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Foreword

Rwanda is one of the most advanced African countries in the circular economy transition.

For almost two decades, it has taken a proactive approach in putting environment and climate change at the heart of its policies, programmes, plans and initiatives¹.

Amongst others, it is one of the early pioneers in banning plastics and one of the founding countries of the African Circular Economy Alliance.

The concept of circular economy synergises well with economic diversification as well as industrialisation policies that are high on Rwanda’s and Africa’s political agenda. It also provides a paradigm for the development of new economic activities which ultimately promises the creation of new jobs, while it simultaneously addresses some urgent environmental and social problems in the continent, such as the growing problem of waste.

In all three of its key overarching strategies, Rwanda refers to the circular economy to achieve green growth and sustainable development and tackle climate change. In its Vision 2050, Rwanda aspires to transform its economy by setting a new pathway that will lead the country to the living standards of upper middle income by 2035 and high-income countries by 2050.

Through its promised value retention, reduction of waste and externalities while creating new economic opportunities, the circular economy can significantly contribute to this aspiration and building a carbon-neutral, climate resilient and prosperous economy. The Environment and Climate Change Policy provides strategic direction and responses to the emerging issues and critical challenges in environmental management and climate change.

It aims at having a clean and healthy environment resilient to climate variability and change that supports a high quality of life for its society, which circular economy can support in transforming consumption and production patterns into sustainable ones. The reviewed Green Growth and Climate Resilience Policy is based on principles related to inclusion, regional and global integration and environmental sustainability, highly linked to the circular economy concept.

The time is right to make these high-level ambitions as well as the meaning and potential of the circular economy more concrete. Enabled through the financial support granted by the UNDP, the Ministry of Environment is proud to present the National Circular Economy Action Plan for Rwanda.

¹ Examples are: Rwanda has the largest Green Fund (FONERWA) in Africa, and is widely seen to have a pioneering, innovative and nimble policy environment, Rwanda has a pioneering role in the co-founding of the African Circular Economy Alliance first launched at the World Economic Forum in Kigali in 2016, while the country also has a track record for being a test location for trialling innovative approaches before launching in other parts of Africa.
This effort ties to the environmental policy landscape in the country and aligns with the national, regional and international development agenda. The Action Plan lays out clear policy options and underlying activities to advance the circular economy in the waste, water, agriculture and construction sectors in the next years until 2035.

It also considers a cross-cutting component that focalises capacity building, collaboration and private sector engagement, identified as key enabling elements.

The final success of the implementation of this Action Plan will be a shared responsibility. It will be determined by the joint effort between the Ministry of Environment and other governmental institutions but will also depend on the collaboration with private stakeholders, including development and financial partners, civil society organisations, media, academia and research institutions as well as local communities. It will require integrity and transparency from all parties.

We acknowledge the technical insights provided by all stakeholders in the development of this document, serving as a steppingstone to build a circular and climate-resilient economy in Rwanda. We anticipate the changes that this Action Plan will bring in relation to socio-economic development and enhancement of the well-being of the present and future generation.
Executive Summary

In recognition and consideration of key overarching strategies and policies, National Circular Economy Action Plan formulates concrete and clear directions for the transition towards a circular economy in Rwanda. Ultimately, it contributes to reaching the long-term ambition of creating “the Rwanda we want” under Rwanda’s Vision 2050.

The Action Plan’s development has been based on a status quo analysis of the most important economic sectors (waste, water, agriculture, textiles, ICT, transport and construction), a comprehensive sector assessment, examining for each sector the economic and labour criteria, the policy landscape and visions, the involvement of women and youth, and the circular economy potential. The data collection and analysis are based on the review of macro-economic data, regulatory and legislative documents, and reports relevant to the circular economy and sectors considered. This has been complemented through stakeholder consultation in form of interviews and two workshops with experts and stakeholders.

Rwanda aims at decoupling economic growth and resource consumption through the application of circular economy to its priority sectors, which are agriculture, waste, water and construction. So, the vision this Action Plan pursues is that “by 2035, the economy of Rwanda is envisioned to have placed the circular economy at the core of economic decision making and practice, ensuring the retention of resource, eliminating waste and pollution while regenerating natural systems”.

In order to realise this vision, the Action Plan proposes 17 policy interventions and concrete activities split across the priority sectors as well as cross-cutting themes that tackle capacity building and collaboration. Together they represent the next action steps towards embedding circular economy in Rwanda in the next 14 years.

Figure 0-1 Overview of policy interventions

1. Develop and embed a mandatory circular economy module in curricula of schools (primary and secondary) and universities
2. Develop and run circular economy vocational training courses
3. Promotion of partnerships and collaboration across the public and private sector, academia and civil society by promoting the Cleaner Production Centre (CPCIC) as Circular Economy Hub or Agency and applying the Private Sector Engagement Model (PSEM) to the four priority sectors
4. Launch a circular economy accelerator and incubator programme
#5 Enhance the valorisation of organic waste from MSW and decrease post-harvest losses

#6 Establish waste collection and transfer centres in every district that allow most appropriate waste treatment

#7 Install a systemic data collection system for waste

#8 Develop a national regulation that facilitates waste characterisation and treatment

#9 Enforce revised national Building Code and the use of the Green Building Compliance System large-scale building categories

#10 Prioritise renewable and local materials over exhausting non-renewable materials as well as local construction types

#11 Develop national guidelines on how to characterise and valorise CDW

#12 Subsidise high-quality commercial organic fertilisers and locally produced biological farm inputs

#13 Integration of urban and peri-urban farms/food systems into national planning

#14 Develop national guidelines for farmers that provide guidance on how to set up a crop and or animal farm in the most sustainable and circular way

#15 Improve the planning of water resources management, supply and wastewater treatment in urban and rural areas

#16 Promote a cleaner, more efficient and circular water use in agriculture, industry and service sectors

#17 Improve and enforce high-quality wastewater treatment and prevent degradation of the environment
In order to track and assess the implementation and impact of this Action Plan and its policy interventions a Monitoring and Evaluation (M&E) framework has been developed. This is made of two sets, with each being composed of a mix of social, economic and environmental indicators. The first set lists macro indicators to measure the impact of the Action Plan’s objectives while the second set holds micro indicators that evaluate the implementation of the different policy interventions.

The roles and responsibilities of key governmental institutions that are leading the implementation of the policy interventions have been defined to ensure sustainable and successful implementation of the Action Plan. The Ministry of Environment (MoE) will lead the overall implementation of the Action Plan that includes the coordination, execution, monitoring and evaluation as well as to collate national reports with all relevant performances related to the circular economy. The implementation of the sector-specific and cross-cutting interventions will be led by Ministry of Education (cross-cutting), Ministry of Infrastructure (waste and construction), Ministry of Agriculture and Animal Resources (agriculture) and the Rwanda Water Resources Board (water).

Based on an input/output approach, the total costs which have to be mobilised to implement the Action Plan throughout the next 14 year has been estimated to be at $211,213,861.
Introduction
This Circular Economy Action Plan for Rwanda has been developed by the Ministry of Environment in collaboration with the United Nations Development Programme. This Action Plan gives clear direction to the country on how the transition towards a more circular economy can be approached and streamlined in the next 14 years, until 2035. More specifically, the Action Plan (a) streamlines efforts and initiatives related to the circular economy across sectors and ministries and (b) mainstreams circular economy principles into economic growth and policymaking.

**1.1 Rwanda’s potential to lead the circular economy transition in Africa**

Many African countries, including Rwanda, face a growing waste management challenge due to economic growth, increasing population and rising urbanisation. In Rwanda, solid waste generation is expected to rise by 14% increase between 2020 and 2035. Efforts, especially related to plastics, have brought great success and resulted in Rwanda having the reputation of being the cleanest African country. While the waste sector is an important sector to enable the circular economy, besides solving pressing waste challenges, the concept also provides various opportunities to transform other economically relevant sectors while generating jobs, offering a more sustainable and interdependent economy and reducing greenhouse gas emissions (GHGs).

Rwanda is one of the African countries that is relatively advanced on its circular economy journey. For over a decade, it has taken a proactive approach and put environment and climate change at the heart of all the country’s policies, programmes and plans as seen by its Vision 2020 initiative which aims to integrate green growth and climate resilience strategies. Rwanda has the largest Green Fund (FONERWA) in Africa, and is widely seen to have a pioneering, innovative and nimble policy environment. Rwanda had a pioneering role in the co-founding of the African Circular Economy Alliance first launched at the World Economic Forum in Kigali in 2016. It also has a track record of being a test location for trialling innovative approaches before launching in other parts of Africa, as demonstrated by drone and smart city initiatives.

The country therefore has significant potential to continue leading the transition towards circular economy in Africa and thereby tapping into the full potential that circular economy can bring to the country and the African continent.

**1.2 Understanding of circular economy**

Circular economy in this study is understood as an alternative model to transform the current linear economy towards sustainable development. The desired system produces neither waste nor pollution by circulating materials and products at their highest quality within the production system and, if possible, feeding materials back into the biosphere to restore natural capital (biodiversity and ecosystems) at the end of their lives. It reduces the use of natural resources and the generation of environmental impacts while contributing to improvements in human well-being. Ultimately, a circular economy decouples economic development from finite resource consumption.

In short, moving towards such a new system, circular economy is based on three overarching principles:

- Designing out waste and pollution;
- Maintaining the value of materials and products and keeping them in use as long as possible;
- Regenerating natural systems.

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REM (2019) Rwanda Compendium of Environmental Statistics 2018
Ellen MacArthur Foundation (2021) What is the circular economy
This Action Plan has been developed based on a four-step methodology. The initial step of the project was the inception phase, where an initial report (inception report) detailing the suggested approach, methodology and workplan have been produced. The next phase, was to (1) understand the current and desired state of play of the circular economy in Rwanda, (2) conduct a comprehensive sector assessment of all economically relevant sectors in Rwanda (waste, water, agriculture, textiles, ICT, transport and construction) and a resulting sector prioritisation and (3) define the vision, mission and objectives of the Action Plan. The third step was the development of a draft action plan, before this National Action Plan has been prepared.

The two main methods used for the development of this Action Plan are data collection (including stakeholder consultation) and data analysis. The largest quantity of data and information has been collected and analysed in the second phase.

The data collection included the identification and review of macro-economic data, policies and regulatory frameworks and governmental documents relevant to the circular economy and sectors analysed, through desk research and literature review. Besides desk research, another and very crucial step under data collection was the engagement with different stakeholders.

This was realised through (1) targeted interviews with stakeholders from the public, private and academic sector, that completed the view on the situation in Rwanda and underlying opportunities uncovered (see list of stakeholders consulted in Annex 1) and (2) two workshops that serve the purposes to validate a deliverable and to provide additional inputs to the work. Through diligent data analysis that included three brainstorm sessions with the entire (local and remote) project team, the information gathered have been processed and combined to well-tailored policy interventions addressing local challenges and opportunities.

**1.3 Methodology**

In recognition of the restrictions for COVID-19 including lockdowns, international and inter-district travel bans and restrictions on groups meetings, the data collection through targeted interviews and workshops had to be limited to virtual meetings.

Due to experienced low rates of participation as well as the lack of access to a stable internet connection, online surveys have been ruled out as additional means to gather stakeholder feedback.

**Box 2.1 Limitation in data collection**

- **Limitations in data collection**
  - In recognition of the restrictions for COVID-19 including lockdowns, international and inter-district travel bans and restrictions on groups meetings, the data collection through targeted interviews and workshops had to be limited to virtual meetings.
  - Due to experienced low rates of participation as well as the lack of access to a stable internet connection, online surveys have been ruled out as additional means to gather stakeholder feedback.

**1.4 Layout of this Action Plan**

This Action Plan falls into the following three parts:

- The state of play of circular economy in Rwanda: aiming to provide a sufficient overview of the current state, in regard to recent efforts to support the circular economy in the country and its economic sectors, their opportunities and gaps.
- The way forward for transitioning towards circular economy in Rwanda: including the vision, mission, objectives and policy interventions by sector that will define the next steps.
- Arrangements for the implementation of the circular economy in Rwanda: presenting the costing of the Action Plan and its interventions, institutional arrangements, a monitoring and evaluation framework as well as an implementation matrix.
Status Quo of Circular Economy in Rwanda
2.1 Current state of circular economy in Rwanda

The term “circular economy” is often not explicitly used or well-known in Rwanda. This applies to the public and private sector as well as civil society.

Policies

While there is no sector-specific circular economy policy in place, the overarching national policy and strategy that makes the strongest connection to the circular economy is the Environment and Climate Change Policy and the revised Green Growth and Climate Resilience Strategy.

Both documents understand circular economy as a means to achieve green and sustainable industry or production in material and waste flows.

Other strategies rather make an indirect relation by not mentioning circular economy directly but suggesting practices that would fall under the circular economy umbrella.

For instance, the Strategic Plan for Agricultural Transformation promotes stimulating efficient resource use processing. The overview of sectorial and overarching policies can be found in Annex 2.

Private Sector

The same applies to the private sector. Across the different economic sectors analysed, there are many different, but small, initiatives that have circular economy at their core without mentioning it. This is partially due to the African ‘make-do’ culture or to new business opportunities identified out of necessity. However, these more innovative businesses face challenges related to consumer demand as most people are not aware of the value of such products.

Also in economically very relevant sectors, such as agriculture, major agricultural and food companies are already implementing circular economy measures without labelling it. They aim to boost their productivity, increase their competitiveness, strengthen their resilience and regenerate natural systems through circular economy related activities. However, there remain many barriers to compete with cheaper imported products which further hinders up-scaling. Identified companies operating according to circular economy principles can be found in Annex 3.

Private sector involvement in relation to circular economy in Rwanda is on a moderate level. The Government of Rwanda recognises the importance of empowering entrepreneurs and small businesses that work in the fields of sustainability or circular economy, but the involvement is still mainly focussed on grants and incubator programmes.5

Projects in which the public and private sector collaborate reciprocally and develop a project together are rather limited. One example of directly involving the private sector is Green City Kigali6, which is about developing a new neighbourhood in Kigali’s Kinyinya Hill between 2018–2022 that is based on principles, such as affordable and sustainable housing

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2 Such as programmes from UNICEF and Airtel Rwanda, GGGI, Youth Connect Africa, Commonwealth Innovation Fund, Segul Family Fund or Imomoko.
6Green City Kigali
Gender norms and customs have kept women’s position in society held up in households and communities. However, in Rwanda women have seen a transition into higher positions with over 60% holding parliamentary seats and about 50% in Cabinet.

The country has therefore set the stage for women entrepreneurs. Women in general have tendencies to circular behaviours, that encourage reuse, repair and prolonging item use or item life for the longest and as a result could potentially be custodians of the circular economy.

If they are given the space, capital and empowerment to cultivate the circular economy, women could potentially drive responsible consumption and production behaviours through role modelling and cultivating a circular economy culture.

However, there are only a few initiatives targeting women and youth involvement, such as the small business Angaza, upcycling rice sacks, advertising banners and plastic bags into fashion bags, which only hires women.

An overview of businesses that have a special relation to gender and youth empowerment are listed in Annex 4.

The most elaborate and concrete initiatives related to the circular economy are initiated by the academic sector through internal and external research projects, e.g. from the African Leadership University, as well as the development of a circular economy Master’s programme on circular agro-economics, currently under development.

In summary and overall, the current state of the circular economy in Rwanda can be assessed to be on a low-medium level. On the one hand, in some sectors the circular economy is well supported through public and private initiatives such as the plastic waste and agricultural sector, which however still hold improvement potentials.

On the other hand, in other sectors with large circular economy potentials, such as the construction sector or the organic waste stream, there is a lack of concrete efforts and enforcement. In addition to this, the level of awareness and skills needed for applying the circular economy across sectors is still lacking. However, the country has shown strong commitment to advance the circular economy in recent years.

The well-developed and enforced plastic product policies as well as Rwanda’s pioneering co-funding role of the African Circular Alliance (ACEA) are solid steppingstones.
Since the 1994 genocide against the Tutsi, Rwanda has experienced rapid economic growth. The country’s average GDP grew by 7.2% over the last decade up to 2019. Economic growth was expected to continue in 2020, but the COVID-19 pandemic has significantly impacted economic activities, resulting in the country’s first economic contraction since 1994 (~3.4% in 2020). Rwanda’s economy is now recovering and is projected to grow by 5.1% in 2021.7

Rwanda’s economy is still strongly dependent on agriculture (26%), almost double the sub-Saharan African average, which is at 18%. The share of industry (19%), under which the construction and textile sectors fall, only makes up about two thirds of the comparative value for other countries in sub-Saharan Africa (sub-Saharan average of 28%). Services, that include sanitation (waste and water), ICT and transport sectors, make up a major component of the Rwandese economy, contributing 46% to the GDP.8

Agriculture is the main economic activity in Rwanda with 70% of the population engaged in the sector.9 However, compared to the engaged working force, the agricultural sector accounts for ‘only’ 26% of the national GDP (in 2020/2021).10 Due to its large employment, the agricultural sector has huge potential to drive the generation of inclusive green jobs. On the African level, millions of jobs could be created by 2030 through circular food systems.11

The transport sector also represents an important sector in Rwanda and plays an enabling role for freight and passenger transport within cities and between cities and villages. Its current GDP contribution lays at 7%.11 The anticipated expansion of Rwanda’s national airline carrier services, network (destinations), fleet and partners to promote the airline industry, is expected to boost employment through thousands of new jobs.

The construction sector contributed around 7% to national GDP, and 8% to national employment (2012–2017).12 The sector is expected to grow by 9% per annum until 2021, which is the second fastest growth rate in Sub-Saharan Africa.14 Due to the increasing population growth, emerging middle class and urbanization trend, Rwanda will face a construction boom in cities, therefore leading to an increase in jobs created within the industry.

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7 World Bank (2020) World Bank Development Indicators
9 FOA (n.d) Rwanda at a glance
10 National Institute of Statistics of Rwanda (2021) GDP – National Accounts (Fiscal Year 2020/21)
11 World Economic Forum (2021) Five big Bets for the Circular Economy in Africa
12 Fortune of Africa (n.d.) Transport sector Rwanda
13 EU, IOL, Government of Rwanda (2018) Infrastructure Development, the Construction Sector and Employment in Rwanda
14 Ibid.
In 2020, the Information and Communication Technology (ICT) sector contributed up to 3.4% to the national GDP\textsuperscript{15}, which implies a growth of 29% in 2020.\textsuperscript{16} The sector expects to contribute to 5% of jobs in formal employment by 2024 by increasing the number of jobs created through business process outsourcing, increasing in percentage of ICT graduates who are expected to expand the elite IT professional pool to approximately 135,000 by 2024.\textsuperscript{17}

The textiles industry represents one of the smallest sectors in Rwanda. It essentially includes only 22 small companies.\textsuperscript{18} The sector’s contribution to the national GDP is therefore limited to less than 1%. However, according to Rwanda’s Ministry of Trade and Industry (MINICOM), the Textile and Apparel sector in Rwanda is the third largest in terms of employment (with a large share of informal workers) in the craft sector that accounts for almost 15% of the individuals engaged in the production of handicrafts. Due to its labour intensity, the textile sector could create millions of jobs on the continent, especially for women and youth.\textsuperscript{19}

For the waste sector, there is no dedicated metric that measures its economic contribution as it is part of the broader sanitation sector. However, it is estimated that its GDP contribution is moderate and will grow as this sector holds huge opportunities in creating circular jobs.

The water sector is also part of the sanitation sector. As for the waste sector, there is no metric dedicated to the water sector. It is expected that the contribution to the GDP is still relatively small as the water supply and wastewater treatment is not fully established. However, as it is a government’s priority to make substantial improvements in this field, it can be expected that the water and wastewater sector holds relevant opportunities in job creation, which will increase its GDP contribution.

**2.3 Summary of the sector assessment and prioritisation**

Based on a thorough assessment of the introduced economic sectors, four sectors have been prioritised. This prioritisation is primarily based on the analysis, scoring and weighing of the following four criteria:

- The economic contribution to the national GDP;
- Alignment with government plans, policies and strategies;
- Circular economy potentials and opportunities;
- Transformative impact, with focus on women and youth involvement.

\textsuperscript{15}The New Times (2021) ICT sector grew by 29% in 2020
\textsuperscript{16}Ibid.
\textsuperscript{17}MINICOM (2017) ICT Sector Strategic Plan 2018-2014
\textsuperscript{18}Ministry of Trade and Industry (2017) Made in Rwanda policy
\textsuperscript{19}World Economic Forum (2021) Five Big Bets for the Circular Economy in Africa
As a result of the assessment, the priority sectors that this Action Plan focusses on, are:

- Agriculture
- Waste
- Construction
- Water

In terms of **economic contribution** to the national GDP, the agricultural sector contributes to 26% of the country's GDP, while the construction sector currently makes a share of 6%. Despite the fact the contribution from the construction sector is relatively small compared to the agricultural sector, it is expected to grow due to high housing needs and the urbanisation trend. The waste and water sectors play a key role in the Government’s agenda and also in the circular economy. Therefore, it can be expected that the moderate contribution to the GDP will be even higher as this sector hold huge opportunities in job creation.

The **circular economy potential** has been identified to be high in all four sectors. These include both cross-sectorial opportunities as well as sector-specific ones. The opportunities in Rwanda’s waste sector are very diverse and depend on the sub-sector and its characteristics. However, all sub-sectors would profit from an improved waste management and the application of lessons-learned from more advanced sub-sectors, such as e-waste and plastics.

The opportunities in the water and wastewater sector also highly depend on the infrastructure, coverage and technologies in terms of water supply and wastewater treatment which is still largely under development. For the public sector huge potential lays in a more integrated spatial planning while potentials targeting operators are related to more water-efficient and circular practices or natural capital accounting. The opportunities in the construction sector address two key lifecycle phases of a building, i.e. its design and end-of-life phase.

They include enforcing the Green Building Compliance system or enhancing the use of locally-produced, alternative or renewable sustainable materials. Finally, in the agricultural sector, the opportunities relate to connecting small-scale farms with each other or with urban areas to better encourage the integration of regenerative, sustainable and circular farming concepts into current practices.

The **transformational impact**, with special focus on women and youth involvement, has been strongly observed in the waste, agriculture and construction sectors. For instance, in the construction sector 25% of newly created jobs are likely to be assigned to women and youth. In water use, agriculture and food processing, the share of youth constitutes more than 40% of the entire population while women constitute over 80% of the employment. Rwanda’s youth and women are Rwanda’s largest population. Youth and women participation can play a key role in responding to recycling and reuse activities as well as to developing new business models in the priority sectors.

The legislative and regulative landscape of the four priority sectors is moderately developed and shows commitment to further improve and advance the circular economy. This shows **alignment with Government plans**, including the Vision 2050 and the revised Green Growth and Resilience Strategy. Many Governmental efforts and initiatives have been conducted, including legislations, regulations and standards. However, there are still many improvement potentials related to making a more concrete and holistic connection to the circular economy and to create an enabling framework for exploring and scaling up business opportunities in the circular economy field.

Even though the textiles sector plays an important role for the Government, the sector only has a very small GDP contribution (1%) while also holding very little circular economy potentials. This is due to the fact that most the majority of the raw materials are imported because of insufficient geographic and climatic conditions to grow cotton in Rwanda.

The ICT sector represents a strong sector for the country. Not only does it contribute to 15% of the national GDP (with a rising trend), but the Government also has the ambition to become Africa’s ICT hub. Although this sector is a key enabling sector for the circular economy, when it comes for instance to the connection of stakeholders and smart agricultural systems, it is mainly service based. Its material, resulting from e-waste is covered under the waste sector. Consequently, we only consider mentioning it as a key enabling element in the action plan.
The transport is also a relevant sector for the Government as it pushes the sector towards e-mobility. While the GDP contribution is moderate, we have not been able to obtain information on the potential of producing batteries, sourced from local lithium or cobalt mines. If this were possible, it would be worth further exploring opportunities from the perspective of a circular economy.

The methodology and prioritisation matrix can be found in Annex 5.

2.4 The priority sectors, their gaps and opportunities

This section provides an overview of Rwanda’s priority sectors as well as a derivation of their major gaps and opportunities in relation to circular economy, which will be addressed through the policy interventions suggested in this Action Plan. A more comprehensive analysis can be found in Annex 6.

2.4.1 Agriculture

Overview

Almost half of the farmland is occupied by small-scale farms relying on traditional technologies and practices, which are spread across the country, covering less than 0.2ha. The land fragmentation additionally creates underemployment as the farms are too small to provide full employment. Land degradation represents a threat to agricultural performance & it is estimated that 1.4 million tons of soil is lost per year, accounting for a loss of $320,000. Rwanda still has enough rainfall, but the intensity of the rainfalls often leads to land erosion and soil degradation. Such events also negatively influence the soil acidity which hinders, for instance, the uptake of nutrients, root growth and access to water, that overall reduces productivity. To tackle parts of this issue, large-scale operators increasingly apply irrigation methods (25%) which are not accessible to small farms.

In terms of agricultural outputs, tea and coffee are the major exports while plantains, cassava, potatoes, sweet potatoes, maize and beans are the most productive crops. Rwanda exports dry beans, potatoes, maize, rice, cassava flour, maize flour, poultry and live animals within Eastern Africa.

The two national polices guiding the development of the agricultural sector are the National Agricultural Policy of Rwanda and the Rwanda Strategic Plan for Agricultural Transformation 2018–2024 (PSTA). The National Agricultural Policy of Rwanda, updated in 2017 in response to the changes facing agriculture and the food system nationally, regionally and globally, stresses the need for a more resilient agriculture and The PSTA seeks to build resilience through on-farm measures and climate smart investments providing a conducive enabling environment required to enable the strategic shift to a green and market-led agricultural sector. Rwanda’s Vision 2050 anticipates a market-led and high-tech driven sector, led by professionals running large and fully irrigated farms.

Circular economy practices in the agricultural sector in Rwanda are mostly visibly implemented by using organic waste of compost as fertiliser, which however is still very low the majority of farmers rely on imported chemical fertiliser. In addition, some farmers use organic waste residues of processing activities as animal feed. The technique to store, collect and separate different crops and waste materials is applied by the reuse of containers, baskets and equipment by different actors. This is supported through governmental initiatives such as Akarima k’igikoni being part of a model village planning program in the whole Southern Province in 2019. The Government collaborates with the citizens to build the kitchen gardens in all the households of the model village by training them on gardening practices, so they can also help their neighbours in the process.

20FAO (2021) Rwanda at a Glance
Recycling practices are applied by using agricultural bags and jerry cans in daily agricultural activities. Input suppliers recycle old papers into paper bags for selling products to consumers. It is rare to find practices such as energy production from waste, use of renewable energies and artificial irrigation especially in the agricultural informal sector.\(^{21}\) Precision agriculture increases efficiency and reduces waste. It makes it possible to use fertilisers and chemicals according to the needs of the soil, trying to provide the right amounts of substances at the right time and at the right place. This optimises performance while reducing the environmental impact. Precision agriculture is rarely practiced amongst the country’s agricultural practitioners. In this field the Government supports projects, such as funding an irrigation system in the Nasho sector\(^ {22} \) in eastern Rwanda, initiated in the Howard Graham Buffett Foundation’s and the Government of Rwanda.

A concept that is well-practiced is agroforestry promoting regenerative practices in the sector. This is supported by the Agroforestry Strategy under the Ministry of Agriculture and Animal Resources or initiatives, such as Girinka supplying low-income households with a dairy cow. This initiative not only supports nutrition and employment, but also serves as a booster to family agropastoral systems that promote regenerative agriculture.

Initiatives from the private sector come from some major companies in the agricultural sector that have put in place a set of strategies that embed circular economy principles. Examples are Kiabi and Mata tea company that have yielded benefits, such as energy efficiency and reduced GHG emissions due to reduced demand for fuel wood, deforestation and soil erosion reduced, water pollution reduced and less demand for water. Another example is Greencare Rwanda that produces organic compost fertiliser, branded as GreKompost and distributes it to farmers.

### Opportunities and Gaps

Even though the agricultural sector has already become a priority sector for the Government, there are still many unexploited opportunities in the agricultural sector with regards to circular economy. As the majority of farmers still uses imported chemical fertiliser, there is a large opportunity to address this gap by promoting organic fertiliser and providing guidance on its application. This should go hand in hand with an incremental decrease of the governmental support for chemical fertiliser in order to ensure price competitiveness.

A key challenge occurring in the agricultural sector is land fragmentation with a dominance of small-scale farms, limiting their potentials and employment opportunities by being disconnected from each other or unable to scale up. This challenge could be addressed with better connection to be able to leverage knowledge, resources and equipment. A similar opportunity arises regarding the promotion of circular community farms in villages and urban areas.

This way the concept of circular agriculture can be promoted, including through skills transfer, the economic risk can be distributed, while food security is supported for the respective communities. A leverage of the gaps of lack of knowledge, know-how, collaboration and equipment could be a governmental initiative dedicated to the two concepts, including guidance and incentives.

The PSTA aims for more resilient agricultural systems by means of regenerative agriculture or through agroforestry (Rwanda Agroforestry and Action Plan 2018-2027). These are already great approaches, however, changing the sector could be accelerated by combining them with circular economy. There are still no guidelines on how to develop closed-loop farms or how to integrate circular practices into farming on-site, such as waste and water valorisation. The Regulation on Solid Waste Recycling mentioned other valorisation options, such as composting through anaerobic digestion, but a high-level elaboration on how to do so is only present for the production of fertiliser elaborated in the Organic Law. Besides establishing guidelines for farmers, relevant regulations should be expanded by circular economy practices with high potential, such as biogas of animal feed production.

\(^{21}\)Nijman, E. (2020) Towards circular food production systems in East Africa

\(^{22}\)The system consists of 63 central pivots capable of irrigating 1,173 ha of plantations, powered by a 3.3 MWp solar off grid with a 2.4 MWh battery storage system (covering 1,200 ha) and will benefit 2099 smallholder farmers who have come together in the Nasho Irrigation Cooperative (Naico).
Considering the urbanisation trend in Rwanda, integrating food and feedstock systems into urban areas can be an important means to ensure food security and avoid longer, thus more vulnerable, supply-chains. The proximity principle is a key element of the circular economy with many benefits. Besides securing food supply, they also create jobs in cities, thereby, strengthening the local economy. While there are some initiatives already ongoing, there is the gap in regulation or national/urban development plans to address and better integrate food systems into cities.

Table 3-1 Summary table of CE opportunities and gaps in the agricultural sector

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase the use of organic fertiliser</td>
<td>Lack of farmers awareness and knowledge related to the application of organic fertiliser; lack of financial support from the Government to make it price-competitive</td>
</tr>
<tr>
<td>Promote the concept of community farms and a better connection of small-scale farms</td>
<td>Disconnection between small farms (isolation); lack of collaboration; lack of knowledge and equipment; lack of guidance</td>
</tr>
<tr>
<td>Integration of more circular principles into farms, including closed-loop systems, and the consideration of other supportive concepts, such as regenerative and agro-forestry</td>
<td>No guidelines or regulation that provides guidance on how this can happen from a circular economy perspective; only parts are addressed policies, e.g. the Organic Law that includes the production of fertiliser; other valorisation practices, such as the production of biogas, are neglected</td>
</tr>
<tr>
<td>Integration of farms and feedstock operating under circular principles into urban areas</td>
<td>No regulatory guidance of how this could be done, or consideration in urban development plans</td>
</tr>
</tbody>
</table>
2.4.2 Waste

Overview

The waste separation patterns usually depend on the area (rural or urban). Urban households dispose of their waste in compost dumping (46.9%), private dust bins (24.1%) or on farms (13%). In some neighbourhoods, two bins are provided, i.e. for organic and non-organic wastes. Disposal in the rural areas happens through compost dumping (54.7%), on farms (30.9%) or in the bush (10.1%).

Waste collection is managed through private companies contracted by municipalities. Outside Kigali, operation areas within provinces are designed at district level. The waste service providers do not receive direct subsidies from the Government, but their operation is facilitated by a degree of exclusivity in service provision on a sector level. The collection rate in cities highly varies depending on the waste infrastructure present between 6%24 (Huye, southern province) and 49% of Municipal Solid Waste (MSW) (Kigali). Although Kigali25 has a central disposal system, solid and liquid wastes are still illegally dumped in rivers, wetlands, ditches and roadsides.

When collected, the composition of MSW is usually dominated by at least two thirds of organic waste, one tenth of recyclables (paper and plastic) and as a last part of textiles, special care and other waste (e-waste and inert waste).

After collection, there is no source separation, and normally all waste ends up at landfills. Besides MSW, this includes serviced, commercial, and industrial waste. On landfills sites, some manual sorting is undertaken by authorised waste pickers. However, a large amount of plastic waste is still mingled with organic waste at dumpsites. As a result, they are in a critical condition threatening the workers and surrounding environment there is no waste processing apart from waste sorting after collection, waste spreading and soil coverage, and no leachate treatment or gas management in place either.

The conditions mentioned above impede waste recycling only 2% of the MSW is currently being recycled, and an even lower percentage of organic waste is used in a beneficial manner.

The Government is taking action to mitigate the risks caused by the Nduba site. Alongside the City of Kigali, and the Global Green Growth Institute (GGGI), the Government launched the project “Waste to Resources: Improving Municipal Solid Waste (MSW) and Hazardous Waste Management in Rwanda” in August 2021. The project’s aims are varied: to promote organic and plastic waste; increase collection of electronic waste; increase community awareness, build capacity, and improve the policy and regulatory environment for circular economy initiatives in the waste sector.26 Besides the National Sanitation Policy and Implementation Strategy (2016) regulating waste management – with a new Integrated Waste Management Strategy currently under development & the recycling of plastic, metal, glass, paper, cardboard, organic wastes and other solid wastes is framed under the Regulation of Solid Wastes Recycling.

There are also initiatives of private sector players, such as Agruni Ltd. which has been involved in waste management and recycling in Kigali. They collect solid waste and sorts it into biodegradable and non-biodegradable and further into recyclable and non-recyclable.27 COPED Rwanda is a similar company involved in waste management and transportation in Kigali that collects waste from residents and commercial institutions. They sort waste into various categories, i.e. bio-organic, recyclable, non-recyclable, organic waste, hazardous waste. COPED has facilities which transform dry biomass waste into briquettes.28

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23 REMA (2016) Operationalizing green economy transition in Africa
25 Ibid.
28 According to our interview with COPED on the 08/09/2021.
E-waste

Rising population, economic growth and modernisation significantly drive up the demand for electrical and electronic equipment (EEE) which will also increase the e-waste generation. Based on a survey, conducted in 2014–2015, Rwanda has a potential annual e-waste generation of 9,417 tons, of which 81.52% are contributed by individuals, 12.14% by public institutions and 6.43% by private institutions.30

Rwanda is one of 13 African countries to regulate e-waste through its national e-waste Management Policy.31 In an effort to reduce the e-waste generation in the country, the importation of used electronics/ICT equipment is restricted and regulated to minimise EEE’s potential adverse effect on human health and the environment. The framework includes the offer of financial incentives to individuals who collect e-waste from the community and bring it to the e-waste recycling plant.

In connection to the e-waste policy, in 2017, Rwanda’s Green Fund FONERWA invested into the establishment of an environmentally friendly e-waste collection centre and dismantling/recycling facility, run by Enviroserve, located in the Bugesera district.32 Other innovative businesses, like Wastezon, use technologies to compliment government efforts in e-waste management. They connect homes to recycling facilities processing e-waste.

Plastic Waste

Plastic waste represents a relevant share of the total waste generated in Rwanda (between 5 to 10%) that mostly ends up in the environment due to insufficient waste disposal and collection. Based on the daily MSW generation in Kigali and the share of plastic waste (5%), the volume of plastic waste generated in Rwanda can be estimated at 95.4 ktons per day.33

While it is difficult to trace how much of the plastic waste is recycled, a relevant share still arrives at the landfill. However, there are initiatives that pick out plastic waste from landfills and reutilise it to produce fashion accessories and other items.34

In 2019, the Government of Rwanda issued a ban on the importation, manufacture, sale and use of plastic carry bags and single use plastics in Rwanda, superseding the law 57/2008 from 2008 which prohibited the importation, manufacture, sale and use of polythene bags. This ban had major impacts on the plastic manufacturing industry as well as on the packaging industry thus triggering innovation in terms of finding alternative packaging materials which, however, is still on a small scale. So far, the Government has initiated smaller projects related to alternative packaging materials on individual segments packaging solutions.

Other governmental efforts related to plastic pollution include the Beat Plastic Pollution campaign or a mandatory clean-up day, called Umuganda. Additionally, the Government supports recycling and reuse of economically valuable waste products, such as plastics and organic waste for fertilizer and fuel, with an eventual transition to mandatory waste management for households and businesses.

Private organisations are also strongly involved in plastic waste management, such as Agroplast, transforming plastic waste into different kinds of packaging solutions.

Organic Waste

Organic waste makes the largest share of the MSW in Rwanda (about two thirds). Due to insufficient waste separation across the entire value chain (including consumers and waste operators), where green waste (mainly yard-derived waste) and food waste are mixed with other waste fractions which is especially the case in low- and middle- income areas the majority of the organic waste ends up at landfills, contaminating other in-organic waste at the landfill site. Another crucial reason that hinders the valorisation of waste is the amount of food that is lost on transportation or through insufficient storage. Rwanda loses and wastes 40% of total food production each year (post-harvest food losses). This represents 21% of its total land use, 16% of its greenhouse gas emissions, and a 12% loss to Rwanda’s annual GDP.35

34 Based on one of our interviews.
35 World Bank (2020) Rwanda Food Smart Country Diagnostic
The topic of organic waste is mainly covered in the Rwanda Strategic Plan for Agricultural Transformation 2018–2024 (PSTA) and the Regulation on Solid Waste Recycling (2015) that aim to enhance the valorisation of organic waste through composting and anaerobic digestion.\textsuperscript{36}

From the private sector, there are a few initiatives that valorise organic waste and produce organic fertilisers, biogas or (insect-based) animal feed.\textsuperscript{37} Companies such as Greencare Rwanda, Recycl’Africa and Rwanda Biosolutions Limited are involved in the production of organic fertilizers from waste. They usually obtain their input material (organic waste) from waste pickers that sort waste at landfills after waste collection.\textsuperscript{38} More companies active in the waste and recycling sector, can be found in Annex 2.

## Opportunities and Gaps

The waste sector plays an enabling role for the circular economy. Proper waste management is a prerequisite for ensuring high-quality waste valorisation. Despite public and private efforts and initiatives, there are still many potential opportunities to exploit.

Due to the large amounts of organic waste that is not properly separated and collected, there is a large opportunity to enhance awareness of waste valorisation and to improve these practices to avoid contamination of other waste streams that hinder their recycling; and instead, to create value through fertiliser, biogas or animal feed production. A few initiatives exist that collect waste separately, either through private initiatives or through the Government in some neighbourhoods, by providing two bins (for organic and inorganic waste) to households. However, it often happens that separated waste is mixed again by the waste collection companies. This can be due to a lack of awareness, know-how, motivation or knowledge about better, more circular practices on both consumer and business side.

A past attempt from the Government to tackle the awareness and know-how about waste separation was already done in 2012. It included the training of households to separate waste and waste collectors to collect organic and inorganic waste separately. Its success was largely restricted by the lack of guidelines, especially at the landfills where collectors could not offload waste systematically, leading to contamination of the sorted waste.\textsuperscript{39} Ten years later, there is still no governmental requirement, in form of a standard or law, making the separation and separate collection of organic waste mandatory, which leads to low-quality collected waste ending up at landfill or in nature. This is reinforced through structural gaps in infrastructure, such as waste collection containers, insufficient access to road networks, restricted capacity of waste collectors or no separate site for organic waste at landfills. In addition to this gap, there is no clear guideline available on how to embed circular practices into households and waste management operations.

A related opportunity is the reduction of post-harvest food losses which represent significant amounts of organic waste, due to low access to technical equipment, e.g. storage and cooling, or insufficient infrastructure interrupting the timely transport of the produce.

Beyond the organic waste fraction, an opportunity to improve the overall waste management and infrastructure, is around waste transfer and collection centers. Very few centers have already been established serving as a means to further separate the waste into material streams and to send those to / let them being collected by waste recyclers and other initiatives executing appropriate waste treatment and valorisation.

The safe disposal of unusable and contaminated waste can be better controlled as well. The largest gap hindering this opportunity is the lack of capacity and know-how related to the identification of different materials to be found in the collected waste.

All of the opportunities mentioned above and more would be enabled and facilitated through systematic data collection. Currently, there is no data collection system or infrastructure in place into which waste collectors, environmental district officers or waste operators could feed in information about the amount of waste collected, the composition and other characteristics that would enable circularity.

\textsuperscript{37} Transformation of organic waste by growing insect on organic waste, which can be used as insect-based animal and organic fertilizer as a by-product.

\textsuperscript{38} According two of our interviewees (anonymised).

Many solutions to circulate the waste generated in Rwanda do already exist. In most cases, they are run by very small initiatives and businesses that have recognised the value-added and business case.

However, they lack of an enabling environment to access financial and business support to scale-up.

**Table 2-2 Summary table of CE opportunities and gaps in the waste sector**

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valorise organic waste, incl. better waste collection and production of fertiliser, biogas or animal feed.</td>
<td>No guidelines, law or incentives supporting the valorisation of waste (through mandatory separation or treatment); lack of infrastructure and enforcement of separation, collection and treatment (majority still landfill); lack of know-how and awareness of the importance of circularity (consumer level) and business case for circularity (business level)</td>
</tr>
<tr>
<td>Reduce food losses</td>
<td>Lack of technical equipment and knowledge of farmers; lack of infrastructure</td>
</tr>
<tr>
<td>Improve waste collection and transfer to increase the quality of recycling input flows</td>
<td>Only a few waste collection centers for e-waste exist; lack of infrastructure (facilities and transport/distribution) and know-how about proper and safe separation of different waste streams</td>
</tr>
<tr>
<td>Systematically gather data on waste to enhance collection and policy-making</td>
<td>No data collection system and infrastructure; no legal obligation to collect data</td>
</tr>
<tr>
<td>Scale-up local recycling (and reuse and repair) initiatives for organics, plastic and e-waste</td>
<td>Lack of leadership and financial support; lack of access to recyclable materials; insufficient waste separation</td>
</tr>
</tbody>
</table>
2.4.3 Construction

Overview

The rapid increase in Rwanda's population and industrialisation is expected to intensify pressures on environmental and social and ecological living that will eventually deplete natural resources. Housing requirements in Kigali are projected to reach 458,265 dwelling units\(^{40}\) by 2022, of which 186,163 dwelling units shall be affordable housing.

It is estimated that an average person consumed about 46 kg of materials — mainly construction and industrial minerals, fossil energy carriers and biomass, and produced 1.45 kg of waste on a daily basis in 2011.\(^ {41}\)

Major products used and produced within the country include lime production, clay tiles and cement. However, the construction sector remains highly dependent on imports due to its trade deficit with imports remaining relatively high (10 times higher) than exports.\(^ {42}\)

To tackle the development of the sector, the only policy in place is the National Housing Policy of 2015, aiming to fast-track affordable housing projects and encourage the use of local, green and affordable building materials.

An important ongoing initiative in the construction sector is the Green Building Compliance System, initiated by the Rwanda Housing Authority and the Singapore Building and Construction Authority to promote the development of green buildings and cities in Rwanda.

This standard is embedded in the Rwanda Building Code which all property developers of building categories 4 and 5 must adhere to and comply with. As a response, small initiatives started looking into the production of alternative, more sustainable construction materials, such as Strawtec Building Solutions, producing compressed straw materials from local materials or My Green Home, converting plastic waste into construction material.

Opportunities and Gaps

In Rwanda, circular economy promises to solve occurring challenges, i.e. the need for housing in the next few years and the dependence on the import of construction materials. This can be achieved by embedding strategies that enable higher resource efficiency into construction practices in the design, construction, use and end-of-life phase.

Starting from the design phase of buildings, circular economy is not broadly considered, which is likely due to the fact that standards related to the design phase do not require criteria for a longer life of buildings or a safe cycling of the materials. The national Building Code was updated through the Green Building Minimum Compliance System. However, this system only includes criteria related to (1) energy efficiency; (2) water efficiency; (3) environmental protection; (4) indoors environmental quality; (5) other green features. All of them are important, but do not address material efficiency or longevity of the building. Expanding the Green Building Minimum Compliance System with circular design principles will advance the circularity of buildings.

The materials used in construction are a combination of locally produced and imported materials, with the majority being imported. This is caused by a lack of awareness and acceptance in the private sector and missing legal or financial incentives that encourage the local construction material industry in order to reduce the dependence on imported steel and cement. Through the Green Building Minimum Compliance System the utilisation of local, sustainable materials have been enhanced, however, this trend needs further support. Another large opportunity lays in sourcing input materials for alternative construction materials from other waste streams, such as plastics, which requires stimulation through capacity building.

\(^ {41}\) OECD (2015) Material Resources, Productivity and the Environment
\(^ {42}\) Ministry of Trade and Industry (2011) Industrial sub-sector master plan for construction materials
The Green Building Minimum Compliance System is mandatory for i) commercial buildings, ii) public administrative and institutional buildings, iii) social, cultural and assembly buildings, iv) health facilities, and v) educational buildings. Despite its legal obligation, only a small part of the buildings applies the system. Besides limited enforcement, a lack of knowledge of green and circular buildings have been identified as key gaps.

The majority of construction and demolition waste (CDW) ends up in landfills or open dumps which represents a direct loss of value. CDW with usually high shares of mineral- based and steel materials has a particularly high recycling potential. Producing secondary raw materials from CDW is hindered by the lack of knowledge on how to characterise and identify the waste materials correctly and increase the know-how and technical infrastructure for the actual recycling process.

Table 2-3 Summary table of CE opportunities and gaps in the construction sector

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Promote circular design of buildings through the Building Minimum Compliance System</td>
<td>No guidelines in place that provide directions on how to align common practices to circular economy</td>
</tr>
<tr>
<td>Prioritise the use of local, alternative, sustainable and renewable construction materials</td>
<td>Lack of acceptance and awareness in the private sector, no legal or financial incentives to reduce the use of steel and cement</td>
</tr>
<tr>
<td>Enhance the application of the Green Building Minimum Compliance System as part of the Building Code</td>
<td>Limited application of the compliance system; restricted mandatory obligation for application (only two building categories, i.e. 4 and 5); knowledge gap on green building concepts; missing empowerment and incentives to make buildings greener</td>
</tr>
<tr>
<td>Improve CDW reuse and recycling</td>
<td>No existing standard or guidelines that could support more CE practices; lack of technical infrastructure and transport options of heavy CDW; lack of know-how about recycling and reuse</td>
</tr>
</tbody>
</table>

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42 Ministry of Trade and Industry (2011) Industrial sub-sector master plan for construction materials
Overview

Rwanda is categorised as a moderately water scarce country. The two main basins (Congo and Nile basin) are the most important water sources. The largest users of water are hydropower plants, large irrigation schemes, domestic water supply and coffee washing stations. The highest abstractions were observed in hydropower (84.76%), irrigation (9.11%), and domestic water supply (5.88%). Water use and availability ratio was estimated at 8.9%\(^43\).

The water resources are mainly influenced by rainfall and evaporation. Climate information and preparedness are therefore essential in the management of water resources.\(^44\) Although Rwanda possesses abundant water resources, the distribution of drinkable water is still inadequate.\(^45\) Wetlands provide an important function of water treatment and purification and serve as sources of water for the lakes and connecting rivers in the country. The National Water Supply Policy 2016 aims to provide a clear directive for the implementation of activities in the water sector, ensuring sustainable access to safe, basic water in Rwanda, specifically to rural areas.

In terms of wastewater treatment, the majority of systems applied are decentralised and semi-centralised systems\(^46\) while a large part of sanitation does not consider treatment and still uses pit latrines (84.6%).\(^47\) In response to this, the National Sanitation Policy was developed with the aim of improving sanitation services, with provision for liquid waste.

Across the country, there is no sewerage system or centralised wastewater treatment plant. However, for larger buildings, such as hotels, hospitals, or commercial buildings, it is mandatory to install a private semi-centralised sewage system that treats the wastewater before it is discharged into the environment. Initiatives from the private sector include Kamel Manufacturing - which works with grey water systems, mainly for schools and hotels and Water Access - that promotes simple water collection and filtering in domestic houses.

To tackle the issues related to wastewater, the Government conducted a feasibility study to build a centralized sewage system in Kigali (“Kigali Centralised Sewerage System”)\(^48\), after receiving funding from international investors, such as the European Investment Bank and African Development Bank.

Opportunities and Gaps

The water sector is strongly interrelated with the other sectors and holds large potential to improve towards circular economy. However, a major focus still lays on water access and sanitation provision without many circular principles integrated.

In order to reduce the water pressure and to enhance a more comprehensive water distribution, the awareness of water efficiency can be further improved, especially in industrial sectors where water consumption is comparatively high.

There is currently no standard regulating or capping water consumption, nor are there any incentives to reduce water consumption, such as Payments for Ecosystem Services, representing a clear gap.

\(^{43}\) Rwanda Water Resources Board, Food and Agricultural Organization of the United Nations (2020) Water users and uses assessment report in Rwanda

\(^{44}\) Ibid.


\(^{46}\) UNICEF (2015) Progress on sanitation and drinking water –2015 update and MDG assessment


\(^{48}\) It will be constructed in the Central Business Area and cover 120,000 people amounting 10% of the city’s population, treating 12,000 m\(^3\) per day. The project which will be located in Giticyinyoni, includes a sewerage system and wastewater treatment plant operated by WASAC.
Large amounts of water used by industries are released back into the environment without being treated in accordance with discharged water quality standards. This is likely due to a missing regulatory framework requiring and enforcing the integration of Cleaner Production principles as well as a lack of knowledge and awareness.

A similar issue occurs in other sectors: an evaluation of both semi-centralised and decentralised wastewater systems has shown that neither complies with effluent quality requirements, which can also be attributed to the absence of lagging guideline and monitoring of the government\textsuperscript{49} as well as a lack of know-how on parts of the private sector or general society. This holds the opportunity to increase awareness about the benefits of proper wastewater treatment that include circularity potentials that can create new business opportunities through e.g. the production of biogas. In addition, wastewater treatment standards have to be improved and enforced in parallel of growing application of centralised, semi-centralised and decentralised systems.

A last opportunity is related to spatial planning. As the water sector is besides the waste sector a fundamental in- and output of all sectors, the optimal management, supply, use and treatment of water should already be considered in the planning phase of land, space and settlements. However, there are no explicit guidelines about how to do this in a practical and harmonised way, mostly due to the lack of know-how. Based on different circumstances, the most optimal solution in terms of proximate water supply and circular treatment should be assessed and applied, guarding the resilience of local water ecosystems and a stable water flow.

This supports the idea of establishing centralised treatment plants in especially densely populated areas while existing semi-centralised and decentralised systems need to be designed and managed more in line with sustainability criteria. However, this requires legal instruments for planning, developing, and managing wastewater treatment systems for collective communities which are still absent.

At the same time, principles and standards that govern semi-centralised systems need to be redefined and better enforced.

\textbf{Table 2-4} Summary table of CE opportunities and gaps in the water sector

<table>
<thead>
<tr>
<th>Opportunities</th>
<th>Gaps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve water-efficiency in consumptive and non-consumptive sectors</td>
<td>Lack of regulations and standards that require changes in water consumption; lack of awareness and know-how; lack of incentives</td>
</tr>
<tr>
<td>Increase Clean Production in terms of water and discharge water and implement Polluter Pays Principle</td>
<td>Lack of standard that sets the framework and guides the application of cleaner production; lack of enforcement and incentives</td>
</tr>
<tr>
<td>Integrate more circularity into wastewater treatment at all levels and reduce the use of chemicals in treatment processes</td>
<td>No guidelines in place that direct the application of circular economy in the water and wastewater sector; lack of know-how; lack of incentives; low access to technologies and NBS to support transition</td>
</tr>
<tr>
<td>Improve integration of water management, supply and wastewater into spatial planning</td>
<td>No explicit guidelines on how to better integrate water into the planning and development of land; lack of know-how</td>
</tr>
</tbody>
</table>

\textsuperscript{49} Akumuntu, J.B. et al. (2017) Enabling the sustainable Faecal Sludge Management service delivery chain—A case study of dense settlements in Kigali, Rwanda
The Way Forward Towards a Circular Economy in Rwanda
3.1 Vision Statement

Rwanda aims at decoupling economic growth and resource consumption through the application of circular economy to its priority sectors, which are agriculture, waste, water and construction.

The vision this Action Plan pursues is that

"By 2035, the economy of Rwanda is envisioned to have placed the circular economy at the core of economic decision making and practice, ensuring the retention of resource, eliminating waste and pollution while regenerating natural systems."

The mission of the National Circular Economy Action Plan for the implementation of circular economy in Rwanda is to inform policymakers, the business community, funding agencies and the general public about short, medium and long-term actions and the parts they have to play. Only in a collaborative way can these actions be implemented successfully in the next 14 years, ensuring sustainable and inclusive economic growth.

3.2 Objectives for each priority sector

- **Cross-cutting**: Increase the awareness, capacity and collaboration across the public and private sector, academia and civil society for circular economy.

- **Waste**: Ensure that waste is collected separately and sorted to achieve high-quality waste fractions that represent key prerequisites for a higher recovery rate across all waste streams.

- **Construction**: Design, construct and use buildings aligned with circular principles, and valorise CDW materials in ways that enable high-quality reuse, recycling and recovery.

- **Agriculture**: Produce food based on regenerative and resource-efficient principles, integrate closed loops into farming operations and optimise transport and storage to reduce post-harvest losses.

- **Water**: Secure long-term water supply and maintenance of natural water bodies through responsible water resource management, integrated planning and high-quality wastewater treatment.

3.3 Policy interventions under the priority sectors

3.3.1 Introduction

Based on the sector assessment and the identified opportunities and gaps, concrete policy interventions have been derived for each priority sector to exploit the opportunities and mitigate the gaps. In addition, horizontal policy interventions aiming to strengthen the capacity building across all sectors on a policy, business and civil society level have also been considered. Together, they represent the next action steps towards embedding circular economy in Rwanda in the next 14 years.
Develop and embed a mandatory circular economy module in curricula of schools (primary and secondary) and universities

The development of a circular economy module for schools and universities is a fundamental step to introduce children, the entrepreneurs, policy makers and scholars of tomorrow to the concept of circular economy. Using their potential and tapping into the capacity of the youth promises to close prevailing knowledge gaps.

Doing so, information will potentially penetrate to their parents which will ultimately expand the reach. Only if the majority of the population understands the importance of circular can a fruitful ground for the implementation of all other policy interventions be created.

The first and fast option of implementing the circular economy into national curricula is to include circular economy topics in existing related courses, such as those that tackle sustainability and environmental topics.

A second option is to develop a stand-alone course which might take one or two years to set up. Both options would introduce the students to the principles of the concept, how it offers a solution to rising global and local challenges, how it looks in practice related to government, municipalities, business and consumers, and finally how it can be applied to everyday life.

This option would naturally allow going more in depth. The course is foreseen to be introduced in three different levels of complexity, reaching primary and secondary school pupils with a more simplified and playful approach, and university students and vocational centres with a more comprehensive and scientific approach.

The latter version can also be used to increase the understanding of circular economy of government officials, teachers as well as environmental district officers.

This represents the priority of the policy intervention to be developed in the short-term. Later and optionally, this course could be combined with internships with local businesses operating according to circular economy principles; it would be tailored to specific sectors or extended to whole educational programmes.

An example to source inspiration from or even to collaborate with is the Master’s programme on circular agro- economics currently under development, as an initiative of the Africa Institute of Neu- Ulm University of Applied Science, the University of Rwanda and the private sector.50

By teaching circularity, this would ideally also contribute to making educational institutions inherently more circular in the long-term.

The course material is anticipated to be freely accessible in an open-source format which would ensure that disadvantaged kids and students that cannot go to school also have access to the material.

Implementing bodies

Ministry of Education (lead implementing body); Ministry of Environment; Higher learning institutions; African Leadership University; Center of Excellence on Biodiversity and Natural Resources50; NIRDA.

50 Companies being involved include SINA GERARD Ese URWIBUTSO, Sharkbite Innovation GmbH and En- Crops GmbH.
51 During our interview with the Center of Excellence, the Director expressed openness to explore opportunities to take a lead in providing training for leader.
**Funding options**

The mobilization of funding depends on how the Government decides to develop the national curriculum, either on its own (on the national level within a working group) or in collaboration with other ongoing initiatives in other African countries, such as a joint initiative between the African Leadership University, the African Circular Economy Network (ACEN), the Ellen MacArthur Foundation and the Mava Foundation. The latter option would imply a split of effort and resources. Generally, funding could be mobilised from international (knowledge) organisations or philanthropy funds, or through a joint-funding effort across the stakeholders involved.

**Time horizon**

within the coming years (rather short-term)

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**#2 Develop and run circular economy vocational training courses**

**Description**

The development of vocational training courses that teach practical circular economy skills, e.g. related to the repair of objects or the right skills for waste processing, targets practitioners in the middle of their profession, but also starters who prefer not or cannot go to university. Besides also aiming at closing the prevailing circular economy knowledge gap, the vocational training courses focus on (re-)skilling the workforce, thereby creating long-term impact on future socio-economic and environmental gains. Inevitably, this will promote circular jobs, that still have a rather negative reputation.

This policy intervention recommends two different types of courses: the first one is made of four different individual tracks that address the priority sectors of this project, i.e. the waste, agricultural, water and construction sector, teaching sector-specific skills based on best practice examples. Before the participants split into the different topics, they are introduced to the concept of circular economy and its practical application this could be based on the course material prepared under intervention #1. Afterwards, the course splits into the thematic fields of the four priority sectors in order to transfer the necessary specific skills, tools and know-how to work in or shift to a circular job or professional activity.

The second type of course suggests being dedicated to women and youth (starters). It can be understood as a preparatory course for being able to attend the sector-specific training courses. Women and youth without work experience will be empowered by helping them to explore their strength and ultimately the different sectors before they decide which one they want to continue with. This may also include the introduction to essential information, such as how to apply for a job, labour rights or how to start your own business.

In order to ensure a strong practical relation, ideally the sector-specific training courses shall include mandatory internships in local businesses operating according to circular economy principles in the respective sectors. This requires a close collaboration with organisations working with the private sector to teach learnings from practice and to convey internship positions.

The course material is anticipated to be freely accessible in an open-source format which would ensure that disadvantaged people, who cannot afford any course, also have access to the knowledge.

**Implementing bodies**

Ministry of Trade and Investment (lead implementing body); Ministry of Education; Rwanda TVET Board; Ministry of Environment; CPCIC; REMA; GGGi; PSF
Funding options

Potential funding to finance this policy intervention could come either from international organisations, the African Development Bank, the national green fund FORNERWA or the Rwanda Development Board.

Time horizon

short-term (1-5 years)

Description

Partnerships and enhanced collaboration across domains are key in transitioning towards a circular economy. As circular economy is a cross-cutting topic, this applies both to the collaboration within the Government and to the strong interaction and knowledge transfer between the different stakeholder groups in order to effectively and successfully implement circular economy projects.

This policy option has two key elements: (1) the promotion of the Cleaner Production Centre (CPCIC) as the national Circular Economy Hub (CE Hub) and (2) the application of the Private Sector Engagement Model (PSEM), developed under this project, to the four priority sectors. Both serve as a platform to engage all different stakeholder groups, ranging from public and private sector to academia and civil society.

The first element includes a stronger promotion of the CPCIC’s original purpose being a central point of contact for all stakeholders, as many stakeholders in Rwanda are not aware of it yet. In addition to this, the services offered and contents and tools disseminated should run through a validation process in which best practices are taken as inspiration to complement and improve the setup, provisions and function of the CE Hub.

The PSEM as the second element aims to result into concrete projects that further implement the circular economy in the country, by responding specifically to private sector needs (elaborated more in detail in Section 4.5). This will require a dedicated body or unit that coordinates the multi-stakeholder exercise of engaging the academic, public and private sector in a dialogue. In order to take advantage of shared resources and making sure that each mandate is balanced, it is suggested to set up and run the PSEM as a public-private-partnership (PPP). This could potentially be through the CPCIC or a newly founded PPP that can act as an independent coordination and implementation body. Prior to its development, an impact assessment audit should be performed by the designated body to determine the scope and extent of its exact activities.

Other potential projects to be developed under this policy intervention are external or innovation research projects between universities, the Government and the private sector or co-creation workshops on a city and neighbourhood level, run by government supported NGOs, examining how concrete circular solutions could look like on a smaller scale.

Implementing bodies

Ministry of Trade and Investment (lead implementing bodies); Ministry of Environment; Ministry of Infrastructure; Ministry of Agriculture; Ministry of Finance; PSF; Higher Learning Institutions; African Leadership University; Center of Excellence on Biodiversity and Natural Resources; NIRDA; RDB

52 Best practices, such as the European Circular Economy Cooperation Hub that aims to provide public authorities with co-creation and co-design advice and activities to improve circular economy programming in a joint and systemic way or Holland Circular Hotspot, a public-private partnership in which companies, knowledge institutes and (local) authorities collaborate to promote and support international collaboration and knowledge exchange on Dutch circular economy.
Funding options

Potential funding options for this policy interventions are either a single-funding effort by the Government of Rwanda (Ministry of Environment), or a joint-funding collaboration between all three sectors, i.e. the PSF, University of Rwanda and the Ministry of Environment, while also international funding could be tried to obtain, such as from the African Union Development Agency (AUDA-NEPAD).

Time horizon

short-term (as soon as possible)

#4 Launch a circular economy accelerator and incubator programme

Description

Rwanda has many talented entrepreneurs that are keen on starting their own businesses with an innovative circular idea. Incubator and accelerator programmes have been proven to establish a solid foundation for entrepreneurs and their up-scaling, offering the opportunity to make Rwanda’s economy more competitive.

The skills needed to start a business or in-depth circular economy knowledge do not belong to the general knowledge. Consequently, the recommended circular economy incubator and accelerator programme includes advanced trainings on the circular economy knowledge as well as on skills on how to run a business sustainably.

In addition to these elements, a mentor programme aims to provide guidance to the participants sourcing experienced practitioners from the private sector. Finally, the programme is meant to provide access to investors through an intermediate and final pitching event. In the development of this important programme to support circular entrepreneurs, inspiration could be drawn from international best practices, such as the Circular Business Platform in Lagos or the Dutch “Versnellingshuis”, but also from local initiatives53, like the from the Impact Hub Kigali running a circular accelerator programme.

Running over a time period of at least one year each, the programme shall act as a platform for entrepreneurs to learn and grow together, exchange knowledge, establish partnerships and to successfully put their ideas into practice.

In terms of establishing partnerships, a collaboration in form of networking events with other incubators and accelerators programmes as well as Private Sector Federation (PSF) members can be considered in order to explore symbiosis and synergy potentials, for instance, for a cost-effective supply of input materials.

Implementing bodies

GGGI; CPCIC; REMA; NIRDA; PSF; RDB

Funding options

The funding model for the policy intervention could lean on the green-preneur programme run by the GGGI and funded by the national green fund FONERWA. Accessing financial resources from FONERWA could enable the development of a separate (new) circular economy programme or the expansion of the current green-preneur programme by opening a circular economy dedicated track.

Time horizon

short-term (5 years)

53 Other accelerator and incubator initiatives as well as supporting organisations in Rwanda can be consulted to even if they do not have an explicit circular economy programme. Examples are: Africa Entrepreneur Collective, Westerwelle Start-up Haus Kigali, Norsken, 250 Start-ups, Segal, K-Lab, Youth Connect Rwanda.
Enhance the valorisation of organic waste from MSW and decrease post-harvest losses

Description

Waste management strategies and policies in Rwanda do not specifically address the collection of organic waste while treatment options are only tackled at a higher level, which represents a gap in the current regulatory landscape. A low rate of valorisation is reflected in the significant share of organic waste in MSW in Kigali this amounts up to 74%. However, in order to move toward a more circular value chain, the support of reducing and valorising organic waste both from end-consumers (MSW) and post-harvest losses, have to be increased.

In terms of valorising organic waste from MSW, the lack of separation of organic waste has been identified as a major challenge. Organic waste mixed with inorganic waste contaminate and impurify each other. Increasing the separation of organic waste can happen at two main levels: (1) at the consumer level, by running awareness campaigns on how to properly separate the waste at source, making it legally mandatory to separate organic and inorganic waste, supported through increased controls and enforcement. Those activities should not be limited to the urban areas, but be extended to the rural areas, where significant organic waste is generated from agricultural waste. With the success of nationwide sanitation activities, like the Umuganda program, additional waste reduction and prevention initiatives can be started for nationwide adaption.

The sorting at source should be encouraged with improved methods for ease of collection. This can be achieved by colour code sorting and the introduction of specific collection days for organic waste or at least the provision of organic and inorganic waste bins for every household. (2) The second point addresses the disposal level. Assuming that in the short- to medium-term a significant amount of waste will still arrive at landfills, those sites should provide separate areas for organic and inorganic waste which would ensure that both parts do not cross-contaminate each other.

This would ultimately improve the quality of organic waste generated and by extension, the volume of the total waste valorised, e.g. through the production of organic fertilizer, biogas or animal feed. Ideally, this intervention would go along with further initiatives to improve the sanitation of the landfills in order to provide safety for the workers.

In order to tackle the reduction of post-harvest losses, farmer education is an important avenue to decrease waste. Specific training modules that teach farmers how to decrease their losses through simple and low-cost techniques, could be administered by the Ministry of Environment or Ministry of Agriculture in collaboration with farmers’ associations at a district level. Those could be developed or adopted from other countries for farmers on farming best practices, preservation methods and regenerative agricultural practices. Furthermore, incentives and financial programmes should be established that support farmers in their investments into better transport, storage and agro-processing tools and technologies.

Implementing bodies

Rwanda Environmental Management Authority (REMA); Ministry of Environment; Ministry of Agriculture; farmers’ associations

Funding options

The funding of this policy intervention is most realistic through a joint effort. While the Ministry of Infrastructure and the Ministry of Environment together with REMA should take a lead in funding the provision of sufficient infrastructure (on the household and farmers level), the awareness campaigns for consumers and farmers should be financed through the Ministry of Education and the Rwanda Development Board or international development agencies.

Time horizon

medium-term (1-10 years)
Establish waste collection and transfer centres in every district that allow most appropriate waste treatment

Description

Improving the infrastructure in the waste value chain is a key opportunity to address the waste challenge in Rwanda. Even if there is a will to improve the waste management, improvements are limited without the necessary infrastructure. This policy intervention aims to tackle the improvement of parts of the present waste infrastructure through the establishment of more waste collection and transfer centers. These centres would represent a central point where waste collectors can bring their waste and where it gets sorted into high-quality waste streams that represents valuable inputs for recycling initiatives. From there, recycling and processing firms would collect useful waste materials. The policy intervention concretely suggests to establish at least one (depending on the required size and road infrastructure) in each district, with each collection centre having different identifiable points for each category of waste.

On the sites of these waste collection and transfer centers, the staff should be well-trained in how to sort the waste and what to do with each waste category. The skills and knowledge of the workers should align with the guidelines recommended under the policy intervention #8, that includes guidance on waste characterization, sorting as well as proper treatment and disposal of unusable waste components. This could be supported by a provision of trainings for each waste collection and transfer centers run through the CPCIC and Center of Excellence on Biodiversity and Natural Resources.

Initial implementation by the government and then operation by a private sector party represents a reasonable approach of implementing this policy intervention.

Other elements that should go hand in hand with this intervention are (1) to financially support already successfully operating waste collection initiatives, such as Enviroserve (e-waste), in order to scale them up. (2) The list of requirements to register as a waste collector is currently very long and demanding. In order to increase the collection rate across the country, the requirements should be reviewed in terms of making it easier for people (especially from the informal sector) or small, low-budget initiatives to become waste collectors. An increased number of waste collectors would ensure higher collection rates and a larger source for secondary raw materials which would ultimately strengthen the waste value chain as well as the local economy. (3) Finally, as the share of informal workers is quite high in waste collection, waste collection and transfer centers represent ideal points of entry for the informal sector to be better integrated in a formal way. Working on site, learning and being part of such an initiative will build capacity in the informal sector offering economic long-term opportunity to each person involved.

Implementing bodies

Ministry of Infrastructure; Ministry of Environment; Rwanda Utilities Regulatory Authority (RURA); Enviroserve; CPCIC; Center of Excellence on Biodiversity and Natural Resources

Funding options

This policy intervention is anticipated to be funded through a public–private partnership between the Government (Ministry of Infrastructure and Ministry of Environment) and a private sector body, such as the PSF or a larger member of it. Additionally, necessary funding could be obtained from the national green fund FONERWA.

Time horizon

medium-term (1-10 years)
Install a systemic data collection system for waste

Description

A comprehensive and detailed overview of the total waste generated and its different waste streams is a prerequisite for successful and effective waste management. Only 2% of the total waste generated in Rwanda is currently recycled, which leaves a large economic potential unexploited.

Developing a data collection system for waste will facilitate the monitoring and assessment of the waste sector, e.g. in terms of generation and collection rates, waste characterization, management, transport and processing, increasing recycling rates in the country.

As waste management and processing are primarily done through private operators (decentralized) to whom the Government assigned districts, a centralized database can be a valuable tool for the private sector to plan for a complete collection of the waste and identify waste hotspots for recyclers. But it would also be an asset for the Government in terms of informing their policy-making related to waste and planning in contracting waste operators.

Once in place, such a system will also enable initiatives, such as future EPR systems. In order to facilitate the geographic identification and location for everybody, the data collection database could be linked to a simplified GIS tool or to Google Maps.

In practice, the database would be filled in with both top-down and bottom-up data, with the focus on bottom-up information. Waste collectors would be obliged to supply the data system with information, such as how much waste and what kind of waste has been collected in each district (or on a more micro level, this could also be done for streets).

This obligation will be passed on to the next stakeholder in the value chain. Complying to it should be a very simple and time-efficient step to prevent data gaps due to a lack of know-how or motivation. Thus, to every stakeholder in the waste value chain from collection to processing, technical assistance could be offered through qualified IT staff holding trainings or workshops at vocational training centers, through the PSF or the CPCIC.

Every repeated non-compliance or deviation of the requirement to document data could become a reason to cancel the contract with the Government providing the right and responsibility to collect waste in a certain district. For stakeholders further down in the value chain this could imply fees.

It will be particularly important in the beginning to compose an overview that is as complete as possible. In this initial phase at least, the database could be publicly available to take advantage of collective knowledge from citizens.

The only prerequisite of contributing data is access to the internet. However, the data obtained this way has to be verified on accuracy and validity before being added to the system.

As an additional element, this policy intervention anticipates to develop a local customization application once the database is established. This could be used as a tool for stakeholders to fill data into the database.

It can also support the communication, collaboration and payments between different economic operators along the waste value chain. In addition to this, the application can also link to the technical vocational training courses (intervention #2) or help identifying and characterize the waste (intervention #8).

The development and implementation are anticipated to be a joint effort between the Ministry of Infrastructure and Ministry of ICT and Innovation, with support in enforcement activities through REMA.
Implementing bodies

Ministry of Infrastructure; REMA; Ministry of ICT and Innovation

Funding options

This policy intervention could be pitched as innovative and front-running project to continental or international investors, such as the AfDB or the Fund for Innovation in Developing.

Time horizon

medium-term (1-10 years)

#8 Develop a national regulation that facilitates waste characterization and treatment

Description

Proper waste characterization and treatment must become a regulatory element in Rwanda's waste policy landscape. As there is still too much waste mismanaged, the gaps of knowledge, legal obligation and enforcement could be closed through a national waste characterization and treatment regulation. This would update the most recent Waste Sanitation Strategy and complement the Integrated Waste Management Strategy currently being under development, in terms of providing know-how about waste characterization and treatment, which is the prerequisite of a well-functioning integrated waste management. This policy intervention would bring together the yet rather patchy landscape of guidelines, regulations or instructions related to the valorisation of different waste types. For instance, the Organic Waste Law and the Regulation of Governing Solid Waste Recycling only include instructions of how to valorise organic waste from a very high-level and incomplete point of view.

The regulation suggested under the policy intervention is anticipated to include (1) an obligation for waste operators to properly characterize the waste and based on this to choose the most appropriate treatment option that can be met based on infrastructural provisions, (2) the obligation for economic waste actors to utilize the systemic waste data collection system, (3) clear instructions on how to characterize waste, identify different waste components and treating usable waste components in the most circular and value-creating way.

This can also be useful for informal and very small initiatives, even households that do not have access to waste infrastructure, to receive guidance on how to deal best with their waste.

The third element shall provide answer to, for instance:

- How can mixed waste be separated in a safe a proper way?
- How can different waste components be identified?
- Which of the identified components are useful and which are not?
- How to deal with the unusable elements? How and where can they be safely disposed?
- What can be done with the useful waste components? To whom could they be sold? What could be done with them on a micro and small scale?
- Etc.
In order to support a successful uptake, supporting elements, such as workshops and trainings, should be offered through the CPCIC or the Center of Excellence on Biodiversity and Natural Resources. These would ensure that instructions are well understood and can be taken into practice.

The initial development of this regulation should be based on a comprehensive scientific study to analyse the most common components and materials that the waste generated in Rwanda contains. This will inform the further content development of the guidelines. The academic institution involved could be the University of Rwanda or NIRDA. During the course of the implementation of the regulation, this body should stay involved for further examining new potentials to process and treat usable waste materials.

**Implementing bodies**

Ministry of Environment; Ministry of Infrastructure; Ministry of Education; REMA; CPCIC; University of Rwanda; Center of Excellence on Biodiversity and Natural Resources; NIRDA

**Funding options**

The mobilisation of funding for this policy intervention and its different elements could be a joint effort. While the development of the regulation itself lays under the responsibility of the Ministry of Environment or Ministry of Infrastructure, the trainings and workshops on how to apply the regulation and its guideline could be funded by the Ministry of Education and potentially the national green fund FORNEWA.

**Time horizon**

medium -term (5-10 years)
Policy interventions in the construction sector

#9 Enforce revised national Building Code and the use of the Green Building Compliance System large-scale building categories

**Description**

The Rwanda Green Building Compliance System is a solid foundation for the adoption of circular economy principles in the built industry. Currently, the compliance system is only mandatory for newly constructed buildings of the category 4 and 5. The amendment of the code to cover all categories of large commercial and industrial buildings, including renovated buildings, would lead to a faster uptake and acceptance of green building principles.

Following the increase in the scope of the compliance system, it is also key to ensure compliance and the creation of a strong and efficient regulatory system or a certification system to monitor adherence by builders, engineers and industry stakeholders. In order to support the transition towards a higher application of the compliance system, a transition plan as well as trainings and workshops should be held that provide clear guidance on the right application of the Building Code and the compliance system. These elements could be offered by the Green Building Organisation and the RHA to construction companies. Ideally, it would become common practice that each construction firm has one to two people in-house that are familiar with the Building Code and the compliance system.

Indicators which are currently indicated as optional indicators should be made mandatory. Examples are:

- Sustainable concrete usage - with the intent of encouraging the adoption of concrete usage practices that are environmentally friendly and sustainable.
- Segregation of waste - with the intent of facilitating segregation of waste at source to encourage reuse or recycling of materials, thereby avoiding waste being sent to landfills.
- Renewable energy - with the intent of encouraging the use of on-site renewable technologies, to reduce net demand for fossil fuel energy and the environmental impact associated with its use.

In the longer -term, indicators that encourage the use of locally manufactured green building materials as substitute for unsustainable, imported building materials should become part of the compliance system.

**Implementing bodies**

Rwanda Housing Authority (RHA); Building Permitting Centres; Ministry of Infrastructure; Rwanda Green Building Organisation (RWGBO)

**Funding options**

This policy intervention should be funded by the Government, such as the Ministry of Infrastructure and the RHA that launched the compliance system in 2019.

**Time horizon**

medium-term (5-10 years)
Prioritise renewable and local materials over exhausting non-renewable materials as well as local construction types

Description

Rwanda faces a rising demand of buildings due to growing population and urbanisation trends. This offers the potential to design and build new buildings and housing units based on circular economy principles from the very beginning which might help to leapfrog to a more circular building stock. This, however, requires clear guidance on how to construct with more sustainable materials and in a way that enables the circular economy, thus creating a business case for the renewable and local materials market.

The expansion of domestic production capacity for exhausting non-renewable materials, like steel and cement, is limited by the needs for energy and raw materials. It is therefore necessary to create a market for alternative materials that are less energy-intense and are possible to produce with domestically available raw materials. At the same time, it is key to support the formal and informal sector with sufficient means to shift to alternative materials.

The prioritisation of alternative construction materials as well as more local construction types can be achieved through (1) research projects, (2) the promotion of the vocational training courses for the construction sector to the formal and informal sector (3) the financial and technical support of entrepreneurs piloting new construction materials (e.g. bricks from plastic waste), (4) supporting concrete opportunities like improving the capacity of compressed earth masonry in order to provide an alternative for the high-energy consuming baked clay bricks. This could be done through pilot projects. (5) An additional measure is the development of transition guidelines for the informal sector on how to shift from conventional to local alternative construction materials and how to be better integrated into the formal sector.

This is of high importance as the informal sector makes up a large percentage of the construction value chain. Many Rwandans patronise informal construction workers for procurement of building blocks and other building materials. The guidelines can be propagated through the vocational training courses (intervention #2) with the input of the private sector, the Construction Board and construction guilds. (6) A final anticipated activity is the creation of a financial advantage for local sustainable construction materials in the form of a tax reduction or subsidy, that can be reduced again once the alternative materials are well-taken up by the market.

Simultaneously, these measures can be supported by running awareness and education campaigns on the benefits associated to saving resources and costs related to the utilization of local sustainable materials as well as on all technical and financial support available. This may especially establish trust and credibility on parts of consumers and suppliers.

Implementing bodies

- Rwanda Housing Board; GGGI; CPCIC; Ministry of Infrastructure; NIRDA; AEBTP (Construction Association); REMA; FONERWA; Rwanda TVET Board; Ministry of Education

Funding options

As the primary responsibility in shifting to an increased use of local alternative materials, lays with the Ministry of Infrastructure, the most obvious option is to finance the intervention through this Ministry. However, for some elements under this intervention, funding could be outsourced or provided in a joint matter with, for instance, the national green fund FORNERWA.

Time horizon

Short-term (1-5 years)
Develop national guidelines on how to characterise and valorise CDW

Description

To achieve a more circular CDW management, it is important to address and change the mindset of consumers and construction industry practitioners in term of how to deal with CDW. This policy intervention aims at developing the know-how of CDW characterisation and valorisation to reduce the amount of CDW dumped at landfills and the environment and to create economic opportunities in the local labour market.

The development of the national guidelines should include a transitory plan and clear guidance to construction companies and recyclers to identify the waste, which is essential for choosing the most appropriate recycling or recovering technique. A second important element to be addressed is information on how to dismantle and repair building elements for reuse in order to preserve their value instead of demolishing them directly. And finally, the guidelines should contain guidance on how to recycle different types of CDW in the most circular way. All these parts should be supported by listing best practices that can serve as inspiration. Ideally, the characterization of construction materials should already be informed at the construction phase (e.g. in a building passport), so that the identification is easier at the end-of-life stage of the building. It could be considered to make this a mandatory requirement for all new buildings.

The design and content development of the national guidelines should be developed in collaboration with the Government (Ministry of Infrastructure), the private sector to identify its needs and knowledge gaps, and a knowledge or research institute that can execute a precedent in-depth analysis about the composition of the CDW in Rwanda as well as bringing in most-recent findings and best practices from the international level. Furthermore, the capacity of the private sector should be developed with regards to the use of digital technology to achieve resource efficiency in the prevention of CDW generation, estimating the material usability from the design and construction stage.

Optionally and in the medium-term, the national guidelines should be supported by specific quality parameters and a quality indicator system, which will address the concerns of consumers and industry practitioners on the quality of recycled CDW. Those quality parameters could score the characteristics of recycled CDW, after undergoing tests, for example durability, or other means of assessing quality.

The national guidelines should be promoted via campaigns through relevant associations, like the PSF, to ensure its uptake. Additionally, workshops on how to apply the guidelines could be run at national vocational training centres.

Implementing bodies

Rwanda Housing Board; GGGI; CPCIC; Ministry of Infrastructure; Ministry of ICT and Innovation

Funding options

A lead in funding of this policy intervention should be taken by the Ministry of Infrastructure. Additional support for some elements, such as the scientific analysis of Rwandese CDW or the workshop, could come from the national green fund FORNEWA or the Ministry of Education.

Time horizon

medium-term (5-10 years)
Subsidise high-quality commercial organic fertilisers and locally produced biological farm inputs

**Description**

Due to the large amounts of generated organic waste, Rwanda has huge potential to shift away from imported chemical fertiliser to locally produced organic fertiliser. Advantages of locally producing organic fertiliser include the valorisation of significant amounts of organic waste, more independence from imports (of chemical fertiliser) and nourishment of the soil with natural and more diverse nutrients that will not degrade its long-term fertility.

The policy intervention includes the development of targeted promotion of organic fertiliser to farmers as well as encouragement to businesses to start exploring the theme which offers a clear business opportunity. A best practice case that can be taken as example is GreKompost that converts organic waste into fertiliser and distributes it to farmers. Increased promotion could be done in collaboration with local research institutes through awareness raising and campaigns at farmers' associations and the PSF, or on a more general level, through radio and banners. Inspiration could be drawn from international campaigns, such as the one launched by the Swedish Society for Nature Conservation, during the first Global Green Action Week.

To promote the transition to organic fertiliser use, (1) the right market incentives are key. The same kind of subsidy that is currently still applied to chemical fertiliser should also support organic fertiliser in order to achieve at least price competitiveness. The Government initiative aiming at balancing chemical and organic fertiliser has to be taken further to fully shift the focus to organic fertiliser. Additionally, it is important to (2) standardise the organic fertiliser market, (3) undertake research about the production of different kinds of organic fertilisers, (4) fund large-scale organic fertiliser usage and (5) develop a strong distribution channel for organic fertiliser disbursement to farmers (see the national seed distribution system), making it more accessible.

The current National Fertilizer Policy (2014) which promotes the use of fertiliser and provides guidelines on its use does not give special consideration to the use of organic fertilisers. This policy intervention finally anticipates to review this policy and to develop a new policy that addresses organic fertilisers specifically. This new policy should provide guidelines to standardise and regulate the production of organic fertilisers. In the medium-term, this requires to incrementally stop the financial support and promotion of the pharmaceutical industry. This should be combined with setting a national target and related impact indicators on the mixed use of both fertilisers until the chemical fertiliser is phased out.

**Implementing bodies**

Ministry of Finance; Ministry of Agriculture; Ministry of Environment; Center of Excellence on Biodiversity and Natural Resources; Ministry of Education; PSF; Imbarage Farmers Organisation; FAO; Ministry of Trade and Investment.

**Funding options**

The financial means to implement the subsidy suggested under this intervention could come from the same source as the subsidy for the chemical fertiliser (with ideally shifting the support fully from chemical to organic fertiliser in the medium-term). The promotion and campaigning could be financed through a collaborative effort between the public, private and academic sector.

**Time horizon**

short-term (as soon as possible)
Integration of urban and peri-urban farms/food systems into national planning

Description

Given the trends of growing population and increasing urbanization, peri-urban and urban food systems need to be better embedded in regional (spatial) planning in order to ensure sustainable food security in the long-term. This would include to improve infrastructure provisions between urban settlements and farms as well as a proper planning manifested in local and regional (city) development plans.

It also requires providing technical know-how and equipment to farms enabling them to increase productivity for meeting an increasing demand. With these elements, this policy intervention aims at offering a solution to prevailing land fragmentation and land degradation, challenges related to the Land Consolidation Policy, and underemployment across the country.

The concept of community farms could be used as a vehicle to pursue this policy intervention, which also supports the Government plans to slowly move away from isolated small-scale farms. Promoting community farms in cities and peri-urban areas across farmers and local communities can imply that several yet small-scale farms, being located close to each other, collaborate and eventually merge to a larger community or co-operative (coop) farm. It can also mean that a community in a village or city decides to share the ownership and develop a farm together that meets local needs. Restructuring or developing new community farms offers the opportunity to simultaneously embed circular economy principles with a focus on closed loops, such as reuse water or produce fertiliser, animal feed and/or biogas for own purposes.

The promotion of this concept could happen through (1) awareness campaigns, (2) the launch of a pilot project which showcases the advantages of community farms, (3) financial support compensating for potential investment in technical equipment, relocations and admin or planning efforts. This could take the form of a guarded lump sum (depending on the expected productivity) for each community farm admitted through a formal application process. (4) Further important elements are the access to technical equipment for farmers who want to expand or apply circular economy principles to their farm and (5) the provision of know-how through vocational training courses on agriculture (intervention #2).

Implementing bodies

Ministry of Agriculture; Ministry of Infrastructure; Ministry of Environment; Rwanda Developing Board; Rwanda Water Resource Board; Imbarage Farmers Organisation; FAO.

Funding options

The different elements of this policy intervention could be financially sourced from different parties. Necessary infrastructure improvements and investments into the technical equipment of farms as well as the suggested lump sum could come from the Ministry of Agriculture, the Ministry of Infrastructure and the Ministry of Environment. The promotion could be funded by a national knowledge institution or the Ministry of Education. The pilot project could be a joint effort between the GGGI, a farmers’ association, such as Imbarage Farmers, and the Ministry of Agriculture.

Time horizon

Long-term (5-15 years)
Develop national guidelines for farmers that provide guidance on how to set up a crop and/or animal farm in the most sustainable and circular way

Description

Many farmers operate their farm based on knowledge passed on from their parents, self-education or obtained from vocational courses. While the majority of indigenous principles are inherently sustainable or circular, they do not exploit the full potential of circular economy in agriculture.

Therefore, composing all necessary information in a comprehensive but simple way would be of significant support for people who decide to develop a farm based on sustainable and circular principles or farmers who want to shift from conventional to sustainable agriculture.

The publicly available national guidelines should contain:

- An introduction to circular and sustainable farming principles as well as their practical application in the context of Rwanda (aligned with course material of intervention #2);
- An explanation of the importance of the water-energy nexus in agriculture;
- Information about the relevance of integrating polyculture and agro-forestry elements into farming;
- Options and examples of how to design a farming system in different formats, e.g. Community farms;
- Instructions on where to get technical equipment and how to install it;
- International best practices with the potential to be replicated to Rwanda or an overview of tools and financial support means that can be obtained;
- Instructions on more recent topics, such as how to shift from chemical to organic fertiliser or phasing out chemical pesticides and replacing them with biological pass control. This is of special importance as, for example, when suddenly applying organic fertiliser, the soil develops a certain dependency on the chemical fertiliser, which might lead to a drop in productivity of the land in the short-term (2-3 years). Thus, if this transition is not guided properly, farmers are likely to switch back to chemical fertiliser. More elements that this guide should include can be defined through the PSEM during a stakeholder meeting defining key types of information required to successfully run or start an agricultural activity.

To realise this policy intervention, it is important that one entity takes the lead in developing the guidelines in close collaboration with farmers, knowledge and educational institutions as well as the public sector. Key is to develop knowledge and content that meet the local needs and are in alignment with the local policy framework in order to develop content that effectively supports farmers on their way towards sustainable and circular farming. The identification of the needs should be done through engagement with the farmers, e.g. through the PSEM (intervention #3) or research studies.

The content development could be done by the Center of Excellence on Biodiversity and Natural Resources in collaboration with farmers’ associations and the FAO as it has experiences on knowledge dissemination. Aligning it with policies and putting it into the official format of the Government would happen in collaboration with the Ministry of Agriculture.

Implementing bodies

Ministry of Agriculture; Ministry of Education; Center of Excellence on Biodiversity and Natural Resources; NIRDA; FAO.

Funding options

The funding for this policy intervention should come from the Government (Ministry of Agriculture) in support of a farmers’ association.

Time horizon

Medium-term (1-10 years)
Policy interventions in **water sector**

#15 Improve the planning of water resources management, supply and wastewater treatment in urban and rural areas

**Description**

Water systems intersect with all sections of society and industry, and opportunities exist in these interfaces to create additional value through the application of circular economy principles. The integration of water into spatial planning is key to ensure water resources management, supply and sanitation services in rural and urban areas. Besides being an essential element of sustaining human life and ensuring life quality, water is a sector intertwined with the energy sector, industry and agriculture. Consequently, the water sector in particular has to be understood and dealt with from a systemic perspective, so that the resilience of freshwater ecosystems and water supply systems can be maintained.

The integration of water must therefore already be included in the planning of human settlements. This can take on many aspects; however, this policy intervention focusses on:

1. **The integration of water basins, sub-basins and catchments into spatial planning in any spatial expansion or new construction.** This will ensure an optimised water allocation and use which would ultimately enhance water resource management. Factors to include are the proximity principles or criteria to choose the right infrastructure for supply and abstraction in order to reduce the water loss through transport, evaporation or other factors as much as possible. Also the ad-hoc integration of catchments and sub-catchments into existing structures, especially in urban areas on large roofs with suitable surface and sufficient static conditions, can be considered to increase water availability and lower the pressure on natural basins. Both the ex-ante and ad-hoc approaches should be applied for consumptive and non-consumptive water users (i.e. domestic buildings, industry and agriculture, but except hydropower).

2. **The protection of natural basins and other water bodies towards impurities and contamination from natural events, such as soil erosions, or human influence through structural changes, should be considered in spatial planning as much as possible.** This can also include projects to restore water basins and renaturise rivers.

3. **The installation of grey water treatment systems in large existing and new buildings and building complexes that allow the reuse of used water for grey water purposes, such as flushing, cleaning or irrigation.** While it is easiest to integrate such a system already during construction, grey water systems can also be installed into existing buildings as they allow maximum flexibility and adaptability. Generally, grey water systems have the advantages of reducing the overall water consumption while their payback period is reasonable starting from 2-3 years. However, grey water systems often utilise chemicals in order to kill harmful micro-organisms or toxins. Ideally, in a circular system this would be avoided where possible. Instead, the focus of new grey water systems applied should lay on biological and nature-based treatment solutions, e.g. treatment ponds, living walls or activated sludge systems. This could be further explored in dedicated research projects.

4. **A balanced application of decentralised, semi-centralised and decentralised/micro wastewater treatment systems.** Centralised systems are great solutions in growing urban areas which should be further expanded in other primary and secondary cities other than Kigali. However, spatial and geographic conditions do not always allow a connection to a centralised system. Consequently, in sub-urbs or slums, semi-centralised and decentralised solutions are the preferred and most feasible options.

This policy intervention suggests integrating these elements systematically into national spatial development plans as current policies do not include any mentioned issues and circular economy specific aspects in relation to the water sector. This should precede studies assessing the potential and implementation feasibility of different wastewater treatment systems in different areas under individual conditions. When embedding this into policy, it is recommended that the Ministry of Infrastructure works with several water and construction stakeholders, such as the Green Building Council or RWB as well as private sector parties. This could be accompanied by legal instruments for planning, developing and managing of wastewater treatments for collective communities (semi-centralised systems) which are still missing.

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In combination to this, campaigns that promote the application of water catchment and wastewater treatment systems into urban, peri-urban and rural structures, should be conducted in order to ensure their uptake.

Trainings, vocational courses and workshops run by e.g. the RHA or Green Building Council could help practitioners to specialise in this field or inform citizens about simplified options that they can install themselves (link to intervention #2).

**Implementing bodies**

- Ministry of Infrastructure;
- RHA;
- Green Building Council;
- private sector parties; such as Kamel Manufacturing; RWB; WASAC.

**Funding options**

The main source of funding regarding a better spatial integration of the water sector should come from the Ministry of Infrastructure. Other elements under this policy intervention can be funded in a joint effort in collaboration with different cities, international development organisations, such as the World Bank, and private sector parties.

**Time horizon**

short-term (1-5 years)

**Description**

The projected growth in population is expected to also increase the water use and availability ratio. This calls for more circularity practices in the water sector especially for those actors consuming a significant amount of water, like agriculture or industry.

This policy intervention focuses on (1) increasing awareness, (2) training and capacity development, (3) regulation and financial incentives and (4) research programmes.

In the short-term, this policy intervention suggests that the priority should be on creating awareness on the challenge that exists and a way to overcome it. This could be done through campaigns targeting industry, service and the agricultural sector, highlighting the importance and benefits of efficient water use. These campaigns should be run at a level that can be propagated through districts via environmental district officers, farmers’ associations or the PSF through its specific chambers.

Building on the campaigns, as a second element, strategies to encourage efficient water use should be promoted through trainings on cleaner production (producing in more environmentally-friendly and efficient ways) and adopting smart irrigation technology. Knowledge transfer for these topics could be achieved through dedicated workshops, for example at the CPCIC or the Center of Excellence on Biodiversity and Natural Resources or through specialised and upgraded courses at local vocational training centres (relating to intervention #2 that suggests vocational training courses in all four priority sectors). Another supportive means, in terms of capacity building, is the guidelines for farmers recommended under intervention #14 that shall inform about how to integrate circular economy and water efficient practices, such as smart irrigation, into their operations.

The third element under this intervention relates to regulating the use of water through a standard that sets different thresholds/limit values\(^5\), which could be a gradient format that promotes water use efficiency in all sectors of the economy. The development of such a standard should be supported by scoping studies that examine different water use trends and circumstances.

\(^5\) These thresholds are intended to define different allowances of water depending on different factors influencing and determining water usage, such as the size of industries and farms, the volume of their outputs (products and produce) or the water intensity of production outputs.
This is important to correctly assign the threshold without compromising or threatening the operation of the industry or farm.

As applications to improve the water efficiency are relatively new and may not be easily accepted by stakeholders, it is crucial to facilitate the transition process. This could be done through two aspects.

First, the adoption of the standard should be incremental, starting with a voluntary standard and making it legally mandatory for large-scale productions and, at a later point of time, also for medium and small-scale productions. This would allow enough time for the transition, which can be more difficult for small-scale farmers and industries who may not have access to sufficient funds and modern technology for implementation.

A mandatory installation of meters at each farm and industry site, which could be subsidised by the Government, would enable to check compliance with the respective threshold. Second, it is important to drive the uptake of more efficient and circular water use strategies.

This could be done through financial support programmes or subsidies for investments into new technologies enhancing the circularity and efficiency of water use. Such means would ultimately support the compliance to the standard.

Another regulatory approach is related to the Payment for Environmental/Ecosystem Services. Based on the amount of water consumed by consumptive sectors, relevant ministries should impose a certain percentage or fee which would be used for projects that aim to preserve and enhance the natural capital of water bodies (link to intervention #15). Before putting a system into place for the implementation of Ecosystem Services Payments, it should be analysed at which point of the value chain the fee should be paid; this could either be through the annual water bill from the utility services or a direct charge to each individual industry through RURA. In addition to this, a sector cross-cutting document has to be prepared to elaborate the methodology of how to define and integrate an ecosystem service fee for consumptive sectors, with a special focus on industry.

A final regulatory element recommended under this policy intervention relates to Cleaner Production to improve water quality throughout its lifecycle, from its abstraction from the environment, its use within the economy wide system and back to the environment. A large amount of water used by industries is released back into the environment without proper treatment, causing significant pollution to the environment. Therefore, regulations guiding effluent treatment should be strictly enforced. Applying the “Polluter Pays Principle” by imposing strict sanctions on industries that do not comply with abstraction/extraction, wastewater treatment standards should be a way forward.

The last element of this intervention requires funding research projects that analyse how nature-based solutions can help to optimise the water consumption and wastewater treatment of industry and the agricultural sector. Increased collaboration between the sectors and academia will ensure that the solutions provided are practicable and can be adopted by local industries. Especially in rural areas, combining circular economy with nature-based solutions, which adopt a community focused approach, has high potential to increase water efficiency.

**Implementing bodies**

ASAC; Rwanda Water Board; farmers’ associations; CPCIC; MININFRA; Vocational centres; institutions of higher learning; PSF; REMA.

**Funding options**

The funding of this intervention should be led by the Ministry of Environment. For the education and awareness campaigns, the promotion of circular economy practices the water sector and the research projects, the Ministry of Education should come in.

**Time horizon**

medium-term (5-10 years)

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56 The charging water users for using water as an ecosystem service.
# Improve and enforce high-quality wastewater treatment and prevent degradation of the environment

## Description

The prevention of pollution through untreated wastewater, where hazardous substances and harmful micro-organisms or pollutants enter the environment, is important to avoid and/or keep as low as possible. This policy intervention suggests three key elements to reach higher and safer levels of wastewater treatment.

The first element recommends a top-down approach through the development of detailed and specific effluent discharge regulations guiding various categories of wastewater. This should also include revisiting existing standards established for the quality of discharged water, combined with sufficient enforcement. Examples of existing standards to be revisited are the national standards for domestic wastewater discharge, the standard on discharged industrial wastewater for treated wastewater57 or standards for specific wastewater treatment systems. Standards for the semi-centralised systems in particular should be evaluated. The amendment of water quality standards for wastewater treatment systems should take global requirements as a point of reference and tailor them to the peculiarities of Rwanda. Once amended, governmental agencies, such as WASAC or REMA, should routinely monitor compliance by running inspections or reviewing company records and independently collecting and testing samples.

Another important aspect related to sustainable wastewater treatment is the utilisation and concentration of chemicals, which should be as low as possible in order to avoid polluting effects to the environment. While the development of biological treatment solutions is neither widely applied nor standardised, this policy intervention recommends the enhancement of the implementation of nature-based solutions on a project basis. This will require strong collaboration with the private sector and extensive research about NBS and their application which can be done by using the PSEM as a vehicle to further explore this opportunity (as elaborated under intervention #3).

The second element of this intervention is the promotion of circularity potential in wastewater treatment among utility companies and small-scale companies, which is meant to help improve the uptake of waste valorisation on-site. This can be through producing renewable energy (biogas) through anaerobic digestion, fertiliser or grey water. Such efforts can help reach energy neutrality goals and support the climate change agenda.

Additionally, the recovery of resources from wastewater represents new business opportunities that can generate new revenue streams to cover operational costs which would ultimately lower the barrier for entry for small-scale businesses to enter the wastewater sector. To support the uptake, awareness campaigns across the PSF, and vocational training on the practical application of these elements are necessary.

Finally, this intervention suggests financially supporting the integration of micro-scale and decentralised systems, including the valorisation of wastewater, to help citizens or small communities to overcome financial barriers.

## Implementing bodies

RURA, REMA, WASAC, Rwanda Standards Board, PSF, District Governments, Private sector companies.

## Funding options

This policy intervention should be funded in a joint effort between the Ministry of Environment and the Ministry of Infrastructure.

## Time horizon

medium-term (5-10 years)

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In order to achieve an effective systemic shift that catalyses change, the public and private sector have to work hand in hand as their actions are highly interlinked with and dependant on each other while the final success is determined by their cooperation. Public entities will not reach the vision and goals for a circular economy alone. Regulation and legislation developed and imposed by the public sector represents the framework for the private sector to act in and to realise policy objectives.

Actions required and rules set in policy must reflect the changes and potentials of the private sector in order to be feasible and achievable. The Private Sector Engagement Model (PSEM) developed under this study offers an effective approach to enhance the collaboration between the public, private and academic sector which will ultimately serve a better uptake of policies on the ground and a stronger empowerment of the private sector to contribute to solving prevailing environmental and social challenges.

3.4.2 Private Sector Engagement Model

The PSEM has been developed as a sector-independent model that shall be applied to the three priority sectors in the short-term as a cross-cutting intervention (#3).

In the medium-term, it may also be applied to other sectors that aim to advance the implementation of circular economy by tapping into the potential that the public, private and academic sector can collaboratively achieve. The application to different sectors will be possible through adjustments in relation to stakeholders involved and the kind of content/knowledge discussed/ transferred.

Goals of the PSEM

Overall, the PSEM aims to implement six generally critical goals when enhancing the collaboration between the public, private and academic sector. Each of these goals shall be aligned with governmental plans, creating a link between Rwanda’s Vision 2050, Rwanda’s NDCs as well as the circular economy.

- Build understanding: collection and analysis of data to align priorities for action;
- Deliver strategy: agreed sense of direction and articulation of roles and responsibilities;
- Enable stakeholders: institutional framework that empowers the actors;
- Foster relations: working together to achieve shared objectives in doing circular business;
- Align structures: organizational structures to align with policy objectives;
- Nurture trust: mutual trust amongst all actors as accountable participants.

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58 Based on the World Health Organisation’s draft Strategy Report. World Health Organisation (2020) Engaging the private health service delivery sector through governance in mixed health systems
In order to coordinate the PSEM and its stakeholders in the most efficient way, one responsible party of the three sectors should be appointed to engage all relevant stakeholders. Ideally, as suggested under policy intervention #3, this would be a newly founded independent implementation body in form of a public-private-partnership. Alternatively, it could also be an organisation of one of the primary parties, e.g. the University of Rwanda, the CPCIC, the Private Sector Federation and the Ministry of Environment.

Goals of the PSEM

In addition to collaborating across the three parties, the PSEM also serves as a means to establish more solid connections within the private sector, between businesses and industries that might lead to valuable collaborations, such as industrial symbiosis initiatives in the economic zone that aim to close the material and product loop.

Another opportunity includes to develop pilot projects and test new ideas before they are promoted and scaled-up. As the up-scaling of micro and small businesses represents one of the main challenges, this platform could potentially be expanded to incubator spaces where micro and small business get connected to investors.
The PSEM considers businesses and industries relevant to the circular economy in the priority sectors. Therefore, included will be both private entities that need transformation and those that already have circular principles integrated in their business model. It must be noted that different types of private sector partners require different ways of working.

Engagement approaches depend on the goals that the Government want to achieve and the capacities of the private sector partners involved. Approaches used for engagement of large companies differ from those for small businesses, as do domestic private sector partners versus multinational companies.

Multinational companies have greater financial capacities which enables them to meet partnership requirements easier than small and medium enterprises.

The PSEM takes into consideration the needs of different types of private sector partners which should be communicated to ensure that all stakeholders recognize the potential opportunities that exist.

**Secondary parties to be involved**

There are more parties to involve in order to ensure a smooth process and the actual realisation. Those secondary, less directly and not constantly involved, stakeholders are: international organisations, financial institutions and other organisations that do similar and/or supportive activities. These groups represent so called "ecosystem supporters" which are crucial for the success of MSEM and entrepreneurs as they can support in a wide range of financial and technical support.

This can be especially of help in the development of a solution and its realisation. From international organisation knowledge can be sourced within the development and engagement process while they may also become implementation partners, which could furthermore attract more partners or funders. Finally, financial institutions are important to involve in terms of ensuring sufficient capital to realise projects.

Complementarily, we also suggest to include continental and international organisations active in Rwanda, such as the African Development Bank (AfDB), the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) or the Swedish International Development Cooperation, European Commission (EU) and the UNDP (see Table 2-1). Their involvement could additionally raise awareness and attract investment into the Rwandan circular economy.

**Elements of the PSEM and their scope**

The elements that structure the functioning of the PSEM are, (1) policy dialogue, (2) technical assistance, (3) capacity building and (4) knowledge sharing and (5) finance (Figure 4-2).

**Table 3-2 Elements of the private sector engagement model**

<table>
<thead>
<tr>
<th>Finance</th>
<th>Policy Dialogue</th>
<th>Technical Assistance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capacity Development</td>
<td>Knowledge &amp; information sharing</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** own figure, based on OECD (n.d.) *The Holistic Toolbox for Private Sector Engagement in Development Co– operation*
All of these elements are enablers for the private sector to be equipped for the successful implementation of circular economy projects by means of e.g. capacity building and scaling-up in the long-term.

(1) A frequent dialogue between the public and private sector intends to help aligning each other’s vision as well as the understanding of that the private sector needs to comply with national policies, thus, to fulfil them. This way, the Government may be able to better tailor policies, guidelines and legislation better to the conditions and circumstances of the private actors involved in the respective sector.

(2) Technical assistance is of especial importance when it comes to the implementation of circular economy solutions. This can relate to technical skills as well as the provision of technical equipment. Finding ways how this can be provided is a key component determining if, how fast and how efficient a project or business activity can be realised.

(3) Capacity development is mainly related to skills and knowledge development through education, workshops and training. Transferring knowledge about the circular economy generally as well as sector-specific knowledge and skills will build capacity among practitioners.

(4) Sharing knowledge and information gained through research or practical experience is key to further improve the way how the three sectors (public, private and academic sector) collaborate, how the private sector can be empowered and how the circular economy is applied in across different sectors.

(5) Finance often represents a shortcoming that hinders or delays the realisation of a project. Therefore, it is key to build a relationship to financial institutions in early stages, but also to explore financial instruments that can help financing circular economy solutions. Instruments that should be promotes that are often untapped are:

- **Peer-to-peer lending**: There are quite a lot of saving groups that are embedded on the grassroots levels. Such peer-to-peer lending groups could financially assist circular small businesses to fund their operations on a loan basis. The saving groups’ model is structured in a way that collateral is not required to get finance hence easing the process for small businesses that struggle with the financial institutions in getting loans. Usually, their fund size is quite so small but this could potentially help a small business in piloting its products or services.

- **Angel Investments**: While in other countries, Angel investors are widespread and filling the funding gap, in Rwanda there is a limited number of Angel Investors, and those who exist are quite hesitant to invest in new industries/concepts like circular economy. There is a great need to sensitize the individuals to provide angel investments but more importantly, the governments should coordinate the establishment of angel investors networks that can be interested in green/circular businesses.

- **Venture Capital (VC) investments**: It’s still a challenge for companies in Rwanda to raise VC investments. While the efforts are being taken to attract VC investments in the country, circular entrepreneurs are prone to disqualification from many investment deals as the tractions expected from is usually compared to linear businesses. Besides attracting VC firms, more efforts should be made in assisting SMEs to become investment-ready, facilitate deals and matchmaking.

- **Corporate-driven CSR financing**: Most circular SMEs in Rwanda are solving most of the externalities posed by the corporates. We rarely see corporates supporting circular SMEs. Corporates should be encouraged to establish partnerships with SMEs tackling their externalities through different support mechanisms: finance, infrastructure development or capacity building (accelerators/incubators)

**Overview of local and international stakeholders to be involved**

Based on the engagement and discovery of different organisations throughout this study, the following overview potential stakeholders to be include in the PSEM has been composed. Depending on to which sector this model is applied to, the six groups of primary and secondary stakeholders have to be narrowed down.
<table>
<thead>
<tr>
<th>Table 3-1 Potential stakeholders to be involved in the PSEM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Private sector</strong></td>
</tr>
<tr>
<td>Agroplast Ltd</td>
</tr>
<tr>
<td>AMEKI</td>
</tr>
<tr>
<td>Angaza Ltd</td>
</tr>
<tr>
<td>BTRACOM</td>
</tr>
<tr>
<td>Cimerwa Ltd</td>
</tr>
<tr>
<td>COPED</td>
</tr>
<tr>
<td>EAGI Rwanda</td>
</tr>
<tr>
<td>ECO Materials</td>
</tr>
<tr>
<td>EcoPlastic</td>
</tr>
<tr>
<td>Ecoplastic Ltd</td>
</tr>
<tr>
<td>Electromax Ltd</td>
</tr>
<tr>
<td>EnviroServe</td>
</tr>
<tr>
<td>Golden Insect Ltd</td>
</tr>
<tr>
<td>GreenAfrika Ltd</td>
</tr>
<tr>
<td>Greencare Rwanda</td>
</tr>
<tr>
<td>Gura Ride</td>
</tr>
<tr>
<td>Inyange Industries Ltd</td>
</tr>
<tr>
<td>Inyenyeri</td>
</tr>
<tr>
<td>Kamel Manufacturing</td>
</tr>
<tr>
<td>Mata Tea Co. Ltd</td>
</tr>
<tr>
<td>My Green Home</td>
</tr>
<tr>
<td>Private Sector Federation</td>
</tr>
<tr>
<td>Recycl’Africa</td>
</tr>
<tr>
<td>Rwanda Biosolutions Ltd</td>
</tr>
<tr>
<td>SINA Entreprise Ltd</td>
</tr>
<tr>
<td>Softpackaging Ltd</td>
</tr>
<tr>
<td>SOIMEX Plastic Ltd</td>
</tr>
<tr>
<td>SORWATOM</td>
</tr>
<tr>
<td>Sulfo Rwanda Industries</td>
</tr>
<tr>
<td>Umuti Ltd</td>
</tr>
<tr>
<td>Water and Sanitation Corporation</td>
</tr>
<tr>
<td>Cleaner Production and Climate Innovation Center (CPCIC)</td>
</tr>
<tr>
<td><strong>Financial institutions</strong></td>
</tr>
<tr>
<td>Rwanda Green Fund (FONERWA)</td>
</tr>
<tr>
<td>Development Bank of Rwanda (BRD)</td>
</tr>
<tr>
<td>Business Development Fund (BDF)</td>
</tr>
<tr>
<td>Green Climate Fund (GCF)</td>
</tr>
<tr>
<td>Adaptation Fund (AF)</td>
</tr>
<tr>
<td>Kigali International Financial Center (KIFC)</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Private financing must be tapped and secured in order to fund green innovations in industry, particularly those that boost productivity and resource efficiency. Rwanda continues looking for ways to increase the amount of private finance available through innovative financial products. Incubators, accelerators, and green guarantees are among the additional instruments available through the Rwanda Green Investment Facility, which was recently established in conjunction with the Development Bank of Rwanda (BRD)\(^5\). Other incubators opportunities and capacity building could be facilitated through the GGGI Green-entrepreneurs, Youth Connekt Afrika and Segal Family Foundation.

According to evidence gathered from some Rwandan businesses, the private sector’s fundraising potential is still limited. The UNICEF in Partnership with Airtel has provided funds for young entrepreneurs working in the environmental field. An example is my “My Green Home” which promotes green Rwanda and environmental excellence by recycling plastic waste into eco-friendly pavers\(^6\).

Only some of the local companies have corporate social responsibility (CSR) budgets. The potential for CSR fundraising is a significant factor for mobilizing resources. In general, CSR is gaining popularity in developing countries such as Rwanda, but it is still on a small scale. An example of that is the South African based telecom giant MTN which has a pan-African reach with a turnover of approximately US$2 billion in 2016. MTN has CSR initiatives which are carried out through the MTN Foundation. The company has pledged to donate 1% of its annual profit after taxes to the foundation’s activities.

The foundation’s mission of giving back to society and “improving the quality of life in our communities” is accomplished by investing in four key areas: education, community and health, economic empowerment, and government priorities\(^6\). Although neither CE or environmental investments were documented in this case. It is an example of how CSR initiatives could be one of the potential financing options in developing countries.

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\(^6\) My Green Home
Arrangements for the Implementation of the Circular Economy in Rwanda
4.1 Costing of the policy interventions

4.1.1 Methodology

In order to provide an indication of the necessary public budget that has to be mobilised to enable the implementation of the policy interventions, each activity has been costed. The costing is based on an input/output approach. It either follows professional estimations on standard overhead costs, but also the consideration of similar direct and indirect activities that have been applied previously.

In the latter case, respective institutions have been consulted that could share their experience and provide guidance, such as the Rwanda Educational Board for the first policy intervention related to the development of circular economy courses and curriculum. For most of the activities, a deliverable has already been ascertained and therefore inputs, such as technical assistance or grants to the private sector as incentivise for delivery, have been considered as well.

Across the timeline, for some of the costs that will be implemented in the medium- and long-term, or those that are direct overhead costs (e.g. staffing or fixed grants), a 10% increase has been factored in to forecast across those years.

4.1.1 Summary of costs

The following table summarises the costs per policy intervention. In total, $211,213,861 have to be mobilised to implement the Action Plan through the next 14 years. A more in detail overview, listing the exact sum of costs per year, can be found in Annex 7, while a description of the cost assumption per intervention is attached in Annex 8.

The detailed cost calculation can be found in the attached excel sheet.
<table>
<thead>
<tr>
<th>N°</th>
<th>Policy interventions</th>
<th>Costs [$]</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>Develop and embed a mandatory circular economy module in curricula of schools (primary and secondary) and universities</td>
<td>765,000,00</td>
</tr>
<tr>
<td>#2</td>
<td>Develop and run circular economy vocational training centres</td>
<td>925,000,00</td>
</tr>
<tr>
<td>#3</td>
<td>Promotion of partnerships and collaboration across the public and private sector, academia and civil society by promoting the CPCIC as Circular Economy Hub and applying the PSEM to the four priority sectors</td>
<td>560,000,00</td>
</tr>
<tr>
<td>#4</td>
<td>Launch a circular economy accelerator and incubator programme</td>
<td>2,586,000,00</td>
</tr>
<tr>
<td>#5</td>
<td>Enhance the valorisation of organic waste from MSW and decrease post-harvest losses</td>
<td>18,170,188,58</td>
</tr>
<tr>
<td>#6</td>
<td>Establish waste collection and transfer centres in every district that allow most appropriate waste treatment</td>
<td>131,651,766,19</td>
</tr>
<tr>
<td>#7</td>
<td>Install a systemic data collection system for waste</td>
<td>182,000,00</td>
</tr>
<tr>
<td>#8</td>
<td>Develop a national regulation that facilitates waste characterisation and treatment</td>
<td>24,297,848,03</td>
</tr>
<tr>
<td>#9</td>
<td>Enforce revised national Building Code and the use of the Green Building Compliance System large-scale building categories</td>
<td>242,120,00</td>
</tr>
<tr>
<td>#10</td>
<td>Prioritise renewable and local materials over exhausting non-renewable materials as well as local construction types</td>
<td>2,012,586,00</td>
</tr>
<tr>
<td>#11</td>
<td>Develop a national guideline of how to characterise and valorise CDW</td>
<td>549,373,04</td>
</tr>
<tr>
<td>#12</td>
<td>Subsidise commercial high-quality organic fertilisers and biological farm inputs that are locally produced</td>
<td>8,897,897,50</td>
</tr>
<tr>
<td>#13</td>
<td>Integration of urban and peri-urban farms/food systems into national planning</td>
<td>10,828,281,64</td>
</tr>
<tr>
<td>#14</td>
<td>Develop a national guideline for farmers that provides guidance on how to set up a crop and/or animal farm in the most sustainable and circular way</td>
<td>1,767,589,85</td>
</tr>
<tr>
<td>#15</td>
<td>Improve the planning of water resources management, supply and wastewater treatment in urban and rural areas</td>
<td>7,778,210,34</td>
</tr>
<tr>
<td>#16</td>
<td>Promote a more efficient, clean and circular water use in agriculture, industry and service sectors</td>
<td>3,183,530,63</td>
</tr>
<tr>
<td>#17</td>
<td>Improve and enforce high-quality wastewater treatment and prevent degradation of the environment</td>
<td>378,800,00</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>211,213,861,18</strong></td>
</tr>
</tbody>
</table>
4.2 Institutional arrangements for implementation

For a successful and sustainable implementation of the Circular Economy Action Plan, it is crucial to clearly define the roles and responsibilities of key institutions that are leading the implementation of the policy interventions. In the following, these are categorised as leading and supporting institutions for the sustainable and successful implementation of the action plan.

The Ministry of Environment (MoE) will lead the overall implementation of the Action Plan that includes the coordination, execution, monitoring and evaluation as well as to collate national reports with all relevant performances related to the circular economy. In this position, MoE can ensure the mainstreaming of circular economy in all priority sectors of Rwanda’s economy.

In line with related NST-1 priorities, the Ministry will provide overall policy oversight, guidance in the preparation and implementation of planning, budgeting, reporting and resource mobilisation processes. Accordingly, it will play the lead role in facilitating coordination of the priority sectors and their responsible ministries and governmental agencies62 as well as key local governments, development partners, civil society, private sector, and academic and research institution partners.

The Ministry will ensure that the policy interventions are tracked by responsible parties in accordance with the Monitoring and Evaluation (M&E) framework. This essential practice will ensure that national priorities can be evaluated and achieved.

Sensitisation of inter-ministerial and inter-institutional activities will be carried out in a systematic approach, utilising innovative communication approaches. Furthermore, MoE will coordinate international processes ensuring Rwanda’s commitments are met in relation to circular economy.

The Ministry will continue to use the existing national coordination mechanism of the Environment and Natural Resources (ENR), which are the Joint Sector Review (JSR), Sector Working Groups (SWGs) and Thematic Working Groups (TWGs) forums where all stakeholders from governments, development partners, private sector, civil society organisations and academic institutions will convene regularly in order to plan, implement and monitor the Action Plan’s implementation hand in hand.

The Ministry of Education (MINEDUC) and MoE will co-lead the cross-cutting policy interventions implementation focusing on embedding circular economy courses and curricula in schools, the development of vocational training courses and promotion of partnerships and collaboration among key stakeholders.

The key support institutions for implementing circular economy cross-cutting policy interventions are the Ministry of Trade and Industry (MINICOM) and its affiliated agencies, which are the National Industrial Research and Development Agency (NIRDA), Cleaner Production and Climate Innovation Centre (CPCIC), Rwanda TVET Board (RTD), Rwanda Development Board (Chief Skills Office), Private sector Federation (PSF) and other relevant stakeholders.

Ministry of Infrastructure (MININFRA) and its affiliated agency of Water and Sanitation Cooperation (WASAC) will lead the implementation of the policy interventions in the waste sector, focusing on improved coordination for strategic intervention activities. This will be done in partnership with all stakeholders in the Water and Sanitation Sector Working Group that include the MoE, Ministry of ICT and Innovation, REMA, RURA, CPCIC, PSF, NIRDA, ENR sub-sectors and key productive sector ministries, including MINAGRI and MINICOM as well as strategic partners, such as the University of Rwanda, Center of Excellence on Biodiversity and Natural Resources (UR-CoEB), and key civil society organisations. Private companies directly involved in waste collection and management need to be engaged as key partners and be subject to proper regulation.

Given the scale and complexity of the waste sector, development partners, such as the World Bank, the European Commission, and the Swedish International Development Cooperation Agency (SIDA), will continue to play important supporting roles in terms of financial and technical support for realising the policy interventions.

62 I.e. MININFRA, MINAGRI, MINEDUC, MINICOM, WASAC, RHA, RAB, NIRDA, CPCIC, RWB, REMA, RURA, FONERWA
The Ministry of Infrastructure (MININFRA) and its affiliated agency of Rwanda Housing Authority (RHA) will lead the implementation of the policy interventions in the construction sector. The policy interventions focus on enforcing the Rwanda Green Building Compliance System, valorising CDW and encouraging the production and use of local, sustainable construction materials, serving as a solid foundation for the adoption of circular economy principles in the built industry in Rwanda.

MININFRA and RHA will need to partner with key stakeholders in the Urbanisation and Settlement SWG, including the Institution of Engineers of Rwanda (IER), Rwanda Green Building Organisation (RWGBO), AEBTP (Construction Association), REMA, FONERWA, Rwanda TVET Board, GGGI and CPCIC.

The Ministry of Agriculture and Animal Resources (MINAGRI) and its affiliated agencies of RAB and NAEB will lead the implementation of the policy interventions in the agricultural sector in line with NST-1 priorities and Rwanda’s updated NDCs interventions. This will require strong national and sub-national coordination mechanisms in order to improve the quality and capacity for sustainable and productive agriculture, animal resources and agroforestry activities.

In relation to the policy interventions, the focus will lay on the promotion of organic fertiliser use and the integration of urban and peri-urban farms/food systems in national agricultural strategies to enhance productivity. Such will require enforcement of compliance with national quality standards. Innovative partnerships with small-scale, private farmers are key to pull resources and revitalise the agricultural soils resources with improved materials and management.

Regarding agroforestry, MINAGRI will partner with the Rwanda Forestry Authority (RFA) to oversee establishment of a strengthened Inter-ministerial Agroforestry Committee between MoE, RFA, MINAGRI, MINALOC and other relevant civil society, private and academic institutions working on agroforestry promotion. A primary aim of this coordination will be to harmonise the implementation arrangements across actors to ensure the application of circular economy principles and techniques that will achieve targets of enhancing agricultural production and food security for Rwanda.

In addition, the agricultural SWG and all its key stakeholders would, among others, support the due consideration of environment and climate change imperatives in agriculture activities implemented by MINAGRI. Lastly, innovative partnerships will be needed to explore the feasibility of commercialisation of community farms working with Rwanda Cooperative Agency (RCA) as a key step in phasing out widespread and inefficient production (and ultimately use).

MINAGRI will need to work with other key stakeholders and sectors considered as support institutions, including the Ministry of Environment, Center of Excellence on Biodiversity and Natural Resources, Ministry of Education, PSF, Imbarage Farmers Organisation, FAO, Ministry of Trade and Investment, World Bank, FONERWA and REMA.

Rwanda Water Resources Board (RWB) will lead the coordination of the policy interventions in the water sector under the Integrated Water Resources Management (IWRM) framework, including wastewater treatment systems that are in line with NST-1 priorities and the 2020 Rwanda’s Updated NDCs.

For the IWRM and analogous to the land sub-sector in terms of addressing soil erosion management, integrated management approaches across diverse user groups will be required. This will involve the strengthening of catchment committees and close engagement of major water users for permit issuance compliance monitoring within agreed allocation frameworks, and in partnership with the Rwanda Utilities Regulatory Agency (RURA).

RWB will partner with other key stakeholders, like the MoE, Rwanda Land Management and Use Authority (RLMUA), Ministry of Agriculture and Animal Resources (MINAGRI), Rwanda Agricultural Board (RAB), Rwanda Institute of Conservation Agriculture (RICA), RURA, and WASAC.

Additionally, the integration of water into spatial planning is key to ensure water resources management, supply and sanitation services in rural and urban areas which will require close collaboration with the Ministry of Infrastructure and local Governments.
Local governments will strengthen the MoE and the Environment and Natural Resource (ENR) sub-sector coordination with respect to the Action Plan’s implementation.

The Ministry of Local Governments (MINALOC) and Districts is critical to ensure that the policy interventions and related NST-1 measures are harmonised with and embedded in District Development Strategies (DDS) and activities. District officials responsible for the ENR sector (water, environment, forestry, lands and mines) will be supported to coordinate the policy intervention’s implementation and day-to-day follow-up of the planned activities.

The District Planning Units will be strengthened to coordinate decentralised planning and budgets for the policy intervention as well as to collect, analyse and disseminate information for evidence-based implementation and monitoring.

The latter data and information collection will be facilitated by training in the use of the planned Integrated Natural Resource Management Information System (INRMIS) from the MoE.

### 4.3 Monitoring and evaluation framework for the Action Plan

In order to track and assess the implementation and impact of this Action Plan and its policy interventions a comprehensive Monitoring and Evaluation (M&E) framework has been developed. It also serves to measure the progress-making against the vision, mission and objectives of the Action Plan that may confirm policy-making or inform about potentially necessary adjustments or interventions.

**Box 4-1 Definition Monitoring and Evaluation**

Monitoring is the routine tracking and reporting of priority information about a project or program: its inputs, activities, outputs, outcomes, and impacts.

Evaluation is the systematic collection of information about the activities, characteristics, and outcomes of a specific program to determine its merit or worth. If a program is judged to be of merit, it is also important to determine whether it is worth its cost.

Evaluation provides credible information for improving programs, identifying lessons learned, and informing decisions about future resource allocation.

Two sets of indicators have been developed to support the M&E of the Action Plan.

- Macro indicators to measure the impact of the Action Plan’s objectives;
- Micro indicators that evaluate the implementation of the different policy interventions.

For each set a mix of social, economic and environmental indicators have been chosen according to the RACER criteria (relevant, acceptable, credible, easy and robust). In order to make full use of the M&E framework, the indicators have to be measured periodically. The first set should be applied every five years (three times until the implementation of the Action Plan ends in 2035) while the second set should be measured every year through the Ministry of Environment. Thus, the first evaluation round through the micro indicators shall happen next year.

Most of the indicators chosen are qualitative. A very few ones – mainly social indicators – are qualitative and have to be gathered through surveys or interviews (indicated behind the indicators for the first set with an ‘S’, and for the second set indicated in column ‘method and frequency of data collection’).
Circular economy is a relatively nascent concept in Rwanda and has been first considered as policy action in the revised National Environment and Climate Change Policy in 2019. Therefore, it is necessary to conduct a baseline study before the policy interventions and their activities are implemented. This study will help understanding and setting the baseline and related targets in order to provide an information base for the elements to monitor as well as to support the M&E in assessing the progress and effectiveness of the activities during implementation and after their completion.

At present, there is no existing data that can be used to establish a baseline and realistic targets for the circular economy interventions and activities. The Ministry of Environment, the UNDP and other key stakeholders responsible for implementing this Action Plan will have to solicit the necessary resources in the first year of implementation to carry out the baseline study.

The proposed baseline study will analyse the current situation, identify the starting points for implementing the Action Plan, set concrete targets and define the benchmark against which future progress can be assessed or comparisons to be made. This will require to determine what kind of information must be collected and examined beforehand.

Finally, it will be important that key stakeholders participate actively in the process of setting the baseline and targets for the Action Plan as this will help to establish a common understanding about what it will accomplish, how and when. The Ministry of Environment, implementing partners, other government stakeholders, donors and civil society partners, among others, should be involved in working sessions at the outset of the Action Plan's implementation to review baseline data and other information to set short-, medium- and long-term targets.

### 4.3.1 Set 1: Macro indicators to measure the impact of the Action Plan's objectives

Under each of the objectives for the priority sectors and the cross-cutting interventions, a few social, environmental and economic indicators have been chosen that evaluate the implementation of the Action Plan from a higher level.

<table>
<thead>
<tr>
<th>Social Indicator</th>
<th>Economic Indicator</th>
<th>Environmental Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of people graduating from institution that offers i) a course in CE, ii) whole educational programme</td>
<td>Budget spent on CE courses and trainings (by knowledge and training institutions)</td>
<td>Perception of improved i) cleanliness ii) knowledge about the interrelation between circular economy and reduced environmental impact</td>
</tr>
<tr>
<td>Mentioning of CE online (company &amp; institutions websites social media)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Ensure that waste is collected separately and sorted to achieve high-quality waste fractions that represent key prerequisites for a higher recovery rate across all waste streams.

<table>
<thead>
<tr>
<th>Social Indicator</th>
<th>Economic Indicator</th>
<th>Environmental Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of i) waste management, ii) waste separation (S)</td>
<td>Increase in contribution of waste management to GDP</td>
<td>Estimated diverted environmental impacts (from landfill through CE applications (e.g. CO(\text{2}) eg.)</td>
</tr>
<tr>
<td>Share of households separating waste</td>
<td>Increase in number of businesses active in the waste sector related to CE (recycling, reuse, etc.)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cost of MSW waste i) collection, ii) disposal iii) treatment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recovery rate of materials</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number of CE jobs</td>
<td></td>
</tr>
</tbody>
</table>

Design, construct and use buildings aligned with circular principles, and valorise CDW materials in ways that enable high-quality reuse, recycling and recover.

<table>
<thead>
<tr>
<th>Social Indicator</th>
<th>Economic Indicator</th>
<th>Environmental Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households considering CE principles in building their houses (S)</td>
<td>Number of green construction jobs created</td>
<td>Estimated diverted environmental impacts (from landfill, open dumping and resource extraction through CE practices (e.g. CO(\text{2}) eg.)</td>
</tr>
<tr>
<td>Share of households valorising CDW</td>
<td>Costs of CDWA i) characterization, ii) collection iii) disposal iv) treatment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Value added from companies active in CDW valorisation activities</td>
<td></td>
</tr>
</tbody>
</table>
Produce food based on regenerative and resource-efficient principles, integrate closed-loops into farming operations and optimise transport and storage to reduce post-harvest losses.

**Social Indicator**
- Increase in number of farmers implementing principles from CE, agro-forestry or regenerative agriculture processes
- Change of the share of food that is lost post-harvest

**Economic Indicator**
- Increased contribution of agriculture and products produced from agricultural waste to GDP
- Number of job created related to closed-loop farming
- Increase of resource-efficiency

**Environmental Indicator**
- Quality of land (fertility and diversity of nutrients)

Secure long-term water supply and maintenance of natural water bodies through responsible water resource management, integrated planning and high-quality wastewater treatment.

**Social Indicator**
- Share of population with i) access to water ii) access to wastewater treatment, iii) installed water catchment

**Economic Indicator**
- Budget spend on wastewater treatment and water resource management
- Value generated from penalties and fees (ESP. PPP))
- Value added of companies operating in wastewater recycling

**Environmental Indicator**
- Quality of i) natural water bodies, ii) access water, iii) treated/discharged water
- Reduction in freshwater access (water-efficiency)
**4.3.2 Set 2: Micro indicators that evaluate the implementation of the different policy interventions**

Relevant indicators that may define the impacts of each policy intervention have been defined in order to reflect the implementation progress from a more micro-level perspective.

**Table 4-2 Micro indicators for Monitoring and Evaluation**

<table>
<thead>
<tr>
<th>N°</th>
<th>Policy interventions</th>
<th>Indicators</th>
<th>Expected results</th>
<th>Method and frequency of data collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Develop and embed a mandatory circular economy module in curricula of schools (primary and secondary) and universities</td>
<td>Number of schools that have included CE education in their curriculum (by adapted course or new course)</td>
<td>Pupils and students educated in circular economy</td>
<td>Annual review of school curriculum and educational offer</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of topics/sectors taught in relation to CE</td>
<td>Topics/sectors covered</td>
<td>Review curriculum and define topics/sectors covered</td>
</tr>
<tr>
<td>2</td>
<td>Develop and run circular economy vocational training centres</td>
<td>Number of participants enrolled at vocational training centres for CE courses</td>
<td>Number of participants</td>
<td>Review every three years through ECV survey, based against previous studies</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of CE related initiatives developed after course attendance</td>
<td>Number of initiatives</td>
<td>Counting of new registrations of companies, social enterprises or NGO related to CE</td>
</tr>
<tr>
<td>3</td>
<td>Promotion of partnerships and collaboration across the public and private sector, academia and civil society by promoting the CPCIC as Circular Economy Hub and applying the PSEM to the four priority sectors</td>
<td>Increase of collaborations between companies</td>
<td>Number of collaborations</td>
<td>Inquire PSF for information; conduct private sector survey</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of companies approaching CPCIC for advice</td>
<td>Number of companies</td>
<td>Inquire CPCIC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of stakeholders participating in PSEM (by stakeholder group)</td>
<td>Number of stakeholders</td>
<td>Inquire PSEM implementation body</td>
</tr>
<tr>
<td>4</td>
<td>Launch a circular economy accelerator and incubator programme</td>
<td>Number of companies/entrepreneurs participating in the programme</td>
<td>Number of companies; Number of jobs</td>
<td>Inquire body that runs the programme</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of CE related initiatives and their number of jobs created after attendance of the programme</td>
<td>Number of initiatives; Number of new jobs</td>
<td>Review data from Ministry of Trade and Industry, Rwanda Statistical Office and Chamber of Commerce</td>
</tr>
<tr>
<td>Nº</td>
<td>Policy interventions</td>
<td>Indicators</td>
<td>Expected results</td>
<td>Method and frequency of data collection</td>
</tr>
<tr>
<td>----</td>
<td>--------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>5</td>
<td>Enhance the valorisation of organic waste from MSW and decrease post-harvest losses</td>
<td>Quantity of waste appropriately separated at source and collected</td>
<td>Estimated share of total waste generated</td>
<td>Annual scoping studies conducted by Ministry of Infrastructure; data collection system (once established)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Share of population participating in waste separation</td>
<td>Percentage of population</td>
<td>Data from municipalities, documentation from environmental district officers; data from waste collectors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Volume of organic waste used for fertiliser, biogas or animal feed production</td>
<td>Volume of recycled organic waste</td>
<td>Information from farmers’ associations or surveys</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of landfills with separate organic waste section</td>
<td>Number of landfills</td>
<td>Access of communities to sanitation measured annually, benchmarked against national targets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Share of waste collection and transportation companies, using proper waste sorting techniques</td>
<td>Share of total companies</td>
<td>Data from municipalities, PSF, data collection system (once established)</td>
</tr>
<tr>
<td>6</td>
<td>Establish waste collection and transfer centres in every district that allow most appropriate waste treatment</td>
<td>Number and frequency of waste collection and transfer stations</td>
<td>Increased waste collection rates;</td>
<td>Data from districts and chamber of commerce</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quantity of collected and sorted waste for input for waste treatment and recycling companies</td>
<td>Improved sanitation in communities</td>
<td>Company survey</td>
</tr>
<tr>
<td>7</td>
<td>Install a systemic data collection system for waste</td>
<td>Quantity of waste data collected</td>
<td>Volume of waste used for CE practices</td>
<td>Data collected by waste companies and at disposal sites; collated and analysed by MININFRA/RURA/WASAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Quality of waste data collected</td>
<td>Estimated share of households covered</td>
<td>Analysis of data collected</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Geographic coverage of waste data collected</td>
<td>Indication of good, medium or bad data quality in terms of usefulness and completeness</td>
<td>Analysis of data collected</td>
</tr>
<tr>
<td>N°</td>
<td>Policy interventions</td>
<td>Indicators</td>
<td>Expected results</td>
<td>Method and frequency of data collection</td>
</tr>
<tr>
<td>----</td>
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<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
</tr>
<tr>
<td>8</td>
<td>Develop a national regulation that facilitates waste characterisation and treatment</td>
<td>Quantity of waste per category of waste</td>
<td>Improved waste characterisation and treatment</td>
<td>Data collected by waste treatment facilities; collated and analysed by MININFRA/RURA/WASAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of companies complying with the regulation/guideline to characterise the waste before treatment/disposal</td>
<td>Number of companies; share of total number of companies</td>
<td>Inspections through REMA or environmental district officers</td>
</tr>
<tr>
<td>9</td>
<td>Enforce revised national Building Code and the use of the Green Building Compliance System</td>
<td>Number of existing buildings that comply with green building compliance system</td>
<td>Number of green buildings</td>
<td>Inquire data from Green Building Association or RHA</td>
</tr>
<tr>
<td></td>
<td>large-scale building categories</td>
<td>Number of buildings constructed using green building principles (by type of building)</td>
<td>Number of buildings</td>
<td>Data from RHA and Ministry of Infrastructure</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Budget allocated for research related to development of sustainable building materials</td>
<td>Available funds for research relating to development of sustainable building materials</td>
<td>Gather data from academic institutions, their annual balance and data from the Ministry of Environment</td>
</tr>
<tr>
<td>10</td>
<td>Prioritise renewable and local materials over exhausting non-renewable materials as well as local construction types</td>
<td>Market share of local sustainable building materials compared to conventional products</td>
<td>Market share of sustainable building materials</td>
<td>Data from Ministry of Economy and Green Building Organisation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change in construction material imports (by material, e.g. steel, cement, etc.)</td>
<td>Share of construction material imports</td>
<td>Annual data released from Ministry of Trade</td>
</tr>
<tr>
<td>11</td>
<td>Develop a national guideline of how to characterise and valorise CDW</td>
<td>Number of construction workers trained on CDW identification and treatment</td>
<td>Number of workers trained</td>
<td>Inquire training centers and institutions holding trainings</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of companies complying to the guideline</td>
<td>Number of companies</td>
<td>Results from inspections through REMA</td>
</tr>
</tbody>
</table>


<table>
<thead>
<tr>
<th>Nº</th>
<th>Policy interventions</th>
<th>Indicators</th>
<th>Expected results</th>
<th>Method and frequency of data collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>Subsidise commercial high-quality organic fertilisers and biological farm inputs that are locally produced</td>
<td>Proportion of farmers using organic fertiliser</td>
<td>Share of farmers utilising organic fertiliser</td>
<td>Data from farmers’ associations, PSF; survey</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of farmers or businesses engaging in the production of organic fertiliser</td>
<td>Number of organisations producing organic fertiliser</td>
<td>Annual reports from Ministry of Agriculture; new registrations at RURA to produce fertiliser</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Change of import/purchase rates of chemical fertiliser</td>
<td>Ratio of imported/purchased chemical fertiliser</td>
<td>Annual numbers from Ministry of Trade</td>
</tr>
<tr>
<td>13</td>
<td>Integration of urban and peri-urban farms/food systems into national planning</td>
<td>Number of CE community farms registered (by type: new or merged farms)</td>
<td>Number of community farms</td>
<td>Data sourced from Ministry of Agriculture, farmers’ associations; surveys</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of CE small-scale farms run in city or sub-urbs</td>
<td>Number of small-scale farms</td>
<td>Information from city planning departments, Ministry of Infrastructure</td>
</tr>
<tr>
<td>14</td>
<td>Develop a national guideline for farmers that provides guidance on how to set up a crop and/or animal farm in the most sustainable and circular way</td>
<td>Number of farmers that accessed and applied the guideline</td>
<td>Number of farmers</td>
<td>Surveys; data from training centers that provide training on the application of the guideline</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of farms operating according to sustainable and circular principles</td>
<td>Number of sustainable and circular farms</td>
<td>Survey</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Output (produce and secondary products from organic waste) from circular farms</td>
<td>Volume of produce; volume of organic fertiliser; volume of biogas; volume of animal feed</td>
<td>Survey and samples through Ministry of Agriculture</td>
</tr>
<tr>
<td>15</td>
<td>Improve the planning of water resources management, supply and wastewater treatment in urban and rural areas</td>
<td>Proportion of the population with access to improved water source</td>
<td>Share of population with access to water</td>
<td>Annual review by Rwanda Water Board</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of regional and city development plans considering an integrated approach of water management (from source to release back into ecosystem)</td>
<td>Number of plans consider integrated water management</td>
<td>Data and information from Ministry of Infrastructure, districts and municipalities</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of renaturisation projects of natural waterbodies</td>
<td>Number of projects</td>
<td>Information from districts and municipalities; data from RWB</td>
</tr>
<tr>
<td></td>
<td>Number of houses with grey water systems (by ad-hoc or ex-ante installation)</td>
<td>Number of houses</td>
<td>Data from Ministry of Infrastructure (permissions for installations), information from RHA and Green Building Organisation</td>
<td></td>
</tr>
<tr>
<td>---</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Coverage of buildings equipped with or connected to wastewater treatment</td>
<td>Buildings covered with wastewater treatment</td>
<td>Data from WASAC or RURA and studies from Ministry of Infrastructure</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water resource availability of freshwater bodies</td>
<td>Volume of freshwater available</td>
<td>Data from Rwanda Water Resource Board</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Development of water efficiency (change in water consumption)</td>
<td>Water consumption</td>
<td>Annual review of Rwanda Water Board and RURA</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Number of companies that have to pay for pollution (Polluter Pays Principle)</td>
<td>Number of companies that do not comply with wastewater quality standards</td>
<td>Results from inspections through WASAC or RURA</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Improve and enforce high-quality wastewater treatment and prevent degradation of the environment</td>
<td>Water quality of discharged water</td>
<td>Data from RWB</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water quality in freshwater bodies</td>
<td>Number of stakeholders that do not comply with wastewater treatment standards (by organisation, company and household)</td>
<td>Results from inspections through RURA</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water quality</td>
<td>Number of stakeholders not complying</td>
<td>Data from RWB</td>
<td></td>
</tr>
</tbody>
</table>

4.4 Implementation tracking matrix

The below displayed implementation tracking matrix lists all policy interventions and its policy interventions developed under this Action Plan. It serves the purpose to keep track of the correct and timely implementation of each step in the next 14 years until 2035.

The majority of the interventions and their activities have been scheduled for the short- and medium-term. This means that most staff and financial resources have to be mobilised in the beginning of the Action Plan’s implementation, thus starting from next year onwards.

Depending on the mobilisation of funds, the activities can be postponed marginally. However, it is suggested that the short-term interventions are implemented as soon as possible as they are key enabling elements to bring fast change on the ground.
<table>
<thead>
<tr>
<th>Sector</th>
<th>N°</th>
<th>Intervention and activities</th>
<th>Time horizon until 2035</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Short-term (1-5 years)</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td><strong>Develop and embed a mandatory circular economy module in curricula of schools (primary and secondary) and universities</strong></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity 1: Implement circular economy into existing sustainability and environmental courses</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity 2: Develop stand-alone circular economy course for (i) primary schools, (ii) secondary schools, (iii) high schools and universities</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity 3: Teach the teachers based on the course material for (iii)</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity 4: Implement and run the CE course under national curricula</td>
<td>13</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td><strong>Develop and run circular economy dedicated courses at vocational training centers</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity 1: Take over content from the course material for (iii) for the general part of the courses</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity 2: Develop content for the preparatory course for women and youth</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity 3: Develop content and method for the four technical vocational courses on the four priority sectors</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td></td>
<td><strong>Promotion of partnerships and collaboration across the public and private sector, academia and civil society by promoting the CPCIC as Circular Economy Hub and applying the PSEM to the four priority sectors</strong></td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity 1: Review the material, services and tools offered by the CPCIC (Circular Economy Hub) if they are up-to-date and address the needs of the stakeholders</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity 2: Establish or assign an independent implementation body for the coordination and implementation of the PSEM (public-private-partnership)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Activity 3: Conduct mapping exercise of international best practices that could support the Circular Economy Hub and PSEM</td>
<td></td>
</tr>
<tr>
<td>Activity</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>-------------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Launch a circular economy accelerator and incubator programme** | Activity 1: Review existing international circular economy incubator and accelerator programmes  
Activity 2: Develop the concept of the circular economy programme, incl. courses on CE (advanced) and business management skills, mentorship programmes, networking events, access to investors  
Activity 3: Implement the programme as a new programme or under the Green-preneur programme run by the GGGI |
| **Enhance valorisation of organic waste from MSW and decrease post-harvest losses** | Activity 1: Run awareness campaigns in cities and rural areas for better waste separation at source  
Activity 2: Improve waste separation methods (color codes, provision of two bins to every household, treatment locally; mandatory separation)  
Activity 3: Integrate separate site for organic waste at landfills and improve sanitary conditions  
Activity 4: Establish and run training modules for farmers to decrease post-harvest losses  
Activity 5: Financial support programmes for farmers for investments into better transport, storage and agro-processing. |
| **Establish waste collection and transfer centres in every district that allow most appropriate waste treatment** | Activity 1: Define location of each center in each district  
Activity 2: Establish the centers (Government) and assign operator (private sector)  
Activity 3: Support for waste collectors (financial support and simplify the requirement list of becoming a collector)  
Activity 4: Hire and train staff on properly sorting the waste (incl. integrating informal sector)  
Activity 5: Promote the centers as central point for waste processors and recyclers to source their materials from |
<table>
<thead>
<tr>
<th>Step</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Install a systemic data collection system</td>
</tr>
<tr>
<td></td>
<td>Activity 1: Establish centralised database</td>
</tr>
<tr>
<td></td>
<td>Activity 2: Fill database with top-down and bottom-up data</td>
</tr>
<tr>
<td></td>
<td>Activity 3: Define legal obligation for waste collectors to frequently inform the database</td>
</tr>
<tr>
<td></td>
<td>Activity 4: Develop local customisation application assisting the database and collaboration and payments between waste players</td>
</tr>
<tr>
<td>8</td>
<td>Develop a national regulation that facilitates waste characterisation and treatment</td>
</tr>
<tr>
<td></td>
<td>Activity 1: Develop guideline how to properly identify and characterise different waste types (incl. preceding study)</td>
</tr>
<tr>
<td></td>
<td>Activity 2: Develop national regulation that (i) makes waste characterisation and respective treatment a mandatory activity for waste firms and (ii) that obliges waste collectors to use the waste database (intervention 7)</td>
</tr>
<tr>
<td></td>
<td>Activity 3: Run parallel studies that examine new potentials to process waste</td>
</tr>
<tr>
<td></td>
<td>Activity 4: Offer training courses on applying the guideline and regulation</td>
</tr>
<tr>
<td>9</td>
<td>Enforce revised national Building Code and use Green Building Compliance System for all large-scale building categories</td>
</tr>
<tr>
<td></td>
<td>Activity 1: Amend Building Code to cover all new large-scale buildings and make certain yet optional indicators mandatory</td>
</tr>
<tr>
<td></td>
<td>Activity 2: Enforce the application of the Green Building Compliance System</td>
</tr>
<tr>
<td></td>
<td>Activity 3: Provide a transition plan, training and workshops to construction companies that facilitate the application of the compliance system</td>
</tr>
</tbody>
</table>
Prioritise renewable and local materials over exhausting non-renewable materials as well as local construction types

Activity 1: Run research projects that examine the potential of locally sourced and sustainable alternative materials

Activity 2: Promote the vocational training courses for the construction sector (intervention 2) to formal and informal construction workers

Activity 3: Develop technical and financial support to entrepreneurs that launch new construction materials (potential link to intervention 4)

Activity 4: Launch pilot projects to test local construction materials, such as earth masonry

Activity 5: Prepare transition guidelines for the informal sector that help shifting to local alternative materials and a better integration into the economy

Activity 6: Develop financial incentives to purchase local alternative materials, e.g. tax reduction or subsidy

Activity 7: Run awareness and education campaigns on the benefits associated to local alternative materials

Develop a national guideline how to characterise and valorise CDW

Activity 1: Conduct study on CDW characterisation and viable treatment options, incl.. The identification of best practices

Activity 2: Develop guideline and transitory plan for identifying CDW components and activities for repair, reuse and recycling

Activity 3: Amend a mandatory requirement to document the materials used at construction stage

Activity 4: Provide trainings and workshops to construction companies on how to apply the guideline
| Activity 1: Promote organic fertiliser to farmers to use and produce it through awareness campaigns |
| Activity 2: Implement market incentives to use organic fertiliser, e.g. subsidy |
| Activity 3: Standardise organic fertiliser market |
| Activity 4: Conduct research projects about the production of different kinds of fertilisers |
| Activity 5: Fund large-scale organic fertiliser usage |
| Activity 6: Develop distributional system for organic fertiliser |
| Activity 7: Develop policy dedicated to organic fertiliser production |
| Activity 8: Incrementally phase out chemical fertiliser |

**Integration of urban and peri-urban farms/food systems into regional planning and promotion of community farms**

| Activity 1: Promotion of community farms to farmers and communities through awareness campaigns |
| Activity 2: Launch of some pilot projects of community farms in different districts |
| Activity 3: Developing financial support means to support the initiation of community farms, e.g. through lump sum when registering |
| Activity 4: Provide technical know-how to farmers (link to intervention 2 and 14) |
| Activity 5: Provide access to technical equipment to farmers to expand and apply circular economy principles |
| Activity 6: Integrate peri-urban farms into national urban planning |

**Develop a national guideline for farmers that provide guidance on how to set up a farm in the most sustainable and circular way**

| Activity 1: Identify the needs of farmers in the transition towards circular economy through PSEM and research studies |
| Activity 2: Develop content of the guideline |
| Activity 3: Align the content with national policies |
### Improve the planning of water resources management, supply and wastewater treatment in urban and rural areas

**Activity 1:** Feasibility Study to integrate natural basins and wastewater treatment into spatial development plans

**Activity 2:** Technical Working Group for identifying applicable outcomes of the feasibility study into spatial planning

**Activity 3:** Develop Guideline to better integrate water into spatial planning

**Activity 4:** Awareness campaigns to protect natural basins and other water bodies towards impurities and contamination

**Activity 5:** Establish a project to protect natural basins for each basin

**Activity 6:** Fund projects for grey water treatment systems in buildings

**Activity 7:** Pilot rain water catchments in urban areas of industrial facilities

**Activity 8:** Awareness campaigns to promote rain water catchments and rain water treatment

**Activity 9:** Trainings for sustainable water resource management and waste water treatment

**Activity 10:** Establish centralised waste water treatment plants in secondary cities (4 pilots in 4 provinces)

### Promote a more efficient, clean and circular water use in agriculture, industry and service sectors

**Activity 1:** Develop and run awareness campaigns targeting industry and the agricultural sector to decrease their water consumption

**Activity 2:** Training courses transferring knowledge about Cleaner Production (potential relation to intervention #2)

**Activity 3:** Conduct scoping study for the development of a standard that regulates water use through a threshold system

**Activity 4:** Develop (mandatory) standard that regulates water usage thresholds depending on industry/farm size or type and volume of outputs

**Activity 5:** Install mandatory water meters at each farm and industry site

**Activity 6:** Conduct feasibility study about the implementation of Payment for Ecosystem Services for water consumptive industrial sectors
<table>
<thead>
<tr>
<th>Activity 7: Establish a Ecosystem Services Payment system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity 8: Enforcing regulation on effluent treatment and applying Polluter Pays Principles</td>
</tr>
<tr>
<td>Activity 9: Fund research projects to analyse how nature-based solutions can help optimising water resource management, consumption and treatment</td>
</tr>
<tr>
<td><strong>Improve and enforce high-quality wastewater treatment and prevent degradation of the environment</strong></td>
</tr>
<tr>
<td>Activity 1: Revisit and amend water quality standards for discharged water</td>
</tr>
<tr>
<td>Activity 2: Promote utilisation of higher and safer levels of wastewater treatment and circularity potential among utility companies and small-scale companies</td>
</tr>
<tr>
<td>Activity 3: Enhance the implementation of NBS on a project basis together with the private sector (PSEM, intervention #3)</td>
</tr>
<tr>
<td>Activity 5: Provide financial support for small-scale and decentralised systems</td>
</tr>
</tbody>
</table>
Reference
African Development Bank (2020) African Development Bank takes steps to accelerate the circular economy in Africa


Akumuntu, J.B. et al. (2017) Enabling the sustainable Faecal Sludge Management service delivery chain—A case study of dense settlements in Kigali, Rwanda


BBC (2018) How the US and Rwanda have fallen out over second-hand clothes

CommsUpdate (2019) USD10m upgrade for Rwandan 4G network

D’Silva, E. (2019) Going surgical on plastics in Rwanda

Ellen MacArthur Foundation (2017) Cities in the circular economy: An initial exploration

Ellen MacArthur Foundation (2021) What is the circular economy


EU, IOL, Government of Rwanda (2018) Infrastructure Development, the Construction Sector and Employment in Rwanda


Fashion Revolution (2021) A policy dialogue on Standards, Quality and Sustainability in fashion and textiles

Fibre2Fashion (2020) Rwanda’s garment-textile exports grow by 83% in 2 years

FAO (2021) Rwanda at a Glance


FONERWA (2021) How The Fund Works

Fortune of Africa (n.d.) Transport sector Rwanda

GGGI (2019) GGGI and RHA give insight on Rwanda’s Green Building Initiative with experts from 10 countries in Africa

GGGI (2019) Meeting Global Housing Needs with Low-Carbon Materials


GGGI (2021) Rwanda launches new Project “Waste to Resources: Improving Municipal Solid Waste (MSW) and Hazardous Waste Management in Rwanda”

GIZ (2020) Factsheet, textile sub-sector in Rwanda


Green City Kigali

Institut National de l’Economie Circulaire (2021) L’école circulaire


MINICOM (2017) Made in Rwanda Policy


Ministry of Information Technology and Communications (2017) ICT Sector Strategic Plan 2018 – 2024

Ministry of Infrastructure (2016) National Water Supply Policy


Ministry of Infrastructure (2021) Rwanda National Transport Policy


Ministry of Trade and Industry (2011) Industrial sub-sector master plan for construction materials

Ministry of Trade and Industry (2017) Made in Rwanda policy


My Green Home


National Institute of Statistics of Rwanda (2021) GDP – National Accounts (Fiscal Year 2020/21)


Nijman, E. (2020) Towards circular food production systems in East Africa

NIRDA (2017) Textile and Garments Value Chain Assessment Report


OECD (2020) *Country profile Rwanda – Plastic and the circular economy*

OECD (2020) *Mainstreaming Gender and Empowering Women for Environmental Sustainability*

Rajashekar et al (2019) *Assessing Waste Management Services In Kigali*

Rapid Assessment & Options Analysis: Waste Disposal in the City of Kigali report (2019)

Refill Ambassadors or milk bars

REMA (2016) *Operationalizing green economy transition in Africa*

REMA (2019) *Rwanda Compendium of Environmental Statistics 2018*

REMA (2020) Draft report: GHG EMISSIONS MITIGATION ACTIONS AND THEIR EFFECT Agriculture, Forestry and Other Land Use (AFOLU) Sector for Rwanda Initial Biennial Update Report (BUR) to the UNFCCC

REMA (2020) Draft report: Mitigation assessment in Industrial Process and Product Use and waste sectors, for the initial Biennial Update Report (BUR1)


Republic of Rwanda (2020) *Update of Rwanda’s Nationally Determined Contribution*

Republic of Rwanda Ministry of Infrastructure (2020) *Energy Division*


RURA (2019) *Statistics Report for Telecom, Media and Broadcasting Sector as of the Fourth Quarter of the Year 2019*

Rwanda Mines, Petroleum and Gas Board (2020) *East Africa, led by Rwanda, is ’frontier’for technology metals: mine developers*


Rwanda Water Resources Board, Food and Agricultural Organization of the United Nations (2020) *Water users and uses assessment report in Rwanda*

The New Times (2020) *Rwanda’s top 10 highly exported products*

The New Times (2021) *ICT sector grew by 29% in 2020*

Trinomics (2021) *Rwanda Green Growth Strategy and Climate Resilient Strategy Report*


Ullrich, S. (2021) *Apfelzucht unter Solarmodulen*

UNAIDS (n.d.) *Basic terminology and frameworks for monitoring and evaluation*
UNEP (2020) Young champions of the earth – Ghislain Irakoze


Water and Sanitation Corporation

Water and Sanitation Corporation (2019) WASAC Projects


World Bank (2020) Rwanda Food Smart Country Diagnostic

World Economic Forum (2021) Five Big Bets for the Circular Economy in Africa
Annexes
### Annex 1

**List of stakeholders interviewed**

#### Table 6-1 List of stakeholders interviewed

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monica Umwali</td>
<td>Angaza</td>
<td>Private sector</td>
</tr>
<tr>
<td>Beth Kaplin</td>
<td>Center of Excellence in Biodiversity and Natural Resource</td>
<td>(waste/up-cycling)</td>
</tr>
<tr>
<td>Dismas Karuranga</td>
<td>Ministry of Environment</td>
<td>Public sector</td>
</tr>
<tr>
<td>Aimable Rwanzunga</td>
<td>COPED</td>
<td>Private sector (waste)</td>
</tr>
<tr>
<td>Paulin Buregeya</td>
<td>COPED</td>
<td>Private sector (waste)</td>
</tr>
<tr>
<td>Jean-Claude Bahati</td>
<td>Inyange Industries</td>
<td>Private sector (food &amp; beverages)</td>
</tr>
<tr>
<td>Aldo Muhizi</td>
<td>Kamel Manufacturing</td>
<td>Private sector (waste/wastewater recycling)</td>
</tr>
<tr>
<td>Benoit Musabyimana</td>
<td>Recycl’Africa</td>
<td>Private sector (waste/compost)</td>
</tr>
<tr>
<td>Joel Mitali</td>
<td>BTRACOM</td>
<td>Private sector (waste/tech)</td>
</tr>
<tr>
<td>Michelle DeFreese</td>
<td>Green Growth Institute</td>
<td>Private sector</td>
</tr>
<tr>
<td>Dheeraj Arrabothu</td>
<td>Green Growth Institute</td>
<td>Private sector</td>
</tr>
<tr>
<td>Grace Ingabire</td>
<td>Green Growth Institute</td>
<td>Private sector</td>
</tr>
<tr>
<td>Juvenal Mukararinda</td>
<td>Green Growth Institute</td>
<td>Public sector</td>
</tr>
<tr>
<td>Larry Paul</td>
<td>Green Afrika Rwanda</td>
<td>Packaging production</td>
</tr>
<tr>
<td>Sebagala Arsh Raina</td>
<td>African Leadership University</td>
<td>Academic sector</td>
</tr>
<tr>
<td>Elke Nijman</td>
<td>African Leadership University</td>
<td>Academic sector</td>
</tr>
<tr>
<td>Olivier Mbera</td>
<td>Enviroserve</td>
<td>Private sector (e-waste)</td>
</tr>
<tr>
<td>Rosette Muhoza</td>
<td>My Green Home</td>
<td>Private sector (waste/construction)</td>
</tr>
<tr>
<td>Dominique Murekezi</td>
<td>WASAC</td>
<td>Public sector (wastewater)</td>
</tr>
<tr>
<td>Bernard Musana</td>
<td>RWB</td>
<td>Public sector (water resources)</td>
</tr>
<tr>
<td>Sylvie Mugabekazi</td>
<td>CPCIC</td>
<td>Private sector</td>
</tr>
<tr>
<td>Martine Uwera</td>
<td>REMA</td>
<td>Public sector</td>
</tr>
<tr>
<td>Rachael Businge</td>
<td>REMA</td>
<td>Public sector</td>
</tr>
<tr>
<td>Melissa Murara</td>
<td>African Development Bank</td>
<td>Public sector</td>
</tr>
<tr>
<td>Davinah Milenge Uwella</td>
<td>African Development Bank</td>
<td>Public sector</td>
</tr>
<tr>
<td>Hedd Megchild</td>
<td>Department for International Development (DFID/FCDO)</td>
<td>Public sector</td>
</tr>
</tbody>
</table>
Overview of sectorial and overarching policies

- **National Environment and Climate Change Policy**, introduced in 2019 by the Ministry of Environment, names as its main tenets to promote the circular economy to make progress in sustainable consumption and production patterns.64

- **Vision 2050** sets a new pathway that will lead the country to the living standards of upper middle income by 2035 and high-income countries by 2050. Although not mentioning circular economy explicitly, it does commit to achieving a carbon-neutral and climate resilient economy with a sustainable management of the environment.

- **Revised Green Growth and Resilience Strategy** is a currently ongoing revision of the Green Growth and Resilience Strategy developed in 2011. It is being aligned with the Vision 2050, National Strategy for Transformation I (NST I) and the National Environment and Climate Change Policy (2019).

  The revised strategy has three main strategic objectives related to energy security and low carbon energy supply, sustainable land use and water resource management, and social protection, improved health and disaster risk management. Besides economic growth and poverty reduction, the strategy is based on principles related to inclusion, regional and global integration and environmental sustainability.

  The bridge to circular economy is built under greening the industry through EPR systems, industrial symbiosis, recycling and water re-use activities or smart solutions.

### Table 6-2 Overview of overarching and sector-specific policies in Rwanda

<table>
<thead>
<tr>
<th>Overarching policies</th>
<th>Sector-specific policies and regulations</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Environment and Climate Change Policy, 2019</td>
<td>Law nº 17/2019 of 10/09/2019 on plastic carry bags and single use plastics</td>
</tr>
<tr>
<td>Vision 2050</td>
<td>Law nº 49/2018 of 13/08/2018 determining the use and management of water resources in Rwanda</td>
</tr>
<tr>
<td>Revised Green Growth and Resilience Strategy</td>
<td>ICT sector strategic plan 2018 – 2024</td>
</tr>
<tr>
<td></td>
<td>Rwanda National Transport Policy</td>
</tr>
<tr>
<td></td>
<td>Made in Rwanda policy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Construction</th>
<th>Agriculture</th>
<th>Waste</th>
<th>Water</th>
<th>ICT</th>
<th>Transport</th>
<th>Textiles</th>
</tr>
</thead>
</table>

|-----------------------------------|-------------------------------------------------------------|-----------------------------------|----------------------------------|-----------------------------------------------|

64 Ministry of Environment Rwanda (2019) National Environment and Climate Change Policy
Construction

The revised Rwanda Building Codes of 2019, incorporated in the Rwanda Green Building minimum compliance system encourages the adoption of green building practices and use of on-site renewable technology, and treatment of wastewater generated on site.

The Rwanda Green Building Minimum Compliance System is a technical document developed by the Rwanda Housing Authority (RHA) with core technical support from the GGGI, Building Construction Authority (BCA) Singapore and Rwanda Green Building Organization (RwGBO). The mandatory system which is applicable to the new category 4 & 5 (large-scale and commercial) buildings is an environmental performance-oriented green building indicators designed to promote energy & water efficiency, environmental protection, better Indoor Environmental Quality to building occupants and green innovation. The Rwanda Green Building Minimum Compliance System which is an Annex 3 to the Ministerial Order determining Urban planning and Building regulations was approved by the Government on 03/04/2019.

Rwanda’s growing population and urbanisation necessitated the development of the National Urban Housing Policy, 2008. The policy aims to facilitate the access of citizens to potable water and sanitation facilities, development of sustainable human settlements with actions to reduce negative environmental impact, despite rapid urbanisation.

Agriculture

Rwanda strategic plan for agricultural transformation 2018–2024 seeks to build resilience through on-farm measures and making climate smart investments. The strategic plan is aimed at providing a conducive enabling environment required to enable the strategic shift to a green and market-led agricultural sector.

Waste

The law n° 17/2019 of 10/08/2019 on single use plastics, introduced in 2019 by the Ministry of Natural Resources, is a revision of the Law n° 57/2008 of 10/09/2008 which placed a ban on plastic bags with a thickness of 60 microns. The law prohibits the importation, manufacturing, use and sale of plastic carry bags and single use plastic items in Rwanda.

The law also includes EPR elements, placing environmental levy on imports of goods packaged in plastic materials and requiring manufacturers, wholesalers and retailers put measures in place to collect, segregate and transfer used plastic waste generated to recycling plants.

The Waste to Resources Strategy is a project, developed through the collaboration between the Ministries of Environment of Luxembourg and Rwanda. The project has the aim of adopting sustainable waste management and circular economy business models to increase the capacity of the waste management system in the city of Kigali over a time period of 3 years.

With the National Sanitation Policy Implementation Strategy, developed in 2016, the goal of the Government is to properly dispose 60% of domestic waste by 2019/2020 and 80% by 2029/2030 and a recycling rate for non-organic solid waste of 30% by 2019/2020 and 40% by 2029/2030. It provides guiding principles for all aspects of sanitation, including liquid and solid waste, industrial waste, nuclear waste, e-waste, health-care waste and hygiene. The policy which was updated from the National Policy for Water Supply and Sanitation was developed to ensure that sanitation does not get neglected or is seen as an add-on to water supply.

The national e-waste Management Policy, introduced by the Ministry of ICT and Ministry of Environment in 2016, was developed to provide a comprehensive guidance for the effective and efficient management of discarded electronic and electric equipment waste through appropriate legal and regulatory instruments.
The national Water Supply Policy, introduced by the Ministry of Infrastructure in 2016 as an update to the 2010 and 2013 National Policy and Strategy for Water Supply and Sanitation, details strategies to improve equitable access to safe, basic water services. The policy outlines objectives to address gaps in the 2010 policy and was updated to align with the Rwanda’s Vision 2020, EDPRS 2 and SDGs with consideration for the emerging issues and lessons learned.

The vision of the policy is to “ensure sustainable, equitable, reliable, and affordable access to safe drinking water for all Rwandans, as a contribution to improve public health and socio-economic development”. The aim of the policy is also that water supply and use is rational, sustainable, and compliant with environmental regulations and safeguards.

The Smart Rwanda Masterplan 2015–2020 has the objective of developing the ICT sector and placing Rwanda as the regional hub has the potential to contribute to scaling circular economy.

The ICT Sector Strategic Plan 2018–2024, launched in 2017 by the Ministry of Information Technology and Communications, has been developed to catalyse rapid and sustained economic growth, equitable social development and employment creation. It leverages on principles set under the Smart Rwanda Master Plan and defines the following seven pillars: Smart Cities, Fintech, Smart Agriculture, Trade and Industry, Health, Education, Government, Women and Youth Empowerment in ICT.

Initiatives such as SMART housing, SMART cities (optimal space utilization, connected cities, broadband, internet of things), Smart Village, are some of the key initiatives that will be implanted under the strategical plan.

The Rwanda National Transport Policy was developed by the Ministry of Infrastructure and other partners to develop strategies to improve the transport system for Rwandans. The principles of the policy border on various factors including environmental sustainability and resilience to climate change.

The policy was developed to further green modes of transport, promoting modes of transport that are non-polluting and non-motorized transport.

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65 1) Decentralization of water and sanitation services; 2) Sector financing mechanisms and access to funding for decentralized actors (district, communities, private operators); 3) Performance of public–private partnership arrangements 4) Further sector harmonization towards a sector-wide approach (SWAp); and 5) The emerging challenge of increased per capita costs to serve the remaining unserved population to reach the target of 100 per cent.


67 Establishing a Service-oriented, Modern, Accountable, and Real-Time (SMART) Government that drives Rwanda’s global competitiveness and job creation; Becoming a highly competitive, agile, open and innovative smart economy with the most favorable business climate that attracts large-scale investments, rewards entrepreneurship and enables fast growth and exports; and leveraging powerful ICT innovations such as Digital solutions, Internet of Things, Big Data and Analytics, Creative Industries and Multimedia, Mobility & Digital Lifestyle, Robotics, Block Chain, Artificial Intelligence and e-commerce.
Following the success of the “Made in Rwanda” campaign, the government announced the “Made in Rwanda” Policy in 2017. The Made in Rwanda Policy was designed to help further Rwanda’s aspiration to become an upper-middle-income country by 2035 and higher income by 2050 (Ministry of Trade and Industry, 2017).

The policy aims to increase economic competitiveness by enhancing Rwanda’s domestic market through addressing bottlenecks in the value chains and improving quality and boosting cost competitiveness. Among the objectives of the campaign is a mind-set change to adjust the perception among consumers that imported products are superior in quality or price, dampening demand for locally made products.

The policy consists of five main pillars, including (1) creating sector-specific strategies with a focus on the textile, garment and leather sub-sectors, (2) reducing the cost of production, (3) improving quality, (4) promoting backward linkages and (5) mind-set change.

In parallel to this policy, the Government has implemented import tariffs on imported used clothes and removed import duties on raw materials for the garment sector to reduce the cost of production for the fashion industry.

**Annex 3 Companies operating according to circular economy principles**

**Table 6-3 Companies active in circular economy**

<table>
<thead>
<tr>
<th>Company name</th>
<th>Sub-sector</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agruni Ltd.</td>
<td>Waste management</td>
<td>Collection of solid waste and sorts into biodegradable and non-biodegradable and further into recyclable and non-recyclable</td>
</tr>
<tr>
<td>Wastezone</td>
<td>E-waste</td>
<td>Use of technology to help recycling actors to source for materials and households to dispose of their e-waste</td>
</tr>
<tr>
<td>Enviroserve</td>
<td>E-waste</td>
<td>Collection, dismantling and recycling of e-waste, management of the Rwanda Green Park facility for the Government.</td>
</tr>
<tr>
<td>COPED</td>
<td>Waste management</td>
<td>Collection and transportation of waste in municipalities</td>
</tr>
<tr>
<td>My Green Home</td>
<td>Plastic</td>
<td>Plastic waste management; collection of PET bottles, production in pavement and housing bricks</td>
</tr>
<tr>
<td>Eco Plastics Ltd.</td>
<td>Plastic</td>
<td>Provision of recycling services and production of new plastic products</td>
</tr>
<tr>
<td>Inyenyeri</td>
<td>Waste/energy</td>
<td>Production of fuel pellets from biomass</td>
</tr>
<tr>
<td>Greencare Rwanda</td>
<td>Organic waste</td>
<td>Organic fertilizer production</td>
</tr>
<tr>
<td>Recycl’Africa</td>
<td>Organic waste</td>
<td>Organic fertilizer production</td>
</tr>
<tr>
<td>BTACOM Ltd.</td>
<td>Plastic</td>
<td>Production of fuel from plastic waste (PET)</td>
</tr>
<tr>
<td>Company name</td>
<td>Sub-sector</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-----------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Golden Insect Ltd.</td>
<td>Organic waste</td>
<td>Production of organic fertilizers using earthworms</td>
</tr>
<tr>
<td>Agroplast Ltd.</td>
<td>Plastic</td>
<td>Transforms plastic wastes into different kinds of packaging solutions</td>
</tr>
<tr>
<td>GreenAfrika-Rwanda</td>
<td>Plastic (alternative packaging)</td>
<td>Development of alternative packaging materials to replace single use plastics</td>
</tr>
<tr>
<td>Umuti Ltd.</td>
<td>Plastic (alternative packaging)</td>
<td>Uses fibre from banana stalks to produce paper and paper bags</td>
</tr>
<tr>
<td>Rwanda Biosolutions Ltd.</td>
<td>Organic waste</td>
<td>Production of organic fertilizers from grass and domestic wastes</td>
</tr>
<tr>
<td>Kamel Manufacturing</td>
<td>Wastewater</td>
<td>Works with grey water systems</td>
</tr>
<tr>
<td>Ampersand</td>
<td>Transport</td>
<td>Assembles and finances electric motorcycles; Builds and operates a network of battery swap stations</td>
</tr>
<tr>
<td>Safi Universal Link Mobility</td>
<td>Transport</td>
<td>Manufactures and assembles electric vehicles</td>
</tr>
<tr>
<td>Rwanda Electric Motorcycle Company</td>
<td>Transport</td>
<td>Assembling electric motorcycles</td>
</tr>
<tr>
<td>Strawtec Building Solutions</td>
<td>Construction</td>
<td>Produces construction materials from straw</td>
</tr>
<tr>
<td>UTEXRWA</td>
<td>Textiles</td>
<td>Sustainable textile production</td>
</tr>
</tbody>
</table>
Annex 4  Initiatives active in women and youth involvement

Table 7-3 Initiatives active in women and youth empowerment

<table>
<thead>
<tr>
<th>Company name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soft packaging</td>
<td>Recycling plastic and bio-degradable waste to produce various agriculture, household and water products (over 60% of its workforce are women)</td>
</tr>
<tr>
<td>Agro plast</td>
<td>Transforms plastic wastes into different kinds of packaging solutions</td>
</tr>
<tr>
<td>Eco-plastic</td>
<td>Plastic recycling and production of new plastic products, over 60% of workers are women</td>
</tr>
<tr>
<td>My Green home</td>
<td>Producing pavers out of recycled plastic, sand and construction waste (female-led), making bricks from PET plastic waste, majority of employees are women</td>
</tr>
<tr>
<td>Angaza</td>
<td>Female owned company that recycles plastic banners into handbags (100%)</td>
</tr>
<tr>
<td>Uzzuri</td>
<td>Textile and shoe company the recycles rubber and cloth material to produce slipper and comfortable shoes (female-led)</td>
</tr>
<tr>
<td>Green Fighter</td>
<td>Female-led company (unsure what they produce)</td>
</tr>
</tbody>
</table>

Annex 5  Methodology and prioritization matrix

Methodology

In order to take the sector assessment further and to arrive at the priority sectors, the elaborated prioritisation criteria have been scored during one of the brainstorm sessions based on a simple three score system, with 1 ranking the lowest and 3 ranking the highest. The ranking of the GDP contribution relies on a quantitative distribution of GDP percentages to a certain score: a low rank has been assigned to the values between 1-5%, the medium to 6-10% and a high score to >10%.

The other three criteria are based on a qualitative assessment. The scoring of the alignment with policies (governmental plans) displays the mentioning of circular economy in existing policies and ongoing plans of the Government, while the circular economy potential and women & youth involvement are based on the number and extent of opportunities identified.

Priority sectors

Summarising the results of the sector assessment, by means of the assessment matrix, four key sectors have been derived which scored the highest in the assessment criteria. These are the:

- Waste sector, including e-waste, plastic waste and organic waste;
- Agricultural sector;
- Construction sector; and
- Water sector
**Table 6-4 Prioritisation matrix**

<table>
<thead>
<tr>
<th>Waste</th>
<th>Water</th>
<th>Transport</th>
<th>Construction</th>
<th>Textile</th>
<th>Agriculture</th>
<th>ICT</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP contribution</td>
<td>(2)*</td>
<td>(2)*</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Alignment with policies</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>CE potential</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Women &amp; youth involvement</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Rank</td>
<td>11</td>
<td>8</td>
<td>6</td>
<td>11</td>
<td>6</td>
<td>12</td>
</tr>
</tbody>
</table>

*Based on estimated value

**Annex 6 Comprehensive analysis of priority sectors**

**Agriculture sector: food and nutrients**

**Economic contribution to GDP**

Agriculture is the main economic activity in Rwanda with 70% of the population engaged in the sector, and around 72% of the working population employed in agriculture. However, compared to the engaged working force, the agricultural sector accounts for ‘only’ 26% of the national GDP (in 2020/2021)

Due to its large employment, the agricultural sector has huge potential to drive the generation of inclusive green jobs. On the African level, millions of jobs could be created by 2030 through circular food systems.

**Policies**

The National agricultural policy of Rwanda, updated in 2017 in response to the changes facing agriculture and the food system nationally, regionally and globally, stresses the need for a more resilient agriculture. The Rwanda Strategic Plan for Agricultural Transformation 2018– 2024 (PSTA) aims to increase productivity, nutritional value and resilience through sustainable, diversified, and integrated crop, livestock, and fish production systems (priority area 2).

Actions outlined in this strategic plan include sustainable land husbandry and climate smart practices; efficient and sustainable use of inputs; effective and efficient irrigation following the IWRM (Integrated Water Resources Management) frameworks. Most of these actions embed circular economy indicators in the agricultural sectors namely production of agricultural commodities using minimal amounts of external inputs, losing nutrient loops and reducing negative discharges to the environment and valorising agri-food wastes. It also includes actions focused on the reduction of food losses and improving revenues of the farmers (priority area 3).

Under area 4, the strategy advocates the sustainable use of resources and promotes environmentally-sensitive options for development in all stages of the value chain. Interventions range from promoting sustainable land and water management to stimulating efficient resource use in value addition and processing. Finally, it also promotes environmentally sustainable practices, and the area gives high priority to building productive resilience to climate change by promoting climate smart practices and technologies.

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68 National Institute of Statistics of Rwanda (2021) GDP – National Accounts (Fiscal Year 2020/21)
69 World Economic Forum (2021) Five big Bets for the Circular Economy in Africa
Overview

The agricultural sector is dominated by small-scale, subsistence, rain-fed farming, relying on traditional technologies and practices, which makes the sector vulnerable to rainfall variability. Large-scale operators increasingly practice irrigation (approximately 25%). Tea and coffee are the major exports while cassava, potatoes, sweet potatoes, maize and beans are the most productive crops. Rwanda exports dry beans, potatoes, maize, rice, cassava flour, maize flour, poultry and live animals within Eastern Africa.

Circular economy practices in the agricultural sector in Rwanda is mostly visibly implemented by using organic waste of compost as fertiliser. In addition, farmers use organic waste residues of processing activities as animal feed. The technique to store, collect and separate different crops and waste materials is applied by the reuse of containers, baskets and equipment by different actors. Recycling practices are applied by using agricultural bags and jerry cans in daily agricultural activities. Input suppliers recycle old papers into paper bags for selling products to consumers. It is rare to find practices such as energy production from waste, use of renewable energies and artificial irrigation especially in the agricultural informal sector.

Precision agriculture increases efficiency and reduces waste. It makes it possible to use fertilisers and chemicals according to the needs of the soil, trying to provide the right amount of substances at the right time and in the right place. This optimises performance while reducing the environmental impact. Precision agriculture is rarely practiced amongst the country’s agricultural practitioners. A concept that is well-practiced is agroforestry promoting regenerative practices in the sector.

This is supported by the Agroforestry Strategy under the Ministry of Agriculture and Animal Resources.

Initiatives from the public sector include an irrigation system in the Nasho sector in eastern Rwanda, initiated in the Howard Graham Buffett Foundation’s and the Government of Rwanda.

Another Government initiative, launched in 2006, is called Girinka (“have a cow”) that gave one dairy cow to every low-income family as part of a poverty alleviation strategy. By June 2016, 248,566 cows had been distributed to poor households. Besides supporting nutrition and employment, this initiative was a booster to family agropastoral systems that promote regenerative agriculture. New cattle breeds have been developed for higher milk yields, and manure was used for crop fertilization and biogas. Girinka can be perceived as a form of a universal basic income (UBI) by supplying every poor household with a cow (non-monetary but culturally appropriate).

Developed in Rwanda, for Rwanda, it is an interesting and regenerative approach to UBI for a country with limited fiscal ability. It could also be a good starting point to encourage higher activities in agropastoral systems (mix of crop and animal components) which closely relate to the circular economy.

In an effort to reduce malnutrition, Rwanda’s Government launched the Akarima k’igikoni initiative as part of a model village planning program in the whole Southern Province in 2019. The Government provides staff, materials, and seeds to build kitchen gardens in each house of the village. There are 338 households sheltering a population of 1,525 people who benefited from this program to-date in Gishyushye Village (Kanamugire, 2019). The Government collaborates with the citizens to build the kitchen gardens in all the households of the model village by training them on gardening practices, so they can also help their neighbours in the process. It even involves the community in organising campaigns to collect seeding plants and gardening materials or funds to buy them. Akarima k’igikoni though a rural area initiative, a study carried out in Kigali Peri-urban area revealed that 5 % of respondent used this regenerative agricultural practice as a way to get food during lockdown.

Initiatives from the private sector come from some major companies in the agricultural sector that have put in place a set of strategies that embed circular economy principles. Examples are Kitabi and Mata tea company that have yielded benefits, such as energy efficiency and reduced GHG emissions due to reduced demand for fuel wood, deforestation and soil erosion reduced, water pollution reduced and less demand for water. Other examples is Greencare Rwanda that produces organic compost fertiliser, branded as GreKompost and distributes it to farmers.

70 Nijman, E. (2020) Towards circular food production systems in East Africa
71 The system consists of 63 central pivots capable of irrigating 1,173 ha of plantations, powered by a 3.3 MWp solar off grid with a 2.4 MWh battery storage system (covering 1,200 ha) and will benefit 2099 smallholder farmers who have come together in the Nasho Irrigation Cooperative (Naico).
**Opportunities**

Opportunities in the agricultural sector are diverse ranging from better connecting small-scale farms with each other or urban areas to stronger encourage the integration of regenerative, sustainable and circular farming concepts into current practices. The following table summarises key opportunities in the agricultural sector while also showing certain barriers that have to be overcome first.

**Table 7-3 Initiatives active in women and youth empowerment**

<table>
<thead>
<tr>
<th>Enabled R-Strategy</th>
<th>Opportunity</th>
<th>Gaps/Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Rethink 2 Reduce 9 Recover</td>
<td>Develop programme to better connect small-scale farmers to enhance knowledge exchange and collaboration and to provide support in terms of equipment, business advise and training for regenerative farming concepts</td>
<td>– Land fragmentation (distance between farms)</td>
</tr>
<tr>
<td>1 Rethink 2 Reduce 9 Recover</td>
<td>Develop a campaign and training programme to introduce closed-loop farming systems, including financial and technical support to integrate them</td>
<td>– Large investment need</td>
</tr>
<tr>
<td>1 Rethink</td>
<td>Integration of farming and feedstock in urban development plans</td>
<td>– Change in urban planning patterns/approaches</td>
</tr>
<tr>
<td>1 Rethink 2 Reduce 9 Recover</td>
<td>Encourage the development of closed-loop communities through the provision of financial support, advisory, trainings and equipment</td>
<td>– Mind-set favouring conventional housing and living</td>
</tr>
<tr>
<td>1 Rethink</td>
<td>Stronger promotion of concepts, like agro-forestry, can help to stabilise the soil and protect the land from erosion and nutrient loss</td>
<td>– Effort to adapt and learn about new concepts</td>
</tr>
<tr>
<td>1 Rethink 2 Reduce 9 Recover</td>
<td>Develop cooperation with international front-running projects in sustainable, regenerative and circular farming and feedstock, through research and pilot projects</td>
<td>– Restricted budget to enhance research collaboration</td>
</tr>
<tr>
<td>0 Refuse 9 Recover</td>
<td>Strengthen the production and use of organic fertiliser through promotion and subsidies</td>
<td>– Build well-functioning collaboration remotely</td>
</tr>
<tr>
<td>1 Rethink</td>
<td>Launch research project about the synergy between the water and agricultural sector</td>
<td>– Ongoing promotion and subsidisation of chemical fertiliser</td>
</tr>
<tr>
<td></td>
<td></td>
<td>– Awareness of farmers</td>
</tr>
</tbody>
</table>
Two key and fundamental challenges are prevailing in the agricultural sector in Rwanda. First, land fragmentation combined with a large share of farms being at a very small scale, and second, land degradation. Almost half of the farmland is occupied by small-scale farms which are spread across the country, covering less than 0.2ha. The land fragmentation additionally creates underemployment as the farms are too small to provide full employment.

Rwanda’s Vision 2050 anticipates a market-led and high-tech driven sector, led by professionals running large and fully irrigated farms. It also envisions that only 30% of the Rwandese population will work as farmers. **On the path to pursue this vision, small-scale farms should be better connected to expertise and equipment while at the same time the development of larger-scale farms should be encouraged by the Government.**

This could happen in form of community farms with shared ownership providing produce for a whole village. Such concepts would provide employment and empower communities, especially in rural areas, and help the transition to move away from isolated small-scale farms. In order to test this idea of community farms, a pilot project could be initiated that tests the practical and cultural feasibility. Supportive efforts from the Government could include trainings in sustainable farming, feedstock and agricultural concepts, such as agro-forestry polyculture which also stabilise the soil, making it less vulnerable to degradation and erosion, or ore integrated production systems. Something to take into consideration for the promotion of polyculture is that contradictions with the crop intensification programme should be avoided.

The critical point is that the programme might favour monoculture due to assigning certain areas to a certain kind of crop. Additionally, **closed-loop systems should be introduced to the communities that would enable to reuse water, produce fertiliser, animal feed or their own energy for cooking purposes or electricity for irrigation.** This requires a large chunk of investments that have to be made available to support the development of infrastructure and technologies needed. As this is a fundamental goal of the Government which will shape the future of the agricultural sector, international and private investors should be involved. Besides funding, they could be a source of additional expertise and lessons-learned.

In respect to the urbanisation trend, **local or regional city development plans, could include – where not yet present – the integration of urban farms and larger-scale peri-urban farms.** This could include support in the development of infrastructure to ensure transport, and thereby reduce the amount of food that gets lost, the promotion of local product on the market or the supply of technically higher skilled workforce from or equipment produced in cities.

In turn, cities would profit from lower demand of imports in the medium-term. In addition to this, **innovative initiatives, such as those related to farm-to-table, should be up-scaled as they apply circular principles to the business model as well as potentially strengthen collaboration between restaurants, markets and local farmers.** For instance, one restaurant in Kigali uses its kitchen waste to produce organic fertiliser which is applied to the restaurant owned farm. Another example is a Black soldier Fly (BSF) farm that collects kitchen waste from different restaurant in the city and uses it to grow its BSFs. These serve then as feed for chicken which is sold back to the restaurants at a lower price. In order to **support such initiatives, it would be helpful to identify waste hotspots**, e.g. markets, households or food manufacturer, as many of these initiatives already support difficulties to obtain enough organic waste to make their business model profitable. This either due to the fact that the waste collected does not have a high enough quality or – and consequently – they have to buy the organic waste from other waste collectors.

The second challenge, land and soil degradation, represents a threat to agricultural performance – it is estimated that 1.4 million tons of soil is lost per year, accounting for a loss of $320,000. On the one hand, Rwanda is one of the countries that still have enough rainfall, but on the other hand, the intensity of the rainfalls often leads to land erosion and soil degradation. Such events also negatively influence the soil acidity which hinders, for instance, the uptake of nutrients, root growth and access to water, that overall reduces productivity.
Continue promoting concepts, like agroforestry, can help to stabilise the soil and protect the land from erosion and nutrient loss. As another, more complex or long-term solution, projects that cover farmland with solar panels to protect the land from rainfall and to produce electricity (agro-photovoltaic), could be taken as an example for new innovative, agricultural and sustainable solutions that will help the country to achieve its goals. Collaboration with international front-running projects could be established to build capacity.

A related opportunity to soil degradation is the promotion, application and production of organic fertiliser. During our stakeholder consultation, we have identified a conflict of interest on part of the Government.

On the one hand, the Government is supporting the production of organic fertiliser, as stated in the Rwanda Strategic Plan for Agricultural Transformation, on the other hand, the Government is also still supporting the promotion (allowing advertisement) and selling (through subsidies) of chemical fertiliser, which is imported in large amounts. Here, the Government should take a clearer standpoint and make an authentic shift to supporting and promoting organic fertiliser in the country or set a national target and related impact indicator on the mixed use of both organic and chemical fertilizers. As a compromise, similar financial means, such as subsidies, should be provided for organic fertiliser as well in order to make it at least price competitive.

Those farmers that are willing to shift from organic to chemical fertiliser need more support in its application. As the soil develops a kind of dependency on the chemical fertiliser, the productivity of the land might drop in the short-term when applying organic fertiliser. It can take two to three years until the land is recovered and runs on organic fertiliser. This requires increasing the knowledge about regenerative farming, including the shift from chemical to organic fertiliser. Otherwise, farmers are likely to switch back to chemical fertiliser. Another supportive element could be to develop pilot and research projects on the application of organic fertiliser that prove its validity and success. An additional point falling under organic agriculture is biological pass control which also needs further exploration and a proof of concept before promotion. Reducing the amount of chemical pesticides would lower health and environmental risks, while it requires new techniques to keep insects away from the crops. Such are biological pesticides or insect traps.

As a last opportunity there is also the potential to further explore the synergies between the water and the agricultural sector. This could include the treatment of wastewater to produce grey water that is safe for irrigating crops and the production of organic fertiliser from the solid waste filtered out during the grey water treatment. Such ideas require a preceding feasibility study and later relatively large investments to provide the right technical equipment as well as trainings to develop technical expertise that enable farmers to support the practical application. Besides Government funds, private and international investors could be involved here as well.

Summarising the various opportunities in the agricultural sector related to the circular economy, it can be concluded that the circularity potential is very high in the sector. Even though in recent years this sector already became a priority sector for the Rwandese Government, still, many opportunities are unexploited when it comes to circular economy.

**Gender and youth involvement and potentials**

With recent developments in circular economy policy adoption in Rwanda, opportunities have been created for women-led companies or SMEs to explore their potential in use of agriculture raw materials, such as maize cob waste and transform them into re-usable or new products that enhance agriculture production e.g. fertilisers. A number of companies are engaged in fertiliser production however, beyond fertilisers there are other products needed for post-harvest handling and across the value chains. As custodians (i.e. 70% of women in agriculture), women are presented with the opportunity to turn food and agriculture waste into reusable products such as fertilisers.

An example is seen in a company called Soft Packaging that is transforming waste plastics into reusable agriculture and water use products. Soft packaging is technology intensive and over 60% of its employees are women. They produce various products, such as laminated woven sacks that protect stored flour from humidity and dirt and un laminated woven sacks to store grain produce like rice, corn and beans or plastic tubings (Ibihoho) that are used in storage of seedlings in optimum conditions before use. The company is also producing other household products such as trash bags and toilet paper packaging.
In the field of food product, opportunities exist for Rwanda to build women-led initiatives, leveraging on the country’s gender commitments and thresholds to promote redesigning of food systems with innovations that prevent food loss and wastage, ensuring food by-products are used at their highest value, and contributing to healthier food products.

In aquaculture, there are also opportunities for women to engage. Aquaculture is a key source of animal protein, but its growth is highly dependent on finite marine resources. Rwanda has limitations when it comes to supply and consumption of animal source proteins. The expansion of school feeding includes a menu with dietary diversity to include animal source foods, is a potential new market for women. If skilled women could make full use of complementary agriculture capabilities to develop an innovation that helps set new standards for sustainable production of animal source foods through aquaculture, such as omega-3 fatty acids for animal nutrition from marine microalgae. These opportunities and innovation furthermore help conserve the natural biodiversity by replacing fish oil omega-3 fatty acids derived from fish that is rarely eaten in Rwanda households and reduce dependency on imported fish.

Other options in agriculture to involve women and youth include natural bio-preservatives. Those help to naturally extend the shelf life of food. Rwanda’s vegetable produce is growing and it currently exports for USD14.7 million. Natural bio-preservatives are non-existent in Rwanda farms and on the food market. Such an initiative could potentially provide a solution for food markets, exporters and consumers in need of natural ways to extend shelf life for produce such as cheese, yoghurt, baked goods and beverages.

This initiative could help in extending the shelf life of fresh meat, fresh vegetables and other animal source proteins for 6 days and months for some of the frozen animal products.

**Waste sector, including plastics, electronic and organic waste**

**Economic contribution to GDP**

The waste sector plays a key role in the Government’s agenda and also in the circular economy. There is no measure dedicated to the waste sector as it is part of the sanitation sector. However, it can be expected that the contribution to the GDP is moderate and will even grow as this sector holds huge opportunities in job creation. Just to illustrate the dimension, an e-waste recycling facility has created 400 green jobs while collection centers have created more than 1,000 jobs in the country.

**Policies**

In terms of policy initiatives, the waste sector has received the highest attention through the National Sanitation Strategy, the plastic ban and E-waste Management Policy. However, circular economy specific elements are still missing. It is anticipated that Integrated Solid Waste Strategy will support the waste sector and its sub-sectors (beyond plastic and e-waste) in further developing waste infrastructure and guiding circular economy practices.

**Overview**

Rwanda is facing a growing waste challenge which will continue to increase due to growing population. This is particularly true for cities and sub-urban areas.

Although there is limited information about the waste sector status quo in the country, based on estimates and trend assessments the average waste generation rate per capita is 0.43 kg per day. Households account for about 62.1% of total waste generated in Rwanda, followed by waste from markets and public offices.

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74 The New Times (2020) Rwanda’s top 10 highly exported products
76 MINIFRA (2020) Baseline study on waste collection and recycling countrywide (won’t be included in the final deliverable)
The waste separation patterns usually depend on the area (rural or urban). Urban households evacuating their waste in compost dumping (46.9%), private dust bins (24.1%) or on farms (13%). The bins provided are for organic and non-organic wastes. Disposal in the rural areas happens through compost dumping (54.7%), on farms (30.9%) or in the bush (10.1%)\(^7\).

There was an attempt from the Government to target waste separation in 2012. The campaign saw the training of households to separate waste and waste collectors collecting organic and inorganic waste separately. This was however unsuccessful because of slack guidelines at the landfills – collectors could not offload waste systematically, leading to contamination of the sorted waste\(^8\).

Another effort to support waste separation is the penalisation of mismanagement of waste through the application of fines. Those are specified in parts, and a series of fines are laid out for interfering enforcement action for businesses. In order to motivate the civil society to properly separate the waste, Governmental instructions call upon everyone’s responsibility to segregate wastes according to their types before waste collection by authorised collectors.

The collection of waste is managed through private companies contracted by municipalities. Outside Kigali, operation areas within provinces are designed at district level. Airports, government institutions, hotels, industries, hospitals and health facilities, schools, commercial complexes, public markets, diplomatic mission and international organisation offices may choose to contract with different providers directly through engagement both inside and outside Kigali. The waste service providers do not receive direct subsidies from the Government, but their operation is facilitated by a degree of exclusivity in service provision on a sector level.

The collection rate in cities highly varies depending on the waste infrastructure present. For instance, in Kigali, the total amount of waste collected increased from 180 tons per day in 2012 to more than 500–800 tons per day in 2016. This adds up to 49% of MSW\(^9\). However, in Huye (a district in the southern province in Rwanda) the collection coverage is only 6%\(^10\).

After the collection, there is no source separation, and normally all waste ends up at landfills. Besides MSW, this includes serviced, commercial and industrial waste. The City of Kigali and the Water and Sanitation Corporation (WASAC) are currently managing Nduba dumpsite through the contractor hired for the daily management of the dumpsite.\(^11\)

On site of landfills, there are some manual sorting undertaken by authorised waste pickers. However, a large amount of plastic waste is still mingled with organic waste at dumpsites. As a result, they are in a critical condition threatening the workers and surrounding environment – there is no waste processing apart from waste sorting after collection, waste spreading and soil coverage, and no leachate treatment or gas management in place either.

The composition of collected MSW can be categorised in the following five main streams, with organic waste representing the largest share:

- **greens**, comprising garden waste and agricultural residues; and (2) **food waste**, comprising domestic kitchen waste, commercial organic waste and industrial by-product waste (both make 74% of the total MSW in Kigali – this fraction is expected to reach 90-100% in rural areas due to higher levels of farming and consumption patterns).

- (3) **recyclables**, comprising all packaging waste products, with the largest chunks coming from plastic and paper (10% of the total MSW in Kigali).

- (4) **other waste** comprising textiles, special care waste, and other waste (e-waste and inert waste) (this makes 15% of the total MSW in Kigali, of which other waste contributes to the highest degree with 12%).

- (5) **construction & demolition waste (CDW)** comprising all building industry waste (making less than 1% of the total MSW in Kigali).\(^12\)

\(^7\) REMA (2016) Operationalizing green economy transition in Africa  
\(^9\) Ibid.  
\(^11\) Water and Sanitation Corporation (2019) WASAC Projects  
\(^12\) Rapid Assessment & Options Analysis: Waste Disposal in the City of Kigali report (2019)
The composition of waste clearly shows potential to gain more value out of the collected waste. This is the reason why we have put special attention to electronic, plastic and organic waste fractions. These fractions can be expected to rise with shifting consumption patterns and increasing urbanisation.

We also consider wastewater (under the water sector) as particularly relevant given its overlap with the agricultural sector.

Only 2% of the MSW is currently being recycled, and an even lower percentage of organic waste is used in a beneficial manner. Although there is a central disposal system, some people still continue to dump their solid and liquid wastes illegally in rivers, wetlands, ditches and road sides. Multiple critical waste management issues have been identified at the designated landfill sites like Nduba dumpsite.

The Government is taking action to mitigate the risks caused by the Nduba site. Alongside the City of Kigali, and the Global Green Growth Institute (GGGI), the Government launched the project “Waste to Resources: Improving Municipal Solid Waste (MSW) and Hazardous Waste Management in Rwanda” in August 2021. The project is led by the Ministry of Environment and funded by the Government of Luxembourg for a 3-year period. Its aims are varied: to promote organic and plastic waste; increase collection of electronic waste; increase community awareness, build capacity, and improve the policy and regulatory environment for circular economy initiatives in the waste sector.

The project has the potential to be replicated at other waste management and collection sites across Rwanda.

Initiatives in the private sector coming from e.g. Agruni Ltd. Or COPED. Since its inception in 2016, Agruni Company Limited has been involved in waste management in Kigali. Agruni collects solid waste and sorts into biodegradable and non-biodegradable and further into recyclable and non-recyclable, Agruni extracts approximately one truck of waste a week, which is equivalent to approximately 20 tonnes a month. COPED Rwanda is a similar company involved in waste management and transportation in Kigali that collects waste from residents and commercial institutions.

They sort the waste into various categories, i.e. bio-organic, recyclable, non-recyclable, organic waste, hazardous waste. COPED has facilities which transform dry biomass waste into briquettes.

**E-waste**

Rising population, economic growth and modernisation significantly drive up the demand for electrical and electronic equipment (EEE) which will also increase the e-waste generation. Based on a survey, conducted in 2014–2015, Rwanda has a potential annual e-waste generation of 9,417 tons of which 81.52% are contributed by individuals, 12.14% by public institutions and 6.43% by private institutions. For instance, e-waste generated from solar products represents 5% of waste generated from EEE. Conservative estimates show that already in 2017, over 250,000 solar products will be sold in Rwanda, reaching half a million by 2021. In an effort to reduce the e-waste generation in the country, the importation of used electronics/ICT equipment is restricted and regulated by the Ministerial Guidelines No: 1 of 25/10/2011 in order to minimise EEE’s potential adverse effect on human health and the environment.

Rwanda is one out of 13 African countries that regulate e-waste through its national e-waste Management Policy. The policy provides for enactment of specific legislation for management and disposal of e-waste to safeguard human life and the environment. It considers international conventions such as the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal or the Millennium Development Goals. The framework includes the offer of financial incentives to individuals who collect e-waste from the community and bring it to the e-waste recycling plant. The incentives are based on weight, with community members offered US$100 for 13–15 kilograms of e-waste collected. These incentives aim to motivate people to embrace the importance of having a clean environment.

In connection to the e-waste policy, in 2017, Rwanda’s Green Fund FONERWA invested close to $1.5 million to establish an environmentally friendly e-waste collection centre and dismantling and recycling facility, run by Enviroserve, located in the Buge seera district. The facility, which is the second of its kind in Africa, has the capacity to process 10,000 tonnes of e-waste annually and collects end-user electronic equipment’s from offices and homes and either refurbishes them or recycles the raw materials.
The refurbished or recycled output can be used by local and regional plastic and metal manufacturers to produce new products, thus supporting Rwanda’s efforts to foster a circular economy. The cost to collect, transport and properly treat approximately 8,500 tonnes of e-waste, including solar products expected to be generated in 2017 is approximately €550,000, with an average economic impact of a cost of 65 €/t distributed across all products.

In 2018, the Government of Rwanda signed a lease agreement with Enviroserve Rwanda Green Park acting as a subsidiary of the Emirati Company Enviroserve Services LLC from Dubai to manage the recycling facility until 2028. When e-waste is delivered to the facility, it is sorted, tested and dismantled. Plastic electronic casings are removed, sorted, shredded and stored. In Rwanda local markets for final recovery can be found for base metals like steel, copper or aluminium while for more complex fractions local recyclers need to rely on international actors.

Metal components like aluminium, copper and steel are recovered and sold to recyclers and smelters, while motherboard recovered from computers are shipped to the Dubai based Enviroserve facility to extract precious metals. Rechargeable batteries are also removed and stored in the facility. By some estimates, with increasing volume, it would be viable to treat fractions in Rwanda, rather than exported as presently, both at a country and company level. For example, with an expected 6,000 batteries from solar home systems to be disposed of in Rwanda in 2016 alone, the scale of value will tip from outsourcing to in-house disposal in the next two years.

In addition to the recycling plant, Rwanda has also established a series of collection centres in each district across the country that have created more than 1,000 jobs.

Other innovative businesses, like Wastezon, use technologies to compliment government efforts in e-waste management. They connect homes to recycling facilities for processing e-waste. Wastezon uses technology to help recycling actors to source for materials and households to dispose of their e-waste. Wastezon has 150 e-waste scrapers, 162 households, and collected over 416 tons of e-waste through its mobile application.

**E-waste**

Plastic waste represents a relevant share of the total waste generated in Rwanda (between 5–<10%) that mostly ends up in the environment due to insufficient waste disposal and collection. Based on the daily MSW generation in Kigali and the share of plastic waste (5%), the volume of plastic waste generated in Rwanda can be estimated at 95.4 ktons per day. Of the plastic in use, 70–80% is claimed to be recycled. The rest can be assumed to be landfilled, as this is the main disposal practice in Rwanda and other practices are difficult to be traced. However, from our interviews, there are initiatives that pick out plastic waste from landfills and reutilise it to produce fashion accessories and other items.

In 2019, the Government of Rwanda issued a ban on the importation, manufacture, sale and use of plastic carry bags and single use plastics in Rwanda. This legislature supersedes the law 57/2008 from 2008 which prohibited the importation, manufacture, sale and use of polythene bags. This ban had major impacts on the plastic manufacturing industry as well as on the packaging industry. While the plastic manufacturing industry literally vanished, 14 companies focussing on plastic recycling operate in Rwanda (data from 2019). For the packaging industry, this triggered innovation in terms of finding alternative packaging materials (which is still at a rather small scale).

However, it also created a competitive disadvantage for Rwandese companies, as foreign companies are still allowed to export products packaged in plastic to Rwanda while local companies are restricted and lack knowledge of viable alternative materials. This led to the tendency of importing alternative packaging products as the domestic production is not able to supply alternative materials, such as paper and cardboard, in quantity and in a cost-effective manner.
However, the recently launched guidelines, developed by REMA, provides procedures and conditions for eligibility to grant exceptional permission to manufacture, use, import or sell single-use plastic items or pack goods in single-use plastics. This should tackle the pressing issue mentioned above. However, considering that the import rates of packaging materials are growing due to the growth of the manufacturing sector, there is a need to strengthen the local packaging manufacturing industry (from alternative materials) and incrementally reduce the import of packaging materials.

So far, the Government has initiated smaller projects related to alternative packaging materials on individual segments packaging solutions. Other segments, such as small sacks and bags, labels, paper containers and non-corrugated bags, have domestically available producers. Governmental efforts related to plastic pollution include the Beat Plastic Pollution campaign or a mandatory clean-up day, called Umuganda. Additionally, the Government supports recycling and reuse of economically valuable waste products, such as plastics and organic waste for fertilizer and fuel, with an eventual transition to mandatory waste management for households and businesses.

Following the government legislation against plastic carry bags and single use plastics, the waste company COPED has started efforts to collect these single use plastics and convert them into construction materials like tiles, roofing tiles and paving stones. The waste is collected from beverage suppliers. The company also uses windrows for aerobic composting and sells to customers.

More private initiatives in plastic recycling include e.g. My Green Home or Agroplast. My Green Home is a female led company producing pavement and house bricks from PET plastic waste. Agroplast transforms plastic wastes into different kinds of packaging solutions.

Organic waste

The share of organic waste makes the largest share of the MSW in Rwanda (74% of waste collected and disposed per day). Due to insufficient waste separation across the entire value chain (including consumers and waste operators), where green waste (mainly yard-derived waste) and food waste are mixed with other waste fractions – which is especially the case in low- and middle-income areas – the majority of the organic waste ends up at landfills, contaminating other in-organic waste at the landfill site. Another crucial reason that hinders the valorisation of waste is the amount of food that is lost on transportation or through insufficient storage. Rwanda loses and wastes 40% of total food production each year (post-harvest food losses). This represents 21% of its total land use, 16% of its greenhouse gas emissions, and a 12% loss to Rwanda’s annual GDP.

The topic of organic waste is mainly covered in the Rwanda Strategic Plan for Agricultural Transformation 2018–2024 (PSTA), which we will come back to under the agriculture sector, and the regulation on governing solid waste recycling in Rwanda from 2015. The production of fertiliser is addressed as the only recycling activity of organic waste.

According to the recent NISR’s Agricultural statistical survey, 55.7% of farmers used organic fertilizers while 24.6% inorganic fertilizers; this highlights the need of value-added strategies that transform organic waste into compost. In addition to this, support interventions for utilization of organic waste as part of waste-to-energy projects.

From the private sector, there are a few initiatives that valorise organic waste and produce organic fertilisers, biogas or (insect–based) animal feed. They usually obtain their input material (organic waste) from waste pickers that sort waste at landfills after waste collection. However, private companies lack Government support while local organic fertiliser producers in particular see themselves disadvantaged compared to imported chemical fertiliser producers, that are subsidised and promoted.

Opportunities

The opportunities in Rwanda’s waste sector are very diverse and depend on the sub-sector and its characteristics. However, all sub-sectors would profit from an improved waste management and the application of lessons-learned from more advanced sub-sectors, such as e-waste and plastic. The following table summarises key opportunities in the waste sectors while also showing certain barriers that have to be overcome first.
## Table 7-6 Opportunities in the waste sector

<table>
<thead>
<tr>
<th>Enabled R-Strategy</th>
<th>Opportunity</th>
<th>Gaps/Barriers</th>
</tr>
</thead>
</table>
| 8 Recycle 9 Recover | Improvement of waste management, incl. supporting correct waste separation at source (incl. enforced rules for households), proper and expanded waste collection, more complete data on waste, improved sanitary conditions and final treatment, through integrated waste management strategy and standards or guidelines. | -Lack of knowledge of consumers and waste operators  
- Lack of infrastructure, e.g. street to landfill  
- Sanitation conditions at landfill site  
- Lack of data |
| 8 Recycle          | Increase recycling and reuse rates through trainings, incubators and financial incentives | Lack of incentives for and know-how in the private sector |
| 3 Reuse            | EPR system in the plastic packaging and e-waste sub-sectors | - Insufficient separation, collection and disposal patterns |
| 1 Rethink 2 Reduce 8 Recycle 8 Recycle | Upscale local plastic recycling and alternative packaging initiatives through regulating imports of plastic packaged products and alternative packaging materials, financial incentives, business support and research projects. Apply successful e-waste recycling center to other districts and perhaps integrate more circularity aspects, such as refurbishment of electronics | - Lack of infrastructure and financial means to bear the responsibility  
- High imports of alternative packaging materials and plastic packaged products; Lack of regulation of imported products (cap or tax)  
- Lack of supportive financial incentives for local initiatives  
Lack of infrastructure and capacity in less urbanised and low- and medium-income areas |
| 5 Refurbish 6 Remanufacture 7 Repurpose 8 Recycle 9 Recover | Tailor awareness campaigns to: - proper e-waste disposal for civil society and businesses - general waste management | Lack of awareness |
| 5 Refurbish 6 Remanufacture 7 Repurpose 8 Recycle 9 Recover | Building upon the E-waste Policy, establishment of a training center in e-waste valorisation that builds capacity and necessary skills in the sector on different lifecycle stages | Available financial resources |
The waste sector represents a key sector to enable the circular economy. This requires high waste separation and collection rates in order to perform different material specific activities in recycling, reuse or up-/downcycling. As the majority of waste, throughout all material streams, is still landfilled, the first and foundational opportunity is to further **improve the waste management** in Rwanda, so that it is able to provide high-quality inputs for closing material loops.

This should include the development of an integrated waste management regulation and standards that facilitate the waste collection and treatment done by private companies, ensuring that all landfills fulfil sanitation standards (such as gas leachate management on-site to avoid toxification), better connect the waste operators with industries that might use waste and/or recycled materials as alternative inputs to their manufacturing activities, or provide necessary support in know-how and financial incentives to comply with regulation and standards.

A stronger effort is also needed to ensure a complete coverage of waste collection in each district and neighbourhood. As some areas, especially rural villages, are rather difficult to reach for private waste companies managing the waste in urban areas, communities need to be encouraged, empowered and equipped to establish small-scale systems that deal with the waste. Here, the support of the public sector is required.

An improved waste management can only be reached when private and public sector work hand-in-hand. As a last element it is fundamental to improve the data availability and collection related to waste in order to make well-informed decisions about the waste sector. Currently, the data availability is better for industrial waste than waste from households, however, on both sides it has to become more complete to enable the waste management. This could be addressed by establishing a mandatory reporting system for waste companies.

Coming now to the more specific opportunities related to each waste stream, improvements in the national integrated waste management should also include an EPR system for plastic packaging and e-waste in order to reduce the amount of waste ending in nature or landfills where it is harmful instead of adding value. Developing such a system also requires addressing prevailing challenges and gaps that occur in relation to separation and collection rates that inevitably influence the quality and quantity that an EPR system may come up with. These have to be drastically improved through educating consumers, training waste collectors and ensuring the financial and know-how capacity as well as collaboration of private companies that participate in the system.

Complementarily, refill initiatives for common drinks, such as refilling re-useable glass bottles with water and milk can be strengthened to reduce the amount of packaging material in use83.

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83 Refill Ambassadors or milk bars
For the plastic waste stream, there is potential to **scale-up existing plastic recycling initiatives on a company and community level** (officially 14 companies). This could be done through the private sector engagement model introduced later in this report. PET in particular offers a good investment opportunity compared to other plastic materials, as it is more abundant and can be easily recycled.

For a successful uptake, a local market (demand) has to be created. As a lot of plastic packaged products are currently imported, this would require reducing such imports to strengthen local businesses that utilise recycled plastic materials for their packaging or other products. Additionally, there could be the opportunity to export recycled plastic once the local demand is met.

From an environmental and lifecycle perspective, the amount of plastic should be reduced in the long-run. Thus, in parallel with strengthening the **local plastic recycling, local initiatives that support the development and growth of the local supply of alternative packaging materials** should be supported. Such initiatives ultimately contribute to replacing plastic and the import of alternative packaging materials. However, some locally manufactured packaged consumer goods are clearly disadvantaged against their imported equivalents.

For instance, printing of un-corrugated cardboard boxes is three times more expensive as shrink wrapping while importing paper packaging is more attractive financially. This fact calls for supportive financial incentives and the regulation of imported products, e.g. through an import tax. Furthermore, projects exploring more environmentally-friendly plastics should be initiated. One example is the currently ongoing project on oxo-biodegradable plastics.

**Other small-scale initiative that could be supported through especially financial support are those that produce fuel from plastic waste that cannot be recycled**, such as Btracom Ltd. This could be accompanied with research projects that examine the potential of up-scaling the project and if it interferes with Government plans.

**Successful initiatives related to reducing e-waste and plastic waste can be up-scaled, applied in other districts and for other waste streams.** These include:

- The e-waste collection centre & recycling facility. The model and approach in terms of collaboration across different ministries, Governmental agencies and the Green Fund and can be copied to other districts. Apart from recycling, other circular economy elements could be integrated, such as refurbishment of electronics, if this turns out to be cost-effective. Once the country’s e-waste recycling capacity is built up, the potential of collecting e-waste on a regional level could be explored.

- Awareness campaigns related to e-waste management within the Government can be developed/adjusted for the private sector and civil society, so that proper disposal is encouraged.

- The weight-based financial incentives to collect e-waste and bring it to the e- waste recycling plant could be applied to plastic waste, especially regarding the potentially increased use of single-use plastic waste through the exemptional permission.

- Awareness campaigns and clean-up days related to plastic waste can be extended to general waste management and the importance to separate household and industrial waste properly.

- The training center that is suggested in the e-waste policy to train students practical skills in e-waste recycling should be realized as soon as possible. This will help to build capacity and necessary skills in the sector. In addition to this, once this pilot is successful, the training center could also teach circular economy skills in other sectors. As circular economy is not limited to the end-of-life stage, other lifecycle stages should also be considered, such as design - this stage determines the level of circularity potential during use and at the end-of-life of each product.

- Enforcement of the plastic law and ban through REMA, making sure that firms comply, can be extended to waste separation of households and companies in order to decrease the amount of waste ending up in nature, the amount of waste getting contaminated and ultimately to increase the amount of waste that can serve as input for new products.
For the organic waste stream, there is a clear opportunity to regulate the different activities that can be done to valorise organic waste - to date, only the production of fertiliser is included in the national Agriculture Strategy on a very high level, while the reuse of organic materials is not specified in the national Sanitation Policy nor in the Organic Law.

An amendment in one of these regulations could include the production of biogas and feedstock. Prior to this, feasibility studies should be used to explore these opportunities and their exact implications. A starting point represents the study from Mucyo, published in 2013, that examines the potential for treatment of organic waste using biogas technology, based on the experiences of a plant in Kigali.

In combination with the legal integration, guidelines should be developed to provide support and direction for people who want to exploit circular opportunities in the field. These can be based on national best practices. Generally, the interviewees whose initiative represent circular economy best practice examples expressed openness to take part in the development and share their experiences and practices, such as Recycl’Africa.

Connected to previously mentioned opportunities, organic waste has to be separated from other waste fraction to ensure uncontaminated waste fractions. Various stakeholders highlighted that previous trials from the city to enforce household waste separation failed due to the lack of any clear downstream sorting. Conversations with various stakeholders, including some waste collectors and regulators, indicated that a targeted waste separation campaign was attempted in 2012. As part of this campaign, households were trained to separate waste and waste collection companies were asked to collect organic and inorganic waste separately.

However, the lack of any stringent guidelines at the landfill, where comingled recyclables were to be further separated into individual fractions, along with a lack of necessary infrastructure (such as internal roads) meant that waste collection companies struggled to offload their waste in a systematic manner, leading to the contamination of inorganic waste. As such initiatives have been dropped. These should be taken up again with the focus on developing enforced guidelines for households how to separate their waste and for waste operators at landfills.44

When developing regulation, campaigns or guidelines, they should be well integrated with agricultural sector and wastewater sector, as there are strong synergy potentials. For instance, as a by-product of treating wastewater, more organic waste can be provided which could be used to produce biogas or fertiliser. At the same time, enough fresh water is crucial for a functioning agricultural sector as Rwanda’s economy is dependent on agriculture.

Considering all the mentioned opportunities, it can be concluded that Rwanda’s waste sector obtains a high circular economy potential. This is not only because the waste sector is an enabling sector for all other sectors, but also because it obtains still many opportunities to further improve the circularity in the sector. Clearly, Rwanda is a front-runner in Africa when it comes to e-waste recycling and plastic waste reduction, nevertheless, these sub-sectors would profit from a further exploration of other circular economy strategies than recycling.

The organic waste sub-sector still holds a lot of low hanging fruits which, if borne, can have a large impact of the overall circularity, decarbonisation and economy of Rwanda.

Gender and youth involvement and potentials

Like other developing countries, waste handling in Rwanda represents a considerable source of income, especially for the more disadvantaged female groups. A big proportion of women are engaged in waste collection and waste picking and manual recycling of products. However, managers and owners of Waste Management and recycling are very few. Leveraging on their involvement and experience, the Ministry of Environment could potentially develop projects that attract women entrepreneurs who could be help improve sanitation and sustainable consumption through solid waste management, proper sanitation behaviour.
This will not only increase their household income but also generate returns for their other women employers and employees. A number of initiatives could include attracting women from poor ubudehe categories to engage in solid waste collection from households, public places and industries to recycle them into re-usable products such as cosmetic and sanitary products.

The fact that such initiatives are generally capital and technology intensive, there's need for the ministry to attract funding that will in turn enable women-led initiatives to engage in start-ups, that could absorb women from poor families and provide employment opportunities the women workforce - disadvantaged groups, and women in particular, should be at the core of initiatives to modernise waste management.

Rwanda has over 60% of youth population and this statistic is growing. It also means that the reproductive age is expected to spiral into more household waste of single use products such diapers and sanitary pads. Yet most of these waste products form the bulk of city landfills. Women as the main custodians of these products could potentially engage in entrepreneurship that produce recycled compostable diapers and sanitary pads. Processing single use diapers and sanitary pads might be easier for women than men as they are the custodians and consumers of these products. Women as consumers of this product could redesign diapers and pads with compostable inserts to address the waste problem but also scarcity of such products in the Rwanda's rural areas.

An example of a woman-led company is Gorilla 2000 computers (now closed) that used to recycle computers could be re-initiated or other initiatives for the purpose of promoting circulatory opportunities women could attain but this time with a focus on recycling local ICT equipment.

**Construction sector**

**Economic contribution**

The construction sector contributed to around 7% to national GDP, and 8% to national employment (2012-2017). Furthermore, according to the Business Monitor International forecast, the construction sector is expected to grow by 9% per annum until 2021, which is the second fastest growth rate in Sub-Saharan Africa.

**Policies**

The National Green Growth and Climate Resilience strategy (GGCRS) that aims to foster green growth and low carbon development of the Government, 2011 has highlighted that buildings should be designed to reduce the demand of energy and water and to support waste recycling.

The National Strategy for Transformation (NST 1) 2017–2024, the implementation instrument for the 7-year Government program, which follows the Economic Development and Poverty Reduction Strategy (EDPRS2, 2013–2018), and finalise the implementation of the Vision 2020, as well as the first four years of Vision 2050 are key documents.

They urge the country to accelerate urbanization because of its transformational potential and its association with higher productivity and income opportunities. Construction is one of the most important pillars of urbanization and therefore occupies a place a choice in the global development strategy of Rwanda.

Building in a more sustainable manner is high on the Government agenda. For instance, the National Housing Policy, rolled out in March 2015, aims to fast-track affordable housing projects and furthermore encourages the use of local, green and affordable building materials.
Overview

Due to increasing population growth, an emerging middle class and the urbanisation trend, Rwanda will face a construction boom in cities - in the real estate sector this will create a demand particularly for affordable housing solutions. For instance, housing requirements in Kigali by 2022 are projected to be 458,265 dwelling units\(^8\), of which 186,163 dwelling units shall be affordable housing.

It is estimated that an average person consumed about 46 kg of materials – mainly construction and industrial minerals, fossil energy carriers and biomass, and produced 1.45 kg of waste on a daily basis in 2011\(^8\). The rapid increase in Rwanda’s population and industrialisation is expected to intensify pressures on environmental and social and ecological living that will eventually deplete natural resources.

The industry in Rwanda is being transformed from state-funded to private-funded resulting in more private real estate developers coming on board to develop housing estates for commercial use. Similarly, several private investors have come on board to develop commercial and industrial areas using private funds.

Major products used and produced within the country include lime production, clay tiles and cement. In 2011, lime production rose to 62.4% reaching 1,405 tons from 865 tons in 2010 (more recent figures are needed for update). Moreover, bricks and tiles also rose by 10% while cement decreased by 11%. However, this does not meet the local demand as there is a trade deficit with imports remaining relatively high (10 times more) than exports. Regarding construction waste, there is a lack of data on how much is actually generated, both in the country overall and in the capital. Confirmed by our research and stakeholder consultation, the majority of the construction and demolition waste (CDW) in Kigali is disposed off in the environment due to low willingness of the construction companies to properly separate and the difficult transportation situation to the city landfill.

One important example of ongoing initiatives in the construction sector is the memorandum of understanding signed in 2016 between the Rwanda Housing Authority and the Singapore Building and Construction Authority to promote the development of green buildings and cities in Rwanda. They developed a mandatory standard for sustainable buildings (Rwanda Green Building Minimum Compliance System contained in the Rwanda Building Code) which all property developers must adhere to and comply with. This standard is applicable to the majority of buildings\(^8\). It has five major crucial domains\(^8\) to focus on with more than 30 plus indicators (or sub-domains) and it also ensures the design together with on-site verification to ensure the full compliance. Efforts have been done to promote the uptake of the system, e.g. through a regional network webinar, organised by ICLEI Africa, GGGI and RHA\(^9\).

The Rwanda Green Building Minimum Compliance System adopted by the Rwanda Housing Authority encourages the use of sustainable building materials. As a response, companies, like Strawtec Building Solutions, produces compressed straw materials from local materials. Straw is an abundant agricultural waste that is a good thermal and acoustic insulator\(^9\). Others, like My Green Home, which was also mentioned under the plastic waste sub-sector, convert plastic waste into construction material.

Opportunities

The opportunities identified in the construction sector are numerous and address two key lifecycle phases of a building – its design and end-of-life phase. The following table summarises key opportunities in the construction sector while also showing certain barriers that have to be overcome first.

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\(^8\) OECD (2015) Material Resources, Productivity and the Environment

\(^8\) i) commercial buildings, ii) public administrative and institutional buildings iii) social, cultural and assembly buildings, iv) health facilities, and v) educational buildings

\(^8\) The five major crucial domains are: (1) Energy efficiency; (2) Water efficiency; (3) Environmental protection; (4) Indoors environmental quality; (5) Other green features

\(^9\) GGGI (2019) GGGI and RHA give insight on Rwanda’s Green Building Initiative with experts from 10 countries in Africa

\(^9\) GGGI (2019) Meeting Global Housing Needs with Low-Carbon Materials
### Table 7-7 Opportunities and barriers in the construction sector

<table>
<thead>
<tr>
<th>Enabled R-Strategy</th>
<th>Opportunity</th>
<th>Gaps/Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Rethink</td>
<td>Develop and promote a circular construction design guide that builds upon circular economy principles and includes best practices from the region</td>
<td>Knowledge of circular economy principles by sector actors</td>
</tr>
<tr>
<td>2 Reduce</td>
<td>Use of local and sustainable building materials and thereby reducing the amount of steel and cement used through research projects and support of local businesses</td>
<td>- Low acceptance of sustainable building materials</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Weak available market for the sale of sustainable building materials</td>
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<tr>
<td></td>
<td></td>
<td>- Competitiveness in cost of conventional and sustainable building materials</td>
</tr>
<tr>
<td>2 Reduce</td>
<td>Strengthen the application of the Green Building Compliance System and Green Building Codes through enforcement, incentives and trainings; Integrate circular economy principles into the system</td>
<td>- Lack of enforcement</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lack of know-how</td>
</tr>
<tr>
<td>1 Rethink</td>
<td>Demand an impact assessment for all large-scale construction projects</td>
<td>- Lack of knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Pressure of time and resources in large construction projects</td>
</tr>
<tr>
<td></td>
<td>Alternative use of CDW waste</td>
<td>- Unavailability of specialized landfills for construction waste</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Improper collection of construction waste</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Lack of collaboration between waste collectors and recycling businesses</td>
</tr>
<tr>
<td>6 Repurpose</td>
<td>Proper management of CDW by ensuring that all CDW arrives at landfill and/or that reuse and recycling activities are being pursued</td>
<td>- Infrastructure (road conditions) from cities to landfill sites</td>
</tr>
<tr>
<td>8 Recycle</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Key opportunities in the construction sector arise from the fact that Rwanda faces a rising demand of buildings due to growing population and urbanisation trends. This offers the potential to design and build new buildings and housing units based on circular economy principles from the beginning.

This, however, requires clear guidance on how to construct with more sustainable materials and in a way that enables the circular economy at the end-of-life of the construction materials and components. This guidance could be provided in form of a circular construction design guide. Such a guide would take into consideration local materials and construction techniques that are combined with circular economy principles. Ideally, this would be developed in collaboration between Government (Ministry of Infrastructure), the Rwanda Housing Association, local construction companies and entrepreneurs to consider different perspectives and ideas. It will also be important to align efforts with urbanisation plans that synthesise the construction, waste and water sectors.

Once developed, events and trainings on how to apply the guide can support the application, addressing individuals, construction material manufacturers or construction companies. This would build knowledge and capacity across practitioners in the sector.

A reason for exploring opportunities to shift from utilising steel and cement to alternative materials, is the fact that the expansion of domestic production capacity for steel and cement is limited by the needs for power and raw materials. Alternative materials are less energy intense and are possible to produce with domestically available raw materials. Consequently, product diversification will give more options to fill trade deficit gaps as well as provide more options for the construction sector. This could be achieved through research projects, the financial and technical support of entrepreneurs piloting new construction materials (e.g. bricks from plastic waste) as well as through the creation of a financial advantage for local sustainable construction materials - for some construction materials, such as cement and sand, the costs per metric ton is higher in Rwanda than in Germany.

A stronger focus should be put on materials, such as clay-fired bricks and tiles; extruded clay and indoor clay products; timber for products like laminated beams, joinery, panels, cladding, windows, doors or cabinetry; sand, which is an important composite of clay materials; limestone for cement; granite, volcanic stones for stone wool or concrete; agricultural waste to produce straw board panels for roods and ceilings; and compressed soil for low-cost bricks and tiles. Such a shift requires the public sector to increase the acceptance of such building materials and push their application in order to create a market through campaigns of financial incentives (e.g. subsidising them or supporting local producers in their activities).

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The Green Building Minimum Compliance System is a good first step towards operating more sustainable buildings. However, two main opportunities have been identified. First, the system does not seem to be applied on a broad range. A study, conducted in 2017–2018, shows that only 17.9% of the concepts were incorporated into buildings. This can be due to a lack of enforcement, education on green building concepts, empowerment and incentives. In order to support the implementation and application of the compliance system, measures to strengthen enforcement, develop incentives and provide trainings have to be combined.

The Housing Association which has been involved in the development, could be the party to take this up. Second, while criteria related to energy and water efficiency, environmental protection and indoor environmental quality are covered, there is no closer connection to the circular construction approaches. Thus, additional circular economy principles applicable to the use phase of a building could be integrated into the compliance system. These principles would for instance address the renovation of buildings with sustainable materials, a mandatory percentage of recycled materials or the application of grey water and rainwater harvesting systems.

As Rwanda’s housing market attracts many foreign direct investors as well as private investors, the before-mentioned elements must be ensured to be applied to all projects, including those led by international and private investors. Especially large-scale housing and construction projects have the potential to significantly reduce negative impacts and showcase circular economy principles. An assessment of impacts, prior to construction, could help the architects, engineers and workers to understand the impact of their choices and techniques on the building’s lifecycle and circularity potential. The results can also be used as a means to communicate and promote the circular economy in the construction sector. An applicable tool could be a simplified version of Life Cycle Assessment could be used to do so, which could be developed and offered by the Rwanda Green Building Organisation (RWGBO).

Regarding construction and demolition waste (CDW), a common practice is to dump it off at landfills nearby construction sites. In the case of Kigali, the main reason for this is the fact that the Nduba landfill is difficult to access via road transport due to traffic, high slope and improper road conditions. As a result, construction companies are less willing to separate the waste which represents a barrier for waste collection companies. They claim to reserve the CDW for later reuse or recycling but actually dump it illegally. Thus, there is a need to address the infrastructure issue which should include better road conditions (e.g. in terms of improving the surface of the road, making the road wider and building another road) or more transport opportunities of heavy CDW. Additionally, construction companies should be incentivised to (1) bring CDW that is difficult to reuse or recycle to the landfill and (2) actually pursue reuse and recycling activities.

The latter could mean in practice to collaborate with local waste collectors and recycling companies or to develop their own recycling activities. This requires stronger collaboration between the cities and waste collectors, operators and recyclers. A potential platform to steer this collaboration could be the PSEM which will be introduced under Section 3.5. Another opportunity is the development of CDW standards and characterisation which will help construction companies and recyclers to identify the waste, which is essential for choosing the most appropriate recycling or recovering technique.

Additional guidelines how to recycle which type of CDW in the most circular way could be provided by the Ministry of Infrastructure. Ideally, these standards would already be informed during the construction phase, so that the identification will be easier at the end-of-life stage of the building. However, this can only be applied to new buildings. Besides these tools, companies in the field of CDW recycling have to be supported with advisory or training and financial means to up-scale their activities.

Further campaigns or dedicated incubators for CDW solutions could make it more attractive for people and businesses to enter the field.

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Gender and youth involvement and potentials

On the production side, a well-designed initiative to develop innovative circular economy in the construction sector with re-usable products will promote sustainable consumption practices that minimise waste by extending the service life of products and promote the sharing economy and second hand markets. The construction sector employs 25-30% women in construction of public and private infrastructure.

Yet no women are actively contributing to the reuse, recycling and repair of construction materials, despite of their significant involvement in the sector. Only one company, My Green Home, owned by a female entrepreneur is involved in eco-processing plastic and construction waste materials to produce pavers that are used fed back into construction.

Water and wastewater

Economic contribution to GDP

Water systems intersect with all sections of society and industry and opportunities exist in these interfaces to create additional value by application of Circular Economy principles.

Similarly, as the waste sector, the water sector is part of the sanitation sector. Respectively, there is no measure dedicated to the water, it can be expected that the contribution to the GDP yet relatively small as the water supply and wastewater treatment is not fully established. However, given the cross-cutting nature of water and how important it is for the basic needs of humans, the functioning of other economic sectors (agriculture, construction, waste management, textiles, mining, metal, etc.), the indirect contribution to the GDP is worth mentioning. The government prioritise to make substantial improvements, it can be expected that the water and wastewater sector holds relevant opportunities in job creation which will increase the GDP contribution.

Policies

In order to achieve the overall water and sanitation sector goals, the Government of Rwanda adopted the National Sanitation and National Water Supply Policy in 2016. These policies were introduced as an update to the Policy and Strategy for Water Supply and Sanitation Services of 2010 and 2013. The National Water Supply Policy aims to provide a clear directive for the implementation of activities in the water sub-sector, ensure increased sustainable access to safe, basic water in Rwanda, specifically to rural areas. The Sanitation policy was developed with the aim of improving sanitation services, with provision for solid and liquid waste. The policy and strategy describe initiatives to solve challenges and exploit opportunities in the wastewater, water sanitation and solid waste management. This includes to further increase the sanitation coverage of domestic houses and schools.

As one of the main targets communicated in these documents the Government aims to increase rural water supply coverage and household sanitation coverage by 100% in 2020. Since its adoption, the water and sanitation sector has changed considerably. Also, the revised Green Growth and Resilience Strategy mentions ambitions in the water sector that especially include building infrastructure in water sanitation, re-use and recycling of water as well as wastewater treatment.

Overview

In Rwanda the abundance of water resources is reflected by the existence of a network of wetlands in various parts of the country. Wetlands and aquatic lands are generally represented by lakes, rivers and marshes associated with these lakes and rivers. The water resources are mainly influenced by rainfall and evaporation and hence climate information and preparedness are essential in the management of water resources. Although Rwanda possesses abundant water resources, the distribution of drinkable

Ministère des Terres, de l’Environnement, des Forêts, de l’Eau et des Mines
98 Ibid.
water is still inadequate. Wetlands provide an important function of water treatment and purification and serve as sources of water for the lakes and connecting rivers in the country. But they, too, are under pressure from many sources.

Rwanda has an estimated water availability level of approximately 670 m³ per capita, thus its categorisation as a moderately water scarce country. The Congo Basin covers 33% of the total territory of Rwanda and drains 10% of its water resources, while the Nile basin covers 67% of its territory and drains 90% of the water. Total water use is estimated to be 608,217,382 m³ per year with the largest users of water being hydropower plants, large irrigation schemes, domestic water supply and coffee washing stations. The highest abstractions were observed in hydropower (84.76%), irrigation (9.11%), and domestic water supply (5.88%). Water use and availability ratio was estimated to have a ratio of 8.9%. The National Policy for Water Supply (2016) and National Sanitation Policy (2016) which supersedes the 2010 National Policy for Water Supply and Sanitation considers changes in the goals of the Government regarding water supply and sanitation. Since then, there have been observed improvements in the attainment of the objectives. According to the EICV 5 report, access to improved drinking water sources has increased in Rwanda, from 85% to 87% between 2013/14 and 2016/17. The RDHS has reported a disparity in the access to improved water source between the urban households (96%) and rural areas (77%) in 2019/2020. Furthermore, provision of refuse collection services has increased from 36% to 42% in the same time; and the percentage of households with access to improved sanitation has increased from 83% to 86%. The percentage of households with an improved sanitation facility marginally improved from 71% in 2014–15 to 72% in 2019–20 according to the DHS Report published in September 2021.

Besides water access and safety issues, concerns also occur in relation to wastewater – there are still decentralised wastewater treatment practices of concern. Across the country, there is no sewerage system or centralised wastewater treatment plant.

At the most, semi-centralised wastewater treatment systems are the best available system, such as in Kigali. Some of them have been reported to not properly work. The EICV 5 report indicates that 84.3% of the improved sanitation in Rwanda used pit latrines with solid slab due to the absence of a sewage system. For larger buildings, such as hotels, hospitals or commercial buildings, it is mandatory to install a private semi-centralised sewage system that treats the wastewater before it is discharged into the environment. However, the monitoring of the Government is lagging behind – the standards for discharged treated water do not meet national standards.

Besides semi-centralised treatment systems, there are decentralised ones that are installed on-site for treating small volumes of wastewater from individual homes, dwelling clusters or businesses. The advantage of these systems is that they come at low cost and expertise required.

An evaluation of both the semi-centralised and decentralised wastewater systems has shown that neither complies with effluent quality requirements. This supports the idea of establishing centralised treatment plants in especially densely populated areas while existing semi-centralised and decentralised systems need to be designed and managed more in line with sustainability criteria.

However, this requires legal instruments for planning, developing and managing wastewater treatment systems for collective communities which are still absent. At the same time, principles and standards that govern semi-centralised systems need to be redefined and better enforced.
In order to tackle the issues related to wastewater, the Government is finally realising a centralised sewerage system in Kigali (“Kigali Centralised Sewerage System”), after funding from international investors, such as the European Investment Bank and African Development Bank could be obtained. It will be constructed in the Central Business Area and cover 120,000 people amounting 10% of the city’s population, treating 12,000 m³ per day. The project which will be located in Giticinyoni, includes a sewerage system and wastewater treatment plant operated by WASAC.

A feasibility study to build the Centralised Sewage System at Gasabo, located in the north of Kigali, was finalized since 2017, but sufficient funds have not yet been raised for the implementation of the project. Under the Lake Victoria Basin Commission with the support of KFW, the feasibility study for the construction of a faecal sludge treatment plant in Kigali was completed. The project financing agreement is under preparation and signature process.

The Kigali faecal sludge treatment plant will have the capacity of treating 600 m³/day of the faecal sludge and it will be constructed at Masaka, replacing the crude dumping site at Nduba Landfill. As a short solution, WASAC Ltd is working with KAMPS, a Belgian Company for the improvement of faecal sludge management in Kigali. KAMPS submitted the proposal for implementation of MASAKA faecal sludge treatment plant and enrolled also on financial resource mobilization through the Belgium Central Government. KAMPS has managed to mobilize the fund for implementation of Masaka faecal sludge treatment plant where approximately 925,000 Euro have been secured through the grant of 700,000 Euro approved by the Belgium Central Government while the remaining fund will come from the Wallonie Region with the condition to use the innovative Technology of KAMPS. The short-term solution as per proposal of KAMPS is to construct the faecal sludge treatment plant of 100 m³/day. The implementation was expected to start this year 2021.

As the quality and access to water highly depends on how water is used and valorised through, for instance, grey water systems that allow kitchen, shower or even toilet water being used for irrigation or flushing after treatment, a strong collaboration between stakeholders is required. Being aware of this fact, the Rwanda Water Resource Board and WASAC should closely work with each other. Other efforts from the public sector side to better integrate the sanitation and supply of water into national and city Master Plans. As the current policy does not include any circular economy specific aspects, the Ministry currently reviews the policy and plans to embed a stronger circular economy and sustainability perspective into it.

Initiatives from the private sector include Kamel Manufacturing, which works with grey water systems, mainly for schools and hotels. Another initiative worth mentioning is Water Access that promotes simple water collection and filtering in domestic houses. But generally, the business opportunity for small companies is rather restricted as this sector is dominated by larger utility companies.

Opportunities

The opportunities in the water and wastewater sector highly depend on the infrastructure, coverage and technologies in terms of water supply and wastewater treatment which is still largely under development. There are important opportunities for operators of the water and wastewater sector to embed circular economy principles across their schemes and operations, for instance, through whole-life asset management approaches, security of supply for key materials, natural capital accounting, partnership building and whole-life cost efficiencies. The following table summarises key opportunities in the waste sectors while also showing certain barriers that have to be overcome first.

107 Exact total fund mobilized by KAMPS is 925,070.45 Euro.
108 Water and Sanitation Corporation
109 According to the interview with a stakeholder from WASAC, hold on the 4/11/2021.
Table 7-7 Opportunities and barriers in the construction sector

<table>
<thead>
<tr>
<th>Enabled R-Strategy</th>
<th>Opportunity</th>
<th>Gaps/Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 Reduce 3 Reuse</td>
<td>Working with natural processes and investing in longer term holistic strategies that will reduce the need for new hard or grey infrastructure assets</td>
<td>Lack of technical and financial capacities</td>
</tr>
<tr>
<td>2 Reduce</td>
<td>Incentivising landowners and managers to use smaller quantities of water, and pesticides and fertilisers</td>
<td>Organic farming still at very nascent stage as most producers rely on pesticides and chemical fertilizers</td>
</tr>
<tr>
<td>2 Reduce 3 Reuse</td>
<td>Implement cleaner production methods for all industries and this could preferably be coupled with the ‘polluter pays’ principle</td>
<td>Lack of strong regulatory framework and enforcement of related policies</td>
</tr>
<tr>
<td>2 Reduce</td>
<td>Reduce the quantity of chemicals used in the drinking water treatment process</td>
<td>Lack of alternatives technologies and nature-based solutions</td>
</tr>
<tr>
<td>8 Recycle</td>
<td>Develop more centralised wastewater treatment plants in urban areas and proximity solutions in rural areas, while reducing the carbon footprint of the systems applied</td>
<td>-Low application of high standards in sewage treatment plants</td>
</tr>
<tr>
<td></td>
<td>Enforce national wastewater standards of semi-centralised and centralised systems</td>
<td></td>
</tr>
</tbody>
</table>

While improving the water supply system, there is a high potential to work with natural processes and investing in longer term holistic strategies that will reduce the need for new hard or grey infrastructure assets. This may include implementing nature-based solutions and leveraging payments for ecosystems solutions.

Another important component is to optimise the water use overall. Rwanda does not yet face water scarcity; however, this approach can reduce costs and prevent shortcomings in water-intense sectors. Agriculture is one of them.

In order to optimise the water use, landowners, land managers and farmers could be incentivising to use smaller quantities of water through more efficient technology, and pesticides and fertilisers to improve water quality. This would ultimately lead to reducing the need to treat it as intensively, as well as savings in energy and costs.

In addition to the previous opportunity, when it comes to water intense sectors and industry in general, integrating more cleaner production methods could make a strong contribution to improving the quality of their discharge water. This could potentially be coupled to the ‘polluter pays’ principle that will motivate all polluting industries to take responsibility of their actions and make larger efforts towards the reduction of pollution of water resources.
In terms of wastewater treatment, usually a relatively high number of chemicals are used to clean the water, which will inevitably stay in the ecosystem doing harm to the environment and human when accumulating. Therefore, using technologies and process that favour a lower use of chemicals is of high relevance when moving towards a more circular economy. This could be supported through awareness campaigns and trainings to those stakeholders treating wastewater.

Led by two projects that are lighthouse projects in the Rwandan water sector, the development of more centralised wastewater treatment plants in urban areas and industrial parks, and proximity solutions in rural areas should be pushed forward by the Government as it holds many benefits, such as higher sanitary and health conditions or a more sustainable and circular water consumption which can fight water shortages and reduce costs.

As a prerequisite, legal instruments for planning, developing and managing wastewater treatment systems (including those for semi-centralised and decentralised systems) should be adopted in the current Water and Sanitation Sector Strategic Plan 2018-2024. Alternatively, a national guideline could be developed. When growing the number of wastewater treatment systems in the country, the integration of approaches and technologies that reduce the carbon footprint of the sewage treatment systems should be empathised from the very beginning. These approaches and technologies should make the wastewater sludge transport, treatment, recycling and disposal more efficient.

Finally, enforcing the national wastewater standards of semi-centralised and centralised systems is key to ensure a certain water quality before the water is discharged into the environment. This could be done through a coordination between relevant institutions such as REMA, RURA, and WASAC.

Summarising the opportunities identified in the water and wastewater sector, it can be concluded that although there are many opportunities to further develop the sector, largest potentials in terms of circularity lay in the wastewater treatment as well as the interaction and synergies with other sectors holds circularity potentials.

Gender and youth involvement and potentials

Studies have indicated that 90% of the work of gathering water and wood, for the household and for food preparation, is done by women in Africa. They are responsible for providing access to clean water which reduces their capacity and time to take up other economic activities and opportunities that could improve household welfare. The opportunity to re-use, recycle water in Rwanda is currently limited given that access to running water remains a challenge especially in rural areas.

In fact, over period, households living in other types of habitat, other than organised villages (Imidugudu), such as isolated rural housing have the poorest access to improved water sources (81%) without any significant change between 2013-14 and 2016-17. However, opportunities exist for such women to re-use, recycle water from public infrastructure.

At household level, women are unable to harvest and re-use rainwater due to the expensive nature of such opportunities. Rainwater harvest tanks that are expensive to construct and maintain. In fact, the 5th National Household Survey indicates that only 14.5% of households in Rwanda have a way of managing rainwater.

Rainwater harvesting is an area that could be tapped into because of the destructive nature of heavy rains on household assets, at times washing away gardens and houses along the rain drainage paths that are not adequately constructed. Small steps could be made to incentivise rainwater harvesting for sanitation i.e. safe water for hygienic and gardening e.g. kitchen gardens. This will in turn allow women and children to re-focus on economic activities.

Other opportunities such as wastewater processing and recycling could be tapped into. An example in Gacuriro Vision City and Vision 2020 have been piloted and more are coming, however, these are only relevant to Kigali and secondary cities some of which have unsustainable water sources and limitations in running water.
<table>
<thead>
<tr>
<th>No</th>
<th>Intervention</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Develop and embed a mandatory circular economy module in curricula of schools (primary and secondary) and universities</td>
<td>425.000</td>
<td>140.000</td>
<td>200.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>765,800.00</td>
</tr>
<tr>
<td>2</td>
<td>Develop and run circular economy dedicated courses at vocational</td>
<td>-</td>
<td>-</td>
<td>200.000</td>
<td>410.000</td>
<td>315.000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>925,800.00</td>
<td></td>
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<tr>
<td>3</td>
<td>Promotion of partnerships and collaboration across the public and private sector, academia and civil society by promoting the CPCC as Circular Economy Hub and applying the PSEM to the three priority sectors</td>
<td>124.000</td>
<td>436.000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>560,800.00</td>
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<tr>
<td>4</td>
<td>Launch a circular economy accelerator and incubator programme</td>
<td>510.000</td>
<td>76.000</td>
<td>2,000.000</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2,586,800.00</td>
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<tr>
<td>5</td>
<td>Enhance valorisation of organic waste from MSW and decrease post-harvest losses</td>
<td>-</td>
<td>771.000</td>
<td>3,898.100</td>
<td>1,037.910</td>
<td>1,326.201</td>
<td>384.000</td>
<td>576.000</td>
<td>1,108.500</td>
<td>1,219.350</td>
<td>1,336.055</td>
<td>1,405.536</td>
<td>1,546.000</td>
<td>1,700.692</td>
<td>1,870.768</td>
<td>18,170.8858</td>
</tr>
<tr>
<td>6</td>
<td>Establish waste collection and transfer centres in every district that allow most appropriate waste treatment</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>133.000</td>
<td>13,630.000</td>
<td>14,933.000</td>
<td>15,242.300</td>
<td>14,925.680</td>
<td>31,975.248</td>
<td>34,339.523</td>
<td>1,381.818</td>
<td>1,518.995</td>
<td>1,671.999</td>
<td>1,839.199</td>
<td>131,651,764.19</td>
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<td>7</td>
<td>Install a systemic data collection system</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>75.000</td>
<td>75.000</td>
<td>32.000</td>
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<td>182,800.00</td>
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<td>8</td>
<td>Develop a national regulation that facilitates waste characterisation and treatment</td>
<td>695.000</td>
<td>1,268.500</td>
<td>3,093.750</td>
<td>2,418.795</td>
<td>2,108.169</td>
<td>1,134.823</td>
<td>3,583.625</td>
<td>1,754.406</td>
<td>1,761.996</td>
<td>2,696.946</td>
<td>814.876</td>
<td>896.363</td>
<td>986.000</td>
<td>3,084.600</td>
<td>24,297,848.03</td>
</tr>
<tr>
<td>9</td>
<td>Enforce revised national Building Code and use Green Building Compliance System for all large-scale building categories</td>
<td>-</td>
<td>20.000</td>
<td>30.000</td>
<td>50.000</td>
<td>55.000</td>
<td>60.500</td>
<td>26.620</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>242.200.00</td>
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<tr>
<td>10</td>
<td>Prioritise renewable and local materials over exhausting non-renewable materials as well as local construction types over commercial, linear ones</td>
<td>80.000</td>
<td>221.000</td>
<td>1,025.600</td>
<td>491.660</td>
<td>194.326</td>
<td>-</td>
<td>-</td>
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<td>-</td>
<td>-</td>
<td>2,012,980.00</td>
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<tr>
<td>11</td>
<td>Develop a national guideline on how to characterise and valorise CDW</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25.000</td>
<td>26.000</td>
<td>33.600</td>
<td>81.460</td>
<td>89.600</td>
<td>38.067</td>
<td>41.873</td>
<td>46.061</td>
<td>50.667</td>
<td>55.733</td>
<td>61.307</td>
<td>549,173.04</td>
</tr>
<tr>
<td>12</td>
<td>Promote commercial high-quality organic fertilizer and biological farm inputs that are locally produced</td>
<td>615.000</td>
<td>906.500</td>
<td>1,705.150</td>
<td>1,485.835</td>
<td>1,429.913</td>
<td>555.500</td>
<td>2,200.000</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>8,897,897.50</td>
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<td>13</td>
<td>Integration of urban and peri-urban farms/food systems into regional planning and promotion of community farms</td>
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<td>-</td>
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<td>281.600</td>
<td>369.760</td>
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<tr>
<td>14</td>
<td>Develop a national guideline for farmers that provide guidance on how to set up a farm in the most sustainable and circular way</td>
<td>-</td>
<td>121.000</td>
<td>77.000</td>
<td>84.700</td>
<td>93.170</td>
<td>102.487</td>
<td>112.736</td>
<td>124.009</td>
<td>136.410</td>
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<td>181.562</td>
<td>199.718</td>
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<td>15</td>
<td>Develop a national guideline for farmers that provide guidance on how to set up a farm in the most sustainable and circular way</td>
<td>75.000</td>
<td>992.500</td>
<td>2,172.000</td>
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<td>2,194.450</td>
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<td>61.307</td>
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<td>7,778,210.34</td>
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<td>16</td>
<td>Develop a national guideline for farmers that provide guidance on how to set up a farm in the most sustainable and circular way</td>
<td>-</td>
<td>146.000</td>
<td>425.600</td>
<td>391.500</td>
<td>391.650</td>
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<td>221.572</td>
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<td>147.394</td>
<td>162.133</td>
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<td>17</td>
<td>Improve and enforce high-quality wastewater treatment and prevent degradation of the environment</td>
<td>-</td>
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<td>26.000</td>
<td>62.000</td>
<td>174.200</td>
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</tr>
<tr>
<td>1</td>
<td>Develop and embed a mandatory circular economy module in curricula of schools (primary and secondary) and universities</td>
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<td>Develop and run circular economy dedicated courses at vocational</td>
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<td>410.00</td>
<td>315.00</td>
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<td>925,000.00</td>
</tr>
<tr>
<td>3</td>
<td>Promotion of partnerships and collaboration across the public and private sector, academia and civil society by promoting the CPIC Circular Economy Hub and applying the PSEM to the three priority sectors</td>
<td>124.00</td>
<td>436.00</td>
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<td>Launch a circular economy accelerator and incubator programme</td>
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<td>5</td>
<td>Enhance valorisation of organic waste from MSW and decrease post-harvest losses</td>
<td>-</td>
<td>771.00</td>
<td>3,898.10</td>
<td>1,027.910</td>
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<td>Establish waste collection and transfer stations in each district that allow most appropriate waste treatment</td>
<td>-</td>
<td>-</td>
<td>133.00</td>
<td>13,630.00</td>
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<td>7</td>
<td>Install a systemic data collection system</td>
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<tr>
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<td>Enforce revised national Building Code and use Green Building Compliance System for all large-scale building categories</td>
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<td>30.00</td>
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<td>55.00</td>
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<tr>
<td>10</td>
<td>Prioritize renewable and local materials over exhausting non-renewable materials as well as local construction types over commercial, linear ones</td>
<td>80.00</td>
<td>221.00</td>
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<tr>
<td>11</td>
<td>Develop a national guideline how to characterise and value CDW</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>25.00</td>
<td>26.00</td>
<td>33.600</td>
<td>81.460</td>
<td>89.606</td>
<td>38.067</td>
<td>41.873</td>
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<td>50.667</td>
<td>55.733</td>
<td>61.307</td>
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<td>Promote commercial high-quality organic fertilizer and biological farm inputs that are locally produced</td>
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<td>906.500</td>
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<td>1,485.835</td>
<td>1,429.913</td>
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<td>309.760</td>
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<td>1,162.810</td>
<td>1,540.791</td>
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<td>93.170</td>
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<td>124.009</td>
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<td>150.051</td>
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<td>181.562</td>
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<td>1,767,589.85</td>
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<td>992.500</td>
<td>2,172.000</td>
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</tr>
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<td>17</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>26.000</td>
<td>62.000</td>
<td>174.200</td>
<td>116.600</td>
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<td>378,800.00</td>
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<td>8,400.550</td>
<td>21,756.988</td>
<td>17,710.106</td>
<td>23,020.157</td>
<td>19,581.058</td>
<td>36,760.464</td>
<td>41,115.510</td>
<td>4,467.772</td>
<td>4,914.549</td>
<td>5,406.004</td>
<td>5,946.604</td>
<td>211,213,861.18</td>
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Annex 2  Description of assumptions for costing the policy interventions

General cost assumptions

- Most Technical Assistance/Consultancy rates are $750 for internationals, $500 for nationals and a daily rate of 50,000 Rwf for teachers/tutors to support local contextual design of the curriculum.

- A 5% variance is applied to fees and expenses for consultancies, for inflationary adjustments.

- Salaried workers are paid a monthly wage within a range of $1,500 to $3,000 from middle managers to senior managers (similar to most project staff).

- A 40% overhead charge is incorporated into costs where a project is to be established e.g. special purpose vehicle.

- The tax applicable for companies is 18% VAT.

- Where services/charges are expected to extend for years, a 10% inflation adjustment has been incorporated.

- Workshop attendee costs are assumed to be 25,000 Rwf per person per day, where workshops are held in Kigali and at times at 50,000 Rwf added for a stipend, where workshops are held out of Kigali.

- Incentives to attract the private sector range between $5,000 and $100,000, subject to complexity of the activity and size of the company e.g. for micro grants $5,000 is applied while for SMEs, a $10,000 is applied and $50,000 to a company etc. RDB follows a similar approach to FDIs to encourage local production (i.e. in tax breaks).

- Where trainings are to be designed to upskill local labour force REB and TVET Board, approaches of using teachers, tutors and professors have been incorporated. Similarly, trainings follow a cascade model to train other teachers, tutors and lecturers.

- Where Sensitisation and awareness campaigns are needed, costing was done in consultation with an informed journalists working with TV and radio stations in Rwanda.

Detailed assumptions per policy intervention and activity

Intervention 1: Develop and embed a mandatory circular economy module in curricula of schools (primary and secondary) and universities

**Activity 1.1: Implement circular economy into existing sustainability and environmental courses:** This cost is based on current practice. The assumption of activity 1.1 is that technical assistance needs to a) identify gaps and b) design modules, and train trainers in circular economy, who will later integrate CE training courses into the existing courses. Direct costs: fees, expenses and taxes have been costed with the assumption that this activity will require the expertise of two consultants – one International and 1 National for a maximum of 30 days.

**Activity 1.2: Develop stand-alone circular economy course for (i) primary schools, (ii) secondary schools, (iii) high schools and universities:** The costing followed a similar curriculum practice, following a discussion with the Rwanda Education Board. A combination of four experts (2 international, 2 national) will work with a team of school teachers, college tutors and tertiary professors for a period of 5-6 months in order to come up with localised content adapted to the Rwandan context for embedding it into the national curriculum for primary secondary schools (to a large extent secondary) and tertiary institutions. The costing followed a similar approach where after initial module design, the experts engage about 12 teachers and professionals through series of 5-day workshops (up to 4) to adapt modules to grade levels and local context.
Activity 1.3: Teach the teachers based on the course material for (above): These costs factor a cascade model of training where an initial number of trainers (at least one trainer per district) are identified to train others in respective schools and institutions. Training of trainers (ToT) should not exceed 10 working days (2 weeks) outside or in a secluded district where each ToT is accommodated and hosted for – creating an enabling environment to learning.

Activity 1.4: Implement and run the CE course under national curricula: This cost is a continuation of the cascade model of where all the 416 education sector officials are also trained as trainers (at least one trainer per sector) to train teachers in respective schools and institutions for a period of up to 10 working days (2 weeks). And in turn, they also train teachers within a central point of their locality (sector), focusing on 1 teacher per school or college. The biggest cost here is the transport facilitation for identified teachers across the 4,802[1] schools and colleges.

Intervention 2: Develop and run circular economy dedicated courses at vocational

Activity 2.1: Take over content from the course material for (1iii) for the general part of the courses: This cost is also based on the assumption that technical assistance is needed to design modules based on findings from previous gap analyses. About four experts (2 international and 2 national) take up the initial design of CE content or modules for vocational and technical education at secondary and tertiary levels (7 levels in total), where levels 3–5 are secondary school level and 6–7 are tertiary. Similar to activity 1, this is also a cascade model where a selection of teachers support a team of 12 national teachers to adapt modules to the local context, ensure practical centres, and laboratories and equipment are established for use in training. A cascade model is also advised in order to ensure that TVET trainers receive a training in the newly adapted courses.

Activity 2.2: Develop content for the preparatory course for women and youth: Two technical experts are hired to design a preparatory course for gender and youth for a maximum of 30 days and a 5-day ToT training organised with up to 12 trainers. This cost includes service fees for system design, of digitised content, software development and costs of running digital CE modules (as short-term courses) on an online platform. It factors in the cost of at least 5 national expert trainers to run monthly digital trainings over a long term, with an incremental cost of at projected at 10% or the previous year budget.

Activity 2.3: Develop content and method for the three technical vocational courses on the three priority sectors: This cost includes technical assistance from 3 national experts for the curriculum design and to adapt courses (identify gaps, design modules, train ToTs) as well as incidentals and tax. It also includes 5-day workshop costs and other incidentals of cascade trainings, first through District ToTs and later to all teachers/schools in the 341[2] TVET centres actors the country.

Intervention 3: Promotion of partnerships and collaboration across the public and private sector, academia and civil society by promoting the CPCIC as Circular Economy Hub and applying the PSEM to the three priority sectors

Activity 3.1: Review the material, services and tools offered by the CPCIC (Circular Economy Hub) if they are up-to-date and address the needs of the stakeholders: The cost for this activity includes to fees 4 experts (3 international and 1 national expert), incidentals and tax to adapt courses (identify gaps, design modules, train ToTs) for up to 20 working days each and expenses including accommodation. It also includes a 1-day workshop for 20 ToTs or stakeholders.

Activity 3.2: Establish or assign an independent implementation body for the coordination and implementation of the PSEM (public-private-partnership): This cost assumes a special purpose vehicle, similar to FONERWA, which is established as a public-private-partnership that incorporates the Government, academia and the private sector. Hence, staffing costs have been incorporated with monthly salaried staff of five (2 senior management and 3 middle managers), established and set up under the Ministry of Environment. Other direct overheads, such as pension, tax, medical insurance of up to 50% of salaries and operational costs of up to 20% of salary cost have been incorporated.

Activity 3.3: Conduct mapping exercise of international best practices that could support the Circular Economy Hub and PSEM: This is a consultancy cost of fees and expenses for 3 experts (2 international and 1 national) as well as direct incidentals e.g. tax and travel.
**Intervention 5: Enhance valorisation of organic waste from MSW and decrease post-harvest losses**

- **Activity 5.1: Run awareness campaigns in cities and rural areas for better waste separation at source:**
  This is mainly comprised of costs for behaviour change communication through annual radio talk shows and community meetings with sensitisation print media communications shared across the various local government offices in Rwanda. The costing was done in consultation with informed journalists working with TV and radio stations in Rwanda.

  The most common and preferable radio program, also broadcast on BBC, is a Urunana radio drama that is also used for health messaging.

- **Activity 5.2: Improve waste separation methods (color codes, provision of two bins to every household, treatment locally, etc.):**
  This activity commences with a feasibility study into waste separation at source to identify and establish pilots of at least 3 companies, (1 in Kigali, 1 in secondary cities and lastly 1 in rural), supported by 5 expert consultants (2 international and 3 national experts). This is followed by an additional repayable grant of up to $500,000 to incentivise and expand successful pilots to 5 factories (1 per province) to produce and distribute weekly collection sacks (3) of quality to households (3 colour coded, weekly distribution subsidised by the Government) across all districts. These 5 firms are expected to produce and distribute waste separation materials; grants could be in form of land lease or matching grant as capital for procuring equipment. Lastly, enforcement and implementation are enhanced through sensitisation activities mainly through communication materials and messaging disseminated through local government officials and community meetings, such as monthly community work (Umuganda) and weekly meetings Inteko z’abaturage.

- **Activity 5.3: Integrate separate site for organic waste at landfills and improve sanitary conditions:**
  This cost includes a feasibility study to establish safeguards and conduct environmental assessment of organic waste separation or transit facilities at each landfill (1 per province). This study is supported by 6 consultants (3 international and 3 national experts) over a period of no more than 20 days.

- **Activity 5.4: Establish and run training modules for farmers to decrease post-harvest losses:**
  This activity includes hiring consultancy services to adapt courses – first through identifying gaps, designing modules, training ToTs who later transmit training to other farmers in mechanisms to decrease post-harvest losses. Utilising a cascade model, ToTs are then send to disseminate training through Farmer Field Schools (FFS) and conduct regular capacity building activities of farmer starting with farmers cooperatives. A ToT training is organised at district level (30) and sector level (416), guided by a team of 3 national experts who run sessions of no more than 5–day trainings.

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**Intervention 4: Launch a circular economy accelerator and incubator programme**

- **Activity 4.1: Review existing international circular economy incubator and accelerator programmes:**
  Inputs to this activity include technical support to incubate good and innovative ideas with grants of up to $100,000 each to enable to acceleration and incubation. These include pilots of three firms or companies, such as COOPED, supported by 2 international experts to provide pastoral care for a period of 1 month spent with each firm. Grants amounts are estimated to be up to $100,000, a similar practice exists in the ongoing accelerator hubs acting as incentives.

- **Activity 4.2: Develop the concept of the circular economy programme, incl. courses on CE (advanced) and business management skills, mentorship programmes, networking events, access to investors:**
  Costing of this activity includes technical assistance of 4 experts (3 international and 1 national expert), plus incidentals and tax to adapt courses (first by identifying gaps, design modules and training ToTs).

- **Activity 4.3: Implement the programme as a new programme or under the Green-preneur programme run by the GGGI:**
  This activity incorporates a grant for seed funding of $10,000 to engage in a competition with an accelerator repayable grant of up to $50,000, targeting high-potential start-ups starting with 10 firms, gradually growing them to 30 start-ups that are supported in the first 4–5 years.
Intervention 6: Establish waste collection and transfer centres in every district that allow most

- **Activity 6.1:** Define location of each waste collection center in each district: The costs include a feasibility study for transfer centers, 1 per province (total of 5) as well as consultancy services of 5 experts (2 national and 3 Internationals).

- **Activity 6.2:** Establish the centers (Government) and assign operator (private sector): Equipment and infrastructure costs - designed as a Public-Private- Partnership. Concessional loans to Companies (upto 5 companies), pilot of 3. Cost inconclusive - each site differs but a lumpsum is provided for GoR (cost across 30 districts).

- **Activity 6.3:** Support for waste collectors (financial support and simplify the requirement list of becoming a collector: Financial incentive for compliance to Health and safety support (tools and equipment) to protect waste collectors. Legal framework to minimum wage through grants for enhancement of safety measures and guidelines to protect waste collectors (social, security and health safeguards/do-no-harm) – $100,000 per firm (upto 5 firms). Labour intensive social work for waste collection (Cash-for-work-support to members in extremely poor households). Monthly wages for waste collection at subsidised wage (50% GoR incentive of $1 or 1,000Rwf per person per day/2 persons per village 120 days annual) – 14,837 villages.

- **Activity 6.4:** Hire and train staff on properly sorting the waste (incl. integrating informal sector): Salaries and training costs to provide community support to Social Workers to provide monthly support (transport facilitation for sector and cell volunteers).

- **Activity 6.5:** Promote the centers as central point for waste processors and recyclers to source their materials: The cost of this intervention includes mainly sensitisation campaigns – where BCC materials are designed and disseminated to provide guidelines and enforce implementation through local government leaders (+5% incidentals).

Intervention 7: Install a systemic data collection system

- **Activity 7.1:** Establish centralised database: The costs of this intervention factor the development of the database though software and service fee for system design, with digitised content (4 technicians).

- **Activity 7.2:** Fill database with top-down and bottom-up data: This includes costs for training district staff and the scale-up of the system to all districts. Considered are the training of 30 district-based officers (5-day workshops), service fee for system scale-up (data entry) with facilitated online support and field visits.

- **Activity 7.3:** Define legal obligation for waste collectors to frequently inform the database: This activity only requires the staff cost to design respective legal guidelines.

- **Activity 7.4:** Develop local customisation application assisting the database and collaboration and payments between waste players: This requires the cost for developing the application (system design, with digitised content) through 4 technicians and for maintaining the system that lead to costs and backstopping support (1 national level staff).
**Intervention 8: Develop a national regulation that facilitates waste characterisation and treatment Activity**

- **Activity 8.1:** Develop guideline how to properly identify and characterise different waste types (incl. preceding study): For this activity consultancy for feasibility study and developing regulations for waste characterisation and treatment have been assumed. This may result in consultancy services of 2 experts (1 international and 1 national).

- **Activity 8.2:** Develop national regulation that (i) makes waste characterisation and respective treatment a mandatory activity for waste firms and (ii) that obliges waste collectors to use the waste database (intervention 7): This activity is costed by assuming costs for technical staff to develop a national regulations for waste characterisation, respective treatment and mandatory documentation. The consultancy service of 2 experts should be sufficient (1 international and 1 national).

- **Activity 8.3:** Run parallel studies that examine new potentials to process waste: The costing for this intervention includes future studies (3 studies per year) that are estimated at a lumpsum using the feasibility example in 6.1.

- **Activity 8.4:** Offer training courses on applying the guideline and regulation: The training module on development and delivery of the guidelines and regulatory framework is anticipated to be convened through a Kigali-based 2-day training workshop.

**Intervention 9: Enforce revised national Building Code and use Green Building Compliance System for all large-scale building categories**

- **Activity 9.1:** Amend Building Code to cover all new large-scale buildings and make certain yet optional indicators mandatory: This activity will require a review of existing guidelines, including a gap analysis and the adaption with CE indicators. This can be covered through the consultancy service of 2 experts (1 international and 1 national).

- **Activity 9.2:** Enforce the application of the Green Building Compliance System: This includes the costing of an annual 1-day workshops with at least 50 companies to enforce inspection of private and public buildings and annual stakeholder seminars/workshops to integrate new guides on compliance and inspection/clearance (e.g. permit approval processes).

- **Activity 9.3:** Provide a transition plan, training and workshops to construction companies that facilitate the application of the compliance system. The costing of this activity includes the development of a transition plan, the training of stakeholders/companies on new guidelines through TOTs and a Kigali-based 2-day training workshop for 2 companies per district to a total of 60 companies.

**Intervention 10:** Prioritise renewable and local materials over exhausting non-renewable materials as well as local construction types over commercial, linear ones.

- **Activity 10.1:** Run research projects that examine the potential of locally sourced and sustainable alternative materials: This includes consultancy services of 5 experts (2 international and 3 national) to conduct an assessment on capacity, gaps and needs on local construction material sourcing options.

- **Activity 10.2:** Promote the vocational training courses for the construction sector (intervention #2) to formal and informal construction workers: The costing of this activity includes to establish partnerships (MoUs) with construction companies and academic institutions for apprenticeships for TVET students. It may require support staff to coordinate and provide liaison services as well as establish grants criteria (for activity 10.3 below).
Intervention 12: Promote commercial high-quality organic fertilizer and biological farm inputs that are locally produced.

- **Activity 12.1**: Promote organic fertiliser to farmers to use and produce it through awareness campaigns: This activity will require to engage Rwanda Media Houses and community messaging (BCC) and to provide sensitisation facilitation to run campaigns with print media (run by agriculture through local governments).

- **Activity 12.2**: Implement market incentives to use organic fertiliser, e.g. subsidy: The costs for this activity includes grants to 2 companies per district in order to engage companies and link them to public-private-partnerships (including banks) for financial incentives (grants to companies $50,000 per company, similar to incentives given to cooperatives in agriculture for equipment). An additional costed element is 3 salaried staff that provide support to the establishment of criteria and to evaluate proposals (salaried workers or multi-sector committees or CSOs).

- **Activity 12.3**: Standardise organic fertiliser market: Design a policy regulation: For this, there’s no cost, given the existence of technical working groups also funded elsewhere.

- **Activity 12.4**: Conduct research projects about the production of different kinds of fertilisers: This can be realised through short-term consultancy services of 2 experts to conduct a study on fertilisers (international and 1 national).

- **Activity 12.5**: Fund large-scale organic fertiliser usage: The costs for this activity include staff and management charges for an NGO/CSO led intervention to support implementation and delivery mechanisms for fertiliser utilisation. This should be done in the first 3-5 years.

- **Activity 12.6**: Develop distributional system for organic fertiliser: The realisation of this activity will be an agriculture-led delivery through local government or supplier. Accordingly, the transportation is embedded into the costs of fertilisers – see policy guideline.

- **Activity 12.7**: Develop policy dedicated to organic fertiliser production: This is also an agriculture-led delivery through local government or supplier. It will require to attract 3-5 industries to trial with technical assistance to Rwanda Agriculture Board for fertiliser production (locally). Another costed element is the testing/trial of fertiliser (2 trials, 2 seasons) for a time period of 5 years.

  Its costing includes a call for proposals (EOIs) and the provision of land or lease of up to $100,000 each to incentivise start-ups as well as a service fee for agronomists specialists (2 per site = 6), implemented in the first five years.

- **Activity 12.8**: Incrementally phase out chemical fertiliser: The costing of this activity includes a pilot test on some districts (3 districts representing all provinces) and the establishment of policy, standards and guidelines for organic fertiliser production. This can be done through international experts evaluating the success (or not) against criteria (fees and expenses) and designing policies and guidelines, implemented in the first for 5 years.
Intervention 13: Integration of urban and peri-urban farms/food systems into regional planning and promotion of community farms.

Activity 13.1: Promotion of community farms to farmers and communities through awareness campaigns: The costing entails technical support to the agricultural sector to establish 3 model farms (as demos) with all CE principles, including water reuse, fertiliser and animal feeds production as well as biogas use. The support will be obtained through staff support for the Rwanda Agricultural Board, using government incentivised model farms, led by the private sector, cooperatives or NGOs, e.g. Holland GreenTech. Other costed elements are the public media involvement and a grant of $50,000 for equipment.

Activity 13.2: Launch of some pilot projects of community farms in different districts: The costs of this activity assume an organisation of 2 launch events with awards to best model farms and host a media broadcast meeting.

Activity 13.3: Developing financial support means to support the initiation of community farms, e.g. through lump sum when registering: This includes financial incentives to support cooperatives in the registration of community farms. The cost includes a lumpsum limit to cooperatives which is at 5 cooperatives per district ($5,000 each).

Activity 13.4: Provide technical know-how to farmers (link to intervention 2 and 14): This activity requires to build a partnership with academia and research institutions (including TVET and IPRC centres), to support CE graduates and apprenticeships to train farmers as well as to conduct research and practice on appropriate technologies relevant to the integration of CE into farms. The cost includes the support to CE tertiary graduates and apprentices (50), with graduates after year 3 gradually growing numbers to 150 each year for an additional 5 years. Conducting research/studies about appropriate technologies are relevant for the integration of CE into farms – 5 RCT research trials.

Activity 13.5: Provide access to technical equipment to farmers to expand and apply circular economy principles: The costing of this activity is made of grants to companies, with $50,000 per company (similar to incentives given to cooperatives in agriculture for equipment) up to 2 per district per year; in year 1 and increase gradually over time (as budget allows).

Activity 13.6: Integrate peri-urban farms into national urban planning: This activity mainly requires the organisation of workshop sessions for the engagement of per-urban farms into sector working groups.

Intervention 14: Develop a national guideline for farmers that provide guidance on how to set up a farm in the most sustainable and circular way

Activity 14.1: Identify the needs of farmers in the transition towards circular economy through PSEM and research studies: The costing of this activity includes the technical assistance of 2 consultants to provide a capacity needs assessment (1 international and 3 national).

Activity 14.2: Develop content of the guideline: This includes the design and implementation of the respective policy content led by Government staff.

Activity 14.3: Align the content with national policies: The costing includes the design and implementation of policy content as well led by Government staff.
Intervention 15: Improve the planning of Water resource management, supply and wastewater treatment in urban and rural areas

- **Activity 15.1: Feasibility study to integrate natural basins into spatial planning:** This is assumed to be realised through consultancy support of 5 experts (2 international and 3 national).
- **Activity 15.2: Technical Working Group for identifying applicable outcomes of the feasibility study into spatial planning:** For this activity, costs for 1 staff support is considered for at least year 12 month.
- **Activity 15.3: Develop Guideline to better integrate water into spatial planning:** Cost assumptions for this activity include 1 staff managed support from year 4 onwards, picking up from the above activity.
- **Activity 15.4: Awareness campaigns to protect natural basins and other water bodies towards impurities and contamination:** This activity includes mainly sensitisation campaigns that will be realised through local government leaders with BCC materials and dissemination (+5% incidentals).
- **Activity 15.5: Establish a project to protect natural basins for each basin:** The activity's costing includes a feasibility study and grants or match funding of $50,000 to pilot an INGO for two basins.
- **Activity 15.6: Fund projects for grey water treatment systems in buildings:** This includes grey water projects piloted in all 30 districts starting with public buildings e.g. district hospitals or markets and grants of up to $25,000 awarded for per district.
- **Activity 15.7: Pilot rainwater catchments in urban areas of industrial facilities:** The costing entails 4 pilots established at industrial zones in urban cities where industrial zones exist.
- **Activity 15.8: Awareness campaigns to promote rainwater catchments and rainwater treatment:** This includes technical assistance from 4 experts (2 international and 2 national) for 5-6 months to support the establishment of regulations and processes for natural basins/other water body impurities and contamination.
- **Activity 15.9: Trainings for sustainable water resource management and wastewater treatment:** The costing assumes a training workshops in Kigali for companies with at least 60 attendees, running over 3 years.
- **Activity 15.10: Establish centralised wastewater treatment plants in secondary cities:** This activity includes 4 pilots in 4 (rural) provinces to establish wastewater treatment plants. Its costs are based on the a similar model in Gacuriro Estate WWT plant, developed in 2020, funded by RSSB and the City of Kigali.

Intervention 16: Promote a more efficient, clear and circular water use in Agriculture, industry and service sectors

- **Activity 16.1: Develop and run awareness raising campaigns targeting industries and the agricultural sector to decrease their water consumption:** The costing includes frequent awareness campaigns in form of monthly Talk Shows and a live broadcast launching successful projects through TVR, Radio Rwanda, and the other five community FM stations. It also considers incidentals (5%), hourly charge per week for 5 radio channels (TVR: 2.5M rwf, RR: 2.3M rwf, FMs: 1M rwf).
- **Activity 16.2: Training courses transferring knowledge about Cleaner Production (potential relation to intervention #2):** The activity’s costing assumes technical assistance through 2 consultants (2 international and 3 national) for the training of farmers in smart and efficient irrigation technology.
- **Activity 16.3: Conduct scoping study for the development of a standard that regulates water use through a threshold system:** The costing considers fees for 2 consultants (1 international and 1 national) to conduct the feasibility study.
Activity 16.4: Develop mandatory standard that regulate water usage thresholds depending on industry/farm size or type and volume of outputs: This entails technical assistance from 2 consultants to establish the regulations for efficient water use in relevant sectors.

Activity 16.5: Install mandatory water meters at each farm and industry site: The costing defines costs for staff and management (1 middle level management staff).

Activity 16.6: Conduct feasibility study about the implementation of Payment for Ecosystem Services for water consumptive industrial sectors: The feasibility study will cause costs for 3 consultants (1 international and 2 national).

Activity 16.7: Establish an Ecosystem Services Payment system: The costing of this activity includes technical assistance from 4 technicians to develop and deliver an e-payment system that will be handed over thereafter to staff to use and manage (same staff as assigned in Activity 16.5). Accordingly, the main costs will relate to consultant and software fees for system design and content.

Activity 16.8: Enforcing regulation on effluent treatment and applying Polluter Pays Principles: The costing is made of staff and management costs of 1 middle level manager.

Activity 16.9: Provide financial support to fund research projects in water consumption and wastewater treatment: The assumption of the costs for this activity are cash grants or matching grants to boost innovative ways for wastewater treatment within the private sector. This may include $50,000 cash grants for equipment, similar to the GGGI model.

Activity 17.1: Revisit and amend standards for discharged water: This requires technical assistance to establish and revisit the standards through 1 international consultant.

Activity 17.2: Promote utilisation of higher and safer levels of wastewater treatment and circularity potential among utility companies and small-scale companies: The costs include fees for staff training in utility companies and other small-scale companies (up to 30).

Activity 17.3: Enhance the implementation of NBS on a project basis together with the private sector (PSEM, intervention #3): This is assumed to be in form of project expenses or cash grant for equipment ($50,000) for private sector firms to implement NBS.

Activity 17.4: Provide financial support for the integration of micro-scale and decentralised systems: The cost assumption of this activity includes the establishment of a funding mechanism for non-profit or civil society organisations on a micro-scale that support citizens and communities in decentralised valorisation systems of wastewater. This will be enabled through cash grants availed at a micro-scale ($5,000 cash grants for equipment) – up to 10 grantees.
Activity 10.3: Develop technical and financial support to entrepreneurs that launch new construction materials (potential link to intervention #4): This includes to attract, setup and establish an innovation fund with established criteria for entrepreneur grants – grants of up $10,000 each are given to 2 companies per district.

Activity 10.4: Launch pilot projects to test local construction materials, such as earth masonry: Costs for this activity include the establishment of a) a coordination platform; b) criteria to assess progress, success, and support mechanisms and c) an M&E framework to assess success/lessons. This may require 1 consultant and 1 M&E staff to develop the M&E framework with tools for inspection to assess progress and success.

Activity 10.5: Prepare transition guidelines for the informal sector that help shifting to local alternative materials and a better integration into the economy: This includes the development of a transition plan by 2 experts (1 national and 1 international) as well as the engagement of the private sector to work out mechanisms for integrating local alternative and renewable materials. The latter will be facilitated through short-term technical support of 1 national consultant.

Activity 10.6: Develop financial incentives to purchase local alternative materials, e.g. tax reduction or subsidy: This activity requires the engagement with the Ministry of Finance, RRA, RDB and PSF in a policy and partnership for finance incentives (grants for companies up to $5,000 per company, similar to incentives given to cooperatives in agriculture for equipment). The grants are foreseen to be awarded to 2 companies per district (total 60).

Activity 10.7: Run awareness and education campaigns on the benefits associated to local alternative materials: The costs for this activity are mainly caused by awareness campaigns, the broadcast launch of successful projects (from activity 10.3 and 10.4 above) as well as live broadcast for Print Media outlets (+5% incidentals).

Intervention 11: Develop a national guideline how to characterise and valorise CDW

Activity 11.1: Conduct study on CDW characterisation and viable treatment options, incl. The identification of best practices: This activity includes a brief study on policies and best practices to understand International and regional best practices study (for guidelines and how to characterise and valorise CDW).

Activity 11.2: Develop guideline and transitory plan for identifying CDW components and activities for repair, reuse and recycling: The realization of this activity requires 1 salaried staff that ensures the coordination of stakeholders in form of technical working group or committee meetings as well as the facilitation of the meetings.

Activity 11.3: Amend a mandatory requirement to document the materials used at construction stage: This activity will cause costs for the employment of staff to manage the process and secure outsourced support to conduct a maximum of 5-days technical working group meetings.

Activity 11.4: Provide trainings and workshops to construction companies on how to apply the guideline: This will be realised through staff facilitating training and conducting a Kigali-based workshops of 2 days for 2 cohorts of 50 persons each.