments, etc. to provide a more stable environment for investments (in recycling infrastructure, equipment-leasing models, etc.) into developing countries, and to unlock better access to finance.
3.c Recover and valorisation of separately collected biomass waste and residues as food, feed, nutrients, fertilisers, bio-based material	<p>Bio-refinery facilities and process technology for the extraction of bio-based products and feedstock from bio-wastes and residual biomass, wastewater, and sludge of organic origin</p> <p>Anaerobic digestion and composting plants utilising the resulting digestates/composts as</p>	<p>Enabling framework function (Section 2.5) See 3.a, b.</p> <ul style="list-style-type: none"> ▪ Revise fiscal policies: Tax exemptions, subsidies ▪ Revise regulations: Setting standards ▪ Develop policies to advance disposal fees (e.g., consumers pay a fee at the point of purchase, based on estimated collection and treatment cost, which is used to finance end-of-life management of the products)⁴⁶⁹ ▪ Raise awareness and increase capacities <p>Selected fiscal policy sample:</p> <ul style="list-style-type: none"> ▪ The Government of Colombia provides tax exemptions for energy generated by agricultural waste 	<p>Access to capital function (Section 2.3) See 3.a, b.</p> <ul style="list-style-type: none"> ▪ Blended finance (incl. guarantees, grants and concessional financing, debt finance (loan, project finance, bonds), equity finance) ▪ Leasing ▪ PPPs <p>Selected public sample:</p> <ul style="list-style-type: none"> ▪ Brazil's Guarantee Fund for Biogas (GFB) provides short-term collateral for biogas project loans and unlocks public and private finance

⁴⁶⁸ EIB Circular Economy Guide 2019.

⁴⁶⁹ Policies need to consider that plants must be financed with a combination of revenue for the treatment of waste ('gate fee' and paid per ton of bio-waste treated; payment to be arranged by the municipality as owner of the waste, financed through fees for waste collection from households, and can be co-financed by regional funds under conditions), and a revenue for the sale of renewable gas or renewable electricity and heat and development of commercial products such as fertilisers from biogas production.

Down-hill categories	Examples of typical investments/projects	Selected instruments	
s	fertilisers/soil conditioners.		
3.d Reuse/recycling of wastewater	Equipment and technology to collect, treat and distribute wastewater in order to reuse it for household, industrial or agriculture purposes instead of discharging it	<p>Enabling framework function (Section 2.5)</p> <p>Use grants for capacity building (TA/training) to set an enabling framework as a prerequisite for commercialization:</p> <ul style="list-style-type: none"> ▪ Raise awareness and increase capacities of local utilities (to improve technical and financial performance (technical assistance / training) contributes to enhancing the creditworthiness of utilities. ▪ Raise awareness and increase capacities of commercial financiers (to adjust lending practices by creating financial products specifically targeting the needs of the sector, including longer tenors with a sufficient grace period, and reduced collateral requirements) ▪ Set up and enforce environmental standards 	<p>Access to capital function (Section 2.3)</p> <ul style="list-style-type: none"> ▪ Grants and concessional financing are for off-grid solutions ▪ Blended finance for (near) creditworthy utilities, incl. long-term finance and guarantees for mobilising commercial finance ⁴⁷⁰ (e.g., applying project finance by implementation of a project on the basis of a specially created company (SPV)) ▪ Bonds (via municipalities) <p>Selected public and IFI samples:</p> <ul style="list-style-type: none"> ▪ A PPP in Durban (South Africa) treats and reuses water from sewerage systems for industrial use (by a paper mill and a local refinery) ▪ Rwanda 's Kigali Bulk Water Supply Project for the construction of a water treatment plants provides financing of a large-scale water treatment facility via a PPP (Development finance in form of TA, debt and equity via Metito) ▪ Jamaica Credit Enhancement Facility for the construction / rehabilitation of wastewater treatment plants (incl. a grant from the GEF's Caribbean Regional Fund for Wastewater Management that serves as a guarantee to an existing revenue stream (the K-Factor - a surcharge on water bills) that unlocked loan finance for wastewater treatment projects ▪ With the World Bank Group Scaling ReWater initiative, IFC addresses barriers to investment in wastewater treatment and reuse and offers transaction advice, financing solutions and hybrid financing from public and private sources, mainly to leverage private capital to accelerate the construction of wastewater treatment plants <p>Reduce risk function (Section 2.4)</p> <ul style="list-style-type: none"> ▪ PPP between municipalities and private environmental services companies ▪ Political risk insurance e.g., to provide a more stable environment for private investments (in wastewater infrastructure, sewage sludge recycling, etc.) and to unlock better access to finance <p>Sample:</p> <ul style="list-style-type: none"> ▪ A PPP in Durban (South Africa) treats and reuses water from sewerage systems for industrial use (by a paper mill and a local refinery)

⁴⁷⁰ OECD, 2019, Making Blended Finance Work for Water and Sanitation Unlocking Commercial Finance for SDG 6.

Cross hill categories

Circular support models focus on the support and facilitation of all circular strategies in all lifecycle phases. This entails the management and coordination of circular value networks and resource flows, optimising incentives, and other activities that support the transition to circularity.

Cross-hill categories	Examples of typical investments/projects	Selected instruments	
<p>4.a Development /deployment of tools, applications and services enabling circular economy strategies</p>	<p>ICT tools for predictive maintenance and repair to extend the life of products</p> <p>Digital tools and applications to enable reverse logistics (tracking, take-back of products for reuse, repair, or recycling), improve resource efficiency and avoidance of waste production (e.g., food waste in restaurants and shops)</p> <p>Virtual marketplaces for secondary raw materials or second-hand/repaired/upgraded products</p> <p>Digital material passports and related data repositories to facilitate the tracing, marketing, and trade of secondary raw materials in end-of-life products and constructions</p> <p>Methodological frameworks and tools for measuring and monitoring of progress in the transition to a circular economy</p> <p>Digital tools and applications for consumer awareness raising/education on the application and benefits of different circular economy strategies</p> <p>Advisory services to companies and public authorities for devising, preparing, and implementing circular economy transitions.</p>	<p>Enabling framework function (Section 2.5)</p> <ul style="list-style-type: none"> ▪ Raise awareness and educate private and public stakeholders: address mindset and culture and every-day behaviour ▪ Revise fiscal policies: incentivise (via Tax reduction) the development and application of tools and services that enable CE concepts ▪ Facilitate advisory services (available to companies and public authorities) to enable advice and development of CE concepts (e.g., scaling existing cleaner technology and resource efficiency promotion centres) 	<p>Access to capital function (Section 2.3)</p> <ul style="list-style-type: none"> ▪ Facilitate access to finance via blended finance (favourable lending, guarantees) and crowdfunding for developing /commercialising digital solutions

V. Annex: Sector descriptions and general barriers and windows of engagement

The greenhouse gases related to material use account for about 45% of the global greenhouse gas emissions. To address them, it is crucial to embed circular principles and goals across all sectors industries. In 2010, those 45% the global GHG emissions could be attributed to the production of materials and products (10.2 billion tonnes of CO₂e), and food, as well as the management of land (11.9 billion tonnes of CO₂e).⁴⁷¹

To address them, it is crucial to embed circular principles and goals across all sectors and industries. By 2050, the global demand for industrial material such as steel, cement, aluminium, and plastics is projected to increase by a factor of two to four, while global food demand is projected to increase by 42%. Even with ambitious strategies to increase energy efficiency and move to zero-carbon energy sources, emissions from the production of steel, cement, aluminium, and plastics alone will reach, cumulatively, 649 billion tonnes CO₂e by 2050. This exceeds the remaining carbon budget for industry and energy emissions of 420 – 580 billion tonnes consistent with meeting the 1.5°C target.⁴⁷²

The following sectors and industries have been chosen to be analysed, because their current linear practices exhibit a high environmental impact that needs to be addressed and/or they promise huge circular opportunities that could drive the transformation and/or they are focus sectors in the five analysed countries. Additionally, all chosen sectors and industries need external interventions to accelerate the circular economy.

The Circular Economy categorisation system is sector-agnostic. The products and resources that flow along the Value Hill categories, however, encounter different barriers and value creation opportunities, depending on their characterisations.

An important characterisation that might be made refers to the speed of which resources flow through the economy, which influences the set of circular strategies available: Resources and products might be sorted along a scale of such that they flow very quickly (**products that flow**) in comparison to such that are around for a long time (**products that last**). Example: plastic packaging or food account for very fast flowing products, whereas buildings or heavy machinery are considered lasting products.

Often, but not necessarily, related to that is the **value of products and resources**, which also influences the set of available strategies. Example: consumer electronic products are fairly unexpensive in comparison to an airplane.

And finally, the **level of complexity** of the product value chain influences the set of strategies that are available, as it influences the level of control a single stakeholder has over the regarding resources. Example: in comparison to a plastic bottle, the textile industry relies on a complex, global supply chain.

These are not the only relevant characteristics to consider when analysing of a resource system with the Circular Economy categorisation system. However, the examples show that barriers and opportunities depend on the characteristics of the product systems.

Construction & Buildings and Demolition Waste

The combined impact of population growth, increased prosperity and effects of climate change is leading to an increased competition for natural resources. Construction sector uses significant share of current and projected material use. Today, construction and use of buildings accounts for almost half of all raw material consumption and energy consumption and for about one third of all water consumption in the EU.⁴⁷³ A GI Hub analysis has shown even larger figures, namely that infrastructure consumes around 63% of the world's materials, and the G20 share of this consumption is around 80%.⁴⁷⁴ Circulating steel while avoiding its contamination, and getting more value from the steel we use, would avoid 500 Mt of additional primary steel production by 2050; this corresponds to more than 1 billion tonnes of GHG emissions per year.⁴⁷⁵ However, majorly used materials in construction are non-metallic minerals and its annual consumption is projected to be doubled by mid-century.^{476, 477} Today, some 55% of the world's population – 4.2 billion inhabitants – live in cities. This trend is expected to

⁴⁷¹ Ellen MacArthur Foundation. Completing the Picture. How the Circular Economy tackles Climate Change. Reprint. 2021.

⁴⁷² Ellen MacArthur Foundation. Completing the Picture. How the Circular Economy tackles Climate Change. Reprint. 2021.

⁴⁷³ <https://www.novia.fi/cewood/articles/new-circular-construction-methods>

⁴⁷⁴ https://cdn.github.org/umbraco/media/4265/gi-hub-paper_advancing-circular-economy-through-infrastructure_2021.pdf

⁴⁷⁵ Ellen MacArthur Foundation. Completing the Picture. How the Circular Economy tackles Climate Change. Reprint. 2021.

⁴⁷⁶ <https://www.worldbank.org/en/topic/urbandevelopment/overview#1>

⁴⁷⁷ <https://www.oecd-ilibrary.org/sites/967a3098-en/index.html?itemId=/content/component/967a3098-en>

continue. By 2050, with the urban population more than doubling its current size, nearly 7 of 10 people in the world will live in cities.⁴⁷⁸ mostly driven by low-income countries, which are experiencing fast population growth.⁴⁷⁹

Because of the design of buildings, most construction materials are discarded or down-cycled. To clearly slow down resource consumption, circular approaches to ensure resource efficiency are important drivers to develop within planetary boundaries. The outcome of circular economy approaches in the construction sector is one of the most promising concepts, in keeping construction materials in the value chain as long as possible.

Table 39: **Construction and Buildings** Overview of sector characteristics

Main problems	Major levers	Main drivers
<p>There are three main problems to be addressed:</p> <p>There are three main problems to be addressed: <i>Cross-hill: Overconsumption and long-time stocking of natural resources beyond planetary boundaries for building of infrastructure.</i> <i>Up-hill: Underuse and premature end of use of available infrastructure resources.</i> <i>Down-hill: Premature end of life of construction material (downcycling or dumping of construction waste).</i></p>	<p>Considering these main issues, there are four major levers to address the problem:</p> <p><i>Addressing the problem up-hill: Finance innovation for reduced resource and material input and incentivise design for recycling and collaboration along the value chain.</i></p> <p><i>Addressing the problem cross-hill: Enable value sharing over long time horizons and along the complex value chain. Supporting and financing regarding business models for the use of resources and materials.</i></p> <p><i>Addressing the problem top-hill: Support and finance optimal use and life cycle models for infrastructure.</i></p> <p><i>Addressing the problem down-hill: Finance technology and business model development to increase reuse and recycling of construction material.</i></p>	<p>Main driver is a policy framework as well as enabling financial instruments to overcome the long-time horizon of construction and allow to create an innovative value creation and sharing architecture along the value chain. Additionally, a close collaboration of all stakeholders is necessary to develop and work towards a joint long-term use vision for a building.</p>

The sector's greenhouse gas (GHG) emissions account for approximately 40% of global GHG emissions. The major contributors to these emissions are the materials used⁴⁸⁰ as well as the heating, cooling, and lighting of buildings and infrastructure⁴⁸¹. In Europe, construction makes up more than a third of total energy consumption.⁴⁸² It is important to note that a relatively small proportion of these embodied emissions is related to electricity and heat, therefore a move to renewable electricity can only achieve so much in this space.⁴⁸³

Cement, steel, aluminium, and plastics are four of the most commonly used materials in our economy. While they are used for different purposes, the construction of buildings and infrastructure accounts for a significant proportion of the demand for them.⁴⁸⁴ The production of steel and cement are the two largest contributors to infrastructure's embodied emissions.⁴⁸⁵ In terms of material consumption, non-metallic minerals (NMM) for construction are the largest proportion of global material consumption at around 48%. NMMs include materials like sand, gravel and clay which are used in very large quantities to produce concrete, asphalt, and glass for infrastructure. This could be a focus area for circular infrastructure as its the foundation for construction, and extraction rates for NMMs are rapidly exceeding natural replenishment rates.

⁴⁷⁸ <https://www.worldbank.org/en/topic/urbandevelopment/overview#1>

⁴⁷⁹ <https://www.oecd-ilibrary.org/sites/967a3098-en/index.html?itemId=/content/component/967a3098-en>

⁴⁸⁰ <https://www2.deloitte.com/ce/en/pages/real-estate/articles/putting-the-construction-sector-at-the-core-of-the-climate-change-debate.html>

⁴⁸¹ While playing a large role in resource consumption and GHG-Emissions, resource consumption for the energy supply during the lifetime of buildings is not part of this consideration.

⁴⁸² <https://www.rolandberger.com/en/Insights/Publications/lt%E2%80%99s-time-for-construction-to-embrace-the-circular-economy.html>

⁴⁸³ https://cdn.github.org/umbraco/media/4265/gi-hub-paper_advancing-circular-economy-through-infrastructure_2021.pdf

⁴⁸⁴ <https://ellenmacarthurfoundation.org/news/our-plan-for-cement-the-circular-economy>

⁴⁸⁵ https://cdn.github.org/umbraco/media/4265/gi-hub-paper_advancing-circular-economy-through-infrastructure_2021.pdf

Buildings nowadays are often constructed with more material than is needed: this is referred to as ‘overspecification’, and it is due in part to the need to assure the building structures’ resistance and stability, but also partly to the need to reduce the labour costs that would be needed to design more material-efficient structures. Studies from the United Kingdom have shown that buildings in the UK could be designed with 20% and up to 46% less steel without jeopardizing the stability and resistance of the structures.⁴⁸⁶ At Ramboll, building experts have estimated that the use of concrete can often be reduced to the tune of 10% from current building designs.⁴⁸⁷

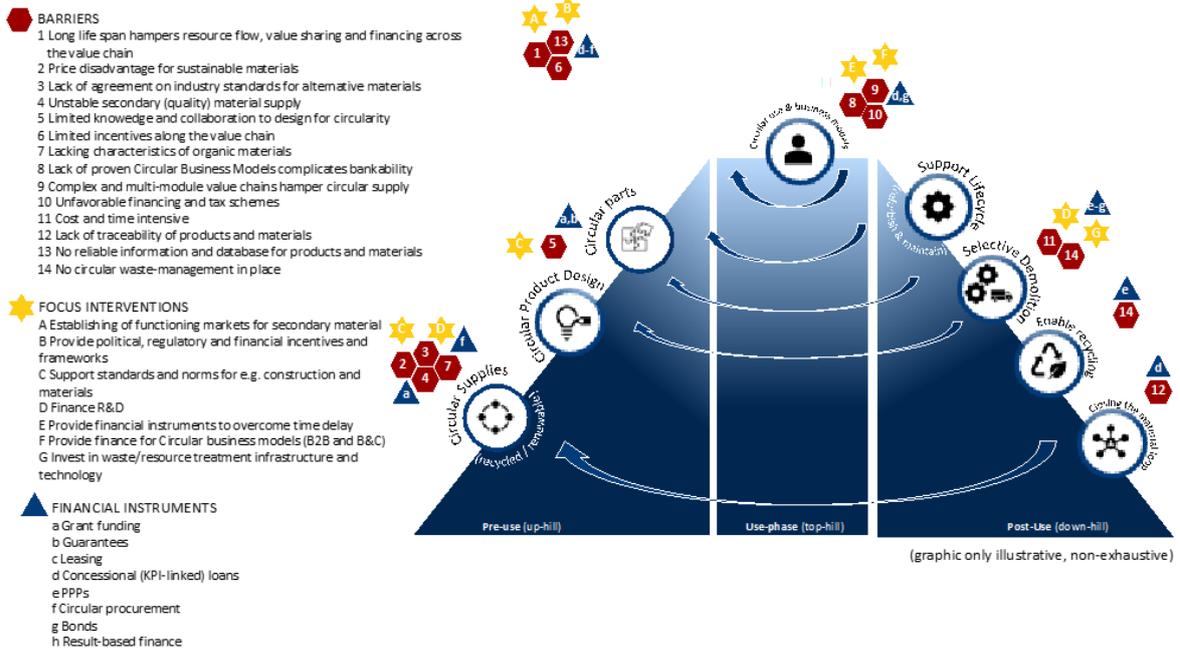
When buildings reach the end of their lifetime, in Europe only 40% of construction waste is recycled or reused.⁴⁸⁸ Additionally, currently 15% of building materials are wasted during construction.⁴⁸⁹ Most of these recycled materials are landfilled or downcycled for second-grade construction like roads, rather than new buildings.⁴⁹⁰

The value loss of this linear approach is immense⁴⁹¹. By innovating business models along the entire value chain, an additional global market is expected of more than EUR 600 billion by 2025 with an annual growth rate of 12%. Europe will play a leading role in this circular economy with a market share of EUR 240 billion.⁴⁹²

Characteristics

Buildings and other infrastructure are amongst the longest lasting products, which expands the value chain not only across countries but also across a long-time span. This complicates value sharing with other stakeholders, e.g., between resource and material providers, constructors, beneficiaries of constructions, and recyclers. Value sharing, however, would be also key to decrease costs per construction phase for the beneficiaries of the buildings. Additionally, as costs and benefits are not shared over time, and frameworks for the transfer of ownership for build-in products can be demanding, the bankability of circular construction projects as well as for product-service-systems is poor.

Construction



Outline Building and Construction - Sectors considerations - CE opportunities and options to respond and Value Hill

⁴⁸⁶ Moynihan, M. C. and Allwood, J. M. (2014) ‘Utilization of structural steel in buildings.’, Proceedings. Mathematical, physical, and engineering sciences. The Royal Society, 470(2168), p. 20140170. doi: 10.1098/rspa.2014.0170. // Dunant, C. F. et al. (2018) ‘Regularity and optimisation practice in steel structural frames in real design cases’, Resources, Conservation and Recycling. Elsevier, 134, pp. 294–302. doi: 10.1016/j.resconrec.2018.01.009.

⁴⁸⁷ <https://ramboll.com/ingenuity/circular-economy-8-actions-to-cut-60-co2-in-the-buildings-sector>

⁴⁸⁸ <https://www.rolandberger.com/en/Insights/Publications/It%E2%80%99s-time-for-construction-to-embrace-the-circular-economy.html>

⁴⁸⁹ <https://materialeconomics.com/publications/industrial-transformation-2050>

⁴⁹⁰ <https://www.rolandberger.com/en/Insights/Publications/It%E2%80%99s-time-for-construction-to-embrace-the-circular-economy.html>

⁴⁹¹ Even with loss of ecosystem services not yet accounted for.

⁴⁹² <https://www.rolandberger.com/en/Insights/Publications/It%E2%80%99s-time-for-construction-to-embrace-the-circular-economy.html>

Table 40: **Construction and Buildings** Sectors considerations – CE opportunities and options to respond and Value Hill

Sector	Key barriers in selected sectors based on Value Hill	Considerations to respond to key barriers
<p>Construction and buildings and demolition waste⁴⁹³</p>	<p><u>Circular design and production (up-hill)</u></p> <ul style="list-style-type: none"> ➔ Design construction products for disassembly and easy to separate into components that meet the 3R strategies (reduces, reused, recycled). ➔ Develop modular construction principles for Design for Deconstruction (DfD) ➔ Design for adaptability, the concept considers how the building can be simply converted for other uses and readapted with minimal internal distortion (less complex than DfD) ➔ Reduce the use of virgin materials by reuse of building components and materials ➔ Reduce “wet methods”, Foster mechanical connections ➔ Develop high-grade products w/ high-recycled content (material with high durability used in structural elements) ➔ Intensification of the use of buildings (e.g., bigger housing units) ➔ Optimization of material and construction supply chains (e.g., use locally abundant bio-materials) ➔ Replace carbon intense materials with low carbon materials (e.g., timber) <p><u>Barriers:</u></p> <ul style="list-style-type: none"> - <i>Socio/Cultural habits</i> prevents increase of second-hand materials as they are not desired. - <i>Price advantage</i> of non-organic, less eco-friendly materials, as actors favour cheaper and credible solutions. Virgin minerals are in many cases cheaper than secondary materials due to the latter’s processing costs. - <i>Quality of non-virgin materials</i> (traceability) as actors tend to choose virgin materials b/c of assured quality assured through warranties and standards. - <i>Lack of general agreement on input</i> factors at the industry level. - <i>Polluted materials</i> are not suitable or costly for recycling or removal of hazardous content. - <i>Time delay</i> between implementing a circular action and its benefits due to the long-life spans of buildings may discourage stakeholders. - Multipurpose areas are not financially beneficially <p><u>Focus interventions:</u> 1, 2, 3, 4, 5, 6, 7, 8</p> <p><u>Circular use (top-hill)</u></p>	<p>Interventions to overcome the barriers</p> <ol style="list-style-type: none"> 1. <u>Establishment of a functioning markets</u> for non-virgin materials. Supply and Demand of non-virgin materials must be stimulated by e.g., green public procurement. In addition to regulatory interventions can be supportive to fix market frictions. 2. Increase price competitiveness for non-virgin materials by economic and regulatory instruments (e.g., tax exemptions). 3. <u>Standards and norms for non-virgin construction materials</u> increase credibility and predictability. Standards shapes the potential to be repeatedly used 4. Retrofitting and renovation approaches through <u>selective separation</u>, instead of full demolition. (e.g., provide recommendations in terms of multi-functionality; awareness campaigns). 5. <u>Research and Development</u> for technological solutions supporting circular construction (e.g., modularity constructions, remove hazardous contents, extend life span). 6. <u>Legal basis for the use of more eco-materials</u> and restriction on harmful materials (e.g., prohibition of hydrofluorocarbons) as well as requirements for demolition (e.g., recycle rate, waste laws). 7. Implement <u>digital transparency</u> and quality systems to increase competitiveness.

⁴⁹³ European Environment Agency, 2020, Construction and demolition waste: challenges and opportunities in a circular economy.

	<p>→ Focus on retrofitting instead of demolition. → Renovate, improve maintenance, upgrade, repair and adapt constructions</p> <p>Barriers:</p> <ul style="list-style-type: none"> - <i>Socio/Cultural habits</i> prevents increase of second-hand materials as they are not desired. - Consider changes in <i>architectural/consumer preferences</i> inherits risk of success/satisfaction. - Risk from the presence of inferior materials in buildings and degradation of structural building elements. - Non-organic materials have better characteristics and quality than biodegradable one (high-quality organic materials are not available). - Lack of proven Circular Business Models - Complex and multi-module value chain - Unfavourable financing and tax schemes <p>Focus interventions: 1,2,4, 7, 8, 9</p> <p><u>Circular value recovery (down-hill)</u></p> <p>→ Focus on selective demolition, incl. removal of hazardous materials → Increase material separation, to pure material fractions (increase quantity and quality of recycling)</p> <p>Barriers:</p> <ul style="list-style-type: none"> - Non-controllable waste management - It is more time consuming and potentially more costly demolition. - Lack of traceability (limited information on waste material origin and quality, complexity of buildings and construction materials). - Lack of reliable data on (historical) buildings. <p>Focus interventions: 4,5,6</p> <p><u>Circular support (cross-hill)</u></p> <p>→ Material passports with sets of data describing characteristics of materials and components in building products. This will foster facilitates source separation of end-of-life materials, increase recycling quality and closed loops. → Introduce waste audits</p>	<p>8. Establish <u>guarantee system</u> for construction materials.</p> <p>9. <u>Sharing models:</u> Using “pay-by-use” and “product as the service,” leaving ownership of the materials to the supplier.</p>
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	<p>Barriers: Information and data management for long periods, costs of data gathering and storage</p> <p>Focus interventions: 3,4,5,6, 7, 8</p>	
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Capital Equipment

There is no comprehensive definition for capital equipment, but the Circular Economy Action Agenda for Capital Equipment includes a diverse set of equipment broadly defined by the following criteria: 1) Long-lived and high-value assets accounted for in balance sheets and 2) Equipment critical to the production of goods or services.⁴⁹⁴ The category of capital goods plays an integral role in meeting and improving on society's needs such as mobility, healthcare, and housing. This specifically includes devices and equipment from seven product categories: Motor vehicles, machinery and equipment, electrical machinery (e.g., elevators), other transport equipment (e.g., trains and ships), ICT equipment (e.g., antennas, data centre equipment), medical and precision instruments (e.g., Magnetic Resonance Imaging) and office machinery and computers.

As essential as these products are for serving society's needs around the world, **capital equipment manufacturing consumes 7.2 billion tons of raw materials globally each year**. It is critical to optimize the inventory of capital equipment and its uses through circular strategies to reduce and minimize environmental impact, address resource scarcity, increase market resilience, and develop value chain sustainability. Capital equipment is designed, built, and acquired to last.

Together with buildings and infrastructure, capital equipment encompasses a group of products that are key components of the economic stock (meaning materials in long-term use). Their use life can span decades⁴⁹⁵. The combined volume of global economic stock accumulated since 1900 is 10 times larger than the annual consumption of disposable materials, and **the demolition of long-lived assets represents 23% of global waste being produced every year**. Capital equipment, despite being only a share of the global economic stock, has a massive material impact. **It represents only 6.5% of global annual material consumption and more than half (56%) of global ore consumption**.

However, circular strategies, that are applicable to short-living products and consumable (,products that flow'), might not be effective and/or suitable. Capital equipment as long-life products (,products that last') require a specific approach.

Table 41: **Capital Equipment** Overview of sector characteristics

Main problems	Major levers	Main drivers
There is one main problem to be addressed: <i>Cross-hill: Large resource consumption and long stock-taking.</i>	There is one major lever to address the problem: <i>Addressing the problem up-hill: Support the extension of the use time of the products by e.g., investment in technology options and regulatory and market frameworks for circular business models.</i>	Main driver is technological solutions as well as regulatory ⁴⁹⁶ and market frameworks to enable extended use cycles.

From a segmentation perspective, capital equipment predominantly addresses the need of the business-to-government ("B2G") and business-to-business ("B2B") markets, although some specific products such as "motor vehicles" or "photovoltaic panels" belong also to the business-to-consumer ("B2C") segment.

7.2 million tons of raw materials (including large amounts of high value metals and minerals) are involved in the manufacturing of capital equipment every year.⁴⁹⁷ The combined volume of global economic stock accumulated since 1900 is 10 times larger than the annual consumption of disposable materials, and the demolition of long-lived assets represents 23% of global waste being produced every year⁴⁹⁸. Capital equipment, despite being only

⁴⁹⁴ <https://pacecircular.org/sites/default/files/2021-02/circular-economy-action-agenda-capital-equipment.pdf>

⁴⁹⁵ A car has a typical use life of 15-20 years; an elevator or a train can last for over 30 years; 95% of lithographic printing machines manufactured since 1984 by ASML are still in use today.

⁴⁹⁶ E.g., supporting taxation.

⁴⁹⁷ <https://pop-machina.eu/news/news-items/the-pace-circular-economy-action-agenda-for-capital-equipment>

⁴⁹⁸ https://assets.website-files.com/5d26d80e8836af2d12ed1269/5dea43f562f8ac3e3113fe51_ad6e59_ba1e4d16c64f44fa94fbd8708eae8e34_compressed.pdf

a share of the global economic stock, has a massive material impact. It represents only 6.5% of global annual material consumption and more than half (56%) of global ore consumption.⁴⁹⁹

Capital equipment is designed, built, and acquired to last. Together with buildings and infrastructure, it encompasses a group of products that are key components of the economic stock (meaning materials in long-term use, also known as “products that last”). Their use life can span decades: a car has a typical use life of 15-20 years⁵⁰⁰, an elevator or a train can last for over 30 years⁵⁰¹, 95% of lithographic printing machines manufactured since 1984 by ASML are still in use today (, 2020⁵⁰²

Characteristics

Capital equipment has a strong potential for resource-efficient value creation. Circular strategies applicable to “products that flow” (consumables that typically reach their end-of-use within a year) might not be effective and/or suitable for capital equipment. Capital equipment deserves a specific approach, recognizing that inherently long lifetimes can be extended even further, be shared in use, and that slowing down their degradation could deliver major waste avoidance, given the extensive size of the existing economic stock of equipment.⁵⁰³ In advancing a circular economy for capital equipment, the priority should be on reusing—which includes repurpose, refurbish, and remanufacture—rather than recycling, with the aim of retaining the highest possible value of the equipment and also solutions such as remote and predictive maintenance, remote and on-site upgrades, software solutions that improve use rates of hardware, and also those that can replace hardware (e.g. a mobile app, instead of a dedicated screen).⁵⁰⁴

In the capital equipment sector, the financial capital invested and at stake is relatively high. Because of this, customers are already more used to keeping their investment through service models, making it easier to arrange new business models, such as ‘product-as-a-service’, with stakeholders in a B2B setting compared to B2C. For these reasons—and from a historic perspective in which circular economy strategies such as maintenance and refurbishment have been applied as common practice—the capital equipment sector is a circular economy front-runner in some respects, and has best practices and learnings to share with other sector⁵⁰⁵

While recycling remains the final solution when the technology or condition makes the equipment no longer viable, there is a need to improve the economics of reusing.⁵⁰⁶

⁴⁹⁹ https://assets.website-files.com/5d26d80e8836af2d12ed1269/5dea43f562f8ac3e3113fe51_ad6e59_ba1e4d16c64f44fa94fbd8708eae8e34_compressed.pdf

⁵⁰⁰ https://www3.weforum.org/docs/WEF_Raising_Ambitions_2020.pdf

⁵⁰¹ <https://www.ivl.se/download/18.343dc99d14e8bb0f58b75d4/1445517456715/B1943.pdf>

⁵⁰² https://pacecircular.org/sites/default/files/2020-01/20200120%20-%20CEC%20Report%20web%20-%20single%20page%20-%20297x210%20%281%29_0.pdf

⁵⁰³ Retired aircraft treatment showcases the potential of circularity. When aircraft are retired, 85%-90% of the content is reused or recycled, with around 40%-50% redistributed as useable components. Any unserviceable materials are recycled and fed back into the supply chain as raw materials. https://www.icao.int/environmental-protection/Documents/EnvironmentalReports/2019/ENVReport2019_pg279-284.pdf

⁵⁰⁴ <https://pacecircular.org/sites/default/files/2021-02/circular-economy-action-agenda-capital-equipment.pdf>

⁵⁰⁵ <https://pacecircular.org/sites/default/files/2021-02/circular-economy-action-agenda-capital-equipment.pdf>

⁵⁰⁶ <https://pacecircular.org/sites/default/files/2021-02/circular-economy-action-agenda-capital-equipment.pdf>

Capital Equipment



BARRIERS

- 1 Lack of industry-wide standards and definitions for design for circularity
- 2 Limited collaboration across the value chain
- 3 Lack of transparency on origin, quality, and content of secondary components and materials
- 4 Low-demand nascent markets for used components and secondary bio-based materials
- 5 No level playing field for circular products
- 6 Insufficient integration of circular economy principles in organisational procurement and end-of-use management
- 7 Short innovation cycles that invalidate technical longevity
- 8 Challenging business case for product use extension
- 9 Data inconsistency and silos (e.g. for sharing equipment)
- 10 Regulatory disincentives to product use extension (e.g. current accounting rules for depreciation favour new products, right-to-repair regulations not suitable for B2B equipment, etc.)
- 11 Regulatory obstacles to return end-of-use equipment
- 12 Complex regulatory processes and high transaction costs for reverse logistics with circular objectives
- 13 Underdevelopment of 'second life' enabling technologies



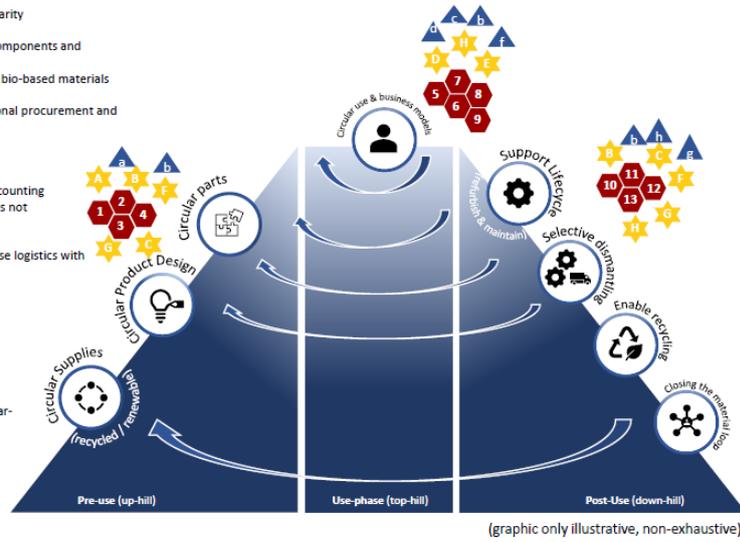
FOCUS INTERVENTIONS

- A Set and review standards and regulations (e.g. green product passports)
- B Create level playing field, removing incentives for linear solutions
- C Support cooperation and collaboration (e.g. to develop traceability standards, product passports, etc.)
- D Enable / support businesses and stakeholders to implement 'circular-ready design' (e.g. favouring depreciation rules)
- E Revisit (governmental) procurement guidelines
- F Provide policy incentives for circular solutions like reverse logistic solutions or tracking mechanisms
- G Enable data gathering and analysis
- H Support favourable investment conditions



FINANCIAL INSTRUMENTS

- | | |
|-----------------------------------|------------------------|
| a Grant funding | e PPPs |
| b Guarantees | f Circular procurement |
| c Leasing | g Bonds |
| d Concessional (KPI-linked) loans | h Result-based finance |



Outline Capital Equipment Sectors considerations - CE opportunities and options to respond and Value Hill

Table 42: **Capital Equipment** Sectors considerations – CE opportunities and options to respond and Value Hill

Sector	Key barriers in selected sectors based on Value Hill	Considerations to respond to key barriers
Capital Equipment <small>507, 508</small>	<p><u>Circular Design (up-hill):</u> <i>Products and components follow circular and digitalization principles for minimal resource consumption and increased reuse strategies.</i></p> <ul style="list-style-type: none"> ➔ Reduced use of (non-renewable) resources (e.g., more renewable, or recycled materials) ➔ Reintegration of re-usable, remanufactured, or refurbished components ➔ Using (economically) recyclable materials ➔ Designing for durability or longevity, maintenance, remanufacturing and refurbishment, adaptability, reparability and disassembly (at end of use). Embed digital technology during the design phase to enable that if required. <p>Barriers:</p> <ul style="list-style-type: none"> - Lack of industry-wide agreed standards and definitions for design for circularity: Various terms relating to circular product design are still in the making: Digital and biobased sources are not yet standard ingredients for defining circular designs, terms such as ‘repairable’ or ‘durable’ are not yet defined, no industry-specifications for ‘reuse’, ‘refurbish’ or ‘remanufacture’. Current circular metrics do not explicitly reflect value retention on business model design, which is a core of circularity objectives for capital equipment. - Limited collaboration across the value chain: Recyclers seldom involved in material selection processes and have little insight into design process. Designers often lack insight into the lifecycle thinking and recovery strategies for products. In addition, there is a lack of feedback loops from operations to design. This leads to a deficiency of innovation regarding coherent design strategies for disassembly, safe disposal, and high-quality component recovery, as well as a lack of effective refurbishing/remanufacturing technologies and processes that complement design for recycling (e.g., reduced shredding of end-of-life products). For closed loop recycling, even closer collaboration between designers, material engineers, procurement, raw material suppliers, recyclers are required. There is limited experience on how this collaboration should look, and how to encourage collaboration across the value chain inside and between sectors. - Lack of transparency on origin, quality, and content of secondary components and materials: Secondary resources often pass through multiple traders, which prevents transparency on origin, chain of custody, or method of collection (e.g., storage systems using second life electric vehicle 	<ol style="list-style-type: none"> 1. <u>Set regulations</u> (collaboration of governments, businesses, and research organisation) for health and safety regulations that should be applied in product/component reuse, to achieve optimal environmental outcome. 2. <u>Review regulations</u> which inadvertently hinder the development of used component supply chains, such as those that require certified destruction of used systems, prevent the purchase of refurbished equipment, or restrict buy-back of used equipment from public organizations. 3. Create a level <u>playing field</u>, removing incentives for linear solutions (e.g., more tax on materials and less on labour). 4. Setting up a <u>governance model with a dedicated structure</u> for the circular economy that involves all relevant structures and ministries (e.g., governments can define a strategy for the circular economy with specific sector focus, as well as short-term and measurable objectives). 5. <u>International standard institutions</u>, in collaboration with manufacturers, can define circular product design standards (e.g., clear definitions and measurement methods for priority aspects such as longevity, digitally-enabled, maintenance, and reuse) 6. Encourage the use of <u>renewable materials and energy</u> (e.g., remodelling of environmentally harmful subsidies and/or differentiated VAT, etc.).

⁵⁰⁷ <https://pacecircular.org/action-agenda/capital-equipment>

⁵⁰⁸ Circle Economy. 2019. ‘The Circularity Gap Report 2019. Closing the Circularity Gap in a 9% World’. https://assets.website-files.com/5d26d80e8836af2d12ed1269/5dea43f562f8ac3e3113fe51_ad6e59_ba1e4d16c64f44fa94fbd8708eae8e34_compressed.pdf.

	<p>batteries need to know technical and usage characteristics of a used battery). The quality of the secondary component/material often unknown due to inconsistent labelling, tracking, and transparency. The ‘immaturity’ of certification processes leads to secondary component suppliers and recyclers struggling to provide the same level of quality and environmental, health and safety assurance for secondary components and materials as other suppliers can for new components/virgin materials. For some manufacturers, this is a key barrier for secondary component or material sourcing.</p> <ul style="list-style-type: none"> - Low-demand nascent markets for used components and secondary or bio-based materials: Lack of transparency on demand for components that have reached end-of-use. As a consequence of low demand, supply through component harvesting is also limited. Where secondary component/material markets are less robust and not commingled with new component/ primary material markets (e.g., steel), recyclers can often not guarantee long-term supply, e.g., due to complex supply chains compounded by shifting waste shipment regulations or their interpretation. The medium- and long-term volumes, qualities, and prices of secondary component/recycled materials are rather uncertain. This puts secondary materials/components at a disadvantage compared to today’s flexible supply chain for virgin materials/components. One additional drawback for bio-based materials specifically is the underdeveloped recycling infrastructure for these materials (e.g., external body of medical imaging devices).⁵⁰⁹ <p>Focus interventions: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 17, 20</p> <p><u>Use phase and circular use models (top-hill)⁵¹⁰</u></p> <ul style="list-style-type: none"> ➔ Using products for longer (e.g., remote, and predictive maintenance, remote and on-site hardware upgrades) ➔ Using products more intensely (e.g., software solutions that improve use rates of hardware or even that replace hardware, etc.) ➔ Re-using capital equipment as well as parts (e.g., resale, repurpose, refurbish, remanufacture, etc.) ➔ Reshape business models for servitization to capitalize on longer or more intense use (e.g., Production Service Systems (PSS), sharing models, platforms, etc.) 	<ol style="list-style-type: none"> 7. <u>Support cooperation between stakeholders</u> like manufacturers, designers, customers, and reverse logistics to align (e.g., backward and forward compatibility, taking a systemic viewpoint, collaborate along the value chain, co-design innovative solutions, etc.) 8. <u>Enable businesses to implement ‘circular-ready design’</u> and circular design requirements that serve as guidance and enablers for circular business models and value retention through e.g., modularity, dematerialization, renewable content, and being fit for reuse strategies (e.g., through funded education and training, etc.). 9. <u>Support the value chain</u> (producers, manufacturers, value retention service providers and standards institutions) to collaboratively develop traceability standards, certification processes, and product passports to enable multiple use cycles for products and components. 10. <u>Enable stakeholders</u> (e.g., manufacturers and value retention service providers) to establish an industry platform for increased transparency about supply and demand for secondary components. This can avoid production downtime and allow for long-term planning. 11. Support the creation of an <u>ecosystem</u> to implement circular and innovative solutions involving companies, start-ups, and universities etc. (also creating digital platforms and networks for knowledge exchange and innovation). 12. <u>Support manufacturers so they can make long-term agreements</u> with secondary component suppliers to
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⁵⁰⁹ ‘The circular bioeconomy: A Business Opportunity Contributing to a Sustainable World.’ According to WBCSD (2020), the transformation to a so-called circular bioeconomy demonstrates a business opportunity of around USD7.7 trillion. The capital equipment industry can also benefit from this opportunity.

⁵¹⁰ aim to retain value for the highest possible value

	<p>Enablers:</p> <ul style="list-style-type: none"> - Accustomed to service models: For capital equipment, financial investments and stakes are relatively high. Customers are more used to keeping investment through service models, making it easier to arrange new business models, such as 'product-as-a-service' (B2B setting compared to B2C). Therefore, and because CE strategies such as maintenance and refurbishment have been applied as common practice, capital equipment sector is a circular economy frontrunner in some respects. <p>Barriers:</p> <ul style="list-style-type: none"> - Lack of industry-wide agreed standards and definitions for circularity: Current circular metrics do not explicitly reflect value retention on business model design, which is a core of circularity objectives for capital equipment. - Limited guidance to balance business model requirements with equipment design and sustainability objectives: Design for circularity requires to balance requirements relating to e.g., usability, longevity, repairability, modularity, backward compatibility, standardization, data security, product safety, production cost, and technical performance. All of these derive from the chosen business model since they relate to the affordability and value-added provided to the customer. The priority of requirements depends on the product category and specific market characteristics. To date, the evaluation of circularity criteria is rarely a structural part of the design process. - No level playing field for circular products: Negative externalities of linear design not yet priced in. Designing products and services for circularity can increase costs for manufacturers in the short term. Results in unlevel level playing field between linear and circular products (e.g., sharing design of components can create an intellectual property risk, while uncontrolled trade of potentially hazardous components can create a legal risk). At the same time, benefits from circular products and services, e.g., through increased customer loyalty, are more difficult to quantify. - Insufficient integration of circular economy principles in organizational procurement and end-of-use management: CE principles and criteria are insufficiently integrated in procurement processes and decisions. Therefore, tenders being limited specifically to new equipment. Also, organizational end-of-life management guidelines might demand destruction of devices and equipment at the end of their use cycles. Additionally, second-hand equipment is often perceived as inferior. Circularity criteria are being excluded from purchasing decisions (e.g., public tenders), so that only new equipment can be purchased, due to a lack of understanding. - Short innovation cycles that invalidate technical longevity: Short innovation cycles may offset the benefits of longer technical lifespan. In many cases product and single component functions, i.e., performance, become obsolete way before they reach their technical end-of life (e.g., a solar panel can last 25-40 years but efficiency is improving so quickly that there would be no economic 	<p>guarantee extended lifetime of equipment (e.g. financing models, etc).</p> <ol style="list-style-type: none"> 13. Research organizations and policymakers can <u>analyse global and local barriers</u> towards enabling connectivity of products and sharing of product data. 14. Policymakers can <u>evaluate and implement regulations</u> in favour of product usage intensity and life extension (e.g., end-of-life processing fees or extended life incentives). 15. Trade ministries can <u>team up</u> with international organizations, the private sector, and standards institutions to elaborate on certification for manufacturers and value retention service providers, to ease shipping of secondary products and components across borders. 16. <u>Revisit organisational procurement guidelines</u>, reconsidering specifications that prevent circularity and integrating tender instruments to reward circular solutions, as well as circularity criteria that need to be tracked by value-based metrics (e.g., adjust public procurement guidelines and processes to effectively integrate circularity) 17. Suppliers, manufacturers, and value retention service providers can <u>commit to professional, safe, and responsible trading standards</u> around secondary components, in compliance with the Basel Convention and country-specific regulations. 18. Financial institutions can improve <u>access to capital</u> for product use extension business models that require additional capital expenditure. 19. Governments and businesses can commit to a percentage of total yearly component category spend that includes a preference for circular products and services—without waiting for the market to offer perfectly circular products.
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	<p>incentive to buy a 10-year-old panel). Designing needs to consider that (e.g., modularity and upgradability).</p> <ul style="list-style-type: none"> - Challenging business case for product use extension: Circular business models often have higher operational costs in monitoring, maintenance, repair/refurbishment, testing, and logistics. Might require larger upfront investment with longer payback time, adding to financing challenges. Also, manufacturers need to have sufficient supply of secondary components to keep up maintenance until end of life. Additionally, benefits of product use extension models need to be measurable to avoid a perceived risk of cannibalizing new product sales, discouraging producers to innovate in this space. - Data inconsistency and siloes: Sharing equipment implies having access to usage data. Therefore, additional monitoring investment is needed, and customers might be reluctant not only to invest, but also to share their actual usage data and store it in the cloud. Available data can be incomplete and siloed, which hinders lifecycle monitoring and traceability. - Regulatory disincentives to product use extension: <ul style="list-style-type: none"> o Current accounting rules for depreciation favour new products, thereby incentivizing businesses to regularly replace used with new products. o Emerging Right-to-Repair regulations are not suitable for B2B equipment. The right to uncertified repair creates safety, reliability, performance, and warranty issues especially for capital equipment. o Regulation can inadvertently create obstacles for product reuse. Chemical regulations (e.g., REACH, EU POP) in place to achieve a toxic-free environment—can hinder reuse of systems, products, or components that contain restricted chemicals or whose full material composition cannot be known. Long-life products (capital equipment) might have been manufactured before the regulations were in place.⁵¹¹ o Current standards, as opposed to standards at time or market introduction, can hinder the reuse of components, e.g., rising energy efficiency requirements hinder the development of Product-as-a-Service models, so that the actual economic life cannot match the potential technical life, and the overall energetic balance of an early replacement can be counterproductive. <p>Focus interventions: 4, 7, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26</p> <p><u>Circular Value recovery (down-hill)</u></p>	<ol style="list-style-type: none"> 20. Governments and policymakers can consider <u>developing green product passports</u> that certify compliance with trade regulations; see call-to-action for more information on product passports. 21. Businesses and governments can work together to <u>scope regional collaborations</u> to develop sophisticated reuse ecosystems, balancing economy of scale with value sharing and local expertise. 22. Incentivise manufacturers and businesses that <u>explore servitization business models</u>, including product-as-a service, components-as-a-service, and asset sharing. 23. Accountants, business consultants, and companies can propose specific changes for <u>adapting accounting to a circular economy</u> for capital equipment, recognizing disincentives of current depreciation rules and considering key aspects of new business models, e.g., estimates of residual value of equipment in product-as-a-service business models. 24. Money lending institutions and manufacturers can collaborate to leverage long-term financing contracts to <u>include a bring-back policy</u> at the end-of-use of equipment that has been financed by the lender 25. Support businesses and manufacturers, that voluntarily <u>establish reverse logistics</u> (e.g., B2B), without waiting for fully compulsory schemes (e.g., by integrating take-back or buy-back programs into contracts). (Reverse logistics objectives can be defined, separately for products, components and/or material as well as tracking and monitoring mechanisms to check on progress.) 26. Enable research organizations to <u>develop data and knowledge</u> about the economic, environmental,
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⁵¹¹ On the other hand, a shift towards circularity must not come at the cost of weakening the protection of human health and the environment from the impacts of hazardous chemicals. These regulations serve as strong enablers for phasing out hazardous materials, which is a crucial aspect of a circular economy.

	<ul style="list-style-type: none"> ➔ Enable parts harvesting ➔ Reverse logistics to enable return for reuse ➔ Support business models for refurbishment, remanufacturing, repurposing, etc. ➔ Recycle materials adequately <p>Barriers⁵¹²:</p> <ul style="list-style-type: none"> - <i>Regulatory obstacles to returning end-of-use equipment or components:</i> <ul style="list-style-type: none"> ○ Some national rules require the certified destruction of used systems or prevent the purchase of refurbished equipment. ○ Some public organizations are not allowed to trade with private parties, which prevents capital equipment being returned to the manufacturer for refurbishing. ○ In many countries it is not possible to put a buy-back clause in the tender for sales of new equipment. In addition, it is sometimes illegal for a manufacturer to buy back equipment, or for owners to return the equipment to the manufacturer or recycler (e.g., trade with private parties may not be allowed). - <i>Limited incentives for capital equipment owners to return equipment at end-of-use:</i> Data security concerns or data privacy law compliance pose disincentives for reuse or collection for material recycling. Also, currently no shared platform for tracing equipment over its lifecycle and different ownerships. Furthermore, the costs of returning can be much higher than sending it to land-fill or other collection channels. - <i>Complex regulatory processes and high transaction costs for reverse logistics with circular objectives:</i> The objective of the Basel Convention is to avoid the environmentally and socially detrimental trading of hazardous waste. Under the Convention, certain transboundary movements of components that incorporate hazardous materials are banned, while others require an approval process based on the Prior Informed Consent Regulation (PIC) process, administered by the authorities of the importing, exporting, and any transit countries. Currently, PIC processes are manual and can be cumbersome, taking up to two years. They also involve high transaction costs and add operational constraints for shipping/reselling abroad. Lack of training (e.g., for trade officials) is part of the cause. Digitizing PIC processes would be one part of the solution. - <i>Underdevelopment of “second life” enabling technologies:</i> A variety of factors are limiting the economic viability of value retention (e.g., under-developed reverse logistics, too little value chain collaboration, and increasing technical complexity), therefore limiting incentives for investment in technological innovation in refurbishing, remanufacturing and repurposing processes. In addition, sorting, pre-processing, and recycling technologies are also underdeveloped, especially 	<p>and social impacts of different value retention models to inform strategic decision-making for setting up reuse facilities.</p> <ol style="list-style-type: none"> 27. Governments, in collaboration with policymakers and value retention service providers, can <u>stimulate the secondary component market</u> (e.g., tax incentives, subsidies, carbon pricing, and targets for manufacturers). 28. Provide <u>policy incentives</u> for the uptake of circular design and investment in refurbishment, remanufacturing, and sorting and pre-processing technologies (e.g., reduced tax, subsidies, financing models, guarantees, etc.) 29. Governments and policymakers, in cooperation with manufacturers and value retention service providers, can <u>establish and enforce take-back schemes</u> in line with environmental, labour, and security standards. Developing a convergence of national regulations should be explored. 30. Governments and financial institutions can set up funds for <u>value retention technology</u> innovation and infrastructure investment . (e.g., for value retention technology innovation and infrastructure investment) 31. Governments can create <u>favourable investment conditions</u> for experienced value retention service providers to bring the technical expertise required to the country or region. 32. Governments can foster an <u>enabling environment for a new generation of sustainable enterprises</u> in value retention and processing services and create an ecosystem to promote collaboration. 33. Industry experts, in collaboration with competent authorities to the Basel Convention, can <u>re-evaluate the classification and treatment of used products,</u>
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⁵¹² For electronics, see below.

	<p>for material streams which are more complex (e.g., electronics or composites), of lower economic value (e.g., plastics), or still emerging (e.g., bio-based materials).</p> <p>Focus interventions: 1, 2, 4, 7, 11, 13, 15, 17, 20, 21, 27, 28, 29, 30, 31, 32, 33, 34</p>	<p>components, and materials to avoid counterproductive hurdles for a circular economy.</p> <p>34. Stakeholders along the supply chain can jointly <u>set up transparent traceability mechanisms</u> for products and components to guarantee efficient trading cross-border and cross-supply chain partners.</p>
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Electronics and Information and Communications Technology (ICT)

There are no data available how many electrical goods are produced annually, but just taking account of devices connected to the internet, they now number many more than humans. In 2020, it is estimated to be between 25-50 billion.⁵¹³ One report puts the global consumer electronics market at around USD1.1 trillion in 2017, growing at a rate of 6% until 2024, when it will be worth USD1.7 trillion.⁵¹⁴

Electronic and electrical waste is the fastest-growing waste stream in the world. In 2018, about 50 million tonnes of e-waste (incl. 435 thousand tonnes mobile phones) were generated globally. This figure is expected to double if nothing changes.⁵¹⁵

Table 43: **Electronic and Information and Communications Technology (ICT)** Overview of sector characteristics

Main problems	Major levers	Main drivers
<p>There are three main problems to be addressed:</p> <p><i>Down-hill:</i> Immense – and increasing – amounts of electronic waste exist, and about 80% of cannot be accounted for or are known to be (illegally) disposed of. Even as product-life extending markets exist, the products finally end up as waste as well.</p> <p>Recycling of electronic products is an economic and environmental imperative. However, it is complex and costly.</p> <p><i>Top-hill:</i> Many electronic products are designed to be fast-moving consumer products, that underly electronic ‘fashion-trends’, which is partly responsible for the waste-crisis.</p>	<p>Considering these main issues, there are four major levers to address the problem:</p> <p><i>Addressing the problem cross-hill:</i> Loss of electronic waste must be prevented (e.g., enforcement of policy frameworks, setting up or mandatory and tangible reverse logistic cycles, ownership of material remaining with the provider, enable harvesting of economic value of the e-waste for companies, etc.)</p> <p><i>Addressing the problem top-hill:</i> Substantial extension of the use-phase of products needs to be supported.</p> <p><i>Addressing the problem cross-hill:</i> Closing the material cycle by designing for easy recycling, supporting recycling-technology innovation, and fostering value chain collaboration.</p>	<p>There is no one single driver in the value chain. The key barriers for circularity can only be overcome by collaboration and cooperation along the value chain and amongst all stakeholders like governments, businesses, and civil society/consumers.^{516, 517}</p> <p>-</p>

E-waste contains many high-value and scarce materials, such as gold, platinum, cobalt, rare earths, and high quantities of aluminium and tin, which makes electronic waste an important resource for such materials. However, recycling rates globally are low. Even in the EU, which leads the world in e-waste recycling, just 35% of e-waste is officially reported as properly collected and recycled.⁵¹⁸ Globally, society only deals with 20%⁵¹⁹ of e-waste appropriately and there is little data on what happens to the rest, which for the most part ends up in landfill, or is disposed of by informal workers in poor conditions. E-waste may represent only 2% of solid waste streams, yet it can represent 70% of the hazardous waste that ends up in landfill.⁵²⁰ E-waste is worth at least USD62.5 billion⁵²¹, which is more than the gross domestic product (GDP) of most countries. In the right hands, however, it could be worth considerably more.⁵²² Urban mining, where resources are extracted from complex waste streams, can now be more economically viable than extracting metal ores from the ground. However, despite the dire need and important opportunities, a circular transition for the electronics industry faces many barriers beyond the control of any individual stakeholder. The key barriers can only be overcome by collaboration

⁵¹³ [https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics+Final%20\(1\).pdf](https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics+Final%20(1).pdf)

⁵¹⁴ <https://www.globenewswire.com/news-release/2018/06/29/1531798/0/en/Global-Consumer-Electronics-Market-Will-Reach-USD-1-787-Billion-by-2024-Zion-Market-Research.html>

⁵¹⁵ [https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics+Final%20\(1\).pdf](https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics+Final%20(1).pdf)

⁵¹⁶ Ellen MacArthur Foundation, 2017, Circular Consumer Electronics.

⁵¹⁷ Platform for Accelerating the Circular Economy (PACE), 2019, A New Circular Vision for Electronics, Time for a Global Reboot (United Nations E-waste Coalition)

⁵¹⁸ [https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics+Final%20\(1\).pdf](https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics+Final%20(1).pdf)

⁵¹⁹ Baldé, C. P., et al., The Global E-waste Monitor 2017, UNU, ITU, ISWA, 2017

⁵²⁰ <https://www.weforum.org/agenda/2018/02/how-do-we-tackle-the-fastest-growing-waste-stream-on-the-planet/>

⁵²¹ Baldé, C. P., et al., The Global E-waste Monitor 2017, UNU, ITU, ISWA, 2017

⁵²² [https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics+Final%20\(1\).pdf](https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics+Final%20(1).pdf)

and cooperation along the value chain and amongst all stakeholders like governments, businesses, and civil society.^{523, 524}

In the short-term, electronic waste remains a largely unused, yet growing, valuable resource. Nearly all of it could be recycled. Urban mining, where resources are extracted from complex waste streams, can now be more economically viable than extracting metal ores from the ground. E-waste may contain precious metals such as gold, copper, and nickel as well as rare materials of strategic value such as indium and palladium.⁵²⁵ Up to 7% of the world's gold may currently be contained in e-waste.⁵²⁶ A lot of these metals could be recovered, recycled, and used as secondary raw materials for new goods.

The challenge is the complexity of doing this; a product can be made up of more than 1,000 different substances.⁵²⁷ Metals in e-waste are difficult to extract; for example, total recovery rates for cobalt are only 30% (despite technology existing that could recycle 95%).⁵²⁸ The metal is, however, in great demand for laptop, smartphone and electric car batteries. Currently, recycling some types of e-waste and recovering materials and metals is an expensive process. The remaining mass of e-waste – mainly plastics laced with metals and chemicals – poses a more intractable problem.⁵²⁹

Like fast fashion, electronics can involve a rapid turnover in style trends, with revenues dependent on selling the latest products, which are increasingly affordable. In particular, affordability has opened up opportunities in developing countries, for instance mobile money has dramatically increased financial inclusion and given rise to other developmental opportunities. In many cases, second-hand device markets flourish in these countries with products such as laptops and smartphones having second or third lives. Yet eventually all these smartphones, tablets, cameras and home gadgets or appliances will become waste.

A total of 67 countries have legislation in place to deal with the e-waste they generate. This normally takes the form of Extended Producer Responsibility (EPR), when a small charge on new electronic devices subsidizes end-of-life collection and recycling. The legislation covers about two-thirds of the global population.⁵³⁰ However, many countries do not have national legislation on e-waste. In many regions of Africa, Latin America or South-East Asia, electronic waste is not always high on the political agenda, and often not well enforced. When it comes to the export of e-waste to developing countries, it is regulated under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, which has been ratified by 187 countries, other similar conventions exist at a regional level.⁵³¹ Even with these conventions in place, however, large amounts of e-waste continue to be shipped illegally.

In total, 1.3 million tonnes of discarded electronic products are exported from the EU in an undocumented way every year. The illegal movement of e-waste from developed countries to developing countries is a major global challenge. There is a complex web of trans-shipment ports so that e-waste avoids detection by authorities.⁵³² At the same time, shipments of secondary materials from consumer countries to centres of production with the intention of re-integrating materials into new products would benefit from clear international definitions on secondary materials. Shipments of used products for repair, refurbishment or direct re-use are subject to legislative uncertainties.⁵³³

Companies and governments need work towards creating a system for closed-loop production in which all old products are collected and then the materials or components re-integrated into new ones. However, unlike in the forward supply chain, companies must rely on the value of the raw materials only and therefore demand a highly efficient and economical reverse supply chain model that is safe and responsible and ensures materials do not flow into the informal sector.⁵³⁴ Therefore, this will take new financial incentives and policy levers as well as private-sector leadership. The recycling sector will also need an upgrade; in some cases, recycled materials are

⁵²³ Ellen MacArthur Foundation, 2017, Circular Consumer Electronics.

⁵²⁴ Platform for Accelerating the Circular Economy (PACE), 2019, A New Circular Vision for Electronics, Time for a Global Reboot (United Nations E-waste Coalition)

⁵²⁵ [https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics--Final%20\(1\).pdf](https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics--Final%20(1).pdf)

⁵²⁶ [https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics--Final%20\(1\).pdf](https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics--Final%20(1).pdf)

⁵²⁷ <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3908467/>

⁵²⁸ World Energy Council, World Energy Resources 2016, Accessed December 2018

⁵²⁹ Baldé, C. P., et al., The Global E-waste Monitor 2017, UNU, ITU, ISWA, 2017

⁵³⁰ Baldé, C. P., et al., The Global E-waste Monitor 2017, UNU, ITU, ISWA, 2017

⁵³¹ <http://www.basel.int/Countries/StatusofRatifications/PartiesSignatories/tabid/4499/Default.aspx#enote1>

⁵³² Odeyingbo, O., et al., Person in the Port Project: Assessing Import of Used Electrical and Electronic Equipment into Nigeria, UNU, 2018

⁵³³ [https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics--Final%20\(1\).pdf](https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics--Final%20(1).pdf)

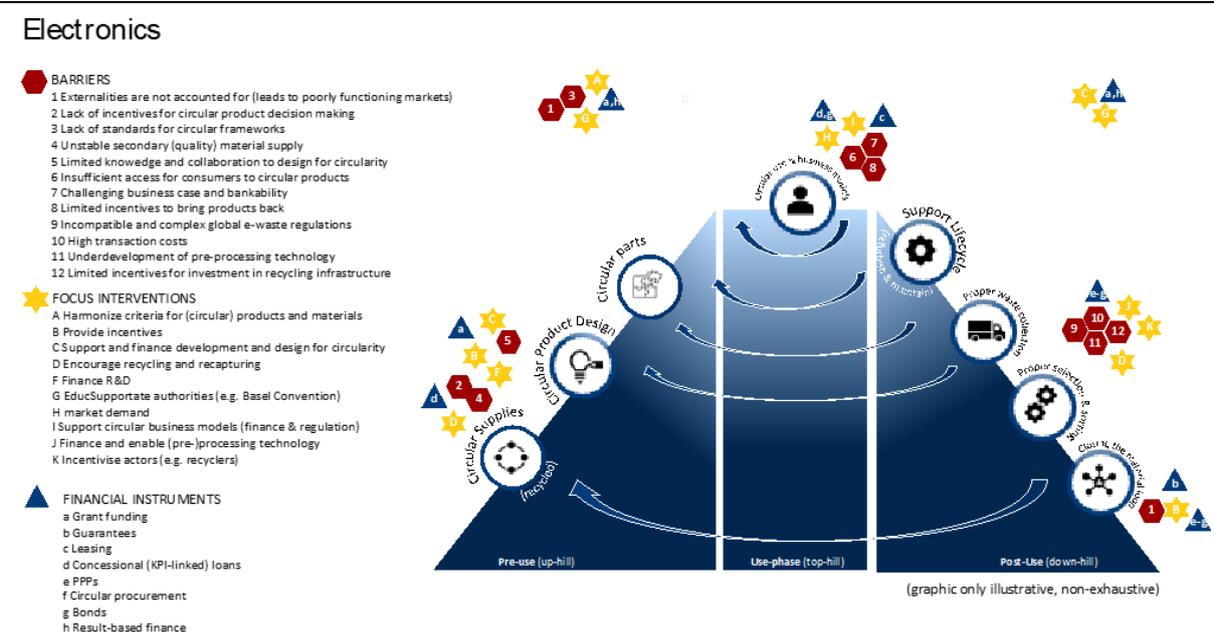
⁵³⁴ [https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics--Final%20\(1\).pdf](https://pacecircular.org/sites/default/files/2019-03/New+Vision+for+Electronics--Final%20(1).pdf)

not of sufficient quality for use in new electronic products. Countries also have targets related to this. In China, there is a target for 20% recycled content in all new products by 2025.

Characteristics

Electronic consumer goods are amongst the fast-flowing goods (especially in relation to the value of the input materials). Policy frameworks as well as support for business models that enable long product life, are necessary to counteract that trend.

The supply chain is global, highly complex and laden with environmental and social conflicts. Due to the participation of countries with weak or non-existing regulations (up-hill as well as down-hill), global regulatory intervention is mandatory to prevent all stakeholders from the exploitation of regulatory loopholes and allow for circular solutions and value sharing. Beyond that, economically viable reverse cycles are crucial for the implementation of closed resource loops. This needs an improvement of the product design for recycling as well as investment in innovative recycling technologies.



Outline Electronic and ICT Sectors considerations - CE opportunities and options to respond and Value Hill

Table 44: **Electronic and ICT** Sectors considerations – CE opportunities and options to respond and Value Hill

Sector	Key barriers in selected sectors based on Value Hill	Considerations to respond to key barriers
Electronics and ICT <small>535, 536, 537, 538, 539</small>	<p><u>Circular Design (up-hill):</u></p> <ul style="list-style-type: none"> ➔ Urban mining ➔ Designing for longevity, remanufacturing, adaptability and repairability (enabling repair, refurbishment, and upgrade e.g., by users via modularity with spare parts (sample: Fairphone) or by technicians (e.g., iPhone)) ➔ Reintegration of used (e.g., remanufactured) parts and recycled material into new components ➔ Reduce hardware operation needs by enabling cloud migration. <p>Barriers:</p> <ul style="list-style-type: none"> - Lack of industry-wide agreed standards and definitions for design for circularity: Various terms relating to circular product design, e.g., repairable, or durable, are not yet defined at industry level. A common vocabulary will help support harmonization efforts in government policies, procurement practices, and certification schemes. To date, standards are being developed that cover some of these aspects (e.g., by the European Committee for Electrotechnical Standardization, CENELEC, or the International Organization for Standardization, ISO). - Lack of incentives to design for circularity: Designing for circularity can increase costs in the short term, whereas benefits from circular products and services (e.g., increased customer loyalty), are more difficult to quantify. Circular economy as a customer value-creating opportunity often not seen yet. Therefore, design for circularity is not often prioritized by corporate decisionmakers, and designers lack a clear mandate for prioritizing circularity criteria. - Limited collaboration across the value chain: Recyclers seldom involved in product design processes, while designers lack insight into lifecycle and end-of- use strategies. This leads to a lack of innovation regarding coherent design strategies for disassembly, safe disposal, and high-quality material recovery, and a lack of effective recycling technologies and processes that complement design 	<ol style="list-style-type: none"> 1. Regional governments can <u>collaborate to harmonize circularity criteria for imported electronic products</u> (e.g., restrictions on hazardous substances, longevity, repairability, and availability of spare parts, etc.) 2. Incentivize and <u>support product design for circularity</u> (e.g., investment in R&D, reduced VAT, compulsory extended warrant periods, subsidies, modular EPR fees, etc.) 3. Support manufacturers, recyclers, and research organizations to <u>collaborate to develop viable design strategies and technical solutions</u> (e.g., provide training courses to businesses, universities, better data on lifecycle impacts to support fact-based design decisions, etc.). 4. Develop <u>advanced recycling and recapture policies</u> to encourage recycling, and the <u>integration of recycled content</u> into new products (e.g., set share of mandatory recycling content, etc.). 5. Support the establishment of a <u>pre-competitive collaboration platform of industry associations</u> to share cross-value chain knowledge sharing and best practice exchange, and to defined broader industry-level targets, e.g., collabora-

⁵³⁵ Ellen MacArthur Foundation, 2017, Circular Consumer Electronics.

⁵³⁶ Platform for Accelerating the Circular Economy (PACE), 2019, A New Circular Vision for Electronics, Time for a Global Reboot (United Nations E-waste Coalition

⁵³⁷ Circular Economy Action Agenda. Electronics. Pace. Platform for Accelerating the Circular Economy. <https://pacecircular.org/action-agenda/electronics>

⁵³⁸ A New Circular Vision for Electronics. Time for a Global Report. Pace. World Economic Forum. In collaboration with the UN E-waste coalition. <https://pacecircular.org/sites/default/files/2019-03/New%2Bvision%2Bfor%2BElectronics-%2BFinal%20%281%29.pdf>

⁵³⁹ Circle Economy. 2018. 'The Circular Phone: Legal, Operational and Financial Solutions to Unlock the Potential of the Fairphone as a Service Model.' https://assets.website-files.com/5d26d80e8836af2d12ed1269/5dea57f99d58652614589821_26616471-0-The-Circular-Phone.pdf.

	<p>for recycling (e.g., reduced shredding). For real closed loop recycling, even closer collaboration between manufacturers (designers, material engineers, procurement, raw material suppliers, etc.) and recyclers is required.</p> <ul style="list-style-type: none"> - Limited guidance to balance design requirements: Designers need to evaluate and balance requirements relating to usability, longevity, recyclability, data security, product safety, and production cost. The order of priority of different requirements depends on the product category and specific product characteristics. To date, an evaluation of circularity criteria is rarely a structural part of the design process. - Lack of transparency on origin, quality, and recycled content of secondary materials: Scrap materials often pass through multiple traders, which limits the ability of recyclers to obtain details on the materials' origin, chain of custody, or method of collection. The quality of scrap material is not well labelled, due to inconsistent labelling or a lack of transparency about material types and grades. Lack of processes that can certify the origin of materials, material quality, and recycled content. In effect, recyclers struggle to provide the same level of quality and environmental, health and safety assurance for secondary materials as other suppliers can for virgin materials. For some manufacturers this is a key barrier to secondary material sourcing. - Unstable secondary material supply: The medium- and long-term volumes, qualities, and prices of recycled materials are rather uncertain. This puts secondary materials at a disadvantage compared to today's flexible supply chain for virgin materials. Barrier to increase secondary material and product level. Where secondary material markets are less robust and not integrated with primary material markets, recyclers cannot guarantee long-term supply (e.g., due to complex supply chains compounded by shifting waste shipment regulations or their interpretation). <p>Focus interventions: 1, 2, 3, 4, 5, 6, 7</p> <p><u>Rethink usage and business models (top-hill)</u></p> <ul style="list-style-type: none"> ➔ Using products for longer ➔ Addressing underused product capacity and premature end of use⁵⁴⁰ with adequate business model solutions ➔ Enable introduction of Product Service Systems (PSS) 	<p>tively develop standards for secondary materials to increase sourcing and use of recycled materials</p> <ol style="list-style-type: none"> 6. Enable producers to increase <u>sourcing of recycled content</u>. 7. Support and <u>finance development and piloting (R&D) of digital solutions</u> to increase product <u>traceability</u> and transparency (building on standardized indicators). 8. Enable efficiency and <u>transparency in compliant and responsible transboundary movement</u> (e.g. educate authorities on Basel Convention to enable them to team up with trade ministries, private sectors and such to develop certification e.g. for collectors in exporting countries and recover facilities in importing countries, to be used as a basis for establishing 'green lanes' for shipments on defined routes under a trusted trader system; invest in digital procedures to speed up and improve the process; continue efforts to harmonize classification of electronics, (EEE, WEEE, waste, hazardous waste')). 9. Transform consumption modes to <u>increase market demand for circular products and services</u> (e.g., revisit organisational (public) procurement guidelines that prevent integrating circular criteria in evaluation processes). 10. Guide and <u>support new business models</u> for environmental, financial, and social triple-win (e.g., bring circularity in discussion with large-scale purchasers, highlighting the environmental and social benefits, and test the appeal of new value propositions).
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⁵⁴⁰ Blomsma, Fenna. Collective 'action recipes' in a circular economy – On waste and resource management frameworks and their role in collective change. Journal of Cleaner Production, July 2018.

	<p>Barriers:</p> <ul style="list-style-type: none"> - Insufficient consumer access to repair and refurbishment services: Due to growing product complexity, design characteristics (e.g., irreversible adhesives), and software restrictions, consumers have very limited options to perform small repairs to their own electronics products. Often reparability is also limited for safety and liability reasons (e.g., battery packs are shielded from access by the consumer to avoid safety hazards). High labour costs of repair, coupled with new products with low prices and better features, has made repair shops less accessible, especially in developed economies. Product categories covered by professional repair or refurbishment are usually limited only to smartphones, laptops, and computers, and less available for other electronics products. - Insufficient integration of circular economy principles in organizational procurement (B2B): Organizational procurement accounts for a significant share of market demand. However, circular economy principles and criteria are insufficiently integrated in procurement processes and large-scale public and private sector buyers, resulting e.g., in tenders being limited specifically to new equipment. - Challenging business case for product use extension: Business models to extend electronics product use (e.g., PSS) may incur higher operational costs in monitoring, maintenance, repair/refurbishment, testing, and logistics. On the other hand, they may be disadvantaged in buying decisions, especially for products with rapid innovation cycles. Also, some business models require a larger upfront investment with a longer payback time, adding to financing challenges. There is also a need to measure the benefits of product use extension models to avoid a perceived risk of cannibalizing new product sales, discouraging producers from innovating in this space. <p>Focus interventions: 8, 9, 10, 11, 12, 13, 14</p> <p><u>Circular value recovery (down-hill)</u></p> <ul style="list-style-type: none"> ➔ All e-waste should be treated by the formal sector ➔ Maximize the collection of end-of-life electronics ➔ Keep collected materials at highest quality (e.g., use high tech recycling to extract broad range of materials) ➔ Improve economics of recycling (e.g., by automation during the disassembly and refurbishment processes to improve quality and quantity) 	<ol style="list-style-type: none"> 11. Governments can provide <u>legal clarity regarding the liability</u> of manufacturers and independent repair providers for product defects and related consequences. 12. Financial services institutions or industry associations can consider <u>establishing a collective insurance scheme for independent repair providers</u>. 13. Financial services providers can <u>improve access to capital</u> for product use extension business models. 14. Support countries to <u>set up effective collection systems</u> (e.g., legal frameworks for e-waste collection and recycling, EPR schemes, but also take-back schemes, etc.). 15. Support countries to <u>strategically plan and install collection, sorting, pre-processing, and recycling operations</u> (e.g., regional hubs or more distributed value chains to develop pre-processing and recycling ecosystems, balancing economies of scale with value sharing and local expertise, etc.). 16. <u>Provide finance in sorting and pre-processing technology</u> (e.g., disassembly robots able to use dismantling commands stored in product passports, and intelligent sorting systems using machine vision, provide opportunities, etc.) 17. <u>Increase incentives for investment in recycling technologies and facilities</u> (e.g., foster enabling environment for e-waste management, improve enforcement of existing regulations to ensure level playing field for compliant actors, stimulate recycling materials market via tax incentives, subsidies, recycled content targets, etc.). 18. <u>Incentivise recyclers</u> to adjust recycling processes to <u>complement design for recyclability</u>
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	<p>Barriers:</p> <ul style="list-style-type: none"> - Inconsistent/incompatible e-waste regulations and enforcement globally: 78 countries, covering 71% of the global population, had an e-waste policy, legislation, or regulation in place by 2019. However, how legally binding these are and the scope of the legislation (e.g., the product categories covered) differs across countries. Also, enforcement of legally binding policies is often lacking. - Lack of formal e-waste collection globally: In 2019, 53.6 million metric tons of e-waste was generated, of which just 17.4% was documented for formal collection and recycling globally. In low- and middle-income countries often too limited financing for a formal and functional collection infrastructure and ecosystem. Informally collected e-waste often ends up with illegal or hazardous treatment. - Insufficient integration of circular economy principles in end-of-use management: Organizational end-of-use management guidelines can be a barrier to circularity, demanding destruction of devices and equipment at the end of their use cycles (e.g., data security) or prohibiting the return of products back to the manufacturer for refurbishment or remanufacturing (e.g., because trade with private parties may not be allowed). - Complex regulatory processes and high transaction costs for reverse logistics with circular objectives: The objective of the Basel Convention is to avoid the environmentally and socially detrimental trading of hazardous waste. Under the Convention, certain transboundary movements of hazardous waste are banned, while others require an approval process based on the Prior Informed Consent Regulation (PIC) process, administered by the authorities of the importing, exporting, and any transit countries. Currently, for some trade cases with circular objectives, PIC processes can take years to go through, involving high transaction costs and adding operational constraints for manufacturers and recyclers. Lack of training, for example of trade officials, is part of the cause. In addition, there is also a need to reduce costs for domestic reverse logistics processes in some countries. - Complex and inconsistent electronics classifications: International reverse logistics processes for end-of-use electronics are highly dependent on two classifications: 1) is the product classified as “used EEE” or as “WEEE”, and 2) is it classified as “non-hazardous waste” or as “hazardous waste”? In cases where the product is classified as “WEEE” and “hazardous”, international reverse logistics processes need to follow the rules of the Basel Convention on the Control of Transboundary Movements of Hazardous Waste and Their Disposal.⁵⁴¹ - Underdevelopment of sorting and pre-processing technology: Sorting technologies cannot keep up with advancing material complexity and fast changes of electronics products (more than 1,000 different substances and up to 60 elements from the periodic table). Difficult for sorting and pre-processing to deliver the purer streams that are needed for high quality recycling. 	<p>(e.g., to optimize recovery of materials at high rates and quality levels).</p> <p>19. Integrate and advance <u>decent work in the transition to a circular economy for electronics</u> (e.g., foster cooperation between informal collectors and formal recyclers, protecting safety and health of informal workers and their families, investing in up- and reskilling programmes, supporting workers to transition into formal employment, etc.)</p> <p>20. Support governments <u>to improve documentation of e-waste collection</u> (e.g., by including e-waste recycled outside of EPR schemes to improve the date of waste flows as basis for strategies to increase collection rates.</p>
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⁵⁴¹ In 2019, an addendum to the revised technical guidelines from 2014 was introduced with the objective of clarifying these definitions. Discussions within the Basel Convention are still ongoing, and the technical guidelines so far have only been approved on an interim basis (Secretariat of the Basel Convention n.d.). The complex and inconsistently applied classification for electronics and the effects on reverse logistics are a barrier to a circular economy for electronics.

	<ul style="list-style-type: none"> - Lack of mechanisms for safe treatment and recycling of hazardous e-waste: E-waste can contain hazardous substances (e.g., certain flame retardants, lead, and mercury). In the treatment of e-waste, it is important to protect workers and avoid the release of these substances into the environment. The compliant recycling of hazardous e-waste (e.g., contaminated plastics) incurs technical costs and requires proper training. Various countries lack the technological capabilities or access to the facilities they need to recycle hazardous e-waste. In some jurisdictions waste treatment laws disincentivize any processes other than mechanical separation (e.g., permits may be required for any waste treatment that uses heat, water, or chemicals), making hazardous e-waste recycling operations uneconomical. - Limited incentives for investment in recycling infrastructure: Volatile market prices for raw materials, difficult-to-aggregate scrap volumes, and uncertain market demands lead to unstable revenues for recycling operations. In addition to competition from virgin materials, recycling practices not complying with environmental and safety regulations can undercut market prices. This lack of level playing field limits compliant recyclers in increasing capital expenditure investment and expanding their operations. In low- and middle-income countries, there is a need to foster an enabling environment (e.g., through reducing business registration costs) for new sustainable e-waste enterprises. Strong informal sector activity in e-waste collection and recycling may disincentivize investment from global recycling companies, due to the business risks linked to engaging with the informal economy⁵⁴². - Limited incentives for consumers to bring back electronics at end-of-use: Consumers (especially individuals) often lack awareness about the environmental, health, and safety impacts of e-waste or - even when awareness is present -, behaviour does not necessarily change. Social and financial incentives for consumers to get informed and invest the time to bring back end-of-use electronics, especially smaller devices, are limited. Also, data security concerns and the wish to store an old device as a back-up pose disincentives for bring-back, and ultimately prevent potential second-use and closed loop material recycling. <p>Focus interventions: 4, 15, 16, 17, 18, 19, 20, 21</p> <p><u>Circular Support (Cross-hill)</u></p> <ul style="list-style-type: none"> ➔ Improve the reuse market by improving transparency of pricing, product specifications, condition, and traceability. <p>Barriers:</p> <ul style="list-style-type: none"> - Externalities are not accounted for: Current price points of electronics products do not account for their negative externalities, including greenhouse gas emissions, health hazards, biodiversity loss, 	
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⁵⁴² Circular Electronics Partnership. 2021. 'Circular electronics roadmap: an industry strategy towards circularity'. <https://cep2030.org/our-roadmap/>

	<p>and resource use. This puts products that reduce externalities (such as with increased circularity), while incurring higher costs in doing so, at a competitive disadvantage.</p> <ul style="list-style-type: none">- Low awareness of the environmental and social hazards of e-waste: While the health hazards of e-waste are known, especially for pregnant women and children, there is currently limited scientific research on the macroeconomic and societal cost of e-waste dumping (hampers value integration into circular value creation models). Also, the general public is usually unaware of the negative environmental and social impacts of e-waste. This limits both consumer behaviour change and public demand for government and business action. <p>Focus interventions: 1, 2, 4, 5, 8, 9, 10, 11, 20</p>	
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Plastics

Plastic is widely used in most areas of our life. While it is an amazing material that enabled many of our modern life conveniences (hygienic packaging for food and medical instruments, functional wear, windows, or flooring, etc.) and also enables energy efficiency solutions (styrofoam insulation for buildings, lightweight construction of cars, etc.), it causes a mountain of problems along its life cycle and along the value hill. Researchers estimate, that more than 8.3 billion tonnes of plastic have been produced since the early 1950s. Along the lifecycle of a product, in the US, plastic industry releases at least 232 million tons of GHG each year. That is the equivalent of 116 coal-fired power plants.⁵⁴³

Regarding (problematic) **plastic waste generation, however, is strongly influenced by the lifetime and cost of the product** (e.g., 96% of plastic packaging ends up as waste, whereas building and construction creates ,only' 5% of waste of the annual plastic production)⁵⁴⁴. While the main problem of short-term products is current waste generation, products with a long mean lifetime, like building products (in average about 35 years), create other problems: they delay crucial issues like the treatment of toxic or non-recyclable materials into the future. Therefore, for those implementations, it is all the more important to rethink material composition.

Table 45: **Plastics** Overview of sector characteristics

Main problems	Major levers	Main drivers
<p>Plastic products with a long mean lifetime, like building products (in average about 35 years), have three main issues:</p> <p><i>Top-hill:</i> general (over)-consumption of resources, mostly due to a still 'premature end of use' of products (e.g., windows or flooring are destroyed when buildings are refurbished or torn down) and also because of underused product capacity (e.g., kitchenware, like mixers are present in many households but hardly used).</p> <p><i>Down-hill:</i> the second main issue is that the end-of-life treatment of toxic or non-recyclable materials (e.g., flooring, plastics in electronic products) is delayed into the future, where they prevent safe, or in general, like-for-like recycling.</p> <p><i>Top-hill:</i> A third major issue occurs because of uncontrollable leakages of materials containing problematic substances along the production or use process (e.g., Styrofoam scraps on building construction sites, etc.). Those scraps are released into the environment, are (mechanically) broken down into microplastics and further dissipated into ecosystems.</p>	<p>Considering these main issues, there are three major levers to address the problem:</p> <p><i>Addressing the problem up-hill:</i> The source of both issues of (over)-consumption of resources as well as the delay of the treatment of problematic resources can be addressed during the design phase of the product, by choosing (alternate) input materials as well as design for re-use or recycling.</p> <p><i>Addressing the problem top-hill:</i> Depending on the kind of product, innovative product life cycle extension models (e.g., product longevity, re-use, sharing-models, etc.) can help to keep products in use for longer.</p> <p><i>Addressing the problem down-hill:</i> Closed material loops or similar adequate end-of-life collection and treatment has to be ensured. First, to keep problematic substances under control at all times and prevent them from being exposed into the environment and second, to enable high-qualitative material cycles to decrease resource consumption.</p> <p>-</p>	<p>Plastics has a fractured manufacturing chain with an asymmetric power balance. There is not a single main actor. Formulators – the ones able to design in recyclability – are no decision makers regarding the product composition and have to deliver what is ordered by the manufacturer. Neither the manufacturer of the plastic products, nor the customer or the recycler, however, would demand circularity. Regulatory frameworks are certainly the main driver. To fulfil the requirements, though, the main driver would be a close collaboration along the whole value chain.</p>

A common problem of all plastic products is their **reliance on and consumption of fossil resources**, as well as an **exuberant addition of (problematic) additives** to the material to enhance their performance (e.g. plasticizers, flame retardants, antioxidants, acid scavengers, light and heat stabilizers, lubricants, pigments, antistatic agents,

⁵⁴³ <https://www.reuters.com/business/cop/plastics-outpace-coals-greenhouse-gas-emissions-by-2030-report-2021-10-21/> (Accessed Feb 13th, 2022); Beyond Plastics. The New Coal. Plastics & Climate Change. October 2021.

⁵⁴⁴ Plastic waste in tonnes, and waste production in relation of annual plastic production per sector (2015): packaging 141 million tonnes (96%), textiles 42 million tonnes (71%), other sectors 38 million tonnes (81%), consumer & institutional products 37 million tonnes (88%), transportation 17 million tonnes (63%), building & construction 13 million tonnes (5%), electrical/electronics 13 million tonnes (72%), industrial machinery 1 million tonnes (33%). <https://ourworldindata.org/plastic-pollution>

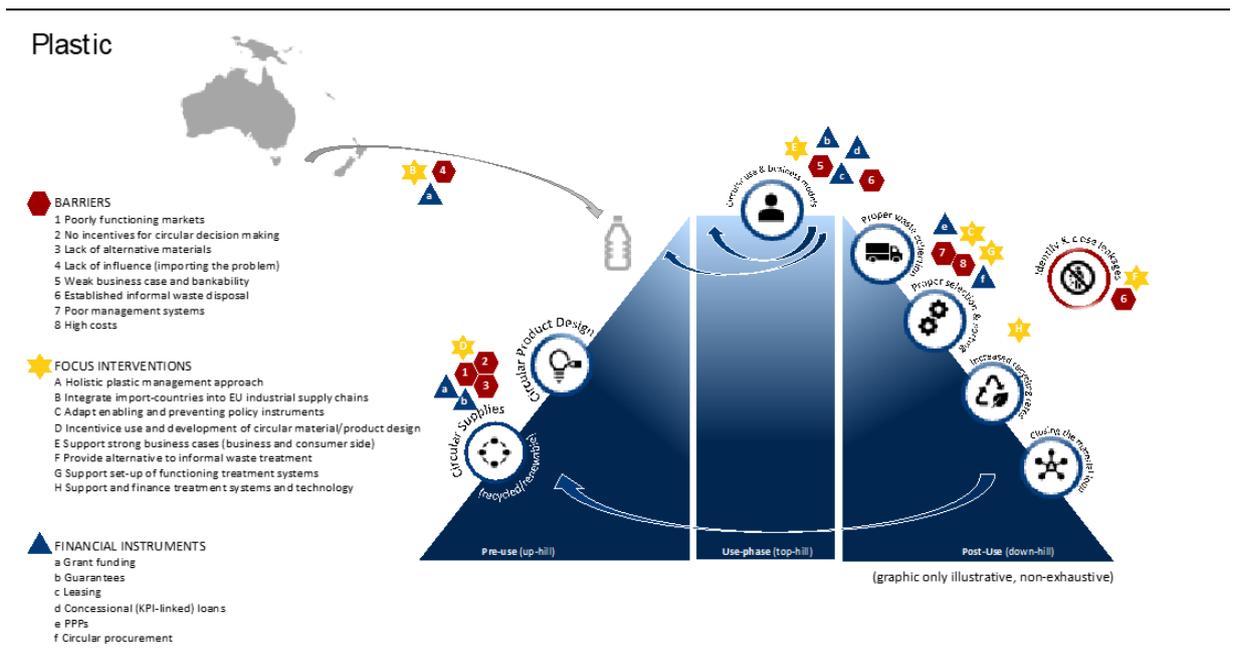
slip compounds and thermal stabilizers).⁵⁴⁵ Depending on the kind of additive, the production process, the circumstances of the product use and the end-of-life treatment, those substances can migrate, emit, leach, fragment or being released⁵⁴⁶ into the environment and pose a threat to ecosystems and human health. Additionally, in most cases they are obstacles to recycling.

Characteristics

In this document, mid- to long-term plastic applications are addressed, like e.g., window frames or pipes (products that last). For fast-flowing single-use plastic products see chapter 'Packaging'. For plastic used in cables or electronic products see chapter 'Electronics & ICT'.

The use of plastic allows to create very bespoke product characteristics. It is comparably cheap, with low part-complexity, lightweight and/or to add certain specifics like flame-retardancy, colour, processability, or flexibility right into the material itself. With these prerequisites, plastic most likely will remain part of our economic life. While alternative raw materials to fossil resources need to be identified, the addition of problematic substances might need to be tolerated in certain product groups (e.g., flame retardants for textiles used in airplanes or in building insulation, etc.) and solutions for a safe product life and end-of-life treatment need to be found. Decision for input (compound) material and product design are decisive factors for the recyclability of the products.

In general, mid- to long lasting plastic products (e.g., parts for cars or machinery, windows, kitchen machines, etc.) can be traced to a manufacturer or could be designed for traceability. Plastic products that last can be part of mid- to high-pricing product groups, which allows for certain use-extension or take-back schemes. Supply- and value chains of plastic products that last are often semi-complex and expand over at two or more countries.



Outline Plastics Sectors considerations - CE opportunities and options to respond and Value Hill

⁵⁴⁵ Hahladakis, J. et al. An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal, and recycling. *Journal of Hazardous Materials*. Volume 344. February 2018.

⁵⁴⁶ Hahladakis, J. et al. An overview of chemical additives present in plastics: Migration, release, fate and environmental impact during their use, disposal, and recycling. *Journal of Hazardous Materials*. Volume 344. February 2018.

Table 46: **Plastics** Sectors considerations – CE opportunities and options to respond and Value Hill

Sector	Key barriers in selected sectors based on Value Hill	Considerations to respond to key barriers
Plastics ^{547, 548, 549, 550, 551, 552, 553}	<p><u>Rethink the material (up-hill)</u></p> <ul style="list-style-type: none"> ➔ Dematerialize (use of renewable or recycled materials) ➔ Identify plastics that should be eliminated / substituted due to their un-beneficiary properties (and prepare facing out). ➔ Development of plastic substitutes (e.g., vegetable, or cellulose fibres or organic waste materials), that can decrease reliance on imports of (single-use) plastics and strengthen local economy. ➔ Development of circular polymers, additives, and compounds (recyclable and/or biodegradable). Look to build economies of scale. ➔ Implement / develop track and trace systems (e.g., tracer-based sorting) <p>Barriers:</p> <ul style="list-style-type: none"> - Unintended/cross-dimension consequences: The use of renewable material has ecological and socio-economic consequences, too, and can shift waste, pollution, or destruction to other parts of the system⁵⁵⁴. - Poorly functioning markets: raw feedstock fossil fuels are currently cheaper to use than recycled materials. The supply of cheap virgin oil-based plastics shows little sign of slowing, as many oil companies are pursuing greater production of plastics to help compensate for declines in other markets such as energy⁵⁵⁵. 	<ol style="list-style-type: none"> 1. Implement a <u>holistic plastic management approach</u> in the country (politically, economically, financially). 2. <u>Protect countries from pressure</u> of major oil companies⁵⁵⁶. 3. Work towards <u>integrating import-countries into the EU industrial supply chains</u>, in particular for key industrial ecosystems such as plastics (e.g., packaging, textile, consumer goods, building, etc.). 4. Evaluate <u>other policy instruments</u>, such as EPR schemes, mandating recycled content, tax benefits for producing/sourcing recycled plastics, and shifting subsidies from virgin plastics to recycled plastics. 5. Further research to <u>better understand regulatory trends surrounding plastics and plastic waste</u> in terms of <u>scope and regulatory distance</u> between countries, and support countries

⁵⁴⁷ <https://ccpe.fraunhofer.de/index.php/de/cluster-circular-plastics-economy-ccpe/>

⁵⁴⁸ Circular Economy Action Agenda. Plastics. Pace. Platform for Accelerating the Circular Economy. <https://pacecircular.org/action-agenda/plastics>

⁵⁴⁹ <https://ourworldindata.org/plastic-pollution>

⁵⁵⁰ Barrowclough, D and D Vivas Eugui (2021), 'Plastic Production and Trade in Small States and SIDS: The Shift Towards a Circular Economy', International Trade Working Paper 2021/01, Commonwealth Secretariat, London.

⁵⁵¹ <https://plasticseurope.org/wp-content/uploads/2021/10/20191206-Circular-Economy-Study.pdf>

⁵⁵² <https://ellenmacarthurfoundation.org/topics/finance/overview>

⁵⁵³ 3R Initiative, EA, South Poland Quantis, 2020, Guidelines for Leadership in Corporate 1Plastic Accounting

⁵⁵⁴ Crop-based plastics may increase land-use, deforestation, use of fertilizer, water, and pesticide use (explore options with e.g., microalgae or organic waste)

⁵⁵⁵ The oil and gas industry plans to spend around USD400 billion until 2025 on plants used to make raw materials for virgin plastics. Carbon Tracker. 2020. 'The Future's Not in Plastics: Why Plastics Demand Won't Rescue the Oil Sector'. Analyst Notes (blog). September 2020. <https://carbontracker.org/reports/the-futuresnot-in-plastics/>.

⁵⁵⁶ There are reports that, for example, certain major oil companies are pressuring Kenya to change its world-leading stance against plastic waste. The Guardian (2020) "Oil Industry Lobbies US to Help Weaken Kenya's Strong Stance on Plastic Waste". 1 September. <https://www.theguardian.com/world/2020/sep/01/kenya-plastic-oil-industry-lobbies-us>

	<ul style="list-style-type: none"> - No incentive to use secondary materials: producers of plastic and packaging have little to no incentive to consider recycling or reuse when they design products - Lack of alternative materials with comparable price and functionality: Alternatives to (conventional) plastics are often more costly, can differ in functionality, and do not always have a lower environmental footprint throughout their lifecycle. It is challenging to phase out plastics without a viable and versatile substitute. - Lack of financing to develop alternatives: Renewable materials (e.g., organic fibres) or organic wastes can be a substitute for some plastic applications and can even strengthen local economy. However, financing for innovation, supporting start-ups and develop an economy is lacking. - Importation of the problem with little influence on the solution: Plastic as a waste problem is mostly imported, while influencing the source of the problem – the design and manufacturing phase – is mostly not tangible. The usual scope of measures for importing countries often includes only a regulatory ban of problematic products or substances (e.g., plastic bags or plastic straws). <p>Focus interventions: 1, 2, 3, 4, 5, 6, 7, 8, 9,10</p> <p>Rethink product design (up-hill)</p> <ul style="list-style-type: none"> → Design products for reuse and recycling → Be aware of and concerned about the life cycle impact of products <p>Barriers:</p> <ul style="list-style-type: none"> - Lack of incentives to design for reuse and recycling: Adding these requirements to plastic material and product design may require investment, new collaborations, and higher costs, which are currently not rewarded by the market (e.g., through premium price points) or by policy (e.g., tax incentives). - Sustainability is not consumers most important decision driver: If circular innovation or internalisation of external costs increase the costs of materials or products, consumers (B2B as well as B2C) most likely need additional incentives to decide for the sustainable solution. <p>Focus interventions: 11, 12, 13, 14, 15, 16, 17, 18, 19, 20</p>	<p>working towards global coordination and enhanced national cooperation to phase out unwanted (value chain) plastic solutions.</p> <ol style="list-style-type: none"> 6. Investigate <u>environmental and socio-economic impacts</u> of renewable material inputs for plastic. 7. To drive secondary material demand, <u>incentivise companies to using post-consumer resin</u> (PCR) wherever possible. 8. <u>Support R&D regarding circular materials</u> (recyclability, biodegradability or renewable resource-based⁵⁵⁷ polymers, additives.) and make research accessible resp. affordable to SMEs⁵⁵⁸ (e.g., funding). 9. Ensure <u>affordable access to new process and raw material knowledge</u>. 10. Support <u>collaborations between governments, businesses, and researchers</u> to develop solutions (e.g., standards, assessment methods, etc.). 11. <u>Assess policy instruments</u> such as eco-design directives and <u>public procurement</u> to incentivize design for circularity. 12. Develop (or introduce existing) <u>industry guidelines</u> on how to embed recyclability principles into their design process (e.g., reduce of colourants, labels, sleeves, adhesives, etc.) 13. Incentivize and <u>support product design for reuse and recycling</u>. 14. Governments can <u>leverage financial instruments</u> (e.g., taxation or EPR fees) to help ensure
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⁵⁵⁷ E.g., microalgae or organic waste. Further research on impacts and viability of industrial applications needed.

⁵⁵⁸ <https://ccpe.fraunhofer.de/index.php/de/cluster-circular-plastics-economy-ccpe/>

	<p><u>Rethink usage and business models (top-hill)</u></p> <ul style="list-style-type: none"> ➔ Reuse plastic products ➔ Collaborate to innovate (collaboration and value sharing between resin suppliers, manufacturers, brands, waste contractors and recyclers) ➔ Re-think material ownership models <p>Barriers:</p> <ul style="list-style-type: none"> - <i>Lacking track record impedes financing:</i> Circular business models like ‘product-as-a-service’ or even ‘molecule-as-a-service’ are still in development and don’t have a long track-record yet. Conventional lending institutes hesitate to finance such innovative business models – especially when collaborations along the value chain cross state borders. - <i>Reuse often lacks a strong business case and is perceived as risky:</i> While some refillable systems have been financially successful, many reuse models (also thinking of other sectors than packaging) – especially the ones with return systems – incur higher operational costs through reverse logistics, cleaning, organizing, and handling the returning packing. Alternative materials could also bring additional costs, with increased weight or variances in shape that impact logistics. This inhibit the scaling of business models and are also seen as riskier by traditional financial assessments (legal complexities and lack of proven track record). - <i>Reuse requires consumer behaviour change:</i> reuse can require consumers do things differently and with more effort (e.g., cleaning, bring to collection point, etc.). Information (awareness rising) by itself will not change behaviour, especially when convenience is compromised. <p>Focus interventions: 21, 22, 23, 24, 25, 26, 27</p> <p><u>Reduce leakage (down-hill)</u></p> <ul style="list-style-type: none"> ➔ Identify and close leakages of plastic waste into the environment (open dumping, open burning, disposal in waterways, littering at construction sites, etc.) <p>Barriers:</p> <ul style="list-style-type: none"> - <i>Wanting awareness (civil society):</i> People are partly not aware of the consequences littering might has for the environment or even for their own livelihood (throwback on fishing grounds or tourism, might not feel responsible (workers at construction sites) or do not know about other options (controlled waste collection instead of illegal landfills). Alternatives to littering might also be too expensive. - <i>Limited financing models for plastic waste collection (public services):</i> Collection is key to preventing leakage into the natural environment and to secure feedstock for recycling. Plastic waste collection poses a logistical and economic challenge: billions of households and businesses need to be connected to a network of collection points in an economically viable way. That is a challenge especially 	<p>the <u>environmental costs</u> of production and consumption are more accurately <u>reflected in market prices</u>.</p> <ol style="list-style-type: none"> 15. <u>Ban single use, toxic or unrecyclable plastic products or materials.</u> 16. (Commercially) <u>reward companies that think long-term</u> and along the value chain (e.g., enable value creation for circular materials and products, investments in recycling infrastructure or technologies) 17. <u>Foster collaboration along the value chain</u> (resin suppliers, manufacturers, brands, waste contractors and recyclers) 18. <u>Making use of soft intellectual property protection categories</u> such as utility models and industrial design protection may be very relevant to allow and promote local and low-cost innovation. 19. Develop <u>regional financial institutions</u> to support new and existing enterprises. 20. <u>Eliminate the use of ‘unnecessary’ or ‘problematic’ plastics in public procurement contracts</u> and also include plastics with recycled content in public procurement guidelines. 21. <u>Support circular business models in public procurement contracts</u> (e.g., in long- life products in building and construction). 22. Research organizations, businesses, governments, and finance can collaborate to <u>develop metrics that measure the environmental and social impacts</u> of new business models. 23. Finance and government can <u>evolve accounting methods and financing models</u> to provide a level playing field for new business models and increase their access to financing.
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	<p>in rural areas. Despite its significance in reducing externality costs, plastic waste collection is usually a cost in itself, with limited direct financial return to justify the investment.</p> <ul style="list-style-type: none"> - Established informal waste collection and treatment: Informal waste collection/treatment practices are the foundation for peoples' livelihoods. The practices are well protected and important part of local economies yet lead to (amongst other issues) plastic leakages. <p>Focus interventions: 30, 32, 33, 36, 38</p> <p><u>Improve end-of-life treatment (down-hill)</u></p> <ul style="list-style-type: none"> → Implement proper (plastic) waste collection processes → Implement state-of-the-art selection and sorting technology → Increase recycling rates (mechanical and chemical recycling) → Increase secondary material use rate <p>Barriers:</p> <ul style="list-style-type: none"> - Poor waste management systems: Many countries have poor waste collection systems or poor incentives to collect the waste at all. Even if waste is collected, countries can lack the capacity to process it properly. - Changing landscape and fragmentation of the waste trade globally: Evolving regulations and differences between countries causes complexity and costs that can result in leakage and disincentivize the transport of plastics intended for recycling. This includes variation in regulations on the transboundary movement of waste, and the categorization of plastics as "waste" or "hazardous waste". While regulations are needed to serve as protection for importing countries, there may be unintended consequences if approval processes also hinder legal trading for proper recycling. Additionally, the shifting regulation landscape can add to uncertainty around investments in reverse logistics and recycling infrastructure. - Too much waste produced: Economies, trading partners and foreign investors depend on a thriving and wasteful plastic industry. - Mixed post-consumer plastics: Post-consumer plastic waste comes with a large diversity in types (e.g., PET, HDPE, PVC, PS, ...), forms, colours, and chemical additives. This poses a challenging in sorting, and severely compromises quality. Efforts to reduce resource intensity and innovations often involve new chemicals and compositions that current end-of-use solutions may not yet be equipped to handle. Composition labels, chemical markings, and recyclability and biodegradability labels vary by geography and sector, can be inconsistent or misleading, and often result in consumer or recyclers confusion. - High cost of sorting plastics: The sorting and cleaning processes of mixed plastic wastes are laborious and expensive. Consequently, plastic recyclers struggle to secure feedstock for their facilities, 	<ol style="list-style-type: none"> 24. <u>Address cost barriers for consumers</u> by providing targeted subsidies that address premium pricing on reuse options, with a focus on reuse items with the most significant environmental impact (e.g., tax reduction, beneficiary depreciation models, subsidies, etc.). 25. Businesses and municipalities can <u>co-invest in infrastructure</u> to provide consumers with convenient return-from-home channels, collecting reusables through a curb-side collection process and returning to point of purchase for customers to easily access again. 26. Provide policy and financial <u>support to companies implementing new business models</u>, based on their performance along defined metrics. 27. <u>Address hygiene and safety concerns</u> to promote dispense of or reuse of plastic and plastic products 28. <u>Support countries to develop strategic plans</u> to set up collection, sorting and recycling facilities, in compliance with trade regulations 29. <u>Set collection targets.</u> 30. Support the <u>set-up of functioning collection/take-back systems.</u> 31. <u>Inform strategic decision-making</u>, by providing/developing data and knowledge about the economic, environmental, and social impacts of different global/local recycling models. 32. Governments, businesses, and finance can <u>develop financing models for plastic collection systems</u>, especially for low- and middle-income countries and rural areas. 33. <u>Integrate and advance decent work opportunities</u> for (informal waste collection) workers from the beginning
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	<p>and the profitability of sorting is limited to relatively few plastics for which there is an established recycling market.</p> <ul style="list-style-type: none"> - Lack of scalable high quality recycling technology: a major limitation of mechanical recycling is that the quality of recycled plastics is degraded. It is estimated that PET can typically be recycled a maximum of two to three times. Chemical recycling may turn unsorted, uncleaned plastic waste into virgin quality feedstock, and can theoretically be recycled infinitely. However, concerns are also raised about its high energy intensity. The European Union, for example, is yet to undertake an in-depth review of chemical recycling (Simon 2020). This policy uncertainty in turn discourages investment in research and development as well as scaled facilities, keeping chemical recycling at low technical and financial maturity. - Contaminated plastic waste: Recycled plastics/textile fibres may contain unknown concentrations of hazardous chemical mixtures (e.g., flame retardants, heavy metals, chemical additives, etc.) <p>Focus interventions: 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38</p>	<p>34. Develop and enforce <u>quality and safety standards for sorting and recycled plastic outputs</u>.</p> <p>35. Look to <u>build economies of scale</u>: Support projects and initiatives that improve the economics of recycling infrastructure and recycled polymers.</p> <p>36. National and municipality governments can <u>collaborate to design waste collection systems</u>, taking into consideration the local ecosystem (e.g., recycling infrastructure), residential density, and cultural and socio-economic impact (informal collectors), agreeing on where harmonization or adaptation to local contexts should apply.</p> <p>37. Businesses, governments, and finance can <u>work out blended financing models for plastic collection, sorting and recycling infrastructure</u>.</p> <p>38. Educate society and raise awareness: address mindset and culture as well as provide tangible every-day behavioural and decision-making solutions</p>
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Textiles

Textiles are fundamental to our society, providing us with clothing, shoes, carpets, curtains, furniture, etc. for homes, offices, and public buildings. While industrially used textiles often are subject to specific chemical treatment to ensure their specific high requirements (fire protection for textiles in airplanes or cars or fire hoses), the focus of this document specifically lies on clothing.

Globally, supply chains of clothing, footwear and household textiles cause significant pressure on primary raw materials and water, land use and greenhouse gas emissions. Fashion, and its supply chain, is considered to be **the planet's third largest polluter (after food and construction)**. Due to its long supply chains and energy intensive production, it contributes to around 10% of global greenhouse gas emissions. That is more than all international flights and maritime shipping combined.⁵⁵⁹ Over 90% of the emissions for apparel come from four activities: dyeing and finishing, fabric preparation, yarn preparation, and fibre production.⁵⁶⁰ Most of the pressures and impacts related to the consumption of clothing, footwear and household textiles in Europe occur in other regions of the world, where the majority of production takes place. This is the case for 85 % of the primary raw materials use, 92 % of the water use, 93 % of the land use and 76 % of the greenhouse gas emissions.⁵⁶¹

Table 47: **Textiles** Overview of sector characteristics

Main problems	Major levers	Main drivers
<p>There are three major problems in the textile industry:</p> <p><i>Up-hill:</i></p> <ul style="list-style-type: none"> Use of harmful substances, manufacturing processes and pollution, as well as devastating working conditions. Overconsumption of resources due to 'fast fashion' (e.g., low-quality and/or quickly changing fashion standards). <p><i>Down-hill:</i> Extremely large volumes of textile wastes, which in practice are mostly not recyclable</p>	<p>Considering these main issues, there are four major levers to address the problem:</p> <p><i>Addressing the problem cross-hill:</i> Economic and policy frameworks need to be put in place that globally allow for sustainable, circular and 'slow fashion' practices along every step of the value chain and which create a level playing field for emerging holistic solutions. That is, e.g., creating (globally binding) regulatory frameworks and standards for environmental protection, internalisation of external costs and fair working conditions.</p> <p><i>Addressing the problem top-hill:</i> Awareness rising of consumers and incentivising and enable sustainable consumption for industry and consumers.</p> <p><i>Addressing the problem up-hill:</i> Finance innovation and incentivise design for recycling and collaboration along the value chain.</p> <p><i>Addressing the problem down-hill:</i> Support and finance technology development to increase textile recycling and close the resource loop</p>	<p>Major drivers are the consumers and a globally binding regulatory framework (and/or equally impactful industry standards).</p>

Between 2000 and 2014, clothing production doubled with the average consumer buying 60% more pieces of garment compared to 15 years ago. Yet, each clothing item is now kept half as long.⁵⁶² Global fibre consumption is expected to reach between 130 and 145 million metric tonnes by 2025.⁵⁶³ The global fashion industry produces over 92 million tonnes of waste per year. In the U.S. alone, over 17 million tons of used textile waste are generated annually.⁵⁶⁴ Just a fraction of end-of-life textiles is recycled (1% is recycled to produce new fibres of similar value, but 12% is downcycled, i.e., less valuable use).⁵⁶⁵ At least USD 100 billion worth of materials p.a. are lost.

⁵⁵⁹ <https://edgexpo.com/fashion-industry-waste-statistics/>

⁵⁶⁰ Quantis 2018 Report –Measuring Fashion | Environmental Impact of the Global Apparel and Footwear Industries Study.

⁵⁶¹ Textiles in Europe's circular economy. European Environment Agency. Nov 2019.

⁵⁶² https://unece.org/fileadmin/DAM/timber/meetings/2018/20180716/UN_Partnership_on_Sustainable_Fashion_programme_as_of_6-7-2018.pdf

⁵⁶³ Ellen MacArthur Foundation. A new Textiles Economy: Redesigning Fashion's Future, Circular Fibres Initiative. 2017

⁵⁶⁴ <https://www.ecofriendlyhabits.com/textile-and-fashion-waste-statistics/>

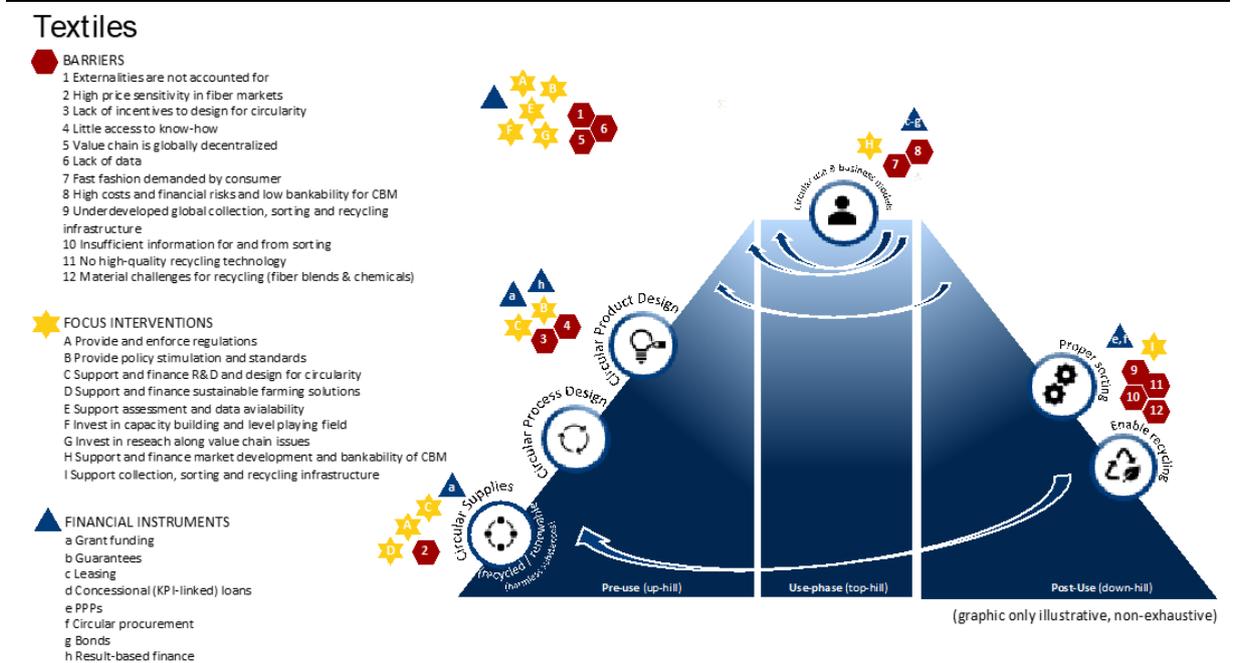
⁵⁶⁵ Ellen MacArthur Foundation, 2017, A New Textiles Economy: Redesigning fashion's future

A transition to a circular economy is expected to unlock a USD 560 billion economic opportunity in the fashion industry, by better capturing the value of underutilized and landfilled or incinerated clothes.⁵⁶⁶

Of the estimated 53 million tonnes of clothing manufactured annually, 73 % end up on landfills or are incinerated. 12 % are downcycled to other lower-quality products like insulating materials or cleaning cloths. Another 12 % is lost in manufacture as offcuts or destroyed as unsellable surplus stock. 0.5 million tonnes or almost 1 % alone of the volume finds its way as microplastic into waters as a result of the washing of synthetic textiles.⁵⁶⁷

Characteristics

In these times, clothing is among the fast flowing and low-priced consumer products. The global value chain beyond the most complex of all sectors and with highly asymmetric balances of power. Problematic parts of the value and supply chain keep shifting around the world, temporary settling in low-income economies. Admittedly, the wandering textile industry helps countries grow out of poverty, over time raised the countries productivity, wages and working conditions across the local economy, while the countries production and export baskets diversified into more sophisticated goods and services. However, as the textile industry moves on, the major challenges in this industry keep being the same: ensuring decent conditions for workers and reducing environmental impacts along the up-hill process.



Outline Textiles Sectors considerations - CE opportunities and options to respond and Value Hill

⁵⁶⁶ Ellen MacArthur Foundation, 2017, A New Textiles Economy: Redesigning fashion's future

⁵⁶⁷ https://www.recovery-worldwide.com/en/artikel/the-limitations-of-textile-recycling_3411757.html

Table 48: Textiles Sectors considerations – CE opportunities and options to respond and Value Hill

Sector	Key barriers in selected sectors based on Value Hill	Considerations to respond to key barriers
Textiles ⁵⁶⁸	<p>There is a need to <u>transition</u> the sector and improve resource efficiency and environmental impact throughout the full lifecycle of products. Such a <i>new textiles economy</i> relies on <u>four ambitions</u> that also respond to the CE concept⁵⁶⁹</p> <p><u>Circular Design (up-hill)</u></p> <ul style="list-style-type: none"> - Ensure that inputs for textiles are safe (e.g., phase out hazardous substances like dyes and additives, as well as microfibre release) - Change to inputs that are recycled (synthetic as well as natural fibres) or renewable⁵⁷⁰ (e.g., cotton, plant or wood based) - Ensure more effective and efficient production processes (reduce waste, less inputs of resources, such as fossil fuels and chemicals, and decrease water use, apply energy efficiency and renewable energy. - Change the way textile is designed: increase the re-use- and recyclability of textile, improve quality and durability <p>Barriers:</p> <ul style="list-style-type: none"> - Lack of incentives to design for extended use life and recyclability – design decisions often fail to consider how a product can extend its use life, and how materials will be looped back into the economy at end-of-use. Adding these requirements into textile design may require investment, new collaborations, and higher costs, which are currently not rewarded by the market (e.g., through premium price points) or by policy (e.g., tax incentives). - Limited access to circular design know-how: Designers interested in circularity often do not have enough information to effectively implement in their work. With limited indicators around circular product and process design, it is challenging to make informed operational decisions to maximize value and circularity simultaneously. Companies also tend to treat circular design and material innovations as proprietary knowledge and are reluctant to share openly. Finally, there are often gaps in connecting complementary research, which inhibits and slows innovation. - High price sensitivity in fibres market: a major barrier to scaling recycled content in textiles is high price sensitivity for raw material inputs. Since fibres are at the beginning of the value chain, even a small price difference between virgin and recycled fibres has posed a significant barrier for brands to source recycled fibres. Coupled with low consumer willingness to pay a premium for sustainability, the relatively 	<ol style="list-style-type: none"> 1. Develop and harmonize indicators to measure textile products’ adherence to circular principles. Set balanced targets, as well as incentive mechanisms based on these metrics to stimulate circular design. Support projects to measure, monitor, and track textile design commitments. 2. Provide policy stimulation for the uptake of circular design, repair, reuse, recycling, and sourcing of recycled content (e.g., consider textiles products to be covered by Extended Producer Responsibility (EPR) systems, incl. product taxes, recycling requirements, and disposal fees, grant tax benefits for producing/ sourcing recycled fibres, or externality fees for non-renewable virgin fibre.). 3. Implement product design standards, such as the EU’s Eco-design Directive that establishes requirements for businesses to adapt design and manufacturing practices to meet energy use, recyclability, waste, and water use standards. 4. Enact reparability requirements, similar to the “right to repair” schemes for electronics proposed by the EU, requiring businesses to provide consumers with reasonable access to producer supported repair of properly used products. 5. Set up and enforce standards for sustainable plant-based fibre production. 6. Financers can fund development of materials that meet circular design requirements without functionality or aesthetic trade-offs.

⁵⁶⁸ UNEP, 2020, Sustainability and Circularity in the Textiles Value Chain

⁵⁶⁹ Ellen MacArthur Foundation, 2017, A New Textiles Economy: Redesigning fashion’s future

⁵⁷⁰ Use renewable resources in connection with regenerative agriculture

	<p>higher price for recycled fibres results in low market demand, and in turn, discourages scaling-up of recycling.</p> <p>Focus interventions: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11</p> <p><u>Circular Use (up-hill)</u></p> <ul style="list-style-type: none"> - Keep textiles in use for longer (e.g., transform the way clothes are sold and used) <p>Barriers:</p> <ul style="list-style-type: none"> - Sustainability is not consumers' most important purchasing decision driver: Research suggests that price and quality continue to be the most commonly considered factors when consumers make a purchasing decision. If a more sustainable product or business model has higher price points or function trade-off, or requires extra effort (e.g., bring back), market adoption is likely to be limited. Circular models may bring additional value to consumers in new ways, such as with increased access to or variety of clothing, but these elements are often overlooked or undervalued by customers who make “like-for-like” comparisons with linear models that typically do not involve these value drivers. - Low emotional durability and short trend cycles: Clothing, particularly in “fast fashion”, is often characterized by low “emotional durability”, or the customer’s lack of attachment and desire to keep an item, and a culture of disposability, where items can easily be replaced. Similarly, the market is driven by short “trend” cycles where garments become obsolete and undesirable quickly, hampering the ability to reuse or resell items, as well as fuelling a constant customer desire for newer, trendy items. - New business models often require higher costs and additional capabilities: New business models that can increase product use rates (e.g., rental, subscription, or re-commerce), may incur higher operational costs (e.g., extra transport, cleaning, handling, and packaging) compared to the conventional sales business model. These business models may also require new capabilities in customer service, accounting, legal, and other business processes, which take time to develop or acquire. - Perceived financial risk: Traditional financial assessment often sees the above-mentioned new business models as more risky, due to higher upfront investment, longer payback, asset-intensity, legal complexity, poorly understood residual value accounting, and lack of a proven track record. Therefore, it is often difficult for innovative companies and entrepreneurs to secure financing for such new business models. <p>Focus interventions: 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25</p> <p><u>Circular Value recovery (down-hill)</u></p> <ul style="list-style-type: none"> - Ensure that textiles are recycled at end-of-use 	<ol style="list-style-type: none"> Support collaborations (e.g., researchers, civil society, and businesses) with the agricultural sector to identify best practices of sustainable plant-based fibre production, and champion these examples for wider adoption (e.g., share knowledge about profit-enhancing regenerative agriculture practices; collaborating with other segments’ agriculture, such as food production, to share and benefit from emerging progress on the common goal of improved land use, etc.) Finance, businesses, and governments can develop blended financing <u>mechanisms</u> to develop sustainable farming solutions and support farmers to transition. <u>Support detailed assessment.</u> Enable thorough lifecycle analyses to better understand the variety of environmental impacts occurring at different stages of materials use (consider all the environmental trade-offs among materials and their impacts, in order not to shift the environmental burden from one pressure to another). <u>Develop sound data systems:</u> Availability of accurate and reliable data are key for addressing and reporting CE interventions. <u>Invest in capacity building</u> e.g., occupational education should embed sustainability such as environmental impact and CE concepts in their curricula, among others to strengthen ability to analyse material flows, <u>sector association</u> may provide, facilitate/connect with <u>service providers</u> to increase sector-relevant CE-knowledge, Research institutions can support the transition through creating evidence and proof points. Governments can include circularity (e.g., textiles with recycled content) in <u>public procurement guidelines</u> to stimulate market demand and design change.
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	<p>Barriers:</p> <ul style="list-style-type: none"> - <i>Underdeveloped collection, sorting, and recycling infrastructure globally:</i> There is an overall insufficiency in textile collection, sorting, and recycling infrastructure globally. Infrastructure development is particularly challenging for post-consumer textiles, since they are from dispersed sources (which presents challenges for collection) and are highly heterogenous in composition (which presents challenges for sorting). When not collected separately or sorted effectively, textiles waste often ends up in landfills and incineration plants in higher income countries and is subject to open dumping or open burning in lower-income countries. - <i>Chemical additives can compromise the quality and safety of recycled output</i> Chemicals (e.g., dyes, flame retardants, and coatings) are prevalent in most textile products (3500 different substances have been identified in textile production⁵⁷¹). These additives pose a hazard in the production phase and add complexity to sorting and compromise the quality and safety of the recycled output. - <i>Fibre blends are challenging to recycle</i> Fabric with fibre blends provide extraordinary functionality for textile products but are very difficult to recycle because they contain mixed fibres. The fibre blends need to be separated before entering mechanical recycling, and separation is technically challenging, energy intensive, and costly. When unseparated textile blends enter mechanical recycling, the result is lower quality outputs. - <i>Insufficient information for and from sorting:</i> Sorting is a critical step to provide high-purity inputs needed for high-quality recycling, especially for post-consumer textiles which are very heterogeneous. Currently, textiles sorting is done mostly manually, relying on the judgement of experienced workers. Labels are both impractical to serve as an information input for efficient sorting, and sometimes inaccurate. As a result, textiles sorting is costly, difficult to scale, prone to errors, and lacks quality assurance. - <i>Low maturity of scalable high-quality recycling technology:</i> A major drawback of mechanical recycling, the dominant form of recycling technology for textiles, is that it shortens cotton fibre length, leading to low value applications. Chemical recycling on the other hand promises virgin-quality fibre output that can theoretically be recycled infinitely. As it is very energy intensive, concerns have been raised. The European Union for example is yet to undertake an in-depth review of chemical recycling. The uncertainty in policy direction discourages investment in research and development as well as scaled facilities, keeping chemical recycling at low technical and financial maturity. Although various innovative recycling technologies are being explored, their market maturity still remains low. <p>Focus interventions: 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40</p>	<ol style="list-style-type: none"> 13. Governments can assess <u>policy options to make repair and reuse more economically attractive</u> for consumers (e.g., labour tax reductions). 14. <u>Support market innovation and business development</u> (e.g., local, and regional incubators can promote innovative circular economy projects). 15. Collaborate (e.g., international organisations and governments) to install and <u>implement guidelines for used textiles trading</u> (e.g., example minimum quality, type of products that suit local market needs, end-of-use management capacity such as collection, sorting, and high-quality recycling, etc.) 16. Governments and businesses in current exporting countries can <u>grow the local second-hand market and high-quality recycling</u>, to reduce the amount of used textiles traded. 17. Businesses, governments, and finance can <u>work on financing mechanisms for reuse</u>, collection, sorting, and recycling operations in importing countries. 18. Support the <u>raising of consumer awareness</u> around the environmental and socio-economic impacts of fast fashion, highlighting the significant externality costs of these low-priced items (e.g., resource use and labour practices). 19. Develop <u>new product metrics to communicate the most relevant/impactful product information</u> to consumers (e.g., resource footprint of the product) and influence purchase decisions. 20. <u>Assess effectiveness of policy measures</u> (and related economic and environmental impacts) <u>to implement effective financial incentives</u> for reuse models, specific to varying regions and current states.
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⁵⁷¹ KEMI. 2014. 'Chemicals in Textiles, Risks to Human Health and the Environment'. Stockholm: KEMI, The Swedish Chemicals Agency. <https://www.kemi.se/en/publications/reports/2014/report-6-14-chemicals-in-textiles>.

	<p>Cross-hill Barriers</p> <ul style="list-style-type: none"> - Lack of data: There are still data gaps, regarding e.g., information on unused materials, secondary raw materials, recyclables, reuse, refurbishment and remanufacturing, harmful substances, waste flows, as well as the uptake of circular business models and the indirect materials flows associated to international trade. - Customer perception and culture: “fast fashion phenomenon” ⁵⁷² - Sector is comprehensive: The value chain is very decentralised and comprises different actors with different interactions. - Externalities are not accounted for: Current price points of textiles products do not account for their negative externalities (e.g., GHG emissions, health hazards, biodiversity loss, and land and water use. This puts products that reduce externalities (such as with increased circularity) while incurring higher costs in doing so, at a competitive disadvantage. - Low-quality and low-durability garments are unsuitable for reuse and recycling: Low-durability garments have a shorter lifespan, limiting use rates, and low-quality garments limit the possibility of recycling at end-of-use. Both are particularly common in “fast fashion”, which is often driven by low cost. Furthermore, the prevalence of low-price garments stimulates consumer behaviour towards buying new and often, instead of repairing or buying second-hand. <p>Focus interventions: 1, 2, 3, 9, 10, 17, 18, 20, 40, 41</p>	<ol style="list-style-type: none"> 21. <u>Increase investment in new business models (e.g., repair services, second-hand platforms, short-term clothing rental, with attractive value propositions to consumers.</u> 22. <u>Support the develop of metrics</u> to measure the environmental and social impacts of new business models. 23. <u>Support development of science-based methodologies and tools</u> to guide new business model design, forecast their impacts and measure actual impacts, alongside the abovementioned metrics. 24. Provide <u>policy and financial support to companies implementing new business models</u>, based on their performance on the above-mentioned metrics. 25. Finance and government can <u>evolve accounting methods and financing models</u> to provide a level playing field for new business models and increase their access to financing. 26. <u>Plan and (co-)invest in collection, sorting, and recycling infrastructure.</u> Modulate technology mix and capacity. 27. Governments <u>can develop and enforce quality and safety standards</u> for sorting and recycled textiles outputs. 28. <u>Accelerate research and development in high-quality and cost-effective textile sorting and recycling technologies.</u> 29. Work out <u>blended financing models</u> for textile collection, sorting, and recycling infrastructure. 30. <u>Scope regional collaborations to develop sorting and recycling ecosystems</u> (e.g., a regional hub or a more
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⁵⁷² Ellen MacArthur Foundation, 2017, A New Textiles Economy: Redesigning fashion’s future

		<p>distributed value chain, planning a balanced mix of recycling technologies and infrastructure).</p> <ol style="list-style-type: none"> 31. <u>Develop data and knowledge</u> about the economic, environmental, and social impacts of different global/local recycling models to inform strategic decision-making. 32. <u>Support advancing of textile tracking systems to better inform planning</u>, (e.g., tracking volume of textile waste generated and additional variables such as fibre composition that may impact infrastructure needs). 33. <u>Connect fragmented collection, sorting, and recycling systems, to improve efficiencies</u>, scale best practice, and achieve economy of scale. 34. <u>Develop technologies for digitally sharing product information</u> and/or for automated, sensor-based sorting. 35. Convene sorters and recyclers to <u>develop quality standards</u> for textiles sorting outputs. Foster collaboration to improve recycling economics, with shared responsibilities and benefits across the value chain. 36. Develop <u>industrial standards on labelling requirements</u>, to make sure relevant and accurate information can be shared across the value chain, in the right format. 37. Pilot and <u>scale new technologies</u> to improve textiles sorting. 38. Implement and <u>enforce adequate legal frameworks for decent work</u>, including support for the integration of informal workers. 39. <u>Foster Transparency</u> on a product's content, production history, and properties for use and after-use, for example information on substances of concern and
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		<p>resource use, durability and care information, or details on material content and recycling options is crucial to inform actions.</p> <p>40. Establish a <u>coordinating vehicle that drives CE ambitions</u> (e.g., align industry players on a CE sector (incl. ambitious targets) and facilitate demonstrator projects, engage stakeholders along the textiles value chain and provide them with the relevant support, tools, and insights to progress towards the vision).</p> <p>41. <u>Align clothing design and recycling processes.</u></p>
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Packaging

The primary purpose of packaging is to **protect its contents** from any damage that could happen during **transport, handling, and storage**. Especially the protection of food is highly important, as food waste is identified as a major environmental problem.⁵⁷³ In comparison to the packed product, the environmental impact of the packaging usually is fairly low. The higher the environmental impact of the product manufacturing, the more justifiable and necessary is the use of protective packaging.

Nevertheless, packaging is becoming a massive problem, mostly because of the creation of enormous and often uncontrollable amounts of waste. In 2019, a total volume of 79.3 million tonnes of packaging waste was generated, an estimated 177.4 kg per inhabitant in the EU. This quantity varied between 74.0 kg per inhabitant in Croatia and 228.0 kg per inhabitant in Ireland. The proportion of packaging material (volume) in 2019 in the EU was⁵⁷⁴: paper and cardboard 40.6 % (globally 17%⁵⁷⁵), plastic 19.4 % (globally 12%⁵⁷⁶), glass 19.2 %, wood 15.6 %, metal 5.0 % and other materials (0.3 %).⁵⁷⁷

Table 49: **Packaging** Overview of sector characteristics

Main problems	Major levers	Main drivers
<p>Single-use packaging products usually have a short lifetime and cause three main problems:</p> <p><i>Down-hill:</i> Massive amount of harmful waste that cannot be controlled and is leaking into the environment (illegal dumping, landfills, and littering). A most pressing problem is the leakage of plastic waste into the aquatic systems where they do harm in their current state as well as in fragmented and broken-down micro-plastic state.</p> <p><i>Up-hill:</i> General (over)-consumption of resources, mostly due to an overuse of (harmful) material and not optimized packaging design for re-use and recycling.</p> <p><i>Top-hill:</i> Export of goods and the anonymity of the regarding packaging producer makes packaging waste a problem of the importing countries.</p>	<p>Considering these main issues, there are three major levers to address the problem:</p> <p><i>Addressing the problem down-hill:</i> The leakage of (packaging) waste into the environment needs to be stopped immediately by ensuring secure waste collecting systems in the regarding countries (and by preventing the export of wastes into such countries).</p> <p><i>Addressing the problem up-hill:</i> The design-phase needs to address the recyclability of packaging material, the optimal use of material as well as the substitution of harmful materials.</p> <p><i>Addressing the problem top-hill:</i> Countries need to provide frameworks to control materials or products that enter their country and to ensure their circular-ready state.</p>	<p>There is no single main driver. Packaging exists in a complex and established (global) system. Relevant actors are the packaging developers, the material providers (formulators), product providers, commerce and distributors and customers, as well as waste collectors, sorters, and recyclers. Additionally, a tight regulatory and political framework, (especially) for (food) packaging and waste treatment usually is in place. Changing packaging means to change a complex system all at once.</p>

In the EU in 2019 paper and cardboard (40.6 %), plastic (19.4 %), glass (19.2 %), wood (15.6 %) and metal (5.0 %) are the most common types of packaging waste. The EU claims a recycling rate of packaging waste of 64.8 % in 2019.⁵⁷⁸ In seven EU Member States, more than half of the plastic packaging waste generated was recycled Lithuania (69.3% (19.2%, 2017 data)). Of the volumes of plastics processed in the packaging industry in 2019, just some 10.1 % were recycled materials, almost 90 % therefore being virgin material.^{579, 580} While

⁵⁷³ In the EU, around 88 million tonnes of food waste are generated annually with associated costs estimated at 143 billion euros.

https://ec.europa.eu/food/safety/food-waste_de

⁵⁷⁴ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics#Waste_generation_by_packaging_material

⁵⁷⁵ https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html

⁵⁷⁶ https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html

⁵⁷⁷ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics#Waste_generation_by_packaging_material

⁵⁷⁸ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics#Waste_generation_by_packaging_material

⁵⁷⁹ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics

⁵⁸⁰ <https://ec.europa.eu/eurostat/de/web/products-eurostat-news/-/ddn-20210113-1>

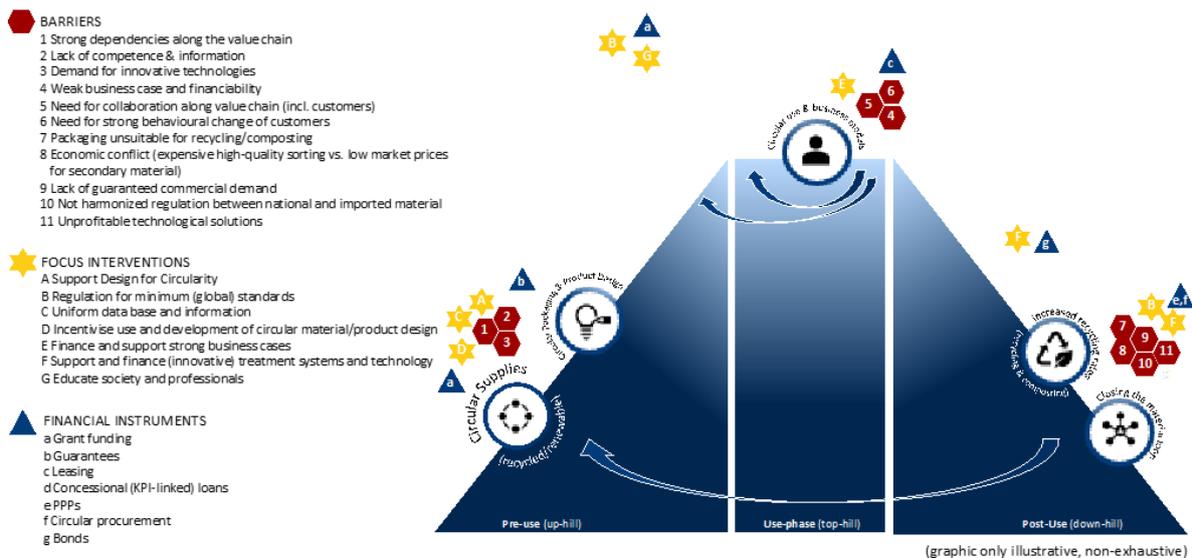
these amounts at least did not end up in the environment, the figures also do not represent the kind of like-for-like recycling we need to see in a Circular Economy. Amounts that are downcycled, used as substitute fuel, and in some cases incineration, are part of those recycling figures. While paper, plastics, metal, and glass in general have very good recycling properties, the packaging and its material compounds are usually designed in a way that prevents single-origin collection and like-for-like recycling.

Characteristics

Packaging is usually a single-used product and are amongst the fastest-flowing resources in our economy. One way to address that is to design out packaging when possible, and to slow down the resource flow by designing re-usable packaging. However, the majority of packaging might remain single-use. In that case, the resource flows need to be organised and controlled. The current design of packaging allows for a wide range of improvements, e.g., phasing out fossil-based input materials, design for recycling, tracer-based sorting of materials, etc. Beyond that, flaws in waste management resp. non-existing waste management still leave many opportunities to improve resource flows.

Packaging in general is amongst very low-priced products and manufacturing rarely expands over more than two countries. However, stakeholders from other sectors are amongst the most important decision makers, when it comes to packaging design, such as retail, distributors and of course the clients as the users of the product packaging. The packaged goods are usually distributed globally, and the packaging material, that then causes problems, can hardly be traced or re-routed back to the producer. As such, the packaging sector is a highly complex one.

Packaging (see also plastics)



Outline Packaging (to be read in combination with outline on packaging) - Sectors considerations - CE opportunities and options to respond and Value Hill

Table 50: **Packaging** Sectors considerations – CE opportunities and options to respond and Value Hill

Sector	Key barriers in selected sectors based on Value Hill	Considerations to respond to key barriers
Packaging ^{581, 582, 583, 584, 585, 586}	<p><u>Rethink the packaging (up-hill)</u></p> <p>Rethinking the packaging means innovating at the packaging design level (packaging concept, format, components, material choice) to provide the same essential packaging function, while designing out waste. For example, moving from non-recyclable to recyclable packaging formats or using a completely different type of material.</p> <ul style="list-style-type: none"> ➔ Eliminate packaging while maintain product integrity and user experience⁵⁸⁷ (e.g., eliminate what is not needed or innovate/substitute what is needed) ➔ Reuse packaging (e.g., refill at home, return from home, return on the go, refill on the go, B2B) ➔ Circulate material (design for material recycling and material composting, use secondary materials) ➔ De-fossilise packaging material (increase use of alternatives to fossil-based primary material) <p>Barriers:</p> <ul style="list-style-type: none"> - Lack of competence: Packaging designers, purchasers, decision makers still know little about parameters for circular packaging. - Strong dependencies: Design for packaging underlies strong dependencies, like food grade and best before good requirements, transport and storage geometry, marketing and information issues, requirements of traders, etc. - Need for collaboration: designing packaging for optimal life cycle requires collaboration between all stakeholders (including consumer). - Lack of data: change of packaging can influence the environmental footprint of the whole product, and trade-offs have to be considered. There is still a lack of data and standardised method to compare evaluations (due to complex system scopes). Also, calculations are still time intensive and costly, as well as lobby driven. 	<ol style="list-style-type: none"> 1. Implement <u>design for circularity</u> for efficient and effective resource management (e.g., use well-recyclable/compostable materials and additives, standardized design/product formulation for single use bottles, using mono-materials and/or transparent material and/or mono-colours, tailor packaging design for available collection, sorting and recycling structures (can be different regarding country)) 2. Make <u>recycling more economically viable</u> (manufacturer and distributors of packaging not insisting on own, unique packaging but rather orient on EU-wide minimum standards to reduce the number of fractions to be sorted. This reduces costs and increases volumes) 3. Create a <u>uniform basis for evaluating</u> the sustainability of packaging alternatives including product life cycle (e.g., standardised evaluation methods, available data sets, agreed upon materials) 4. <u>Invest in sorting and recycling/composting technology</u> and its further development (e.g., tracer-

⁵⁸¹ <https://ceflex.eu/>

⁵⁸² <https://plastics.ellenmacarthurfoundation.org/upstream>

⁵⁸³ Circular Economy Initiative Deutschland (Ed.): Plastics Packaging in a Closed Loop – Potentials, Conditions, Challenges, * Elsner, P., Müller-Kirschbaum, T., Schweitzer, K., Wolf, R., Seiler, E., Désilets, P., Detsch, R., Dornack, C., Ferber, J., Fleck, C., Fröhling, M., Hagspiel, K., Hahn, R., Haupts, C., Hoffmann, C., Krüger, P., Lange, M., Leopold, T., Löscher, M., Niedersüß, P., Ohlendorf, T., Pattberg, J., Renner, M., Schlarb, A. K., Schmidt, M., Siebert, H., Siggelkow, B. A., Stadelmann, S., Thielen, J., Wilts, H., Beermann, M., Dieterle, M., Ecke, N., Klose, S., Kobus, J., Krause, L., Maletz, R., Marm, A. and Kadner, S., acatech/SYSTEMIQ, Munich/London 2021.

⁵⁸⁴ Circular Economy Initiative Deutschland (Ed.): Circular Economy Roadmap for Germany, *Kadner, S., Kobus, J., Hansen, E., Akinci, S., Elsner, P., Hagelüken, C., Jaeger-Erben, M., Kick, M., Kwade, A., Kühl, C., Müller-Kirschbaum, T., Obeth, D., Schweitzer, K., Stuchtey, M., Vahle, T., Weber, T., Wiedemann, P., Wilts, H., von Wittken, R. acatech/SYSTEMIQ, Munich/London 2021

⁵⁸⁵ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics

⁵⁸⁶ <https://ec.europa.eu/eurostat/de/web/products-eurostat-news/-/ddn-20210113-1>

⁵⁸⁷ Avoid shifting or creation of waste to/at other places in the system, e.g., due to increased food waste or damage to products

	<ul style="list-style-type: none"> - Compound materials: due to strong dependencies and conventions, packaging often consists of hard-to-recycle compound materials and contain for recycling unfavourable additives. - Unknown properties of alternative materials: alternative materials like bioplastic, bio-degradable materials, sustainable ink, etc. do contain a lot of unknowns. Recycling/composting, sorting as well as long-term packaging abilities are not proven; quantity and quality of material flows are still insufficient or volatile. - Importation of the problem with little influence on the solution: Plastic as a waste problem is mostly imported, while influencing the source of the problem – the design and manufacturing phase – is mostly not tangible. The usual scope of measures for importing countries often includes only a regulatory ban of problematic products or substances (e.g., plastic bags or plastic straws). <p>Focus interventions: 1, 2, 3, 8, 9,10, 12, 14, 15, 16</p> <p><u>Rethink the product (up-hill)</u></p> <p>Rethinking the product means innovating at the product design level (product formulation, concept, shape, size) to change the packaging needs, while maintaining or improving the user experience. For example, changing from a physical product to a digital product, or from a liquid product to a solid product.</p> <ul style="list-style-type: none"> ➔ Redesign the product (concentrate instead of dilution, solid instead of liquid, digital instead of physical) <p>Barriers:</p> <ul style="list-style-type: none"> - Lack of competence: Designers, purchasers, decision makers still know little about circular economy and what they should aim for (only few universities already are integrating circular economy issues in their schedule). - Consumers are unpredictable: Consumers are not customed to certain kinds of new products and often don't approve (e.g., solid soap as shampoo). Market develops slowly. A lot of money might be needed for product development and market entry. - New technologies needed: Some products need to be re-invented from scratch. <p>Focus interventions: 3, 14, 15</p> <p><u>Rethink the business model (top-hill)</u></p> <p>Rethinking the system means innovating at the system design level (business model, supply chain, location of production, product delivery) to change the packaging needs. For example, selling products in refillable or returnable packaging, rather than single-use packaging. Localising production, so freshness can be assured without relying on the complex, often less recyclable packaging, that is frequently required in global supply chains.</p> <ul style="list-style-type: none"> ➔ Re-using models (e.g., Refilling, returning, circulating packaging) 	<p>based-sorting, artificial intelligence, mechanical and chemical recycling, composting, etc.)</p> <ol style="list-style-type: none"> 5. Promote the <u>development and implementation of circular business models</u> and networks (enable innovative multi-use systems and stakeholder alliances, increase bankability, educate on management techniques for complex problems like e.g., validated learning or experimentation) 6. <u>Provide financing</u> for new business models, especially if they lack financial profitability in favour of economic value creation 7. <u>Technological innovation</u> is needed to up the recycling game. Mechanical recycling does not provide sufficient potential to close the material loop. Mechanical recycling, however, allows to for high-quality recycling and for the introduction of bio-based plastic to substitute fossil virgin material. 8. Fund <u>research into potential further components</u> of a Circular Economy for packaging (e.g., mechanical recycling process and bio-based materials, tracer-based sorting but also e.g., for large-scale business model experimentation) 9. Set <u>economic incentives</u> (e.g., compensate inexpensive virgin material vs. secondary material e.g., via bonus system for environmental sound packaging design, introduce ambitious carbon levy or tax-favour optimisation of recycling technologies with regard to their carbon footprint) 10. Use <u>regulatory instruments</u> to e.g., set an EU-wide minimum standard to contribute to the harmonisation of packaging materials, their components, and additives as well as standards for packaging itself. Regulation could also not only increase recycling rates, but also recycling
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	<p>→ Localise product (e.g., digital solutions to skip unnecessary distribution or storing (e.g., best-before-good), produce on demand (e.g., fill or provide fresh food)</p> <p>Barriers:</p> <ul style="list-style-type: none"> - Circular Business Models: Circular Business Models are just about to develop. Market and companies are still in experimentation phase. - Uncertain bankability: Financial success of solution might be uncertain due to innovation status, or financial unprofitability known from the beginning. - Need for collaboration: designing new business models for packaging requires inclusion of and collaboration between many stakeholders (including consumer). - Digital solutions: Circular packaging business models might require (new) digital solutions. - Concerns over hygiene (e.g., packaging): Concerns of consumers, business, and regulators, coupled with variances in reuse policies, have been hindering the implementation of scaling of plastic reuse models. Heightened concerns due to COVID 19. Concerns over hygiene have been recognized e.g., as a top priority to address in order to realize the tourism sectors ambition to tackle plastic pollution. While the pandemic might end someday, the impact on consumer behaviour might last. <p>Focus interventions: 5, 6, 9, 10, 11, 14, 15, 16</p> <p><u>Increase recycling / cascading (down-hill)</u></p> <ul style="list-style-type: none"> → Increase recycling rates (mechanical and chemical recycling) → Increase composting rates → Increase secondary material use rate <p>Barriers:</p> <ul style="list-style-type: none"> - Unsuitable for recycling/composting: Packaging design unsuitable for reuse, sorting or recycling/composting (e.g., compound materials, insufficient volumes) - Collection misplacement rates: By consumer misplaced waste disposals complicate sorting and hinder highest recycling rates. - Economic conflict: Conflict between higher-quality sorting and quicker, more convenient sorting process, as market prices for secondary material (at least in plastic sector) are volatile and often higher than for virgin material. - Lack of commercial demand: Lack of guaranteed commercial demand for recycled material due to high prices or wanting quality - Not harmonized regulation: Transnational differences between national regulatory objectives 	<p>output quality as well as fixed minimum proportion of post-consumer recycling plastics in products. Compulsory usage rates could be set for transport and shipping packaging.</p> <ol style="list-style-type: none"> 11. Increase <u>supply chain and customer information</u> by regarding labelling or reporting duties on defossilised raw material input. 12. Pick up the pace of packaging <u>material harmonisation</u> 13. Offer support and incentives for consumers 14. Offer specialised <u>education and training</u> (e.g., for product/industrial/packaging designers, recyclers, purchasing, etc.) 15. Provide education as the basis for <u>overarching cooperation</u> with a changed value creation philosophy (enable collaboration along the individual links in the value chain, like material selection, packaging design, recycling infrastructure, etc.) Support collaboration along the value chain and create value networks. 16. Address hygiene and safety concerns to promote dispense of or reuse of packaging.
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	<p>- <i>Technology</i>: yet unavailable or unprofitable technological solutions (e.g., established industrial composting created for quick volume reduction, not for value capturing)</p> <p>Focus interventions: 2, 4, 7, 8, 9, 10, 14, 15</p>	
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Food

An estimated 1.3 billion tonnes of food is wasted globally each year, one third of all food produced for human consumption.⁵⁸⁸ The annual amount of wasted food equals about half of the annual grain harvest (2009/2010).⁵⁸⁹ According to the Food Waste Index, this accounts for about 17% of global food production that may go wasted, with 61% of this waste coming from households, 26% from food service and 13% from retail.⁵⁹⁰ Eliminating waste in the food industry would reduce annual emissions by 1.4 billion tonnes by 2050 (that is more than the entire airline industry pre-pandemic).⁵⁹¹ What is more, regenerating nature through ecosystem-focused agricultural practices and switching to regenerative food production globally would reduce emissions by 3.9 billion of tonnes of greenhouse gases per year by 2050.⁵⁹² The Food Waste Index is the first of its kind to highlight the scale of the problem. Indeed, it suggests that global food waste could be more than twice the size of earlier estimates.⁵⁹³

It is estimated that food loss and waste costs the global economy USD936 billion a year, and that overall, food systems cost society USD12 trillion dollars in health, economic and environmental costs – which is 20% more than the market value of food systems.⁵⁹⁴ Other studies indicate, that the amount of food lost or wasted costs 2.6 trillion USD annually and is more than enough to feed all the 815 million hungry people in the world – four times over.⁵⁹⁵

The term “Food waste” and “food loss” are commonly used terms but don’t quite mean the same thing.⁵⁹⁶

- “Food loss” typically refers to food lost in earlier stages of production such as harvest, storage, and transportation.
- “Food waste” refers to items that are fit for human consumption but thrown away, e.g., at supermarkets or by consumers.

According to the FAO597, high- and low-income countries discard similar amounts of food — 670 and 630 million tonnes, respectively — but there is a major difference in where and how that loss occurs.⁵⁹⁸

In low-income countries, loss occurs more often in the earlier stages. For example, in Sub-Saharan Africa, 83% of food is lost during production, handling/storage and processing, while just five per cent is wasted by consumers. Conversely, in North America and Oceania, 32 per cent is lost in earlier stages, and 61 per cent is wasted by consumers.⁵⁹⁹

⁵⁸⁸ <https://en.reset.org/global-food-waste-and-its-environmental-impact-09122018/>

⁵⁸⁹ https://www.save-food.de/de/Projekte/Studien/Studie_%E2%80%9EGlobal_food_losses_and_waste%E2%80%9C ; https://www.save-food.de/cgi-bin/md_interpack/lib/all/lob/return_download.cgi/Global_Food_Losses.pdf?ticket=g_u_e_s_t&bid=4530&no_mime_type=0

⁵⁹⁰ UNEP. Food Waste Index. Report 2021.

⁵⁹¹ Ellen MacArthur Foundation. Completing the Picture. How the Circular Economy tackles Climate Change. Reprint. 2021.

⁵⁹² Ellen MacArthur Foundation. Completing the Picture. How the Circular Economy tackles Climate Change. Reprint. 2021.

⁵⁹³ <https://www.weforum.org/agenda/2021/03/global-food-waste-solutions/>

⁵⁹⁴ https://www3.weforum.org/docs/WEF_Incentivizing_Food_Systems_Transformation.pdf

⁵⁹⁵ <https://en.reset.org/global-food-waste-and-its-environmental-impact-09122018/>

⁵⁹⁶ <https://en.reset.org/global-food-waste-and-its-environmental-impact-09122018/>

⁵⁹⁷ <https://www.fao.org/platform-food-loss-waste/en/>

⁵⁹⁸ <https://en.reset.org/global-food-waste-and-its-environmental-impact-09122018/>

⁵⁹⁹ World Resource Institute. From ‘why’ to ‘how’. Reducing food loss and waste. January 2016. Craig Hanson.

Table 51: Food Overview of sector characteristics

Main problems	Major levers	Main drivers
<p>The food sector has three main problems:</p> <p><i>Up-hill:</i> Food loss along the food production and distribution, especially in low- and middle-income countries leads to high regarding resource consumption and nutrition losses.</p> <p><i>Top-hill:</i> Waste of food that is fit for consumption e.g., by consumers, supermarkets, or restaurants, leads to regarding resource consumption and nutrition losses.</p> <p><i>Down-hill:</i> Nutrition destruction along the waste-management.</p>	<p>Considering these main issues, there are three major levers to address the problem:</p> <p><i>Addressing the problem down-hill:</i> Close the nutrition cycle by keeping the nutrition value of organic waste streams and re-route the organic streams (in particular phosphorus) back to agricultural land. Invest in respective technologies, management systems and businesses.</p> <p><i>Addressing the problem up-hill:</i> Stop food loss by e.g., education of stakeholders (technology and knowledge transfer) and investment in innovative solutions, as well as support of local entrepreneurs and start-ups that address the problem at hand. Foster innovation and organisational solutions.</p> <p><i>Addressing the problem top-hill:</i> Educate consumers, supermarkets, and other stakeholders on how to avoid food waste and support local initiatives, technologies, and businesses to prevent or process food waste.</p>	<p>There is no single major driver. Actions are required along the value chain.</p> <p>Introduction and investment in (innovation of) technologies, innovative solutions, new ways of working and manage food quality are essential.</p> <p>The reduction of food loss and waste and closing the nutrition cycle are key to the implementation of a transformative circular change.⁶⁰⁰</p>

Reasons for food loss in low-income countries in the early stages are because of limitations in harvesting technology, that can result in damaged produce or poor yield. Other reasons across all countries, why crops might not leave the farm can be e.g. that farmers over plant to control for adverse weather and end up with surplus if conditions are favourable, or that retailers have high aesthetic standards for fruits and vegetables, which means that “non-perfect” produce might not even make it to the truck.⁶⁰¹ In each case, crops are sold for animal feed or simply discarded.

In low-income regions, the causes that food is lost after the harvest are often related to poor infrastructure, equipment limitations or insufficient cold storage. Imagine, for example, milk in Bangladesh transported by rickshaw to processing plants, exposed to the hot sun while slowly crossing narrow, bumpy roads. It is not uncommon for fresh fruits, vegetables, meat, dairy, and fish to spoil in hot climates and become unsafe to eat.⁶⁰²

When food is lost or wasted, all the resources that were used to produce this food - including water, land, energy, labour, and capital - go to waste, and eutrophication increases. As for the value of this resources: 70 per cent of our water consumption is used for agricultural purposes, including crop irrigation and drinking water for livestock, and twenty-eight per cent of the world’s agricultural area is used to produce food that is ultimately lost or wasted each year.⁶⁰³

A matter of great concern is the increasing demand for nutrients needed for food production, especially for phosphorus (P).⁶⁰⁴ The demand for phosphorus is growing drastically faster than the human population due to a shift to meat-based diets, which require far more phosphorus than plant-based diets.⁶⁰⁵ The scarcity of phosphate rock, which is a non-renewable resource, is increasingly putting pressure on developing methods and policies for the recovery and reuse of phosphorus from multiple sources in the human system e.g. human and animal

⁶⁰⁰ <https://www.un.org/en/observances/end-food-waste-day>

⁶⁰¹ <https://en.reset.org/global-food-waste-and-its-environmental-impact-09122018/>

⁶⁰² <https://en.reset.org/global-food-waste-and-its-environmental-impact-09122018/>

⁶⁰³ <https://en.reset.org/global-food-waste-and-its-environmental-impact-09122018/>

⁶⁰⁴ Jurgilevich, A. et al. Transitioning towards a Circular Economy in the food system. Sustainability. Jan 2016.

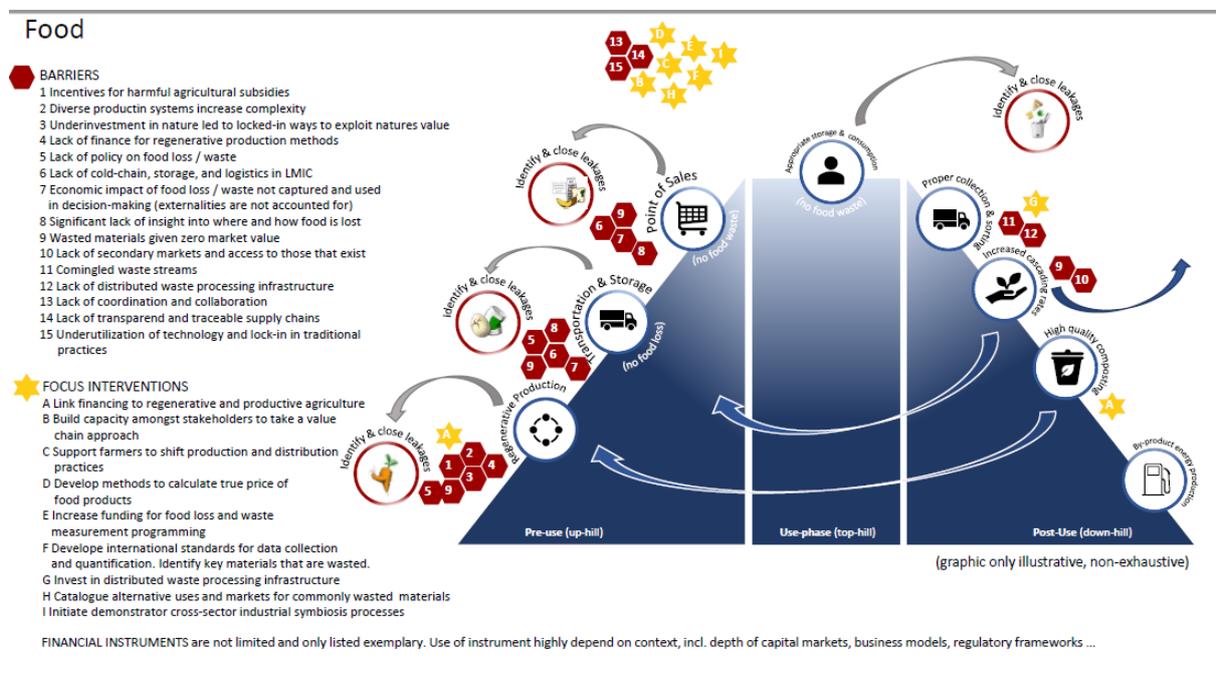
⁶⁰⁵ Jurgilevich, A. et al. Transitioning towards a Circular Economy in the food system. Sustainability. Jan 2016.

excreta and food and crop waste.⁶⁰⁶ The European Union (EU) has listed phosphorus as a critical raw material.⁶⁰⁷ In addition to vast nutrient losses, there is an increasing nutrient imbalance throughout the globe. Rich countries accumulate nutrients in their arable soil while poor countries do not have equal access to nutrients and their soil suffers from severe phosphorus deficit and accordingly low agricultural production.⁶⁰⁸

Not only does food waste result in unnecessary degradation of land but clearing land for agricultural purposes is also a cause of deforestation, which eliminates wildlife habitats and wipes out greenhouse-gas-absorbing trees. Additionally, as waste in landfills, food residues lead to greenhouse gas emissions. All in all, the FAO estimates the carbon footprint of food waste is 3.3 billion tonnes of CO₂ equivalent per year.⁶⁰⁹

Characteristics

The loop of nutrients related to the food system can, principally, be closed. The loop of organic matter can be partly closed by reusing food, and the utilization of by-products and waste. Minimization of food surplus and waste reduces the overall consumption of organic matter in the economy and decreases nutrition consumption. The measures must be implemented both at the producer and consumer levels and, finally, in waste management. In the transition towards sustainability, interestingly, small-scale experiments offer opportunities for local, and also national, policy development.⁶¹⁰



Outline Food Sectors considerations - CE opportunities and options to respond and Value Hill

⁶⁰⁶ Cordell, D.; Rosemarin, A.; Schröder, J.J.; Smit, A.L. Towards global phosphorus security: A systems framework for phosphorus recovery and reuse options. *Chemosphere* 2011, 84, 747–758. // Cordell, D.; White, S. Peak Phosphorus: Clarifying the Key Issues of a Vigorous Debate about Long-Term Phosphorus Security. *Sustainability* 2011, 3, 2027–2049.

⁶⁰⁷ Jurgilevich, A. et al. Transitioning towards a Circular Economy in the food system. *Sustainability*. Jan 2016.

⁶⁰⁸ Jurgilevich, A. et al. Transitioning towards a Circular Economy in the food system. *Sustainability*. Jan 2016.

⁶⁰⁹ <https://en.reset.org/global-food-waste-and-its-environmental-impact-09122018/>

⁶¹⁰ Jurgilevich, A. et al. Transitioning towards a Circular Economy in the food system. *Sustainability*. Jan 2016.

Table 52: Food Sectors considerations – CE opportunities and options to respond and Value Hill

Sector	Key barriers in selected sectors based on Value Hill	Considerations to respond to key barriers
Food ^{611, 612, 613, 614}	<p>By applying circular economy principles to food system value chains, three objectives are defined as circular components of an ideal future food system: food is produced in ways that regenerate nature; food is not lost or wasted; and commonly wasted resources are used productively.</p> <p><u>Food production (up-hill)</u></p> <ul style="list-style-type: none"> ➔ Food is produced in ways that regenerates nature ^{615, 616} ➔ Food is not lost or wasted (<i>barriers to that see on 'food management and distribution'</i>) <p>Barriers:</p> <ul style="list-style-type: none"> - <i>Perverse incentives from regulation and markets:</i> Markets and policies such as subsidies have been providing incentives that are individually economically rational, but collectively harmful. Currently, USD451 billion spent annually on ecologically harmful agricultural subsidies across the globe⁶¹⁷. Attempting to ensure market competitiveness, these incentives prop up harmful practices that would not be economical without government assistance. In addition, there is a lack of demand from food manufacturers, retailers, and public procurement for foods and ingredients that are produced in ways that regenerate nature. - <i>Diverse production systems increase complexity:</i> Industrialization and the desire for scale lend themselves to monoculture production, due in part to the reduction in complexity and allowing system designers to focus on a limited set of variables. While diverse production systems may be healthier, more resilient, and more productive when well executed, each additional variable increases complexity—making successful implementation more challenging and increasing the need for strong farmer capacity, training, and support systems. 	<ol style="list-style-type: none"> 1. Governments and international donors can <u>link financing for the transition to productive and regenerative agriculture</u> with improved land and forest governance, to reduce the risk of deforestation and negative land use change. 2. Support and finance partnerships to <u>build capacity of farmers, especially smallholders, to adopt locally appropriate regenerative methods and technologies</u> that increase land productivity sustainably. 3. Governments and private sector can partner to <u>support farmers to shift production of crops, so they are grown in optimal locations</u> based on local conditions and nutritional value, including through pilots to demonstrate models. 4. <u>Finance and support pilot projects for farmers and farmer organizations</u> to demonstrate profit-enhancing regenerative transitions in which farmers are able to increase their returns by improving soil health (e.g., such as was demonstrated by Regenacterra in Belgium (Systemiq and Soil Capital 2019) 5. Food brands <u>can strengthen and lengthen purchase agreements</u>, in recognition of the fact that more relational and long-term contracts can more equitably share risk and help unlock

⁶¹¹ <https://ellenmacarthurfoundation.org/topics/food/overview>

⁶¹² <https://pacecircular.org/action-agenda/food>

⁶¹³ <https://www.eitfood.eu/blog/post/transitioning-to-a-circular-food-economy-the-solution-for-food-waste-and-food-loss>

⁶¹⁴ Jurgilevich, A. et al. Transition towards Circular Economy in the Food System. Sustainability. Jan 2016.

⁶¹⁵ There is no single definition of regenerative agriculture. Therefore, the phrase “regenerate nature” is used, as this is closest to the circular economy principles. e

⁶¹⁶ Regenerative farming can imply trade-offs. On the one hand, it reduces need for resources (e.g., synthetic fertilizers and pesticides) per hectare but may need more land due to lower yields.

⁶¹⁷ Deutz, A., Heal, G. M., Niu, R., Swanson, E., Townshend, T., Zhu, L., Delmar, A., Meghji, A., Sethi, S. A., and Tobinde la Puente, J. 2020. ‘Financing Nature: Closing the global biodiversity financing gap’.

The Paulson Institute, The Nature Conservancy, and the Cornell Atkinson Center for Sustainability.

	<ul style="list-style-type: none"> - Historical underinvestment in nature and nature-based solutions: Historic underinvestment in the protection and restoration of nature (current shortfall of USD600-820 billion annually) has led to increasingly creative ways of continuing to extract value from nature without returning any value, instead of investing in and applying nature-based solutions. This has led to agriculture being a key driver of deforestation, desertification, disappearing fresh water supplies, and the need to transport commercial beehives to pollinate crops. - Lack of finance and assistance for a transition to regenerative production methods: Finance has not accounted for linear risks such as soil degradation and biodiversity loss in pricing models, while lacking the tools to assess the value of novel production methods that can lead to positive financial returns. This reduces the flow of finance available to farmers to invest in a transition. In less developed contexts, technical assistance has often focused narrowly on improving yields of staple crops, instead of taking a systems perspective and promoting environmentally beneficial practices that grow nutritious crops. - Systemic focus on quantity of calories instead of quality of nutrition⁶¹⁸: The current linear food production practices extract nutrients from the soil and reduce soil biodiversity. This means external nutrients such as phosphorus and nitrogen need to be mined and added to fields, reducing the resilience of agricultural lands. <p>Focus interventions: 1, 2, 3, 4, 5, 6, 7, 8, 9</p> <p><u>Food management and distribution (top-hill)</u></p> <p>→ Food is not lost or wasted</p> <p>Barriers:</p> <ul style="list-style-type: none"> - Lack of government policy on food loss and waste: Many governments currently do not report their food loss and waste. It is rarely recognized in government policies on topics such as climate food security, and nutrition. Only 11 countries currently include food loss in their Nationally Determined Contributions (NDCs), and none include food waste. - Lack of cold chain, storage, and logistics in lower-income regions: Lack of storage facilities and training on harvest and storage best practices account for an estimated 40% of food losses in developing countries. The lack of infrastructure goes beyond storage and includes for example equipment 	<p>financing for producers to invest in new infrastructure needed to transition to more sustainable methods.</p> <ol style="list-style-type: none"> 6. Support research to <u>map ecological regions' regenerative agriculture potential</u> to prioritize transitions to regenerative production practices in landscapes with the highest potential. 7. Develop methods for <u>calculating the true price of food products</u>, in order to incentivize transitions to more sustainable production practices. 8. <u>Develop a 'bundle of buyers' approach</u>, where buyers of different commodities that grow together well in a multi-crop farm system come together to ease market access and create incentives to increase the productivity and diversity of farmland. 9. Governments can <u>enable innovation</u> to develop low-cost carbon, water, and biodiversity impact verification technology, in order to enable more effective payment for ecosystem services markets for production practices (e.g., incentives aimed at engineers and technologists, etc.). 10. <u>Increase funding</u> for food loss and waste measurement programming, <u>in order to develop targeted interventions</u> and projects to reduce food losses and waste that are contextually appropriate. 11. Governments can <u>develop national commitments to developing a Target, Measure, Act strategy</u> in order to collect the data needed to create new programs and strategies to reduce waste.
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⁶¹⁸ The industrialization and globalization of agriculture has led to over 75% of food coming from just 12 plant and five animal species. Today, calories are the unit of measurement used to judge the success of the food system when it should be nutritional content. While this system has led to more total calories being produced than the global population needs since 1990 it relies on linear practices that extract nutrients and reduce soil biodiversity. <https://pacecircular.org/action-agenda/food>

	<p>to capture post-harvest losses, and roads. Cold chain technologies and sustainable longevity-enhancing additives are also not abundant, even though they could help overcome infrastructure deficit. Beyond infrastructure, a large amount of logistics for trade are paper-based, a system prone to errors and delays that can lead to food losses.</p> <ul style="list-style-type: none"> - Economic impact of food loss and waste not captured and used in decision-making: Most food waste is considered an acceptable business expense instead of a potential cost saving strategy, since information is not captured in a way that helps decision-makers understand the total cost to their bottom line. In addition, there is a perceived high market risk due to a lack of historical data that prevents financial decision-makers from investing in food loss and waste mitigation. - Blind to significant segment of food that is lost or wasted: Most available information on food loss comes from Europe. Assumption-based models extrapolate details to other regions. By not knowing exactly where food is being lost and wasted, from field to fridge and beyond, it is hard to develop impactful programs that utilize capital most effectively. Data availability and quality is increasing, but its effective use to drive decisions is frequently missing. <p>Focus interventions: 10, 11, 12, 13, 14, 15, 16</p> <p><u>Value recovery (down-hill)</u></p> <ul style="list-style-type: none"> → Commonly wasted resources are used productively <p>Barriers:</p> <ul style="list-style-type: none"> - Commonly wasted materials given zero market value: Wasted materials are perceived as a burden one needs to pay others to get rid of, usually at a low cost with poor environmental outcomes. This perception creates a status quo bias, limiting any incentive to think about the value of commonly wasted materials and creative ways to keep the materials in use and retain their value. - Lack of secondary markets and access to those that exist: Due to industrial economic development's focus on linear value chains, and the circular economy for food being an evolving concept, there has not been much research and development on secondary markets designed to keep surplus, lower-quality food and by-products in use, and a lack of awareness of those that do. Even when value chain actors are aware of other potential uses, there is a lack of data, secondary marketplaces, and platforms that easily connect sellers to buyers at scale. - Comingled and contaminated waste streams: In order for composting and anaerobic digestion systems to work effectively and produce safe outputs (see sector chapter on 'waste'), their waste stream inputs need to be pure and clear of plastics and potentially hazardous organic contaminants. In many parts of the world, there is no separate collection for organic waste and even where there is 	<ol style="list-style-type: none"> 12. Private foundations and <u>investors can develop a blended finance structure with retailers and fresh food brands</u>, to prove the investment case for waste reduction infrastructure and spur increased flows of private finance toward food waste reduction. 13. Develop multi-stakeholder partnerships to take a value chain approach to <u>increase availability, affordability, and use of climate smart storage, preservation, and cold chain technologies</u> in farmer and distribution networks in low- and middle-income countries. 14. <u>Develop and demonstrate new financial mechanisms, to lower the barriers to waste reduction technology.</u> 15. Support development of <u>auditable international standard for data quantification</u> that builds on the Food Loss and Waste Protocol in coordination with the private sector. 16. <u>Increase technical assistance</u>, to increase value chain capacity of key processes to reduce food loss. 17. <u>Invest in distributed waste processing infrastructure</u> to increase the share of waste that is able to be recycled/composted into sustainable agricultural inputs. 18. Support calculation of costs of wasted materials and <u>prove the economic and environmental value of repurposing</u> them. 19. Governments can <u>invest in processing infrastructure, such as composting and anaerobic digestion systems</u>, to transform commonly wasted foods into productive forms. 20. <u>Highlight the full cost of waste</u> and issues with waste treatment systems, in order to shift public perception of commonly wasted materials
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	<p>separate collection, unclear guidance, use of plastic bags to line food waste bins, and overpackaging of food products can lead to plastics contamination entering waste streams. Procedures to economically manage organic contaminants prior to land application need to be developed and scaled.</p> <ul style="list-style-type: none"> - Lack of distributed waste processing infrastructure: In many parts of the world there is no collection, processing, or logistics infrastructure to help treat and turn organic waste into viable products such as fertilizers. Globally, only 2% of the organic waste cities produce is looped back to productive use. <p>Focus interventions: 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27</p> <p>Cross-Cutting Barriers:</p> <ul style="list-style-type: none"> - Unsustainable diet habits: Market demand drives “what to produce”. A preference for meat and dairy, among the most resource-intensive and environmentally damaging food products, increases. Just 55% of crops grown globally are used to feed people, with the majority of the rest going to livestock. - Externalities are not accounted for: The market dynamics currently encourage producers to push many environmental costs into externalities (e.g., biodiversity loss, land and water use, greenhouse gas emissions) as ways to reduce costs in pursuit of small profit margins. Price signals along the value chain are a critical way of changing market dynamics, and currently food prices account for neither the environmental impact nor their nutritional benefit. - Lack of coordination and collaboration: The food system is currently governed by silos in government and industry that need to increase their coordination and collaboration to send consistent signals to markets and individuals. For example, food is often considered to be the responsibility of the ministry of agriculture, but it also has critical crossover with health and nutrition, environment and natural resources, finance and trade, and sanitation and waste management. A lack of harmonization often leads to each silo focusing on metrics that pull against each other and further entrench the status quo, instead of moving toward holistic solutions together. - Lack of transparent and traceable supply chains: Having visibility along the entire supply chain is a critical step towards more circularity. However, from farm to fork, the value chain contains many stakeholders and is very complex due to logistics for global supply chains. - Underutilization of technology: For one, relatively limited availability of technological solutions, and second only limited uptake and use of solutions that are available, appropriate, and cost effective. While uptake of technology varies greatly across the world, agriculture/food sectors are often locked 	<p>and spur entrepreneurs to capture currently unseen value.</p> <ol style="list-style-type: none"> 21. Governments can <u>ban collection of food waste in urban mixed waste collection systems</u>, to increase composting rates and alternative uses. 22. Sponsor innovation programs, to <u>bring new models and technologies to market</u> that can make use of currently wasted materials. 23. <u>Catalogue alternative uses and markets for commonly wasted materials</u> (e.g., valuable resources within and outside the food system), because there is limited information on alternative uses and markets, which prevents new business models and supply chains being developed. 24. <u>Showcase by-product business models</u>—from banana husks to household compost to human waste—that can inspire others to consider wasted materials differently and to normalize by-products for productive use. 25. <u>Demonstrate (cross-sector) industrial symbiosis processes</u> and partnerships for making use of commonly wasted materials. 26. <u>Identify key materials that are wasted in product development</u> and assess the economic viability of alternative uses. 27. <u>Governments can use cities as innovation incubators</u> to test concepts that enable sanitary cycles for human waste within the food system. 28. <u>Incentivise food brands that design new products with underutilized crops</u> to boost demand for more sustainable, diverse, and nutritional local food supply. 29. Food brands and retailers can <u>provide their food waste data</u> to support transparency.
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	<p>in traditional practices, due in part to the breadth of stakeholders involved (e.g., 570 million small-holder farms), as well as lack of supporting rural infrastructure and knowledge of solutions. There are significant potential gains currently being missed.</p> <ul style="list-style-type: none"> - Information by itself does not change behaviour: Many resources have been spent on positive food education campaigns that failed to influence human behaviour, due in part to a lack of consideration about the choice environment or real engagement with those they wish to influence. <p>Focus interventions: 28, 29, 30, 31, 32, 33, 34</p>	<ol style="list-style-type: none"> 30. <u>Support the creation of open-source data sets</u>, to help develop new farmer-friendly tools to enable farmers to apply regenerative practices. 31. Create channels for consumers to <u>connect with farmers</u> within the supply chains of popular items, to help humanize food production and give farmers a platform to share their stories and advocate for sustainability. 32. Create <u>public awareness campaigns</u>, to increase consumer awareness of the personal and environmental costs of food waste to shift behaviour. 33. Governments can <u>update national dietary guidelines</u> and public procurement requirements to recommend planetary health diets, signalling the importance of dietary choice on both human and environmental health. 34. Fund <u>research on the correlation between soil health and crop nutrients</u>, to better understand nutritional outcomes from eating regeneratively grown produce.
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Waste management

It feels as if just recently, there was a paradigm shift from frameworks of waste disposal to actual waste management. Waste management is responsible for the entire waste cycle: from waste prevention, re-use and recycling to recovery and disposal. Their tasks include collection, transport, sorting and treatment of waste. ‘Modern’ waste management claims to aim to conserve natural resources and manage waste in an environmentally sound manner, whereby sustainable strengthening of environmental and climate protection measures, as well as resource efficiency, would play a key role. Despite that, many measures still aim for mere volume reduction and riddance of harmful substances, mostly in the spirit of end-of-pipe thinking.

The world is consuming 100 billion tonnes (Gt) of materials a year, while it is estimated that the world generates approximately about 7 – 10 billion tonnes of solid wastes annually. Of this, 2.01 billion tonnes are municipal solid waste with at least 33% of that— extremely conservatively— not managed in an environmentally safe manner.⁶¹⁹ As world population grows, rural-urban migration intensifies, economic prosperity widens, and due to economic development and increased consumption, the generation of waste is increasing steadily over the last years. At the same time, circularity is in reverse: the Circularity Gap Report 2020 report communicated that the global economy is 8.6% circular, while the 2018 edition reported 9.1%. What is more, due to lacking data, in that study one-time recycling or even downcycling is already counted as ‘circularity’, which is not the closed-loop circulation we are striving for.^{620,621} This means, that we are even farer away from circularity than we think.

Table 53: **Waste Management** Overview of sector characteristics

Main problems	Major levers	Main drivers
<p>Apart from the growing waste generation, there are three major problems around waste management:</p> <p><i>Down-hill:</i></p> <ul style="list-style-type: none"> • Lacking waste management (strategy, regulatory framework, or enforcement) in some countries poses a major threat to the environment, as harmful waste and substances are leaked, and harm and endanger ecosystems. • Waste management systems are designed to address waste with end-of-pipe technologies in order to decrease the volumes and destroy harmful substances, instead of treating waste as resource flows and preserving its value. The revenues in this industry rely on the stable waste volumes in the future. <p>There is need for research and technology innovation to create like-for-like recycling flows, partly even for materials that themselves are still under development.</p>	<p>Considering these main issues, there are three major levers to address the problem:</p> <p><i>Addressing the problem down-hill: Functioning waste management systems</i> (collection, sorting, treatment) need to be installed in ways that are appropriate to address the waste resource flows and also consider the societal needs and well-being of the society (including informal sector collectors).</p> <p><i>Addressing the problem cross-hill:</i> Economic and policy frameworks need to be put in place that allow for linear waste management practices to be phased out and at the same time create a level playing field for emerging holistic solutions.</p> <p><i>Addressing the problem cross-hill: Technological innovation and regarding scale up</i> needs to be supported by setting up political frameworks, levelling playing fields and financial support.</p>	<p>For developing waste management systems, the main drivers are regulatory frameworks and enforcement. For countries that are transitioning towards a Circular Economy, a supporting framework for enabling innovation is necessary.</p>

⁶¹⁹ https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html (Assessed online Dec 2021)

⁶²⁰ <https://www.circularity-gap.world/2021#downloads>

⁶²¹ <https://www.globalwastemanagementconference.com/>

Still, in many nations ,waste management’ is already on the edge to serve a Circular Economy and is fostered to become ,resource management’. However, while available knowledge and technology are capable of addressing the present waste to at least a satisfactory degree, unmanaged waste remains to be one of the most urgent problem for our planet. Technology is only one factor to consider when managing solid waste. Countries that advance from open dumping and other rudimentary waste management methods are more likely to succeed when they select locally appropriate solutions. Globally, most waste is currently dumped or disposed of in some form of a landfill.

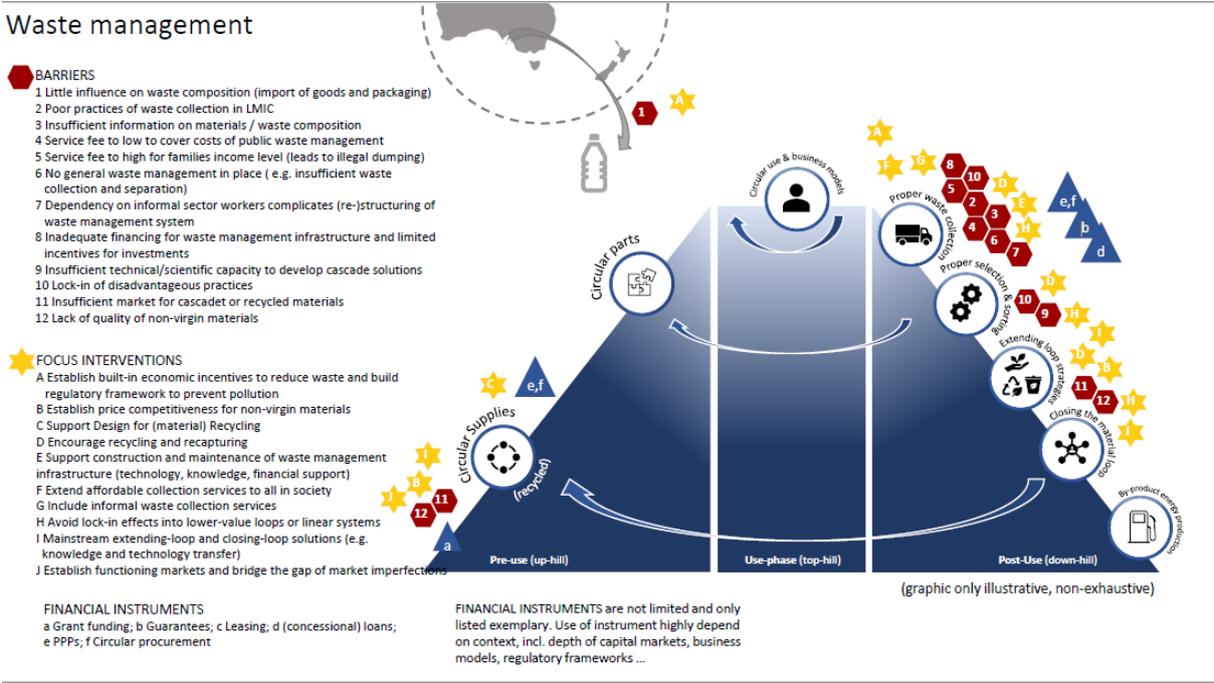
It is estimated that 1.6 billion tonnes of carbon dioxide (CO2) equivalent greenhouse gas emissions were generated from solid waste treatment and disposal in 2016. That accounts for 5 % of global emissions. This is driven primarily by disposing of waste in open dumps and landfills without landfill gas collection systems. Food waste accounts for nearly 50% of emissions. Solid waste–related emissions are anticipated to increase to 2.38 billion tonnes of CO2-equivalent per year by 2050 if no improvements are made in the sector.⁶²²

Characteristics

Waste collection is a critical step in managing waste, yet rates vary largely by income levels, with upper-middle- and high-income countries reaching nearly 100% universal waste collection. Low-income countries collect about 48 % of waste in cities, but this proportion drops drastically to 26 % outside of urban areas.^{623,624}

Waste composition differs across income levels, reflecting various patterns of consumption. High-income countries generate relatively less food and green waste, at 32 % of total waste, and generate more dry waste that could be recycled, including plastic, paper, cardboard, metal, and glass, which account for 51% of waste. Middle- and low-income countries generate 53 % and 57 % food and green waste, respectively, with the fraction of organic waste increasing as economic development levels decrease. In low-income countries, materials that could be recycled account for only 20 % of the waste stream.⁶²⁵

For comparison, global waste composition looks like this: Food and green waste 44%, other 14%, paper and cardboard, 17%, plastic 12%, glass 5%, metal 4%, rubber and leather 2% and wood 2%.⁶²⁶



Outline Waste Management Sectors considerations - CE opportunities and options to respond and Value Hill

⁶²² https://datatopics.worldbank.org/what-a-waste/trends_in_solid_waste_management.html
⁶²³ <https://www.circularity-gap.world/2021#downloads>
⁶²⁴ <https://www.globalwastemanagementconference.com/>
⁶²⁵ <https://www.globalwastemanagementconference.com/>
⁶²⁶ <https://www.globalwastemanagementconference.com/>

Table 54: **Waste Management** Sectors considerations – CE opportunities and options to respond and Value Hill

Sector	Key barriers in selected sectors based on Value Hill	Considerations to respond to key barriers
<p>Waste management ^{627, 628, 629, 630, 631, 632, 633, 634}</p>	<p><u>Waste prevention (up-hill)</u></p> <p>Recycling begins at the end - the ‘get rid’ stage of a product’s lifecycle. The circular economy, however, goes right back to the beginning to prevent waste and pollution from being created in the first place. In the face of our current environmental challenges, recycling won’t be enough to overcome the sheer amount of waste we produce.</p> <ul style="list-style-type: none"> ➔ Start implementing a materials cycle ➔ Work towards higher-value material loops and waste prevention ➔ see sector practices on how to design out waste <p>Barriers:</p> <ul style="list-style-type: none"> - Little influence: High import rate of waste producing consumer goods and regarding packaging - High dependency: Export countries exploiting weak regulation (or implementation and monitoring), readiness or need for cheap products and low awareness for sustainability issues - No level playing field: Circular locally manufactured products cannot compete with cheap import products <p>Focus interventions: 1, 2, 3, 4, 5, 6, 7, 8, 9</p> <p><u>Waste collection, separation, and selection (down-hill)</u></p> <p>Poor practices of waste collection, solid waste management, lack of infrastructure and awareness of the public at large about the consequences of their actions aggravate substantially the situation.</p> <ul style="list-style-type: none"> ➔ Ensure access to affordable waste collection and treatment services ➔ Work towards higher-value material loops 	<ol style="list-style-type: none"> 1. Strengthen implementation of regulations that favour circular materials and products should be developed and implementation thoroughly monitored. Research should ensure, that no contradicting (cross-dimension) policies or regulations are developed (e.g., waste, and environmental law, trade law, tax law). 2. Establish built-in economic incentives to reduce waste generation (e.g., tax exemptions, polluter pays principle, Extended Producer Responsibility (EPR), subsidies). 3. Price competitiveness Increase price competitiveness or even benefits for (circular) local vs. (linear) import products (e.g., tax / subsidies / innovative instruments (placeholder)). 4. Strengthen local circular production and business model schemes Support the region in developing circular economy strategies looking at the entire lifecycle of products, waste prevention, modern waste management and recycling, re-use, repair, and re-manufacturing. 5. Building capacity by increasing knowledge levels, enabling innovation hubs, supporting bankability of

⁶²⁷ OECD, 2019, Waste Management and the Circular Economy in Selected OECD Countries: Evidence from Environmental Performance Reviews (<https://www.oecd-ilibrary.org/sites/1f4e61ee-en/index.html?itemId=/content/component/1f4e61ee-en>).

⁶²⁸ EEA, 2009, Diverting waste from landfill Effectiveness of waste-management policies in the European Union

⁶²⁹ <https://www.oecd.org/environment/waste/OECD-G20-Towards-a-more-Resource-Efficient-and-Circular-Economy.pdf>

⁶³⁰ Guidelines for the Implementation of the Green Agenda for the Western Balkans. EU COM. Brussels, Oct 2020.

⁶³¹ Blomsma, Fenna. Collective ‘action recipes’ in a circular economy – On waste and resource management frameworks and their role in collective change. Journal of Cleaner Production, July 2018.

⁶³² OCED; 2021, Towards a more resource-efficient and circular economy, The role of the G20.

⁶³³ <https://www.circularity-gap.world/2021#downloads>

⁶³⁴ <https://www.globalwastemanagementconference.com/>

	<ul style="list-style-type: none"> ➔ Ensure the controlled disposal of waste in state-of-the-art facilities ➔ Separate hazardous waste from other waste at source and manage hazardous waste streams separately in environmentally sound facilities ➔ Keep waste materials segregated from the beginning (separate collection) and minimise/prevent contamination ➔ Implement state-of-the art selection and sorting technology ➔ Increasingly shift away from controlled disposal and move towards material recovery and recycling <p>Barriers:</p> <ul style="list-style-type: none"> - Poor practices of waste collection: Waste is not collected but individually dumped, in (legal as well as illegal) landfills and environment - Insufficient material information: (import) materials might not be able to be selected due to lack of information about composition (e.g., packaging). - Insufficient waste management service fee: (public) waste management service fees are too low to cover the costs resp. collection rate is too low - Waste management service fee too high: Service fees too high for families to pay for family's income level - Informal sector workers: Tremendous informal sector workforce, facing oppressive and harmful economic realities - No waste management: No waste management practices established - Lock-in of practices: Locked-in effects through dependencies on established economic or technological solutions (e.g., contracts or necessity for volumes, etc.) - Lack of awareness: Wanting awareness in society about necessity for waste collection or separation - Lack of knowledge: Lack of information amongst business to set up solutions - Inadequate financing: Providing public service does not bring in enough financial incentive for private businesses. Subsidies entail the risk to produce lock-in effects. <p>Focus interventions: 9, 10, 11, 12, 13, 14</p> <p><u>Waste treatment: extending-loop strategies (down-hill)</u></p>	<p>circular solutions, creating collaboration networks, etc.</p> <ol style="list-style-type: none"> 6. Provide consumer targeted initiatives that raise awareness of citizens on waste, separate collection, and sustainable consumption 7. Prepare and implement waste prevention programmes, waste management and recycling strategies, and programmes for re-use, repair, and manufacturing 8. Develop a regional agreement on the prevention of plastic pollution, including specifically addressing the priority issue of marine litter 9. Establish economic build-in incentives for post-consumer waste avoidance (e.g., pay-as-you-throw schemes) and better waste treatment (e.g., landfill/incineration charges/taxes, penalties for illegal dumping/burning)⁶³⁶ 10. Support design for material recycling Avoiding (unknown) material compositions (e.g., plastic packaging) (e.g., regulation to (not) place on the market or to disclose composition, incentivise monomaterial compositions, support collaboration between actors like manufacturer and sorting and recycling facilities) 11. Continuing supporting the construction and maintenance of waste management infrastructure (e.g., technology and knowledge transfer about collection and (pre)-sorting, financial support to put-up collection and sorting businesses, etc.) 12. Extend affordable collection services to all in society, irrespective of income level (e.g., fiscal transfers from central governments to help fund municipal waste collection and treatment)
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⁶³⁶ Beware of unintended consequences, like putting economic pressure on or criminalise low-income society and/or abet illegal waste dumping and corruption

	<p>Extract use from substances through controlled transformation ,Waste’ can take different forms. One type of waste occurs when resource capacity is not exhausted, fully consumed or ‘used up.’ This covers situations where more value or utility may be extracted from the resource through (controlled) transformation, deterioration, or redefinition of the resource value.⁶³⁵</p> <ul style="list-style-type: none"> ➔ Substance cascading ➔ (Controlled) downcycling ➔ Waste-to-energy <p>Barriers:</p> <ul style="list-style-type: none"> - Insufficient waste separation: Waste is not separated or and thus not available in reasonable volumes or purity - Locked-in practices: Waste-volumes are dedicated to conventional waste treatment practices (e.g., for economic reasons) - Insufficient technical/scientific capacity: No capacity available to support the development of cascade solutions - Insufficient market: Insufficient economical or regulatory framework present for cascading of/cascaded substances or services - Financing: Unclear financing for innovative solution and wanting market <p>Focus interventions: 15, 16, 17, 18</p> <p><u>Waste treatment: closing-loop strategies (down-hill)</u></p> <p>Keep substances in cycles of (near) equal quality A resource can also be considered wasted when it is not renewed. This describes situations where the means exist to restore or rejuvenate a resource in a manner that re-establishes its functionality. That is: a limiting state – the occurrence of functional, stylistic, or other constraints – can be prevented, undone, or reversed. To neglect the execution of such renewal means that value is lost unnecessarily and thus that waste is created.</p> <ul style="list-style-type: none"> ➔ Recycling (non-biological, more seldom biological resources) ➔ Composting (biological resources) <p>Barriers:</p> <ul style="list-style-type: none"> - <i>*See barriers to ‘extending-loop strategies’</i> 	<p>13. Introducing formal waste collection and disposal systems in a way that is sensitive to the economic realities of existing informal sector workers and enable collaboration between local government and the informal sectors, to ensure that existing workers are fully integrated into the new formal system (e.g., provide legal, eventually tax-privileged, income schemes, establish formal profession to enhance reputation or establish freelance employment schemes)</p> <p>14. Avoiding lock-ins into lower-value loops or linear systems, where waste is not transformed into resources (e.g., no installed overcapacity for conservative waste disposal systems, no economic incentives, or long-term contracts, forward but don’t over-incentivising of end-of-pipe treatment⁶³⁷)</p> <p>15. Mainstream industrial symbiosis and other extending-loop and closing loop solutions (e.g., technology and circular solution knowledge transfer to potential collaboration partners like businesses, municipalities, lenders, setting up circular innovation hubs and foster entrepreneurship, provide finance, etc.)</p> <p>16. Strengthen (scientific) research on extending-loop and closing loop options</p> <p>17. Implement collaboration and knowledge transfer between research institutes, public authorities, businesses and society on technological and economic circular best practices and circular innovation (e.g., research and/or education programmes on circular innovation, enabling cluster creation, encourage piloting and experimentation, provide finance, etc.)</p>
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⁶³⁵ Blomsma, Fenna. Collective ‘action recipes’ in a circular economy – On waste and resource management frameworks and their role in collective change. Journal of Cleaner Production, July 2018.

⁶³⁷ For example: (Illegal) landfills are huge methane emitters. If captured, this methane can be used a valuable economic and clean energy resource and reduce the sector’s significant impact on climate change. It is important to capture the greenhouse gas and the regarding value. Private providers play an important role in comprehensive and skilled service provision. Countries and cities can adopt policy measures that encourage (landfill) operators to capture methane by favouring landfill gas as a fuel source, offering incentives for landfill gas utilization projects, and providing tax advantages for technologies that use biogas from landfills or anaerobic digestion. However, the incentives shall not establish a lock-in effect and allow landfills to phase out.

	<ul style="list-style-type: none"> - No level playing field: Secondary materials happen be more expensive than virgin material (especially plastics) due to - Quality of non-virgin materials: (traceability) as actors tend to choose virgin materials b/c of assured quality assured through warranties and standards. <p>Focus interventions: 15, 16, 17, 18</p>	<p>18. Establishment of functioning markets and price competitiveness (level playing field) for materials and services for cascaded and recycled materials (tax reduction on products, suspension of income tax for start-ups, legal exemptions to terminate contracts for unfavourable 'linear' services like energy from inefficient incinerations as well as regulation of and (public) financing for regarding compensation, etc.)</p>
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