CIRCULARITY ROADMAP FOR GEORGIA 2024

გარემოს დაცვისა და სოფლის მეურნეობის სამინისტრო

Editorial Team: Dr. Dariusz Prasek, Dr. Mariam Kimeridze

Authors: Dr. Dariusz Prasek, Dr. Medgar Tchelidze, Acad. Solomon Pavliashvli, and Dr. Mariam Kimeridze

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July 2024

GSNE "Orchis"

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შვედეთი Sverige

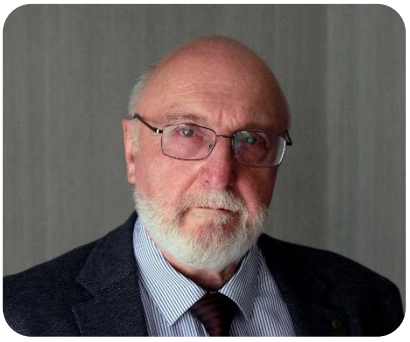
UNDP

Authors:

Dr. Dariusz Prasek

Team Leader, International Consultant in Circular Economy, ESG and Sustainable Development, member of the Executive Board of GSNE "Orchis", Supporting the Government of Georgia in Enhancing Governance and Policies for a Transition to a Circular Economy Sub-Project

Doctor in Environmental Engineering, Independent International Expert in Circular Economy, Sustainable Financing, Environmental, Social and Governance Areas. Former Director of Operations in Environmental and Sustainability Department of the European Bank for Reconstruction and Development.



Dr. Medgar Tchelidze

Deputy Team Leader, Key National Expert in Sustainable Development, member of the Executive Board of GSNE "Orchis", Supporting the Government of Georgia in Enhancing Governance and Policies for a Transition to a Circular Economy Sub-Project

Doctor in Biological Sciences, Expert in Environmental, Social, Governance and Sustainability Areas.

Acad. Solomon Pavliashvili

Chair of the Co-ordination Board of the Government of Georgia for the Circular Economy Programme

Academician at the Georgian National Academy of Sciences, Doctor in Economic Sciences,
Deputy Minister at the Ministry of Environmental Protection and Agriculture of Georgia.

Dr. Mariam Kimeridze

Chair of GSNE "Orchis", the Manager of Supporting the Government of Georgia in Enhancing Governance and Policies for a Transition to a Circular Economy Sub-Project, Expert in ESG and Sustainability Areas

Doctor in Biological Sciences, Expert in Environmental, Social, Governance and Sustainability Areas.

Contributors: Circularity Roadmap development team of GSNE "Orchis"

ACAD. MIKHEIL DJUBUTI	**Expert of National and Regional Development Policies, Plans and Programs** Academician at the Georgian National Academy of Sciences, the President of Georgian Academy of Economic Sciences, Vice Chair of the Center for Innovation and High Technologies at the Presidium of the Georgian National Academy of Sciences, Doctor in Economic Sciences.
MANANA PETASHVILI	**Resource Management Expert, member of the Executive Board of GSNE "Orchis"** Expert in Environmental, Social, Governance and Sustainability Areas, Master in Physics.
PROF. MARGALITA ARABIDZE	**Expert in Energy Sector and Energy Efficiency** Associate Professor at the Georgian Technical University, Head of Energy Efficiency and Renewable Energy Policy and Sustainable Development Department at the Ministry of Economy and Sustainable Development of Georgia.
DR. KAKHA RUKHAIA	**Expert in Waste Management and Recycling** Doctor in Chemistry, Master in Ecology, Expert in Environmental and Waste Management Areas.

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ABBREVIATIONS

AA	EU-Georgia Association Agreement
AR	Autonomous Republic
BTC	The Baku-Tbilisi-Ceyhan Pipeline
CE	Circular economy
CO_2e	Carbon dioxide equivalents
CSO	Civil society organization
DE	Domestic extraction
DMC	Domestic material consumption
EPR	Extended Producers Responsibility
EU	European Union
FAO	United Nations Food and Agriculture Organization
GDP	Gross domestic product
GEL	Georgian Lari
Geostat	The National Statistics Office of Georgia
GFCM	General Commission for Mediterranean Fisheries
GGTC	Georgian Gas Transportation Company LLC
GHG	Greenhouse gases
GNTA	Georgian National Tourism Administration
GoG	Government of Georgia
GOGC	Georgian Oil and Gas Corporation JSC
GSE	Georgian State Electrosystem
GSNE “Orchis”	Georgian Society of Nature Explorers “Orchis”
HPP	Hydro power plant
HZW	Hazardous waste
IFC	International Financial Corporation
IFIs	International Financial Institutions
JSC	Joint stock company
LEPL	Legal entity of public law
MoEPA	Ministry of Environmental Protection and Agriculture of Georgia

MoESD	Ministry of Economy and Sustainable Development of Georgia
MoRDI	Ministry of Regional Development and Infrastructure of Georgia
NACE	Nomenclature of Economic Activities, Statistical Classification of Economic Activities in the European Community
NEAP	National Environmental Action Programme
NECP	Integrated National Energy and Climate Plan
NFA	National Forestry Agency of Georgia
NPMPD	National Pasturelands Management Policy Document
NSMP	The North-South Main Gas Pipeline
NWMAP	National Waste Management Action Plan
NWMS	National Waste Management Strategy
PET	Polyethylene terephthalate
RME	Raw material equivalent
ROA	Return on assets
ROE	Return on equity
SCP	The South Caucasus Pipeline
SDGs	UN Sustainable Development Goals
SIDA	Swedish International Development Cooperation Agency
SMEs	Small and medium size enterprises
SWMC	Solid Waste Management Company of Georgia Ltd
TPP	Thermal power plant
UNEP	United Nations Environment Programme

EXECUTIVE SUMMARY

Georgia's Circular Economy Transition

Georgia is a regional leader in the shift towards a circular economy, aiming to replace the traditional 'end-of-life' concept with a sustainable economic system that closes material loops. Since 2018, Georgia has made significant strides, notably through the introduction of the Extended Producer Responsibility (EPR) within its national Waste Management Code. Legislation on resource management, renewable energy, and energy efficiency is continuously updated to support this transition. The Government of Georgia (GoG), in collaboration with civil society, academia, and international partners, has also initiated the development of a National Circular Economy Strategy and Roadmap. This strategy is comprehensive, encompassing production, consumption, waste management, secondary raw materials, and innovation across various sectors.

Vision for 2050

By 2050, Georgia envisions a society where circular economy principles are embedded in daily life, fostering sustainable production and consumption patterns. The circular economy will drive the regeneration of nature, enhancing resilience, biodiversity, and well-being. Innovation will be at the core, with circular business models, low-impact design standards, and clean technologies becoming the norm. The circular economy will extend across all regions, promoting local development, job creation, and inclusivity, ensuring that the transition is just and fair for all.

Key Initiatives and Findings

In partnership with the Government of Sweden, the GoG undertook a circularity mapping of the Georgian economy, identifying 14 sectors with significant potential for circularity. The results revealed that Georgia is only 1.3% circular, highlighting a vast circularity gap. Over 315 million tonnes of resources enter Georgia’s economy annually, with significant portions of these resources being non-renewable. The key to bridging this gap lies in designing new materials and products for end-of-life recycling and reducing non-circular flows such as fossil fuels.

The Roadmap, developed with extensive stakeholder engagement, outlines short-, medium-, and long-term actions to enhance Georgia's circularity. These actions include developing regulations, policies, and strategies to promote circular practices, establishing circular business incubators, and launching pilot projects.

Strategic Goals and Pillars

To guide the transition, Georgia has set ten long-term goals, including generating green jobs, reducing waste, increasing recycling rates, and improving energy and resource management. These goals are structured around four pillars:

1. **Circular Innovation:** Creating a national innovation system to embed circular design in products and processes.

2. **Circular Culture:** Making circular habits and practices the norm through education, communication, and transparency.
3. **Circular Regulation:** Adjusting regulatory frameworks to support circular practices, expand EPR schemes, and promote waste separation and recovery.
4. **Circular Regions:** Tailoring circular economy strategies to regional contexts, enhancing local waste management infrastructure, and developing secondary markets.

Recommended Actions

The Roadmap recommends several actions to accelerate the circular transition:

- Remove subsidies for linear economic activities and internalize their negative externalities.
- Use public procurement to stimulate demand for circular economy products and services.
- Mobilize private capital for circular initiatives through public funds as de-risking instruments.
- Develop capacity-building programs to inform stakeholders about circular economy principles and their implementation.
- Establish metrics and indicators to track progress and set binding or aspirational targets to guide circular economy initiatives.
- Expand the scope of EPR schemes to additional products and enforce measures to promote high-quality secondary materials production.
- Align national policies with circular economy goals, ensuring coherence across sectors and fostering collaboration within and between value chains.

Georgia's vision for a circular economy is ambitious yet achievable, positioning the country as a global leader in sustainable development. Through comprehensive planning, inclusive partnerships, and innovative strategies, Georgia is poised to create a regenerative economy that benefits its people, environment, and future generations.

GLOSSARY

Consumption refers to the usage or consumption of products and services meeting (domestic) demand. *Absolute consumption* refers to the total volume of either physical or monetary consumption of the Georgian economy as a whole. In this report, when we talk about consumption we are referring to absolute consumption.

Domestic Extraction (DE) is an environmental indicator that measures, in physical weight, the amount of raw materials extracted from the natural environment for use in the economy. It excludes water and air.

Domestic Material Consumption (DMC) is an environmental indicator that covers the flows of both products and raw materials by accounting for their mass. It can take an 'apparent consumption' perspective — the mathematical sum of domestic production and imports, minus exports — without considering changes in stocks. It can also take a 'direct consumption' perspective, in that products for import and export do not account for the inputs — be they raw materials or other products — used in their production.

Greenhouse gases (GHG) refers to a group of gases contributing to global warming and climate breakdown. The term covers seven greenhouse gases divided into two categories. Converting them to **carbon dioxide equivalents** (CO_2e) through the application of characterisation factors makes it possible to compare them and to determine their individual and total contributions to Global Warming Potential.

High-value recycling refers to the extent to which, through the recycling chain, the distinct characteristics of a material (the polymer, the glass or the paper fibre, for example) are preserved or recovered so as to maximise their potential to be re-used in a circular economy.

Materials, substances or compounds are used as inputs to production or manufacturing because of their properties. A material can be defined at different stages of its life cycle: unprocessed (or raw) materials, intermediate materials and finished materials. For example, iron ore is mined and processed into crude iron, which in turn is refined and processed into steel. Each of these can be referred to as materials.

Material footprint, also referred to as Raw Material Consumption (RMC), is the attribution of global material extraction to the domestic final demand of a country. In this sense, the material footprint represents the total volume of materials (in Raw Material Equivalents) embodied within the whole supply chain to meet final demand. The total material footprint, as referred to in this report, is the sum of the material footprints for biomass, fossil fuels, metal ores and non-metallic minerals.

Material flows represent the amounts of materials in physical weight that are available to an economy. These material flows comprise the extraction of materials within the economy as well as the physical imports and exports (for instance, the mass of goods imported or exported). Air and water are generally excluded.

Raw Material Equivalent (RME) is a virtual unit that measures how much of a material was extracted from the environment, domestically or abroad, to produce the product for final use.

Imports and exports in RME are usually much higher than their corresponding physical weight, especially for finished and semi-finished products. For example, traded goods are converted into their RME to obtain a more comprehensive picture of the 'material footprints'; the amounts of raw materials required to provide the respective traded goods.

Resources include, for example, land, water, air and materials. They are seen as parts of the natural world that can be used for economic activities that produce goods and services. Material resources are biomass (like crops for food, energy and bio-based materials, as well as wood for energy and industrial uses), fossil fuels (in particular coal, gas and oil for energy), metals (such as iron, aluminium and copper used in construction and electronics manufacturing) and non-metallic minerals (used for construction, notably sand, gravel and limestone).

Secondary materials are materials that have already been used and recycled. This refers to the amount of the outflow which can be recovered to be reused or refined to re-enter the production stream. One aim of dematerialisation is to increase the amount of secondary materials used in production and consumption to create a more circular economy.

Sector describes any collective of economic actors involved in creating, delivering and capturing value for consumers, tied to their respective economic activity. We apply different levels of aggregation here—aligned with classifications as used in GEOSTAT. These relate closely to the European sector classification framework NACE.

Socioeconomic metabolism describes how societies metabolise energy and materials to remain operational. Just as our bodies undergo complex chemical reactions to keep our cells healthy and functioning, a nation (or the globe) undergoes a similar process—energy and material flows are metabolised to express functions that serve humans and the reproduction of structures. Socioeconomic metabolism focuses on the biophysical processes that allow for the production and consumption of goods and services that serve humanity: namely, what and how goods are produced (and for which reason), and by whom they are consumed.

Total material consumption is calculated by adding Raw Material Consumption (material footprint) and secondary material consumption (cycled materials).

INTRODUCTION

The circular economy concept is gaining attention in light of increasing consumption and resource use by a fast-growing population with rising standards of living. Circularity refers to the circular flow and efficient use and reuse of resources, materials and products. This is a new economic model that represents sustainable progress towards efficient green growth, moving from a consumption and disposal-based linear model to extending the life and use of products and materials and minimising wastage. Due to its expected environmental, climate, social and economic benefits, the circular economy is not only being strongly promoted by the European Commission[1] and other EU institutions, as well as a growing number of EU Member States and cities, it is also attracting increasing attention from the business community and from public and private financiers. The circular economy clearly goes beyond resource efficiency and recycling and provides the framework to develop new business models aimed at increasing the value, use and life of materials, products and assets and designing out waste from production and consumption.

Circular economy strategies have been under development in European cities, regions, and countries in the last few years. 33 strategies have been adopted since 2014, and at least 29 more are under development. The Ellen MacArthur Foundation[2], OECD, European Commission and other notable organizations have estimated that economies could greatly benefit from circular economy strategies on economic, social and environmental dimensions[3].

Adopting the circular economy policy has a potential to put economies on the road to transformation to an economic system that uses natural resources in the most efficient way, preserves the value of materials and products by using them circularly, and reduces the negative impact of economic activities on the environment and health. Applying circular economy approaches can cut industrial emissions, reduce the production of and exposure to hazardous substances and contribute to climate change mitigation. With its truly symbiotic effects on the economy and the environment, the circular economy is a way of achieving certain UN Sustainable Development Goals (SDGs)[4].

The transition to the circular economy requires a radical change in the way we produce and consume. In a circular economy, products are designed for durability, upgradeability, reparability and reusability, with a view to reusing materials from which they are made after they reach the end of their life. In the use phase, products are managed with a view to maximizing their utilization capacity and extending their useful life, thus maintaining their value for as long as possible. This is made possible by companies that develop new business models generating revenue streams from services rather than products while making a more efficient use of resources and/or giving new value to end-of-life products and materials.

Consumers use products efficiently and discard them in such a way that they can be reused or, if this is technically or economically unfeasible, recycling operators turn them into secondary

[1] https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

[2] https://www.ellenmacarthurfoundation.org/the-circular-economy-in-detail-deep-dive

[3] https://www.eea.europa.eu/highlights/circular-economy-to-have-considerable

[4] https://sdgs.un.org/goals

materials that can enter a new production-consumption cycle. This needs to be supported by the whole system, from enabling technologies and infrastructures to a form of market organization that facilitates collaboration along and across value chains and a form of governance and regulation that encourages companies to adopt circular approaches to social norms that make circular production-consumption patterns socially preferable. This paradigm is in contrast with the linear economy which is based on the 'take-make-use-discard' model. This is a model which maximizes the amount of products produced and sold but does not focus on preserving materials. Such an approach prevents effective collaboration along value chains and stimulates the 'throw-away' consumer culture with its noxious environmental consequences.

Like with any systemic change, the transition to the circular economy requires several elements of the system to change simultaneously. The inertia and resistance of the current linear economic systems prevent the transition from occurring. Concerted actions by a host of stakeholders are needed. Government at all levels, businesses, innovators, academia, investors and consumers all have to play their distinct roles and contribute to the process.

With the general objective of replacing the 'end-of-life' concept with an economic system that closes material loops, many countries have embarked on an accelerated path to transition to the circular economy. This normally entails the development of the circular economy strategy and roadmap aimed at comprehensive approach from multiple points of view including production, consumption, waste management, secondary raw materials, innovation, investments as well as ongoing initiatives, in different sectors, by different players, and at different stages of the value chain or different stages of development. Many countries have also introduced in their regulatory systems an Extended Producer Responsibility (EPR)[5], which is considered a key financial and operational instrument which promotes the implementation of waste management schemes in line with the waste hierarchy and the development of a resource-efficient economy.

The EPR is an approach of the environmental policy where the producers and importers of certain products are responsible to manage the wastes generated after the use of their products, and among them to carry related costs. The purpose of the EPR is to improve environmental performance of the waste management system and to mobilize financial resources needed to ensure the reuse, separate collection, recycling, recovery and/or other treatment of waste. It is based on the "polluter pays" principle, which is the cornerstone of many environmental policies. The EPR facilitates the attraction of private investments in the waste management infrastructure and the creation of different jobs in the country. The EPR is directly linked to the green and circular economy development.

Regulations aimed on increasing share of renewable sources of energy in the entire generation schemes and improving energy efficiency are also important instruments for CE transition[6].

[5] https://www.oecd.org/environment/extended-producer-responsibility.htm

[6] Energy Efficiency Directive and Renewable Energy Directive of European Commission https://energy.ec.europa.eu/topics/energy-efficiency/energy-efficiency-targets-directive-and-rules/energy-efficiency-directive_en and https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-directive_en

1 KEY CIRCULAR ECONOMY STEPS IN GEORGIA

1.1 WHAT HAS ALREADY BEEN ACCOMPLISHED IN GEORGIA

Georgia is currently a clear regional leader in the accelerated path towards circularity. With the general objective of replacing the 'end-of-life' concept with an economic system that closes material loops, Georgia embarked in 2018 on an accelerated path to transition to the circular economy with enacting the concept of the Extended Producers Responsibility (EPR) in the national Waste Management Code. Legislation and regulations related to Resource Management, Renewable Energy and Energy Efficiency is also being constantly updated and improved. With the concerted efforts of the Government of Georgia (GoG), civil society organisations, academia and international partners, Georgia has also initiated the development of the National Circular Economy Strategy and Roadmap based on a comprehensive multidimensional approach that covers production, consumption, waste management, secondary raw materials, innovation, investments as well as ongoing initiatives in different sectors implemented by different players that are at different stages of the value chain or different stages of development.

Georgia is currently a clear regional leader in the accelerated path towards circularity. With the general objective of replacing the 'end-of-life' concept with an economic system that closes material loops, Georgia embarked in 2018 on an accelerated path to transition to the circular economy with enacting the concept of the Extended Producers Responsibility (EPR) in the national Waste Management Code.

The GoG strongly believes that Circular Economy strategies benefit from inclusive partnerships, and different players capable of providing the knowledge, funding, or improving the regulation need to work together to bring about a paradigm shift with the general objective of replacing the 'end-of-life' concept with an economic system that closes material loops. The GoG is working with various donors to progress the transition to the Circular Economy and finance green economy initiatives.

1.2 CIRCULAR ECONOMY PROGRAMME IN GEORGIA AND CIRCULARITY MAPPING FOR GEORGIA

In 2019-2023, GSNE "Orchis" implemented the Circular Economy Programme comprising two elements - the first one encompassed an awareness raising aiming at promoting the Circular Economy and providing recommendations to various groups of key stakeholders, including policy makers, financial institutions, and project promoters how to accelerate the implementation of circular economy principles at various levels of economic activity.

Another element was mapping circularity level of the economy in Georgia. To perform circularity mapping, which is a complex process, economic sectors of Georgia have been assessed in terms of circularity. At the initial stage a screening exercise was conducted to select out of the 99 sectors (economic activities) listed in the register of National Statistics Office of Georgia those sectors, which may be prospective for transition to circular models of economy. Two simple criteria have

been used for screening: (i) economic criteria characterizing the role of the sector in the country's economy (input in GDP; annual production; number of employees); and (ii) volumes of waste generated or losses. As a result of the screening, 14 sectors have been identified as having potential (medium; high; extremely high) for developing circularity. Subsequently, the task team took a deep dive in the 14 selected sectors and prepared a snap-shot description of each, including mass flows of materials (raw materials, products, by-products, and wastes), losses and wastes generated, share of recycled wastes and estimation of potential for recycling. The task team also recommended appropriate national quantitative circular economy policy targets and circular ambitions, identified sectoral opportunities, defined sector-specific policy options, and developed a set of recommendations for the Circular Economy Road Map and Strategy for Georgia.

All these has been built on extensive consultations and interviews with relevant governmental agencies and business leaders, review more than 80 most relevant reference documents and analysis of available statistical data.

The circularity mapping was implemented by the task team of GSNE "Orchis" formed from 13 international and local experts representing the highest level at various economic sectors. The mapping process took 24 months of intensive work, and was completed at the end of October 2022. Throughout this period, the task team interacted closely with the Inter-Ministerial Co-ordination Board (CB) of the GoG consisting of 36 representatives from various ministries and governmental agencies under the leadership of Acad. Solomon Pavliashvili - Deputy Minister at the Ministry of Environmental Protection and Agriculture of Georgia. Together with the main outcome – the establishing of the circularity level of the economy of Georgia and developing relevant recommendations, the mapping process has demonstrated an efficient interaction between the civil society and public sectors towards the desired results.

1.3 KEY FINDINGS OF THE MAPPING PROCESS

1.3.1 Primary Screening as Preparatory Work for Mapping Circularity

Prioritization of industries and/or their clustering is the final, summarizing part of the mapping process: first, the main profile of the circularity of the Georgian economy is developed – a uniform, multiparametric description of each sector with the identification of material flows – resource consumption, energy, volume of products and waste streams (recyclable and not). Then, there is an understanding of this basic material, prioritization and clustering. But the initial process preceding the compilation of the profile is the primary screening.

Primary screening implies a superficial but quick analysis of the entire set of industries recorded in the register of the National Agency for Statistics, based on only two or three key criteria. The register of the National Statistics Office of Georgia contains 99 items in the list of various types of economic activity. Obviously, this is too long a list to compile a profile. The list also includes such types of economic activity that are insignificant in their contribution to GDP, are not associated with significant consumption of energy resources and raw materials or waste generation. To carry out a description of all these activities would be unproductive and unjustified. Preliminary screening allows us to weed out unpromising types of activity at an early stage in order to narrow the range of activities to a reasonable minimum. The activities excluded from the following discussion include: financial and insurance activities; education; administrative activities; public administration; real estate activities; Information and communication; arts entertainment etc.

Further mapping work is carried out on this shortened list of sectors, including 56 nominations (see Table 1).

The set of screening criteria should reflect, on the one hand, the importance and contribution of the industry to the overall structure of the country's economy, and on the other hand, the most important aspect of circularity.

► Economic Indicators Selected for Mapping Circularity

During the consultation with the Inter-Ministerial CB and analysis of the available statistical data, we came to conclusion that for estimation of the role of different economic sectors and sub-sectors following indicators could be used available in data bases of the National Statistics Office:

- Input of the sector in GDP (main criteria)
- Number of employees engaged in sector (additional criteria)

Combination of these two indicators gives an overall picture about the significance of the sector in the economic structure and the trend during the recent 10 years enables to make conclusions regarding the potential for further development. Actually, share in GDP is considered by us as the main economic criteria for estimation of the sector importance and number of employees is taken as additional criteria.

► Circularity Indicators Selected for Mapping Circularity of Georgia

- At the screening stage of the project development, we have focused at the waste generation and recyclability indicators to estimate the circularity potential of the sectors
- Potential for improvement of the land resource management and management of gross material and energy losses have been considered as another factor to support circularity
- Product durability or/and energy saving indicators could be applied later, at the next stage of the deepened assessment.

For screening needs, we used qualitative estimation of waste volumes generated by the sector and subsectors and three grades:

- High level of waste generation per unit of product or activity
- Medium level of waste generation
- Low level of waste generation

As a result of the Screening, following 14 sectors and subsectors of economy have been estimated as prospective for further prioritization and clustering:

	1. Agriculture, fishing and Manufacture of Food Products
	- Annual crop production
	- Permanent crop production and manufacture of food products
	- Grape cultivation and wine making

	- Animal husbandry and manufacture of food products
	- Fishery and fish processing
	2. Forestry, logging and Manufacture of Wood Products
	- Forestry and logging
	- Manufacture of wood products
	3. Mining and quarrying (except oil and gas extraction)
	4. Construction
	5. Manufacture of basic metals
	6. Electricity, gas, steam and air conditioning supply (Electric power generation, transmission and distribution/ Manufacture of gas; distribution of gaseous fuels through mains
	7. Sewerage; Waste collection, treatment and disposal activities; Waste utilization, remediation activities and other waste management services
	8. Wholesale and retail trade
	9. Tourism, accommodation and food service activities

Table 1 shows general macro-economic metrics and circularity qualitative indicators of the listed sectors and subsectors.

Table 1 General macro-economic metrics and circularity qualitative indicators of 14 sectors and subsectors selected for deeper analysis

Nace Rev.2	Economic Activities	GDP Mln GEL 2019	GDP %	Annual Turnover Mln GEL	Annual Production Value Mln GEL	Qualitative Indicators of Circularity (High/ medium/low)				Circularity Potential
						Economic Value	Waste Generation	Resource management improvement potential	Material and energy losses	
1-3	**Agriculture, fishing and Manufacture of Food Products**				726					
1	Crop and animal production, hunting and related service activities	3050.6	6.14			High	High	High	Low	Extremely High
3	Fishing and aquaculture	35.6	0.07			Low	Medium	High	Low	Medium
10-12	Manufacture of food products, beverages and tobacco products	2271.7	4.57	4,680.00	4,800	High	High	Low	Low	Extremely High
	Forestry, logging and Manufacture of Wood Products									
2	Forestry and logging	117.6	0.24			Medium	Medium	High	Medium	High
16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials	49.2	0.1	120	110	Low	Medium	Low	Low	Medium
	Manufacture of basic metals and non-metallic mineral products									
23	Manufacture of other non-metallic mineral products	423.7	0.85	1,400.00	1,424	High	Medium	Low	Low	High
24	Manufacture of basic metals	651.2	1.31	1,450.00	1,440	High	High	Low	Low	Extremely High

Nace Rev.2	Economic Activities	GDP Mln GEL 2019	GDP %	Annual Turnover Mln GEL	Annual Production Value Mln GEL	Qualitative Indicators of Circularity (High/ medium/low)				Circularity Potential
						Economic Value	Waste Generation	Resource management improvement potential	Material and energy losses	
	Manufacture of other products									
13-15	Manufacture of textiles, wearing apparel, leather and related products	116.3	0.23	360	360	Medium	Medium	Low	Low	Medium
22	Manufacture of rubber and plastic products	99.3	0.2	430	423	Low	Medium	Low	Low	Medium
25	Manufacture of fabricated metal products, except machinery and equipment	139.2	0.28	400	378	Medium	Medium	Low	Low	Medium
31-32	Manufacture of furniture	72.6	0.15	220	222	Low	Medium	Low	Low	Medium
5-9	**Mining and quarrying**	**596.3**	**1.2**	**1,000.00**	**1,000**					
	Mining of coal and lignite	5.3	0.01	13.90	16	Low	High	Low	Low	Medium
	Extraction of crude petroleum and natural gas	8.7	0.02	20.00	26	Low	High	Low	Low	Medium
	Mining of metal ores	477.0	0.96	993.00	991	High	High	Low	Low	Extremely High
	Other mining and quarrying and Mining support service activities	104.0	0.21	199.00	201	Medium	Medium	Low	Low	Medium
	Construction									
41-43	Construction	3680.8	7.4	8,200.00	9,074	High	High	Low	Low	Extremely High

Nace Rev.2	Economic Activities	GDP Mln GEL 2019	GDP %	Annual Turnover Mln GEL	Annual Production Value Mln GEL	Qualitative Indicators of Circularity (High/ medium/low)				Circularity Potential
						Economic Value	Waste Generation	Resource management improvement potential	Material and energy losses	
41-43	**Wholesale and retail trade**									
45	Wholesale and retail trade and repair of motor vehicles and motorcycles	838.4	1.69			High	High	Low	Low	Extremely High
46	Wholesale trade, except of motor vehicles and motorcycles	2795.2	5.62			High	High	Low	Low	Extremely High
47	Retail trade, except of motor vehicles and motorcycles	2527.4	5.09			High	High	Low	Low	Extremely High
	Tourism, accommodation and food service activities									
55-56	Accommodation and food service activities	2223.0	4.47		1,200	High	High	Low	Low	Extremely High
	Transportation and storage									
49	Onshore transport and transport via pipelines (transit)	1065.9	2.15			High	Low	Low	High	Low
50	Water transport					Low	Medium	Low	Medium	Medium
51	Air transport					Low	Low			Low
52	Warehousing and support activities for transportation					Low	Medium			Medium
	Other Activities									
33	Repair and installation of machinery and equipment	70.6	0.14	150	140	Low	Medium			Medium

Nace Rev.2	Economic Activities	GDP Mln GEL 2019	GDP %	Annual Turnover Mln GEL	Annual Production Value Mln GEL	Qualitative Indicators of Circularity (High/ medium/low)				Circularity Potential
						Economic Value	Waste Generation	Resource management improvement potential	Material and energy losses	
35	Electricity, gas, steam and air conditioning supply	1009.1	2.03	3,500	1,650	High	Low	Low	High	High
	Electric power generation, transmission and distribution			3,100	1,525	High	Low	Low	High	High
	Manufacture of gas; distribution of gaseous fuels through mains			430	138	Medium	Medium	Low	High	High
	Water supply; sewerage, waste management and remediation activities							Low	Medium	Low
36	Water collection, treatment and supply	243.5	0.49	260		Medium	Low	Low	Low	Medium
37-39	Sewerage; Waste collection, treatment and disposal activities; Waste utilization, remediation activities and other waste management services	107.0	0.22			Medium Specific	Extremely High	Low	Low	Extremely High

1.3.2 Prioritization and Clustering of the Sectors of Economy

We expected two possible types of outcomes from the preliminary assessment of the different sectors of economy in Georgia and mapping process: (i) Prioritization of industries, and (ii) Clustering of industries.

- **Prioritization of industries:** Identification of a small group of clearly priority industries from the entire set of economic sectors represented in the country, which have the most favourable prospects for a significant increase in the degree of circularity

- **Clustering of industries:** splitting the entire set of economic industries represented in the country into groups of the same type according to the criteria of circularity (economic and environmental indicators, resource consumption, material and waste flows), indicators characterizing key players and the process of sector administration, economical sustainability and type of regulations needed in support.

1.3.2.1 Primary screening of economic sectors in Georgia: selection of industries that should be reflected in the circularity profile of Georgia

As we indicated earlier, the register of the National Statistics Office of Georgia contains 99 items in the list of various types of economic activity. We conducted a preliminary assessment of each industry according to screening criteria. As a result of such an assessment, as expected, it was not possible to isolate only a few priority groups in order to complete prioritization already at this stage. But it was possible to cut off a lot of unpromising areas and narrow the range of economic activities under consideration to 14.

Further, in the Mapping Report it has been presented a clustering evaluation table for the types of economic activities that have been screened and are of interest for subsequent mapping. **Below we provide an updated version of the clustering section developed under this Circularity Road Map.**

Economic sectors can be classified and distributed into different clusters using a number of criteria:

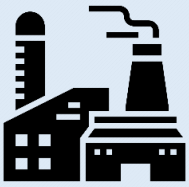
1. Types of priority actions aimed at implementing the principles of the circular economy:
    - Reuse of products, recovery of materials or recycling of waste
    - Reduction of material and energy losses
    - Efficient use of resources
    - Reducing the amount of waste by including the supply of spare parts and the organization of repair services in the commercial scheme
    - Increasing the life span of products

2. The type of regulations necessary for the circular transformation of the economic sectors assigned to this cluster:
   - Binding laws and technical regulations
   - Permissive laws and regulations that allow for actions that were not previously permitted or were subject to additional costs (taxes, etc.)
   - Encouraging regulations that provide additional economic benefits or economic advantages to companies implementing the principles of the circular economy
   - Development of indicators and standards that allow assessing the activities of economic entities in terms of their compliance with the principles of circularity
   - Policy, strategies and strategic action plans
3. Economical and financial viability of the proposed actions in long-term and scheme of the initial investments
4. Entities responsible for the execution of actions aimed at implementing the principles of the circular economy:
   - Government organizations or companies engaged in this type of activity
   - A narrow circle of large private companies, which limit the number of subjects engaged in this type of economic activity
   - A wide range of private companies (small and medium-sized businesses) engaged in this type of economic activity

Using a set of these criteria, the sectors of the economy and types of economic activity screened out at an early stage of screening are grouped into the following four clusters:

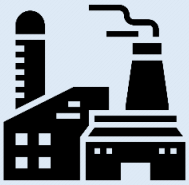
► **Cluster 1. Management of Resources and Losses**

	**Types of actions aimed at implementing the principles of the circular economy**	- Reduction of material and energy losses - Efficient use of resources
	**The type of regulations required for the circular transformation of the economic sectors assigned to this cluster**	- Policy, strategic action plans
	**Entities responsible for the enforcement of regulations and the implementation of actions aimed at implementing the principles of the circular economy**	- Government organizations (ministries, agencies or companies) engaged in this type of activity

	**Economical and financial viability of the proposed actions in long-term**	- The planned activities are associated with a need of significant initial investments, however in a long-term they increase the productivity and incomes of the beneficiaries - The investments should be either incurred by the responsible governmental organizations, or by the private operators under the terms of investments agreed with the Government - The maintenance costs are covered through the service fees by the beneficiaries
	**Types of activities included in Cluster 1:**	▪ Agriculture, fishing and Manufacture of Food Products - Annual crop production - Permanent crop production and manufacture of food products - Grape cultivation and wine making - Animal husbandry and manufacture of food products ▪ Electricity, gas, steam and air conditioning supply (Electric power generation, transmission and distribution/ Manufacture of gas; distribution of gaseous fuels through mains

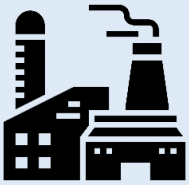
► Cluster 2. Mining and Basic Metal Manufacture

	**Types of actions aimed at implementing the principles of the circular economy**	- Reuse of products, recovery of materials or recycling of waste
	**The type of regulations required for the circular transformation of the economic sectors assigned to this cluster**	- Binding laws and technical regulations - Encouraging regulations that provide additional economic benefits or economic advantages to the companies implementing principles of the circular economy
	**Entities responsible for the enforcement of regulations and the implementation of actions aimed at implementing the principles of the circular economy**	- A narrow circle of large private companies, which limit the number of subjects engaged in this type of economic activity

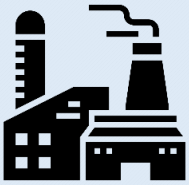
	**Economical and financial viability of the proposed actions in long-term**	- The planned activities are associated with a need of significant initial investments, however the investments are economically feasible and the activities are self-sustainable. The investment schemes correspond to usual business planning models for feasible projects.
	**Types of activities included in Cluster 2**	▪ Mining and quarrying (except oil and gas extraction) ▪ Manufacture of basic metals

► Cluster 3. Basic Industrial and Municipal Waste Streams Management

	**Types of actions aimed at implementing the principles of the circular economy**	- Reuse of products, recovery of materials or recycling of waste
	**The type of regulations required for the circular transformation of the economic sectors assigned to this cluster**	- Binding laws and technical regulations - Permissive laws and regulations that allow for actions that were not previously permitted or subject to additional costs (taxes, etc.) - Encouraging regulations that provide additional economic benefits or economic advantages to companies implementing the principles of the circular economy - Development of indicators and standards that allow assessing the activities of economic entities in terms of their compliance with the principles of circularity
	**Entities responsible for the enforcement of regulations and the implementation of actions aimed at implementing the principles of the circular economy**	- A wide range of private companies (small and medium-sized businesses) engaged in this type of economic activity and PROs and other associations created by them

	**Economical and financial viability of the proposed actions in long-term**	- Economic viability is conditional: The planned activities need significant initial investments. In most cases, the planned activities are not associated with the additional incomes sufficient for covering related expenses. In such cases the PROs are sustained through service fees paid by the waste producers (polluters) and income generated through waste recycling is just an additional income source. In other cases, the waste recycling activities may become economically viable if supported by incentivizing regulations and financial mechanisms (taxes; investment grants etc.)
	**Types of activities included in cluster 3**	▪ Agriculture, fishing and Manufacture of Food Products - Annual crop production - Permanent crop production and manufacture of food products - Grape cultivation and wine making - Animal husbandry and manufacture of food products - Fishery and fish processing ▪ Forestry, logging and Manufacture of Wood Products - Forestry and logging - Manufacture of wood products ▪ Waste Management Activities: (sewerage; Waste collection, treatment and disposal activities; Waste utilization, remediation activities and other waste management services) ▪ Construction ▪ Manufacture of other goods and products ▪ Wholesale and retail trade ▪ Transportation and storage ▪ Tourism, accommodation and food service activities

► Cluster 4. Energy Efficiency and Renewable Energy

 **Types of actions aimed at implementing the principles of the circular economy**	- Efficient use of resources - Minimization of Energy losses - Increasing the share of renewables
 **The type of regulations required for the circular transformation of the economic sectors assigned to this cluster**	- Binding regulations to support energy efficiency and increasing share of renewable energy - Encouraging regulations that provide additional economic benefits or economic advantages to companies implementing the principles of the circular economy - Development of indicators and standards that allow assessing the activities of economic entities in terms of their compliance with the principles of circularity
 **Entities responsible for the enforcement of regulations and the implementation of actions aimed at implementing the principles of the circular economy**	- A wide range of private companies (small and medium-sized businesses) engaged in this type of economic activity and associations created by them - Construction companies - Energy sector operators
 **Economical and financial viability of the proposed actions in long-term**	- The planned activities are associated with a need of significant initial investments. The CE activities will become economically viable in mid-term and long-term, especially in case if they are if supported by incentivizing regulations and financial mechanisms (taxes; investment grants etc.)
 **Types of activities included in cluster 4**	▪ Energy sector ▪ Construction ▪ First category enterprises of different economic sectors[7]

[7] The Enterprise of the first category is an enterprise whose performance indicators at the end of the annual reporting period meet a least 2 of the following 3 criteria: a) the total value of its assets exceeds 50 million GEL; b) its income exceeds 100 million GEL; c) its average number of employees in the reporting period exceeds 250.

1.4 CIRCULARITY LEVEL ACCORDING TO MAPPING AND GEORGIA'S POTENTIAL TO INCREASE CIRCULARITY

1.4.1 Circularity Level According to Mapping

The results of the circularity mapping show that Georgia is 1.3% circular — leaving a significant circularity gap of more than 98.7%. This means that the country's economy is largely linear, and the vast majority of resources Georgia uses to satisfy its needs come from virgin sources. More than 315 million tonnes of resources are entering Georgian economy each year, amounting to nearly 78 tonnes per person — a figure that has continued to grow over recent years.

Georgia is 1.3% circular — leaving a significant circularity gap of more than 98.7%.

Georgia's circularity metric of 1.3% does not mean that 98.7% of the materials flowing through its economy go to waste. The circularity gap is composed of a range of elements: many materials (40 million tonnes) are added to stock in the form of buildings and infrastructure, while around 1.4 million tonnes of materials are represented by biomass with the potential for cycling, such as wood products and food crops. While materials in both these categories can be cycled, quite some time will pass before this is possible. It is important to stress that while developing a roadmap to circularity, it was crucial to focus on design of new materials and products to ensure that end-of-life cycling will be feasible and of high value. Non-circular flows, such as fossil fuels, and other non-renewable inputs together represent significant part of the gap. Georgia's most critical goal will be cutting this while boosting its circularity metric—especially as stock build-up will continue to enlarge due to the country's geography, and an appetite for bigger houses, among other factors. The target for coming 5/10 years will be to increase the level of circularity from current 1.3% up to 9.1%.

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During the initial screening of sectors of Georgian economy, the team of experts selected 14 sectors, which seemed to have the highest potential for developing circular models of economy. Overview of these sectors has demonstrated that their current level of circularity is low for each separate sector. The losses and waste generation are significant in each selected sector, while the reuse of materials, recycling of wastes or recovery of materials, as well as efficient use of resources is poor. At the same time, most of the selected sectors have significant potential for improving performance and circularity indicators. The experts have also identified priorities within each of the selected sectors. The analysis confirmed the preliminary hypothesis that one of the key sectors with the highest circularity potential is agribusiness.

For further preparation of the Circularity Roadmap and the National Strategy for Circular Economy, the group of experts analysed key gaps and provided several financial and non-financial policy recommendations. In addition, based on the work recently carried out by other group of experts in the preparation of the Circularity Gap for Sweden, the task team recommended to further explore during the preparation of the Circularity Roadmap, various scenarios to shift the Georgian economy towards circularity. These scenarios could include the following: 1) Construct a circular built environment, 2) Cultivate a thriving food system, 3) Make manufacturing circular, 4) Reshape extractive industries, 5) Drive clean mobility forward, and 6) Design conscious consumables. While

individual scenarios may have limited impact, all together, they can significantly increase Georgia's circularity.

The main conclusion was that all of the preselected 14 sectors have tangible potential for shifting towards the circular models of economy, some of them as high as 25 per cent and no one of these sectors should be discarded during the development of the CE transition strategy and action plans. Agriculture seems to be the highest priority sector for Georgia, as six sectors out of the preselected 14 represent subsectors of Agriculture.

All of the preselected 14 sectors have tangible potential for shifting towards the circular models of economy, some of them as high as 25 per cent and no one of these sectors should be discarded during the development of the CE transition strategy and action plans.

1.4.2 Georgia's Potential to Increase Circularity

For mapping circular economy opportunities, the ReSOLVE framework[8] has been used as it offered a structure for a systematic screening of opportunities to identify and map opportunities. It has been an iterative exercise that began with a high-level mapping for each focus sector derived from existing circular economy literature. Thereafter, it has been verified and fine-tuned with sector stakeholders and experts to ensure that the mapping covered all relevant opportunities. The key focus of the mapping exercise has been to create an overview of opportunities by sector. The key principles of the circular economy can translate into six business actions: Regenerate, Share, Optimise, Loop, Virtualise, and Exchange – together, the ReSOLVE framework.

The aggregated input in GDP of the sectors of economy preselected at the screening stage and used in this assessment, constitutes 52.9% of Georgia's entire GDP. So far as the selected sectors are exactly those, which have tangible impact on circularity, the current and targeted levels of circularity have been calculated based on indicators related to these selected sectors. It has been assumed, that the dismissed sectors have low impact on overall circularity. Each sector has been weighted based on its share in GDP. The weight has been then multiplied on the individual indicators of current and target circularity and further summed to derive the integral figure of circularity for Georgia's economy.

Sectors with the highest circularity potential in Georgia

- Annual crop production
- Permanent crop production and manufacture of food products
- Grape cultivation and wine making
- Animal husbandry and manufacture of food products
- Logging and wood products
- Fishery and fish processing

[8] https://earthbound.report/2016/09/12/the-resolve-framework-for-a-circular-economy/

- Mining and quarrying (except oil and gas extraction)
- Construction
- Manufacture of other non-metallic mineral products
- Manufacture of basic metals
- Electric power generation, transmission and distribution
- Sewerage; Waste collection, treatment and disposal activities; Waste utilization, remediation activities and other waste management services
- Oil and gas production and transportation
- Accommodation and food service activities

The team of experts has also prioritised and clustered industries according to their circularity potential. This entailed splitting the entire set of economic industries represented in the country into groups of the same type according to the criteria of circularity (economic and environmental indicators, resource consumption, material, and waste flows), indicators characterizing key players and the process of sector administration.

1.4.2.1 Criteria and Assumptions used for estimation of circularity

The sectoral input (SI) in circularity is calculated as circularity level of the sector (Cs) multiplied by the weight of each sector (W):

$$SI = Cs \times W;$$

Weight of each sector correlates with its share in GDP; 1% share means weight 0.01; 100% – corresponds to weight equal to 1.0.

Circularity level of the sector (Cs) is estimated conditionally:

- % of reused or recycled waste generated in the sector (taking into account that the sectors with low level of waste generation have been eliminated at the screening stage) is deemed as the same % of circularity in terms of waste streams management
- The maximum baseline level of losses is deemed as the 0 level of circularity and further improvements (% of improvement) is estimated as the same % increase in circularity.

Examples of estimations are given below:

EXAMPLES OF ESTIMATIONS OF CIRCULARITY LEVEL

Agriculture Sector

According to the data provided in the report Agriculture of Georgia 2020 prepared by the National Statistics Office of Georgia (Geostat): total input of Agriculture sector in GDP (2019) is equal to 7.4%, while input of the animal husbandry is about 3.72% (Shares of animal husbandry in total agricultural output is also 50%); If we assume the current baseline condition of the pasturelands as the worst case scenario and all further improvements of pastures and veterinary services are compared with this initial level, we can present this in following figures:

- "Sectoral input in circularity" for present state: 0.0
- "Sectoral input in improvement of circularity": 50% x 0.037 = 1.85

We take the current baseline condition of the irrigation system as the basis for further improvements and in calculations the present level of circularity is assumed to be 0. With the assumption that maximum irrigable land is 400,000 ha, we can say that the target level of irrigation for 2025 is 200,000 ha, which is 50 % of maximum irrigable land and the circularity in terms of loss management for Agriculture is planned as 50%. Weight of this factor in total circularity is less than of the waste recycling for Agriculture, as the waste recycling factor corresponds to the entire input of Agriculture in GDP (3.6% - 0.036 weight factor). Irrigation provides in average 40% increase in production, which means that irrigation weight factor could be estimated as 0.036 x 0.4 = 0.0144.

This adds additional circularity value to Agriculture's "Sectoral input in circularity" and "Sectoral input in improvement of circularity":

- "Sectoral input in circularity" (baseline): 0% x 0.0144 = 0.0
- "Sectoral input in improvement of circularity": 50% x 0.0144 = 0.72

1.4.2.2 Estimation of Current Circularity of Georgia's Economy and Target Levels of Circularity

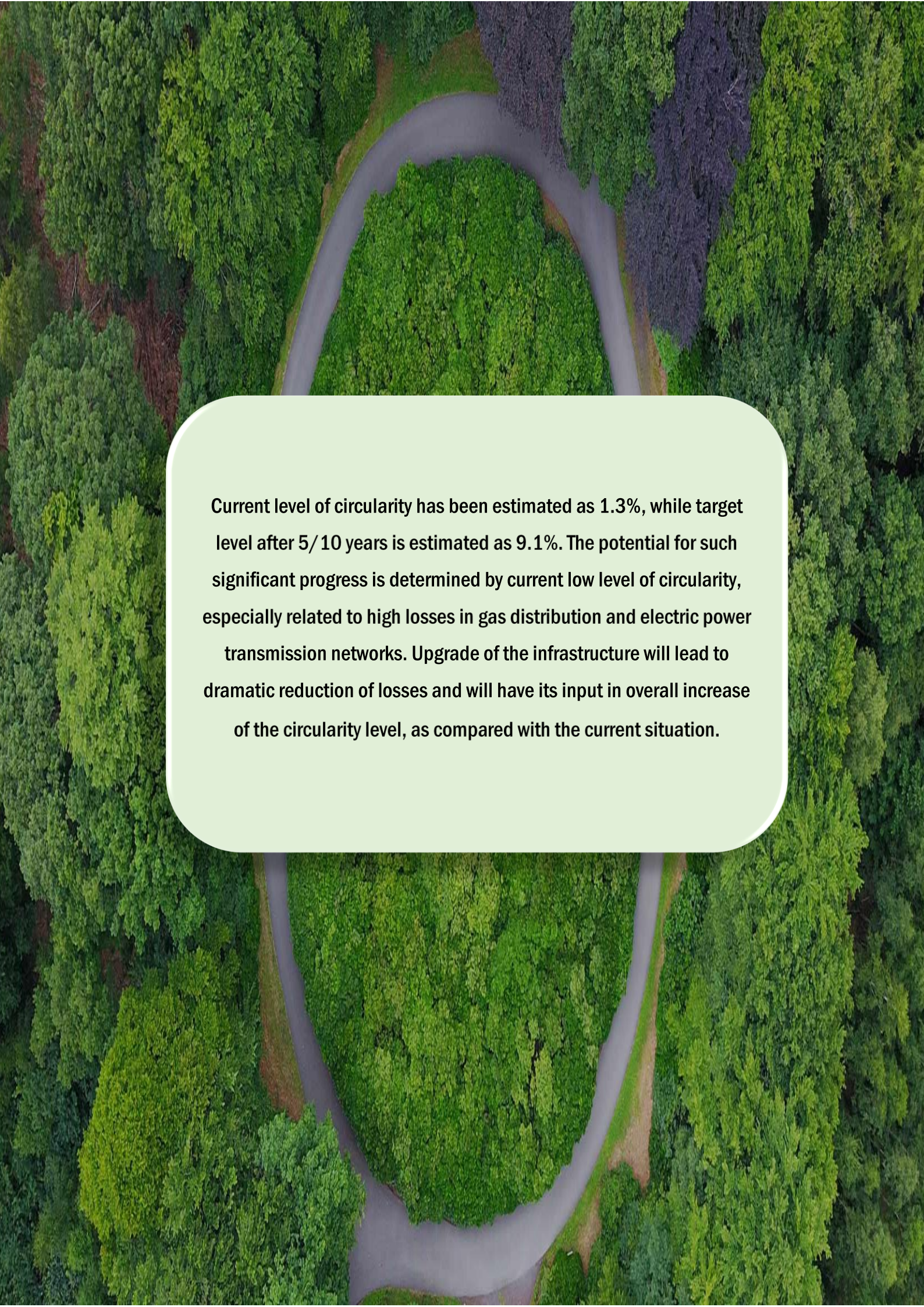
The aggregated input in GDP of the sectors of economy preselected at the screening stage and used in this assessment, constitutes 52.9% of Georgia's entire GDP. So far as the selected sectors are exactly those, which have tangible impact on circularity, the current and targeted levels of circularity have been calculated based on indicators related to these selected sectors. It is assumed, that the dismissed sectors have low impact on overall circularity.

Each sector has been weighted based on the share in GDP. The weight has been then multiplied on the individual indicators of current and target circularity and further summed to derive the integral figure of circularity for Georgia's economy.

Current level of circularity has been estimated as 1.3%, while target level after 5/10 years is estimated as 9.1%. It should be noted that the potential for such significant progress is determined by current low level of circularity, especially related to high losses in gas distribution and electric power transmission networks. Upgrade of the infrastructure will lead to dramatic reduction of losses and will have its input in overall increase of the circularity level, as compared with the current situation. The details of estimations are given below in a table:

Table 2 Circularity improvement potential for Georgian economy

	Sector	Used or Recycled Wastes %	Losses of Resources %	Current % of Circularity	% in GDP	Weight	Sectoral input in circularity	Target% of circularity by sectors	Sectoral input in improvement of circularity
1	Annual Crop Production	10		10				15	
2	Permanent Crop Production	12		12	7.1	0.071	0.52	25	1.18
3	Livestock Production	0		0			0	10	
4	Grape Production and Winemaking	0		0	3	0.03	0	40	1.2
1-2-4	Crop Production (input of irrigation)			0	1.44	0.0144	0	50	0.72
4	Input of Improvement of Pasture Management and Veterinary Services			0	3.72	0.037	0	50	1.85
5	Forestry and Manufacture of wood and of products of wood	5		5	0.3	0.003	0.015	15	0.045
6	Fishing and Aquaculture, Processing of Fish	0	9.80%	0	0.1	0.001	0	2.8	0.0028
7	Mining (except oil and gas extraction)	0.85%		0.85	1.4	0.014	0.012	10	0.14
8	Construction	0		0	8.5	0.085	0	10	0.85
9	Energy Generation and Transport		20.5	0	2.3	0.023	0	5	0.115
10	Oil and Gas Production, Onshore Transport and Transport via Pipelines		2.00%	1	2.5	0.025	0.025	2	0.05
11	Tourism, Accommodation and Food Service Activities	5.20%		5.2	5.2	0.052	0.27	15	0.78
12	Manufacture	5		5	8	0.08	0.4	10	0.8
13	Waste Management	17%		25	0.2	0.002	0.05	25	0.05
14	Wholesale and retail trade	0		0	14.3	0.143	0	10	1.43
	TOTAL				**52.9**		**1.3**		**9.1**
							Actual level of circularity 1.44 %		**Target level of circularity 9.1%**



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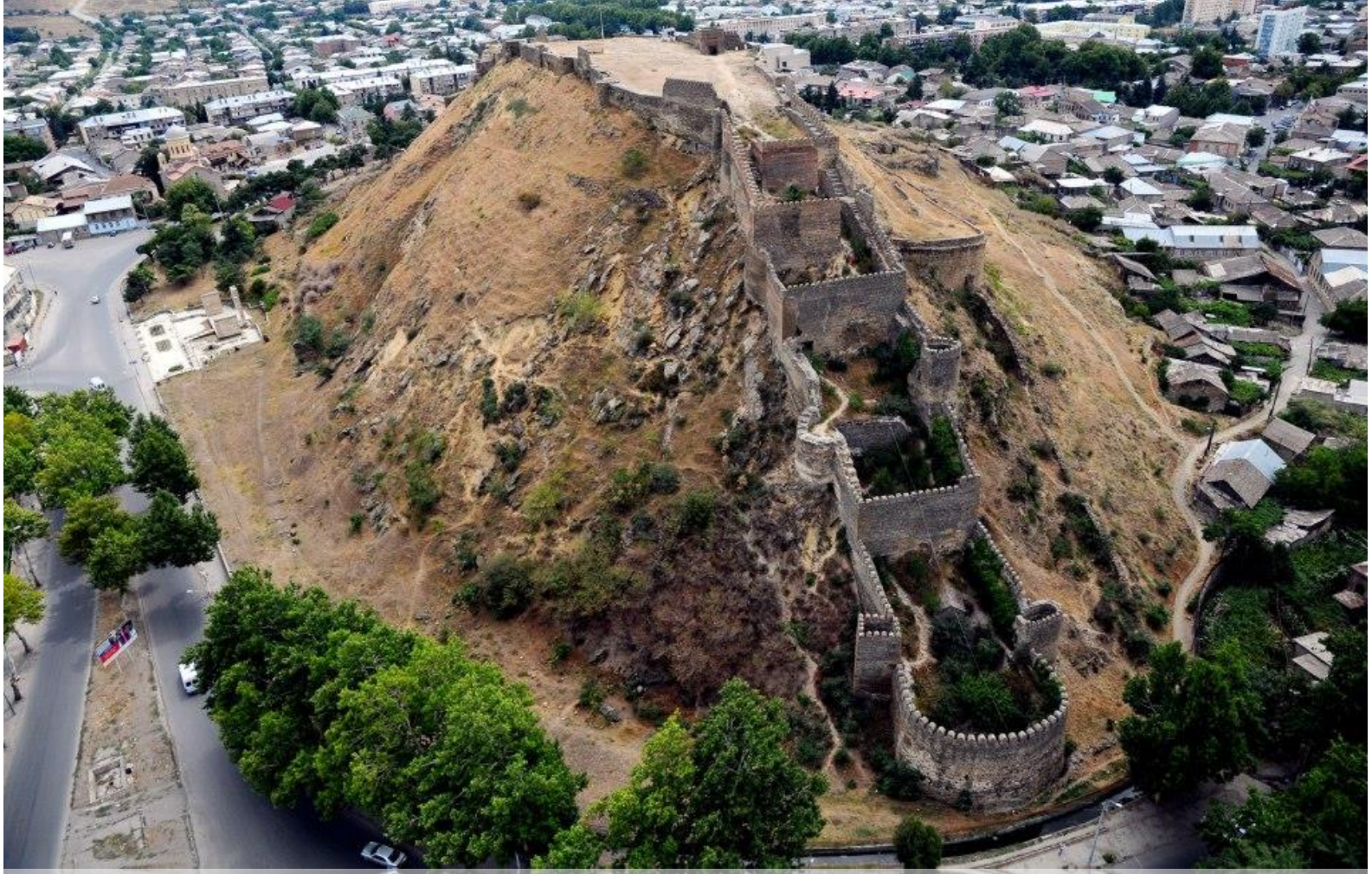


2 KEY STEPS IN THE DEVELOPMENT OF THE CIRCULARITY ROADMAP

2.1 INTRODUCTION

The development of the Circularity Roadmap ("the Roadmap") has been based on the circularity mapping prepared in 2021 – 2022 by CSO Georgian Society of Nature Explorers "Orchis" (GSNE "Orchis") in close cooperation with the GoG and with the financial support of the Government of Sweden. The National Roadmap to a Circular Economy has been coordinated by the GoG and implemented by GSNE "Orchis" within the framework of the "Supporting the Government of Georgia in Enhancing Governance and Policies for a Transition to a Circular Economy" Sub-Project of the UNDP's Governance Reform Fund (GRF) Project funded by the Government of Sweden. The key stakeholders in this process were the representatives of the GoG represented by the Inter-Ministerial Coordination Board consisting of 36 representatives from various ministries and governmental agencies under the leadership of the Deputy Minister at the Ministry of Environmental Protection and Agriculture of Georgia Acad. Solomon Pavliashvili.

The aspects covered by the Roadmap include:

- Overall circularity features of the Georgian Economy and level of circularity
- Identification of the priority sectors of economy for planning CE transition action plans
- Key aspects of circularity specifically important for Georgia, which should be taken into account during planning of the CE transition

Priority objectives for Transition Economies may differ from the objectives of the Developed Countries. For the countries with diverse and extensive production, the material productivity and durability are the most important aspects that affect circularity. Georgia's overall production rate is not high and production is mostly focused on agricultural products[9]. Thus, in this case, material productivity and durability of products is not a key issue and the other aspects of circularity could be crucial, which have much less importance for the developed countries. In particular, for Georgia the key factors for CE transition could include:

- Minimization of gross energy and material losses in energy networks and gas distribution pipelines
- Improvement of the land and water resource management

[9] Input of agriculture in GDP is around 7%, manufacture of food products 4.57%, mineral products and basic metals – 2.16% and all the rest production value is only 0.86% of GDP.

The Roadmap includes basic recommendations for the preparation of the Circularity Strategy and Strategic Action Plan for Circular Economy in Georgia. This process will also need to be supplemented by an intensive capacity building for targeted stakeholders in Environmental, Social and Governance (ESG) principles and key elements of the European Green Deal such as EU Taxonomy and their practical implementation in the economic development.

2.2 STAKEHOLDER ENGAGEMENT

A systemic change that is needed to shift from linear to circular economy is difficult to attain without working with a wide set of stakeholders, securing broad commitment, and encouraging ownership of and confidence in the Circular Economy Roadmap and its actions. Thus, stakeholder engagement is one of drivers of the efficacious and accelerated transition.

To ensure successful development of the given Roadmap, incorporation of different interests and values, shaping and alignment of visions between different stakeholders regarding the Roadmap and circular future of Georgia, as well as transparency and efficiency of this process, a collaborative, participatory and capacity-building approaches has been applied. For this, four plenary meetings have been planned and organized to consult and engage with the key stakeholders at critical stages of the Roadmap development process, and one high level national meeting has been planned and organized for wider groups of stakeholders once the Roadmap has been drafted. In addition, ongoing consultation meetings have been organized with various concerned governmental bodies.

- The purpose of the plenary meetings was to coordinate and cooperate with key stakeholders, to inform them about activities implemented for the preparation of the CE Roadmap and achieved progress, to consult them and get their feedback regarding major aspects of the Roadmap.

- The purpose of the consultation meetings was to collect necessary information and to seek their advice and recommendations of concerned governmental agencies in the areas of their competence.

- The high level national meeting was arranged to present draft CE Roadmap to wider range of stakeholders for discussion to respectively finalize the research.

The Inter-Ministerial Coordination Board established by the GoG for the Circular Economy Programme has been identified as a key stakeholder for the process as it includes high-level representatives of all concerned ministries and policymakers that have an essential role in the transition to a circular economy, green growth, and sustainable development. On the other hand, it has been recognized that two ministries - the Ministry of Environmental Protection and Agriculture (MoEPA) and the Ministry of Economy and Sustainable Development (MoESD) – should have a leading role in the planning and implementation of the circular transformation process. Therefore, particular efforts have been applied to continuously coordinate and collaborate with these ministries, which on their part have provided invaluable support to the task team and notably contributed to the Roadmap development. The plenary meetings and consultation meetings have ensured that other key stakeholders, such as other concerned ministries, policymakers, financiers,

businesses, etc. have been also actively engaged in the Roadmap development process so that their visions and concerns are adequately reflected in this document and they feel the ownership of the Circular Economy Roadmap.

To ensure informed and meaningful engagement of the key stakeholders, the Roadmap development process has been accompanied by intensive capacity building among key stakeholders in the areas of circular economy, Environmental, Social and Governance (ESG), sustainable finance and green public procurement (GPP) to inform them regarding principles and key elements of the European Green Deal such as EU Taxonomy, ESG and GPP, and their practical implementation in the economic development.

The described stakeholder engagement strategy ensures the Roadmap reflects the real needs of the country and creates a common mindset among key stakeholders to instigate systemic change towards circularity. The engagement of the key stakeholders guarantees that the GoG assumes ownership of the Roadmap, underpinning its adoption and implementation for sustainable growth. Involving all key stakeholders has enabled optimization of resources and efforts needed for the Roadmap development as well as using wider expertise of all concerned parties and raising the profile of the work performed. The transparency of the process has built the trust and credibility creating a positive environment that encourages adoption and implementation of the Roadmap.

2.3 GENERAL OVERVIEW OF ECONOMIC STRUCTURE OF GEORGIA

To develop a roadmap and then a strategy and action plan for the transition to a circular economy model, it is necessary, first of all, to describe the general structure of the Georgian economy, its features that determine the current level of circularity and prospects for the development of circular models. Naturally, the description should reflect the specifics of Georgia's economic structure. In Chapter 3.5.1 we will focus on those specific features. Here, we provide an overall picture of basic economic indicators.

The brief overview of the features of the Georgian economic system presented below focuses only on those aspects that allow us to assess the degree of circularity of different sectors of the economy, identify the most promising areas and specific features important for effective interventions. The review is based on the materials of the Circularity Mapping for Georgia 2022, with some updates, which mainly concern the clustering of economic sectors. Specifically, the logic of the clustering has been improved based on the feedback of the key stakeholders, and detailed analysis of sectors have been structured according to clusters so that specific features of each cluster have been stressed. Besides, the current and potential circularity levels of all 14 focus sectors have been re-assessed taking into account additional elements to ensure that appropriate CE targets are set for Georgia for different time horizons. The updated analysis is provided in Section 3 of this Roadmap.

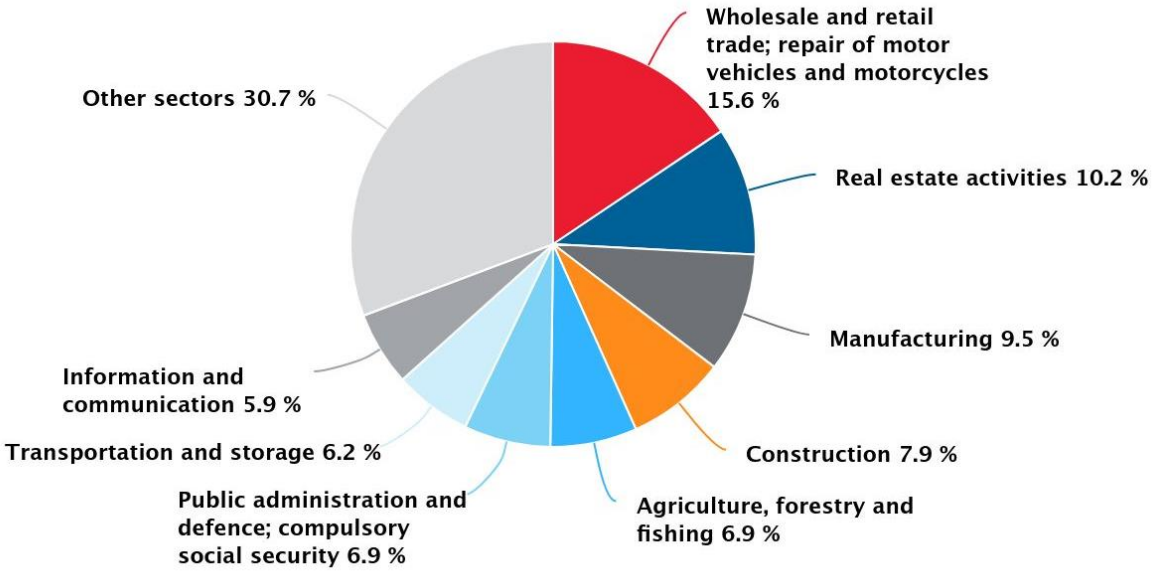


Figure 1 GDP Structure (%) in 2023

Source: National Statistics Office of Georgia (Geostat) 2024

Table 3 Gross Domestic Product by Sectors

NACE Rev. 2	Economic Activities	Gross Domestic Product (at current prices, mil. GEL), 2023*
A	Agriculture, forestry and fishing	4 820,1
B	Mining and quarrying	724,0
C	Manufacturing	6 624,5
D	Electricity, gas, steam and air conditioning supply	1 919,0
E	Water supply; sewerage, waste management and remediation activities	456,7
F	Construction	5 524,0
G	Wholesale and retail trade; repair of motor vehicles and motorcycles	10 847,5
H	Transportation and storage	4 319,1
I	Accommodation and food service activities	2 694,1
J	Information and communication	4 116,5
K	Financial and insurance activities	3 628,2
L	Real estate activities	7 125,3
M	Professional, scientific and technical activities	1 547,0
N	Administrative and support service activities	861,8
O	Public administration and defence; compulsory social security	4 814,7
P	Education	3 512,5
Q	Human health and social work activities	2 388,8
R	Arts, entertainment and recreation	2 839,8
S	Other service activities	724,8
T	Activities of households as employers; undifferentiated goods and services producing activities of household for own use	83,2

NACE Rev. 2	Economic Activities	Gross Domestic Product (at current prices, mil. GEL), 2023*
	(=) GDP at basic prices	**69 571,7**
	(+) Taxes on products	**11 031,3**
	(-) Subsidies on products	**356,9**
	(=) GDP at market prices	**80 246,1**
	GDP per capita in GEL	**21 574,9**
	GDP per capita, USD	**8 210,1**
	GDP in mil. USD	**30 536,8**
	Exchange rate, USD/GEL, average of the same period	2,6279

Source: National Statistics Office of Georgia (Geostat) 2024

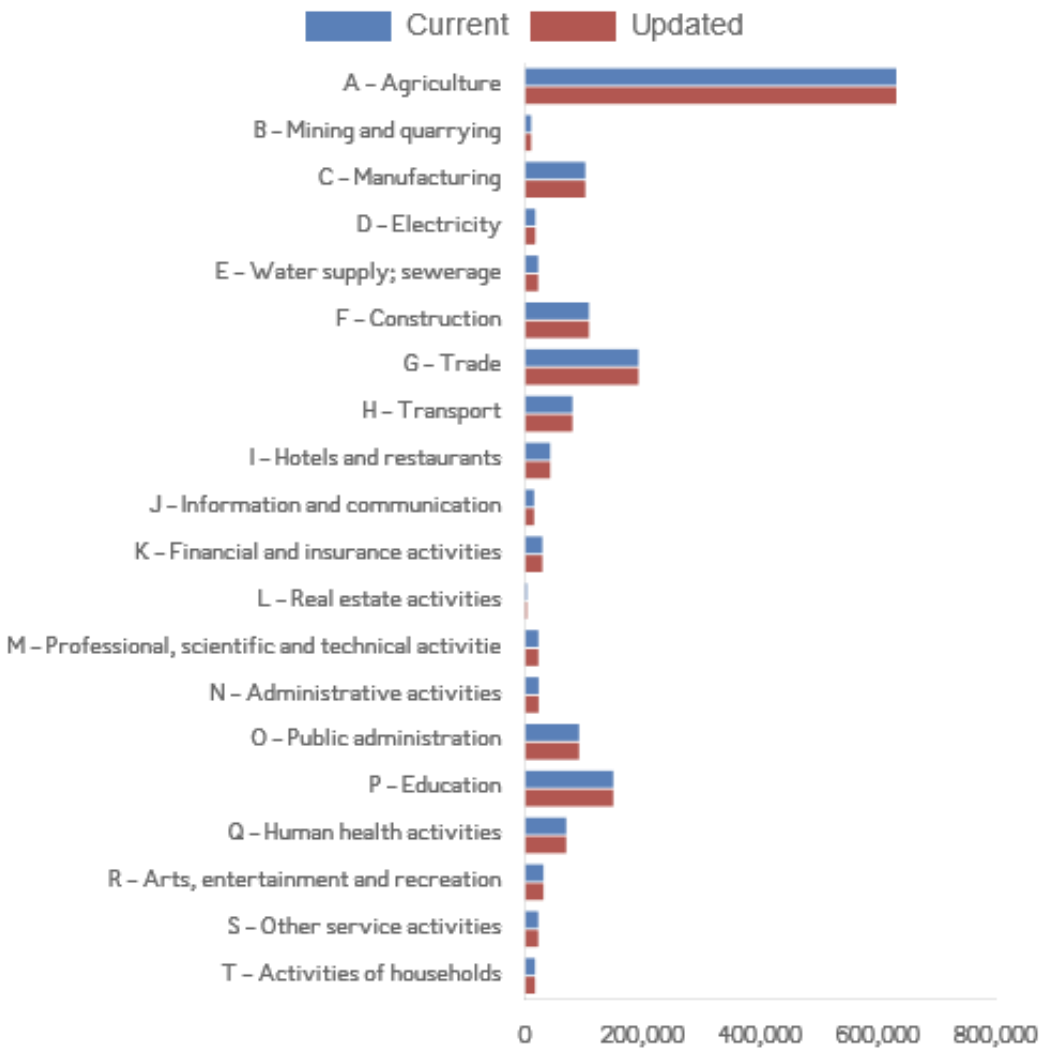


Figure 2 Number of employees by sectors (persons)

Source: National Statistics Office of Georgia (Geostat) 2024

3 CURRENT STATE ASSESSMENT BY CLUSTERS

3.1 CLUSTER 1: MANAGEMENT OF RESOURCES AND LOSSES

3.1.1 Agriculture, Fishing and Manufacture of Food Products

Sector nomination and NACE Index (NI): Crop and animal production, hunting and related service activities (NI/ 1); Input in GDP of the entire subsector (Mln GEL): 3,050.6 (7.1%)

Agriculture, and Manufacture of Food Products is one of the significant sectors of the Georgian economy. It follows behind the trade, industry, construction, and real estate activities. In 2019 aggregated input in GDP of the entire sector equals GEL 3,239.4billion, which is 8.3% of the total economy.

The entire agriculture sector is attributed to cluster 1 (Management of Resources and Losses) and cluster 3 (Basic Industrial and Municipal Waste Streams Management). Under the cluster 1 the agriculture sector is discussed due to existing losses and potential for productivity improvement related to the irrigation and sustainable management of pasturelands (land resource management).

3.1.1.1 Current Situation (Resource Management)

- **Pastures in Georgia**

  Pastures in Georgia cover around 1.7 million ha (or 1.9 million ha if haylands are included), which amounts to 25% of the country's total land and 50% of agricultural land.

- **Irrigated land area**

  40,000ha for 2015

- **Policies and Regulations**

  Management of pastures: The National Pasturelands Management Policy Document (NPMPD) has been prepared in 2022. The recommendations provided by the NPMPD should be embedded in the national legislation. The Law on Sustainable Pasture Management is under the development.

  Management of irrigation systems: In 2017 Irrigation Strategy for Georgia 2017-2025 has been developed. It encompasses both the rehabilitation of decayed irrigation infrastructure and the development of a modern data-based professional and participatory irrigation management capacity.

3.1.1.2 Gaps Related to Management of Resources and Losses

► Irrigation

In overall, the land resources are not optimally used due to poor condition of pastures and high share of not irrigated land. Irrigated land area currently is about 40,000ha (2015). In Soviet time maximum of irrigated area was 400,000ha. According to the "Irrigation Strategy for Georgia 2017 – 2025" Rehabilitation investment is expected to increase the irrigable area to 200,000 hectares by 2025 and investments in irrigation infrastructure is expected to exceed 778 mln GEL. The researches show that the difference in crop yields between irrigated and not irrigated parcels is significant. The difference in crop yield between irrigated and not irrigated parcels is significant in the case of Hazelnut, Red grape, White grape, Herbs, Potato, Maize and Wheat. Considering the distribution of irrigated land, the weighted average treatment effect in the case of annual crops amounts to 48% and 28% in the case of permanent crops. The weighted average of expected yield increase for permanent crops is lower due to the small effect of irrigation on the yield of apples that occupies 35% of irrigated land of permanent crops[10]. Thus, we can roughly estimate that in average replacement of non-irrigated land by irrigated will increase the yield by 40%. Current input of agriculture in GDP is about 7- 8% (7.1% in 2019) and half of that corresponds to plant growing (annual and permanent crops, including grapes).

This adds additional circularity value to Agriculture's **"Sectoral input in circularity"** and "**Sectoral input in improvement of circularity":**

- "Sectoral input in circularity" (baseline): 0% x 0.0144 = 0.0
- "Sectoral input in improvement of circularity": 50% x 0.0144 = 0.72

► Pasture Management

Pastures in Georgia cover around 1.7 million ha (or 1.9 million ha if haylands are included). The significant part of pastures in Georgia are low productive due to improper management.

The direct benefits from improved pastures are: a) increased carrying capacity on improved pasture compared with that on native pasture; **b)** growth rates of 90 to 160 kg/year compared with 40 to 80 on native pasture; **c)** breeder pregnancy rates of 85% compared with 55%; **d)** branding rates of 80% compared with 40 to 50%; **e)** death rates in each class of stock of only 2% compared with 5% to 15% or higher; **f)** weaner weights up to 180 kg at five to six months compared with 120 kg on native pasture[11].

[10] The Role of Irrigation Development and Its Impact on Various Indicators of Agricultural Sector Competitiveness 2021; Center for Economic Policy Analysis – CEPA].

[11] The Value of Improved Pastures/ Northern Territory Government/ No: E32 January 2013/ https://industry.nt.gov.au/__data/assets/pdf_file/0018/233451/297.pdf

► **Rough estimation of circularity input**

If we assume the current baseline condition of the pasturelands as the worst case scenario and all further improvements of pastures and veterinary services are compared with this initial level, we can present this in following figures:

- **"Sectoral input in circularity" for present state: 0**
- **"Sectoral input in improvement of circularity": 50% x 0.037 = 1.85**

3.1.1.3 Actions and timeline

Short term actions:

- Complete the Law on Sustainable Pasture Management (the law is under the development currently)
- Develop the Pasture Management Strategy and Action Plan for 2025 – 2030 in compliance with the National Pasturelands Management Policy Document (NPMPD)
- Implement Irrigation Strategy for Georgia 2017-2025
- Develop Irrigation strategy for 2025 – 2030

Mid-term and long-term actions:

- Implement the Pasture Management Strategy and Action Plan for 2025 – 2030 in compliance with the National Pasturelands Management Policy Document (NPMPD)
- Implement Irrigation Strategy for Georgia 2025 – 2030
- Create a capacity building programmes, technological and business consulting capacity that supports Sustainable Pasture Management.
- Create a capacity building programmes, technological and business consulting capacity that supports Sustainable Management of the Irrigation Systems at the community/end users level (creation and management of the irrigation associations)

3.1.1.4 The Regulations Required for the Circular Transformation

Policy, strategic action plans:

- Law on Sustainable Pasture Management should be completed (the law is under the development currently)
- The Pasture Management Strategy and Action Plan for 2025 – 2030 should be developed in compliance with the National Pasturelands Management Policy Document (NPMPD)
- Irrigation strategy for 2025 – 2030 to be developed

3.1.1.5 Entities responsible for the implementation of the Planned Actions

- Ministry of Environmental Protection and Agriculture

- Georgian Amelioration LTD (Government owned company established to manage the irrigation matters)
- Governmental CE Commission
- Municipalities (to support implementation of the strategies and strategic action plans)
- Businesses and farmer associations engaged in agriculture (to support implementation of the strategies and strategic action plans

3.1.1.6 Economical and financial viability of the proposed actions in long-term and scheme of the initial investments

- Initial investments for development and implementation of the strategies, action plans and developing basic infrastructure (main and secondary irrigation channels; initial actions to increase pasture productivity) should be incurred by Government
- The established system of the pasture management and management of irrigation systems should ensure sustainable management of the systems without further investments from the government: the fee collection mechanisms and maintenance of systems at the level of the end users (municipalities; farmer's organisations etc.). Additional income generated due to improvement the pastures and irrigation infrastructure will allow to spent some part of this additional income (fees paid by end-users) for the maintenance needs.

3.1.2 Electricity (Electric power generation, transmission and distribution)

Sector nomination and NACE Index (NI): Electric power generation, transmission and distribution (NI/ 35.1); Input in GDP (Mln GEL): 1009.1 Mln GEL* / 2.3%; Annual Production value: 1,650 Mln GEL
(Data for GDP and Annual Production value is given for the entire NI/ 35, which includes also gas, steam and air conditioning supply. However, the Lion's share in this figure should be attributed to (NI/ 35.1)).

3.1.2.1 Current situation

Electricity demand is highly seasonal in Georgia, with peak demand in winter and lower demand in summer. This is the inverse of the seasonal hydropower generation pattern: hydropower generators tend to produce at their peak in summer months and at their lowest levels in winter. This enables Georgia to export energy during the summer, but also requires hydropower generators to spill large amounts of water.

In 2017 the electricity imports exceeded exports by 2.2 times and reached 1,497.2 Mln kWh that exceeds the same indicators of the previous year by three times and indicators of 2015 by two times. Annual Use of Electric Energy – for internal use of TPPs and HPPs: 21.4 Thousand tons of oil equivalent or 236,6 GWh

- Import of electric power: 1 711.9 GWh annually
- Total generation 11 159.8 GWh annually
- Export of electric energy: 255.6 2 GWh annually
- Domestic consumption of electric power: 11 479.3 GWh annually

► **Policies, laws and strategic plans**

Certain strategic documents and regulations are developed to improve the situation:

- National Energy Policy of Georgia (Approved in June 2024)
- Integrated National Energy and Climate Plan of Georgia (Approved in June 2024) - dimensions of: a) Energy Security, Renewable Energy, Decarbonization, Energy Efficiency, Energy Transmission Infrastructure; b) Proposal on possible use of energy batteries
- The law On Promoting the Generation and Consumption of Energy from Renewable Sources (2019) and Ordinance of the Government of Georgia on schemes for promotion and auction rules (2022) compliant with the EU 2009/28/EC directive
- Ten-Year Network Development Plan of Georgia (last update for 2023 – 2033)
- Law of Georgia On Energy Efficiency (2020) and related 8 bylaws
- Law of Georgia On Energy Efficiency of Buildings (2020)

3.1.2.2 Gaps related to Management of Resources and Losses

► **Losses due to absence of energy storages**

The energy sector has seasonal limitations due to the dominant role of the hydropower generation: lack of water during the winter season and excess of water inflow during the flooding season. The excess water, which could be used for power generation, is spilled without use in power sector. The useless waste of water is recognized as a loss. In case of engaging the spilled water in hydropower generation, the need of import could be eliminated (GSE data). Thus the waste loss of resources could be estimated as minimum as value equal to import - 1 711.9 GWh annually (15% of total consumption).

The annual losses of energy in transmission lines and distribution networks constitute 76.3 thousand tons of oil equivalent or 887.7 GWh (7.7% of total annual consumption).

► **Other gaps**

- Inefficient schemes of import, consumption and export: lack of energy storage facilities
- Lack of energy efficiency in consumption

3.1.2.3 Actions and timeline

The Government of Georgia is planning to achieve no import mode of operations for the energy system and fixed capacity of exported gas based power generation, assuming that current import level for the natural gas will be maintained as a constant capacity used in thermal plants.

Government of Georgia is planning to rehabilitate the transmission lines and networks and minimize the losses in the network.

Short term actions:

- Implement the projects aimed on rehabilitation of the transmission lines to minimize energy losses in the mainline transmission lines managed by GSE to meet the target levels and timelines set forth in NECP. The target for 10 years (till 2030) is to reduce the losses from 7.7% to 5.0% as minimum. [Source: Integrated National Energy and Climate Plan (NECP)]. Reduction of losses by 2.7% means 311 GWh annually or 0,05% of current GDP (about 21,5 Mln GEL).
- Establish/improve the system of supervision over the power distribution companies and enforcement mechanisms to ensure duly rehabilitation and maintenance of the transmission lines and minimization of the energy losses
- Develop strategy, action plan and particular projects aimed on optimization of the import-consumption-storage-export schemes; Develop strategy, action plan and projects of energy storages (batteries; Hydropumped reservoirs etc.)
- Develop Strategy and Action Plans to promote Energy efficiency in compliance with the Law of Georgia On Energy Efficiency (2020); Develop Net-Zero Consumption Buildings Strategy in compliance with the Law of Georgia On Energy Efficiency of Buildings (2020)

Mid-term and Long-term Actions:

- Develop particular projects aimed on optimization of the import-consumption-storage-export schemes: projects of energy storages (batteries; Hydropumped reservoirs etc.)
- Establish the system for financing and managing Energy efficiency projects
- Establish/improve the construction supervision system to ensure implementation of the Net-Zero Consumption Buildings Strategy

3.1.2.4 The regulations required for the circular transformation

Policy, strategic action plans and other regulatory documents to be prepared:

- Develop strategy and action plan aimed on optimization of the import-consumption-storage-export schemes; Develop strategy and action plan related to energy storages (batteries; Hydropumped reservoirs etc.)
- Develop Strategy and Action Plans to promote Energy efficiency in compliance with the Law of Georgia On Energy Efficiency (2020)
- Develop Net-Zero Consumption Buildings Strategy in compliance with the Law of Georgia On Energy Efficiency of Buildings (2020)

3.1.2.5 Entities responsible for the implementation of the Planned Actions

- Ministry of Economy and Sustainable Development
- Governmental CE Commission
- GSE
- Ministry of Environmental Protection and Agriculture
- Businesses engaged in energy generation and operation of the electric networks

3.1.2.6 Economical and financial viability of the actions in long-term and scheme of the initial investments

Initial investments for development and implementation of the strategies, action plans and developing basic infrastructure (energy storages; rehabilitation of transmission lines) should be incurred by the Government of Georgia (energy storages; rehabilitation of GSE transmission lines) or by the private companies (some types of the energy storages; rehabilitation of transmission lines operated by the private companies). The established system of the infrastructure operations and maintenance will ensure sustainable management of the power storage and transmission systems without further gross investments from the government: the energy fee collection mechanisms and export incomes ensures sustainable operation of the systems.

3.1.3 Manufacture of Gas; Distribution of Gaseous Fuels through Mains

Sector nomination and NACE Index (NI): Extraction of crude petroleum and natural gas (NI/ 6);
Input in GDP (Mln GEL): 8.7 / 0.2%;

Sector nomination and NACE Index (NI): Onshore transport and transport via pipelines (NI/ 49);
Input in GDP (Mln GEL): 1065.9 Mln GEL* / 2.5%

3.1.3.1 Current Situation

Share of natural gas in total supply of energy resources in Georgia is about 40%. Gas is the most widely consumable primary energy resource in Georgia. Local gas production is rather low (less than 0.5% of total annual consumption), therefore, demand of Georgia on natural gas is mainly balanced by import. Georgian Oil and Gas Corporation (GOGC) carries out natural gas import on the basis of agreements made between the parties followed by wholesale supply of natural gas to distribution companies. The distribution companies, from their part, supply natural gas to the so-called social sector and commercial consumers.

- **Natural gas transit**

Transit of gas in Georgia is provided by two gas pipelines - the South Caucasus Pipeline (SCP) transporting gas from Azerbaijan to Turkey and the North-South Main Gas Pipeline (NSMP). The South Caucasus Pipeline throughput is 20 billion cubic meters per year. The NSMP transits Russian gas to Armenia and its design throughput is 12 billion cubic meters per year. The natural gas transportation system in Georgia is operated by Georgian Gas Transportation Company LLC (GGTC), which is the state-owned enterprise and the natural gas transportation licensee. GGTC obtained the respective license in 2009 and has been transporting gas through the territory of Georgia from the above period.

- **Internal Natural gas distribution networks**

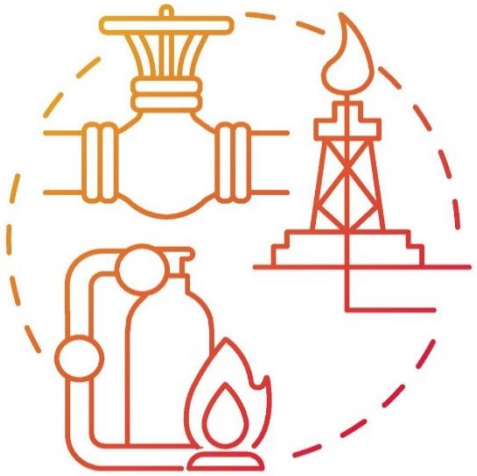
Natural gas is supplied to the market by 34 suppliers, including the three largest companies in the sector distribution network - JSC Sakorggaz, SOCAR Georgia Gas Ltd. and Tbilisi Energy Ltd.

- **Policies, laws and strategic plans**

Certain strategic documents and regulations are developed to improve the situation:

- National Energy Policy of Georgia (Approved in June 2024)
- Integrated National Energy and Climate Plan of Georgia (Approved in June 2024) - dimensions of: Energy Security, Renewable Energy, Decarbonization, Energy Efficiency, Energy Transmission Infrastructure; Feasibility Studies on possible use of gas storages (USAID);
- Under the Projects of Energy Community Interest (PECI) and Projects of Mutual Interest (PMI) it is discussed a project of delivering in Greece and Italy LNG and receiving the same amount of natural gas by Georgia
- Under the discussion are the projects of transforming the natural gas in other products (LNG and CNG) and generating LPG from oil

3.1.3.2 Gaps in Circularity



► **Losses in transportation networks**

Gas transit via the mainline gas pipelines is not associated with losses. However, the internal gas distribution network is not in a good condition and losses here are significant. In 2015, the total losses in the distribution network amounted to 103.8 million m^3, 64% of which came from KazTransGas-Tbilisi.

Georgia's energy balance (Geostat) shows that average losses of natural gas during 2018 - 2020 accounted for 96,967,000m3 (3.7% of inflow and 5.1% of Final Consumption). According to the Integrated National Energy and Climate Plan (NECP), it is planned to reduce losses by 4% by 2030. To achieve this figure, it is planned to invest 144,140,000 GEL by 2030.

► **Other gaps**

- During the recent years not more than 70% of the full capacity of oil pipelines is used for transit and about 83% of gas pipeline capacity.
- Inefficient schemes of import, consumption, storage, processing and export: absence of gas storage facilities. The absence of the gas storage facilities in Georgia is not only increasing the risks of energy security for the country, but also is associated with direct income losses: the opportunity of additional income that could be gained due to the seasonal variations of the gas import/export prices is lost.

3.1.3.3 Actions to reconcile the gaps and timeline

Short term actions:

- Implement the projects aimed at the rehabilitation of the Gas transport networks to reduce losses of gas in networks by 4% by 2030, as it is planned in NECP.
- Implement the strategic gas storage projects till 2030.

- Promote and develop a project of delivering in Greece and Italy LNG and receiving the same amount of natural gas by Georgia [project Under the Projects of Energy Community Interest (PECI) and Projects of Mutual Interest (PMI)

Mid-term and long-term actions:

- Promote and develop a project of transforming the natural gas in other products (LNG and CNG) and generating LPG from oil
- Develop strategies for natural gas storage and schemes for generation of additional incomes due to variations of gas prices (gas storage; gas products; generation of electricity etc.);

3.1.3.4 The regulations required for the circular transformation

No new regulations are required. Implement the Integrated National Energy and Climate Plan (NECP), According to the NECP, it is planned to reduce losses of gas in networks by 4% by 2030. To achieve this figure, it is planned to invest 144,140,000 GEL by 2030.

3.1.3.5 Entities responsible for the implementation of regulations

- Ministry of Economy and Sustainable Development
- GOGC
- Businesses engaged in oil and gas exploration, transit, operation of the transit mainline pipelines and gas distribution networks
- Governmental CE Commission
- Ministry of Environmental Protection and Agriculture

3.1.3.6 Economical and financial viability of the proposed actions in long-term and scheme of the initial investments

Initial investments for rehabilitation of the existing gas transport networks and developing new basic infrastructure should be incurred by the Government of Georgia (gas storages; LNG and CNG facilities), or by the private companies (LNG and CNG facilities; rehabilitation of distribution networks operated by the private companies). The established system of the infrastructure operations and maintenance will ensure sustainable management of the gas storage and transmission systems without further gross investments from the government: the gas fee collection mechanisms and export incomes ensures sustainable operation of the systems.

Cluster 2

3.2 CLUSTER 2: MINING AND MANUFACTURE OF BASIC METALS

Includes: Mining of coal and lignite, Mining of metal ores, Other mining and quarrying

Sector nomination and NACE Index (NI): Mining (NI/ 5 - 9); Input in GDP (Mln GEL): 586.3 Mln GEL / 1.4%; Annual Production value: 974 Mln GEL;

Sector nomination and NACE Index (NI): Manufacture of the Basic Metals (NI 24); Input in GDP (Mln GEL): 651.2 Mln GEL / 1.5%; Annual Production value: 1,450.00 Mln GEL

3.2.1 Current Situation

3.2.1.1 Mining

At present the most important mining sites in Georgia include: Madneuli gold-polymetallic, Chiatura manganese, Tkibuli coal deposits. Just few large scale companies are involved in mining of coal, manganese, precious metal ores and copper. “Georgian Manganese” is licenced to operate Chiatura manganese mine. Tkibuli coal located in Tkibuli is licenced to the Georgia Industry Group (GIG) and produces thermal (lignite) coal. JSC RMG Copper and LTD RMG Gold (known as Rich Metals Group-RMG) have operated in partnership with the Georgian Mining Company and other companies in east Georgia, specifically in Bolnisi and Dmanisi to produce gold (Dore alloys (half fabricates) by mining and processing copper and gold containing ores.

Table 4 Annual production of the mines and quarries

Products	Average Production, Ton	Number of licensees	Wastes (tailings etc.) Quantity	Domestic Export, Ton
Coal (coal and lignite)	174,000	1		
Production of Ores:				
Manganese ore	1,749,000	1	1	2,707.5
Precious metals (gold and silver) ores	4,376,000	1	1	13,430
Copper ores	4,271,000	1	1	452,399
Total	**10,570,000**			

In relation with operation of the quarries and mining of construction materials: few large scale companies and many small and medium sized companies are involved in this type of activities.

At a mine, an ore mill normally abuts on the extraction centre to produce the first marketable products (metallic concentrates, sorted ore, and ingots). The technological processes are very different according to the type of substance mined, and the modernity of the technologies employed (flotation, leaching, and biotechnology). These units produce various types of waste,

which can include slurries of finely ground particles that have undergone one or more types of physical or chemical treatment. These tailings are normally dumped in a sort of lagoon or settling basin within an embankment at the exit of the mill. Amounts of mining wastes generated in Georgia are given below.

Table 5 Amount of mining wastes generated in Georgia

Waste description	Total Wastes, tons
Manganese	1,349,000
Precious Metals (Gold and Silver) ore tailings	4,362,570
Copper ore tailings	3,818,601

The tailings still contain a number of commercially valuable compounds but in small concentration. To recover these materials from tailings more sophisticated technologies and additional investments are required. At present the tailings are stored as a technogenic deposits and recovery of materials is postponed for future.

3.2.1.2 Manufacture of Basic Metals

Manufacture of basic metals has significant input in GDP 651.2 Mln GEL, which is 1.5% of GDP (as of 2019).

- The ferroalloy plant of Zestaponi produces 220 000 tons of ferroalloys, of which 98% is exported. In 2021, ferroalloys of 477.44 Mln. GEL were exported.
- Steel and iron products (mainly reinforcement) are manufactured by 2 companies – Rustavi Steel and GeoSteel – these companies manufactured 363 000 tons of steel and iron products in 2020, their price comprising 405.1 Mln. GEL. 95% of the production is consumed by the local market.

► **Wastes Generated**

In 2020 Rustavi Steel JSC and GeoSteel LLC together produced 363 000 tons of steel. **Around 43 000 tailings** can be generated during manufacturing **363 000 tons of this product.**

The annual production of Zestaponi Ferroalloy Plant is 220 000 tons of ferroalloys. The manufacturing of this volume of ferroalloys can produce the same amount of tailings – the output depends on the purification degree of the raw materials (concentrate).

Subsector	Waste and by-products, ton
Steel production	43,000 t tailings
Ferroalloy Plant	220,000 t tailings
Total	**263,000 t tailings**

Tailings (about 263,000 t annually) are generated by basic metal manufacture sector and stored. The tailings could be used for recovering additional portions of valuable materials, using modern technologies.

3.2.2 Gaps

- The Waste Management Code does not regulate waste generated from extractive industries or manufacture of basic metals. Mining waste is supposed to be regulated by the Law on Mineral Resources. However, the law does not correspond to the AA requirements.
- Certain, particular wastes generated in Mining sector is classified as extremely hazardous waste (arsenic wastes; cyanides etc.) and poses community health risks.
- Existing practice of tailing recycling and recovery is very limited in Georgia due to lack of fiscal incentives and limited access to modern technologies
- By-products stored in tailings are not processed to recover valuable materials
- Current level of circularity is very low (0.85%)

3.2.3 Actions aimed to reconcile gaps and timeline

- **Types of actions aimed at reconciling gaps and increasing the circularity level:**
  - Reuse of products, recovery of materials or recycling of waste
- **Particular Actions and timeline:**

There is a great potential for recovering valuable materials from the metal ore tailings deposited near the mines and basic metal manufacture facilities. Significant investments and introduction of modern technologies is required for that purpose.

Short term actions:

- For the next 5/10 years the target could be recovery of materials reprocessing at least 5% of tailings stored near the mines and basic metal manufacture facilities.
- Update the waste management legislation and regulations to specifically address the issue of the metal mining and manufacture tails. Include in legislation mandatory requirements requesting recycling of tails and recovery of valuable materials. Include permissive clauses, enabling the private companies to use their own waste (tailing) for recovering materials.
- Promote and develop a policy and strategic action plans to manage tailings and hazardous wastes related to mining sector
- Develop particular projects to eliminate hazardous waste associated risks

Mid-term and long-term actions:

- Awareness building programs
- Provide technological consulting capacity, networking opportunities and financial mechanisms supporting the producers in developing the waste recycling and material recovery projects

3.2.4 The type of regulations required for the circular transformation of the economic sectors assigned to this cluster

Binding laws and technical regulations related to tailing waste and other mining wastes management:

- Regulations requesting implementation of the modern technologies for recovery of materials from tailings
- Regulations related to hazardous waste management
- Encouraging regulations that provide additional economic benefits or economic advantages to companies implementing the principles of the circular economy
- Development of the strategy, action plan and regulations for managing mining and basic metal production wastes, including hazardous wastes
- Embed technical standards and accountability standards to estimate circularity degree of the companies; Develop and implement Ecolabelling schemes

3.2.5 Entities responsible for the implementation of regulations and the implementation of actions aimed at implementing the principles of the circular economy

This direction seems prospective from the CE standpoint, as there are only few large companies operating in this sector and in case of support from the Government, it is easier to manage the process of shifting to circular models of economy. The Government may support improving legislation and regulations and creating financial mechanisms to raise motivation of the mining companies for recovering materials from the deposited tailings. Efforts focused on supporting just few enterprises may have a significant effect in terms of total mass of the reprocessed materials and financial gain.

- **Implementing organization:**
  - A narrow circle of large private companies, which limit the number of subjects engaged in this type of economic activity
- **Supporting organizations:**
  - Ministry of Environmental Protection and Agriculture
  - Ministry of Economy and Sustainable Development
  - Governmental CE Commission

3.2.6 Economical and financial viability of the proposed actions in long-term and scheme of the initial investments

The specific feature of the cluster 2 in general and mining sector, in particular, is that with the modern technologies, the recovery of the valuable materials from the tailings is economically viable. Thus the projects aimed on the recycling of tailings and recovery of materials does not require donations, subsidies and granting mechanisms for financial support. The usual commercial banking is sufficient for developing such projects. The main point is to make business free from

burdens like double taxation: the tailings stored after the excavation of licensed mines should not be considered as the separate (technogenic) deposit and the recovery of the materials from the stored tailings should not need additional licenses and paying additional fees, in case if the deposit is created by the company during its previous operations.

Cluster 3

3.3 CLUSTER 3: BASIC INDUSTRIAL AND MUNICIPAL WASTE STREAMS MANAGEMENT

3.3.1 Municipal (Household) Waste Management

Sector nomination and NACE Index (NI): Sewerage; Waste collection, treatment and disposal activities; Waste utilization, remediation activities and other waste management services (NI/ 37-39);
Input in GDP (Mln GEL): 107 / 0.2%

3.3.1.1 Current Situation

► **Waste Amounts**

It is estimated that total 900,000 tons of municipal waste is generated today in Georgia. All types of waste are disposed on the landfills or in dumpsites. No activities towards minimization of disposing the municipal biodegradable waste on landfills are observed).

► **Waste Producers**

Current Waste Management Practice and Prospective for Reuse, Recycling, Recovery

Table 6 Amount of municipal waste disposed in landfills

	Units	2015	2016	2017	2018	2019	2020
Generated municipal waste	1000 tons	774.7	870.3	922.1	977.4	994.6	973.3
Population of the country	million people	3.73	3.73	3.73	3.72	3.72	3.73
Municipal waste generation per capita	kg	207.8	233.5	247.2	262.5	267.6	261.1

Data based on: LTD Tbilservice Group, LTD Solid Waste Management Company of Georgia, LLC Sandasuftaveba, NNLE Kobuletis Sandasuftaveba, LTD Keda Komunalurservice

Source: Geostat

► **Strategy**

The National Waste Management Strategy (NWMS) of Georgia, which has been prepared in accordance with the Waste Management Code and the EU-Georgia Association Agreement, was adopted in April 2016 by Ordinance #160 of the Government of Georgia. The NWMS aims at the development of the Georgian waste management to be in harmony with the European waste management policy. In addition to the Strategy, a National Waste Management Action Plan (NWMAP) is developed. The Strategy and the Action Plan are two integral parts of the waste management policy documents in Georgia. All actions in the Action Plan relate to the objectives and targets defined in the Strategy.

The NWMS is in line with the National Environmental Action Programme of Georgia 2012-2016 (NEAP), and has taken the recommendations of the Environmental Performance Reviews, Georgia, UNECE, 2015 into consideration.

The NWMS covers a period of 15 years (2016-2030) - and is a living document that might be revised – while the Action Plan covers a period of 5 years (2016-2020). A joint format forms the basis for the two integrated documents.

► Legislation

The Waste Management Code was adopted 26 December 2014 and came into force in January 2015. Before that waste related issues were regulated by a number of separate legal acts and to some extend by international conventions. Although the newly adopted Code is based on the principles and approaches envisaged by the EU-Georgia Association Agreement (AA) and best international practices, it is necessary to develop and adopt a number of secondary legislation for the full implementation of the Code. In particular, the mining waste issues and waste export/import matters are not covered in compliance with AA. Not all administrative procedures for controlling medical institutions are defined by current legislation. Secondary regulations include also regulations related to the principle of the Extended Producers Responsibility (EPR), which was introduced by the Code. The principle implies that producers take over the responsibility for preventing, collecting, separating and treating used products (waste) for their eventual recovery.

- The Waste Management Code was adopted 26 December 2014 and came into force in January 2015.
- The principle of the Extended Producers Responsibility (EPR) was introduced by the Code and adopted. Adoption of the EPR principle is a significant achievement for Georgia.
- On May 25, 2020 the GoG adopted four technical regulations for EPR: waste oil management, tire waste management, waste management of electrical and electronic equipment, waste management of batteries, and accumulators.
- The fifth regulation related to packaging waste management has been developed and is passing approval procedures
- Several PROs have been established

Adoption of the EPR principle is a significant achievement for Georgia.

► Waste Collection and Transport

- Municipal waste management including household waste collection and transportation is the responsibility of the municipalities according to the Code. Currently waste collection services are offered mainly in the cities and mainly by public operators (LTDs or non-commercial legal entities with 100% state/municipal share). Some practice of private involvement in the waste management sector exists in Georgia, but no clear policy on public-private partnership exists on that. An operator that undertakes waste collection, transportation and/or treatment activities should possess the necessary permit or registration (this obligation entered into force from 1 September 2016).

- Collection and transport of waste in the cities is made with relatively new waste trucks and waste containers, while in the small towns and rural settlements waste transportation, if any, is managed with extremely outdated vehicles which are in poor condition.
- At present, there is yet poor source separation practice of municipal waste and their respective collection and transportation. However, with the support of international financial institutions (IFIs) first steps are made for gradual implementation of source separation practices. Obligation for this has entered into force from 2019.
- The responsibility for sound management of healthcare waste within its premises lays with the medical institutions, and it is regulated and controlled by the Ministry of Labour, Health and Social Affairs together with the MoEPA.

► Landfills

- According to the Code, operation of the non-hazardous waste landfills is the responsibility of the LTD Solid Waste Management Company of Georgia (SWMCG) under the Ministry of Regional Development and Infrastructure of Georgia (except for the landfills of Tbilisi and Adjara AR).
- In general, nearly every rural settlement has one or even more dumpsites. Totally about 60 official landfills (without a permit) and many more illegal dumpsites (small not official landfills) are recorded in Georgia. Several impose serious impacts to the environment and the surrounding communities.
- As of 2015, there were only four landfills (one private and three public) in Georgia meeting international standards.
- SWMCG takes steps to improve the state of the old landfills and construct new modern landfills. As of today the Company has rehabilitated 28 and closed down 13 landfills. Actions are taken to construct new sanitary landfills in Kvemo Kartli and Imereti regions.
- The similar activities take place in Adjara Region, where works are ongoing aiming at closing the old and constructing a new landfill (the construction permit has already been issued). The Ministry of Finances and Economy of the Adjara AR is in charge of above mentioned activities. The construction of the modern sanitary landfill near the village Tsetskhlauri (Kobuleti municipality) is completed and soon after installing the separation facilities the landfill will become operational.

3.3.1.2 Gaps

Existing practice of waste preventing, reuse, recycling and recovery is very limited in Georgia. Data on these activities are also very limited. The reporting obligation for companies and treatment facilities has entered into force only from 1 August 2016.

Due to lack of fiscal incentives, reuse is limited in Georgia and applies only to e.g. glass bottles. A limited number of installations for recycling of waste materials such are paper, glass, plastic and others exist in Georgia; however, data on amounts of recycled materials is not available nor in this case. Recycling is only carried out by private companies for those waste materials for which the cost (per tonne) for collection and treatment is lower than the price of virgin materials.

Incineration of waste for recovery of energy does not exist in Georgia.

- Approval of the fifth EPR regulation related to packaging waste management is pending for too long and still needs to be finalized
- Existing practice of waste preventing, reuse, recycling and recovery is very limited in Georgia due to lack of fiscal incentives and poor source separation. With the support of IFIs first steps are made for gradual implementation of source separation practices.
- Incineration of waste for recovery of energy does not exist in Georgia.
- Construction waste management needs significant improvement. At present construction wastes are disposed at the official and illegal landfills and a lot of small illegal dumpsites. The construction waste disposal and treatment is not well regulated by legislation and no special landfills or treatment facilities are available to recycle the construction wastes.
- There is a lack of regulations related to forestry and wood industry and food and animal husbandry wastes

3.3.2 Agriculture, fishing and Manufacture of Food Products

3.3.2.1 Current Situation

► **Waste Amounts**

In case of annual crops, the most part of losses and produced wastes are related to the losses during harvest period and storage. **In total about 47,700 tons of wastes is generated associated with the annual crop production.** The major input has wheat (13,000 tons, maize 11,000 tons, vegetables 8000 tons and melons 8000 tons[12].

In case of permanent crops, the losses and wastes are generated at the harvesting stage (10 – 12%) and during the processing of the product (about 7%). Walnut and hazelnut wastes constitute 3,150 tons. Total wastes generated during citrus and other fruit production (except grapes) is about 38,000 tons. Out of this 23,500 tons of waste are generated during harvesting and storage. The losses during harvesting grapes equal approximately 10,000 tons. **Thus, the total amount of waste generated during the nuts and fruit harvesting is approximately 36,650 tons.**

Total annual wastes and losses associated with the fishery sector approximate to 11,025 tons:

- Marine fish: 10,900 tons
- Aquaculture:125 tons

About 14,500 tons of fruit wastes are generated during processing of fruits and about 40,500 tons during wine production. These streams of waste are already accounted as food waste.

[12] Agriculture Scientific-Research Centre under the MoEPA of Georgia

Waste Streams Generated in Food Processing, Accommodation and Food Services Sectors. In this chapter it is also accounted wastes and losses associated with the livestock products generated in slaughterhouses and poultry farms.

Table 7 Waste streams generated in Food Processing, Accommodation and Food Service Sectors

Annual Crops production	
Total amount of wastes generated annually	47.7 tones
Used waste (mostly as animal fodder)	4,770 tons/ 10%
Not recycled waste	42,930 tons / 90%
Permanent Crops production	
Total amount of wastes generated annually (harvesting + storage and processing)	41.15 ths. t/y
Used/ recycled waste	0%
Grape and wine production	
Organic wastes from wine production (Skin, seeds, etc.)	40.5 ths. t/y
Wastes/losses during harvesting	10.0 ths. t/y
TOTAL	50.5 ths. t/y
Share of recycled waste:	0%
Average annual waste disposed from Livestock products	
Beef	9.3 ths. t/y
Pork	9.4 ths. t/y
Sheep and goat	1.3 ths. t/y
Poultry	5.5 ths. t/y
Milk and milk products	6.5 ths. t/y
TOTAL	32.0 ths. t/y

The food industry plays an important role in the development of the Georgian economy. Statistic data related to food processing are poor and provide controversial figures, but main trends are visible. Prior to the transition to a market economy, the industry was dominated by large companies. According to National Statistics Office of Georgia, SMEs play the most important role in food industry. In 2017, 96% of enterprises were small-size companies, 2.8% of enterprises – medium size companies, and 1.2% of enterprises were large-size companies. The most SMEs have been concentrated in Tbilisi.

Manufacture	Byproducts (ths. tons)	Waste, (ths. tons)	Total of waste and by-product, (ths. tons)
Subtotal for food products and beverages	207.7	690.6	898.3

Food waste generated in trade sector (retail): 62,511 tonnes/year

- **Specific Regulations**
  - The WM practice in Animal husbandry is regulated by WM Code and the Technical Regulation on management of non-food products of animal origin (including animal waste) adopted by the Ordinance of the Government of Georgia 605 in 2017 (amended in 2021)
  - In 2023 the Parliament adopted the law “On Food Losses, Food Waste Reduction and Donation". The new legislative initiative regulates issues related to food waste and food loss management measures, food loss and food waste reduction, food donation and redistribution policy, responsibility of state bodies and food charity activities.

3.3.2.2 Gaps

Agricultural waste generated by individual households is collected by the municipal services. Separation at source is poor. Part of organic waste is used for feeding animals and very small part is used for composting. 90% part of agricultural waste generated by households goes mixed with other types of waste to the official and illegal landfills. Potential for separation of waste at source is poor and according to experience of professionals, will take 10-20 years before the waist separation practices will be established in rural areas of Georgia.

Agricultural waste generated by large, small and medium size enterprises is also collected by the municipal services. However, in case of creating proper incentives, it is possible to stimulate the large and medium enterprises, as well as part of small enterprises, to collect and separate the organic wastes and use it for composting or for production of animal fodder and more sophisticated bioorganic products demanded on market, instead of disposing the waste on landfills.

→ Current level of circularity is extremely low

→ Recycling of wastes is minimal and spontaneous (part of organic waste is used as animal food)

→ The losses are high at all levels of the production chain:

- Harvest
- Storage
- Processing
- Trading/consumption

→ The UN Food and Agriculture Organization studied the topics of food waste generation and management in the country and it was found that a large amount of food is generated as waste and ends up in landfills, while there is a real possibility that such food could be delivered for people who need it.

→ The WM Code and the Technical Regulation on management of non-food products of animal origin do not provide incentives and requirements for circularity, but mostly make focus on safety and waste utilization aspects.

→ There are no fiscal and other incentives for producers and traders to apply recycling and material reuse Technologies.

→ There is lack of awareness about circular technologies and business models encouraging the enterprises to implement them.

→ By-products generated in food processing industry (207,700 t annually), as well as food waste and other organic wastes are not recycled and reused

→ Recycling and reuse of the packaging waste is poor. Technical regulation under the Extended Producer's Responsibility (EPR) is not yet approved.

3.3.3 Forestry, logging and Manufacture of Wood Products

3.3.3.1 Current Situation

The WM practice of the commercial users of forest is regulated by WM Code, Forestry Code and the Regulations on Forest Management Rules adopted by the Ordinance of the Government of Georgia 221 in 2021:

- The communities and private persons are encouraged to collect and reuse the wood remains in state managed forest. Current fee is 7 Gel/m3
- It is planned to reduce the fee to symbolic cost (about 1 Gel/m3)

Table 8 Waste and losses in Forestry and Timber Processing Sectors

Timber extraction wastes & losses:
– Total wastes 760 ths.m3 = 585.2 ths. tons
– Recycled portion (5%): 38 ths.m3 = 29.3ths. tons
– Not recycled portion (95%): 722ths.m3 = 555.9 ths. tons
Timber processing wastes & losses:
Total waste: 178,940 m3 = 137,780 tons
– Recycled portion (5%): 8,950 m3 = 6,900 ths. tons
– Not recycled portion (95%): 169,990m3 = 130,880 tons

3.3.3.2 Gaps

- Current material efficiency of timber harvesting and wood processing industries is very low.
- Residuals and wastes of roundwood production and manufacture of wood products are used minimally (if any) and in a non-systemic manner. Lion's portion of harvested timber resources is used as fuel (firewood) that is a low value application.
- In relation with the commercial users the Regulations on Forest Management Rules do not add any meaningful details to the general requirements of the WM Code.
- There are no fiscal and other incentives for commercial users to apply recycling and material reuse Technologies.
- For the communities and local population, the current fee for collecting the wood residues on a state forest land is too high and not attractive.

- There is lack of awareness about technologies and business models encouraging the communities to establish joint entities and enterprises and feasible schemes of the wood waste recycling.

3.3.4 Construction

Sector nomination and NACE Index (NI): Construction (NI/ 41 - 43); Input in GDP (Mln GEL): 3,680.8 Mln GEL / 8.5%; Annual Production value: 9,074.00 Mln GEL

3.3.4.1 Current situation

Based on information published by Geostat, construction sector is one of the largest and intensively growing sector of Georgia's economy. During last three years (2019 – 2021), added value in construction sector exceeded GEL 3,400 Mln GEL, thus, being 8.5% of Georgia's Gross Domestic Product – (GDP).

As of 1 March 2018, 17 013 enterprises were registered in Georgia's construction sector, out of which 6 944 enterprises had an active status. There were 43 large enterprises (0.6% of total number of enterprises registered in construction sector) out of which 12 were subsidiaries of foreign companies. 281 (4%) companies were labelled as medium enterprises out of which 26 were subsidiaries of foreign companies. Although number of large enterprises was quite small, in 2017, their annual turnover was 31 % of total turnover of this sector. During 2011-2013, there has been a trend of decreasing share (24%) of large companies' in total annual turnover. However, during the following years the trend of increase has been observed and this proportion reached its highest point in 2016. As for 2017, this figure decreased once again to 31 %. The share of medium and small enterprises in total turnover was 69%.

It should be noted, that the main part (about 75%) of the large construction companies mostly are engaged in large scale infrastructure projects and only 25% in housing sector. On the contrary, the great part of small and medium sized companies participates in construction activities under the housing subsector

► Waste Amounts

Annual inert waste generation volumes for Georgia is roughly estimated as 303,520 tons. This covers wastes produced during construction and during processing of raw materials and production of construction semi-products, like bricks, slabs, clinker etc. Mostly the construction waste consists of remains of concrete, blocks and bricks, cement/clinker products (78%), some part of wooden materials (10%), packaging (8%) and much less metal scarp (4%), as the latest usually is separated and removed at earlier stages.

At present construction wastes are disposed mostly at the official and illegal landfills and dumpsites. Apart from that, a lot of small illegal dumpsites are created in the vicinity of most of villages and settlements creating significant environmental problem. The construction waste

disposal and treatment is not well regulated by legislation and no special landfills or other facilities are available.

In 2022 a thematic study on Sustainable Management of the Inert Wastes has been conducted by the Georgian Parliament and firs concept notes have been produced. However, this is only beginning of the long process for creating efficient waste management system for inert wastes.

3.3.4.2 Gaps

- The construction waste disposal and treatment is not well regulated by legislation. In 2022 a thematic study on Sustainable Management of the Inert Wastes has been conducted by the Georgian Parliament and firs concept notes have been produced. However, this is only beginning of the long process.
- No special landfills or treatment facilities are available to recycle the construction wastes. A lot of construction wastes are irregularly disposed on municipal landfills, on surrounding territories and in a thousand of illegal dumpsites (mostly in gorges and wastelands near the settlements).
- Recycling of wastes and recovery of materials is minimal and spontaneous

Taking into account that the deposits of sand, gravel and other basic construction materials is limited in Georgia and export and transportation costs are high, there is a space for developing new plants, which can use materials of the demolished buildings and other inert wastes for production of construction materials. Crushed remains of concrete, stones and rocks could be used in replacement of gravel, as well as for producing artificial composite materials.

3.3.5 Wholesale and retail trade

**Sector nomination and NACE Index (NI): Wholesale and Retail Trade;
Repair of Motor Vehicles and Motorcycles (NI/ 35-47); Input in GDP (Mln GEL): 6161 / 14.3%**

3.3.5.1 Current Situation

Input of different subsectors:

Economic Activities	Input in GDP (Mln GEL)	Input in GDP %
Wholesale and retail trade and repair of motor vehicles and motorcycles	838.4	1.9
Wholesale trade, except of motor vehicles and motorcycles	2795.2	6.5
Retail trade, except of motor vehicles and motorcycles	2527.4	5.9
TOTAL: Wholesale and retail trade; repair of motor vehicles and motorcycles	**6161**	**14.3**
Wastes produced in Motor vehicle trade and repair sector (consumer level)		
Oil	– Oil Import - 12,700 tonnes /year – Lost - 6,350 tonnes/year	

	– Used oil as waste - 6,350 tonnes /year – Recycled and reused - 2,050 tonnes/year (max. 32%) – Maximum recycling capacity - 2,050 tonnes/year
Accumulators	– Import - 5,500 tonnes /year – Used accumulators as waste - 6,350 tonnes /year – Recycled and reused (locally or exported for recycling) - 6,350 tonnes /year (100%) – Maximum recycling capacity - 18,800 tonnes/year
Tires	– Used tires as waste - 31,272 tonnes /year – Recycled and reused (locally or exported for recycling) - 7,000 tonnes /year (max. 22%) – Maximum recycling capacity - 7,000 tonnes /year
Food waste generated in trade sector	
Retail	– 62,511 tonnes/year

The principle of the Extended Producers Responsibility (EPR) was introduced by the Waste Management Code and adopted. On May 25, 2020 the GoG adopted four technical regulations for EPR:

- Waste oil management,
- Tire waste management,
- Waste management of electrical and electronic equipment,
- Waste management of batteries, and accumulators.

Food in the trade sector (62,511 tonnes/year) is generated by the wholesale and retail trading enterprises (small, medium-size and large organizations; small shops; large supermarkets; networks of supermarkets; wholesale storages etc.). 403,573 tonnes/year of food waste is generated at the household level and is accounted as household food waste, which equals to about half of the entire household waste.

3.3.5.2 Gaps

Existing practice of waste preventing, reuse, recycling and recovery is very limited in Georgia due to lack of fiscal incentives and poor source separation.

Food waste generated in trade wholesale and retail trade sector is not recycled.

Wastes produced in Motor vehicle trade and repair sector (consumer level):

- Recycled used oil - 2,050 tonnes (max. 32%)
- Recycled and reused accumulators (locally or exported for recycling) - 6,350 tonnes /year (100%)
- Recycled and reused tiers (locally or exported for recycling) - 7,000 tonnes /year (max. 22%)

3.3.6 Tourism, accommodation and food service activities

Sector nomination and NACE Index (NI): Accommodation and Food Service Activities (NI/ 55-56); Input in GDP (Mln GEL): 2223 Mln. GEL / 8.4%/ Annual production value 2,100,000,000GEL (2019 year); Travel Agencies, tour-operators and associated activities, (NI/ 79); Input in GDP (Mln GEL): 154.4 Mln GEL / 0.36% (2019 year)

3.3.6.1 Current Situation

► Tourism Statistics

Years	No of Foreign Visitors	Average Nights / Foreign visitor	Local Tourists Annual	Average Nights / Local visitor
2020	1,513,421		12,473,517	2.2
2019	7,725,774	4.1	14,251,973	2.0
2018	7,203,350	4.2	13,137,724	1.9
2017	6,482,830	4.3	12,637,215	1.9
2016	5,392,816	3.9	12,960,138	2.2
2015	5,255,999	3.4	12,360,678	2.2
2014	5,004,331			

Source: *Geostat / Georgian Tourism in Figures/ Georgian National Tourism Administration/ Annual Report for 2019 and 2020*

► Waste generated in the food processing Value Chain:

According to the Food Waste Index Report 2021 (UNEP), the distribution of food waste among households, food services and retail has following features in case of Georgia:

- Household food waste: 403 573 tonnes/year
- Food Services: 110,504 tonnes/year
- Retail: 62,511 tonnes/year

Thus Food Service sector is responsible for generation of 110,504 tonnes of food waste per year, which constitutes 19.2% of the entire annual values of the food waste (576,588 tonnes/year).

► Accommodation and Food Services Sectors

The number of accommodation units registered in the database of the Georgian National Tourism Administration (GNTA) is 2,575. Out of this there are 20 large hotels of several international hotel brands. The rest accommodation facilities are small and medium size enterprises.

Food Consumption	Consumption			Waste		
	Total	Tourism related, 22.44%	Household, 77.56%	Total	Tourism related, 22.44%	Household, 77.56%
Food	2,854,437	640,536	2,213,901	450,000	100,980	349,020

3.3.6.2 Gaps

In general, food waste (food and associated inedible parts removed from the human food supply chain) is the main type of waste generated in sectors of economy, such as accommodation and food services. Another important type of waste generated in this sector is packaging (plastic and glass bottles and other packaging wastes). At present most part of food waste is disposed at the landfills.

Separation of organic wastes and recycling is very poor. There is no practice of donating edible food remains. Part of the returned expired products are used by the farms for feeding animals. Only PET and glass bottles are to some extent separated and recycled. However, the share of recycled waste is small: total 180 900 tons of plastic products were manufactured and imported in Georgia in 2020. The analysis shows that 93% of these (i.e. 168 300 ton) becomes waste, and the recycling volume does not exceed 7% for plastic. In Georgia, 26 companies work on plastic recycling, and 15 of them produces intermediate products (shredded plastics, granulated plastics).

3.3.7 Actions aimed to reconcile gaps for Cluster 3 and timeline

- **Types of actions aimed at reconciling gaps and increasing the circularity level:**
  - **Reuse of products, recovery of materials or recycling of waste**

Short term actions:

- Further development and implementation of the EPR regulations or similar binding regulations (packaging, forestry and wood production; food and animal husbandry wastes; construction waste; etc.);
- Development of the strategy, action plan and regulations for managing mining and basic metal production wastes, construction wastes, wood industry wastes, food and animal husbandry wastes
- Implement the law “On Food Losses, Food Waste Reduction and Donation".
- Implement the provisions of the “Donation” law, support creation of the charity organizations engaged in food redistribution and donation
- Create a regulatory framework that supports and incentivizes CE activities, in particular, collection and recycling of the wastes.
- Develop technical standards and accountability standards to estimate circularity degree of the companies; Develop and implement Ecolabeling schemes
- Develop technological and business consulting capacity and business incubators to assist commercial companies and community associations in developing waste recycling projects

- Work with businesses (producers and traders) to increase circular awareness. Implement Awareness building programms
- develop inert waste disposal facilities and a proper system for managing inert waste collection and disposal
- elaborate regulations and financial mechanisms motivating the constructing companies and waste operators to develop inert waste recycling enterprises

Mid-term and long-term actions:

- Propose and Participate in development of the international platforms for better engagement of all participants of the production/consumption chain (producers, exporters, importers, distributors, end users) in the EPR process
- Further develop and implement the binding EPR regulations (packaging, forestry and wood production; etc.) or develop similar regulations;
- Further develop and improve a regulatory framework that supports and incentivizes CE
- Embed accountability standards to estimate circularity degree of the companies; Develop and implement Ecolabling schemes
- Develop technological and business consulting capacity and business incubators to assist companies in developing waste recycling
- Target for 5-year program: During the 5 years it is possible to achieve recycling of the 10% of the annually produced agricultural wastes.

3.3.8 The type of regulations required for the circular transformation of the economic sectors attributed to the Cluster 3

- Binding laws and technical regulations; Further development of the EPR regulations and binding regulations for the mining and basic metal production wastes, construction wastes, forestry and wood industry wastes, food and animal husbandry wastes management; binding EPR regulations (packaging, used oil, tiers etc.);
- the law “On Food Losses, Food Waste Reduction and Donation".
- Permissive laws and regulations that allow for actions that were not previously permitted or subject to additional costs (taxes, etc.): mining and basic metal production wastes, construction wastes, wood industry wastes, food and animal husbandry wastes
- Encouraging regulations that provide additional economic benefits or economic advantages to companies implementing the principles of the circular economy
- Development of indicators and standards that allow assessing the activities of economic entities in terms of their compliance with the principles of circularity regulatory framework that supports and incentivizes CE activities, in particular, collection and recycling of the wastes.
- technical standards and accountability standards to estimate circularity degree of the companies; Ecolabeling schemes.

3.3.9 Entities responsible for the implementation of regulations and actions aimed at introducing the principles of the circular economy

A wide range of private companies (small and medium-sized businesses, large businesses) engaged in agriculture and manufacture of food products; tourism sector, food services and accommodation; construction, wholesale and retail trade; and associations created by them.

Expanding EPR regulations or development and implementation of similar regulations is recommended and in this case PROs will play a prime role in Cluster sector 3 waste collection and recycling.

The Government can support businesses creating incentives for waste separation and recycling, while the key actors for recycling and reusing wastes are first of all large and medium size businesses and to certain extent also small size enterprises.

Implementing organization:

- A wide range of private companies (small and medium-sized businesses), large businesses engaged in Cluster 3 sector.
- PROs created by the construction companies and business associations

Supporting organizations:

- Ministry of Environmental Protection and Agriculture
- Ministry of Economy and Sustainable Development
- Governmental CE Commission

3.3.10 Economical and financial viability of the proposed actions in long-term and scheme of the initial investments

Economic viability is conditional: The planned activities need significant initial investments. In most cases, the planned activities are not associated with the additional incomes sufficient for covering related expenses. In such cases the PROs are sustained through service fees paid by the waste producers (polluters) and income generated through waste recycling is just an additional income source. PROs and other entities created under the EPR or similar binding regulations are not viewed as self-sustainable economically. Income generated by the waste recycling and production of new products out of the separated waste streams will not cover total expenses.

The main financial principle for operations of the waste collecting and processing entities is subsidies and fees paid by the waste producers under the EPR regulations. **The waste management organisations (PROs etc.) get the major part of their income for providing waste management services to different producers.** The income generated through manufacture of new products from the waste is considered as the additional income, but not the basic.

In other particular cases, the waste recycling activities may become economically viable if supported by incentivizing regulations and financial mechanisms (taxes; investment grants etc.).

Cluster 4

3.4 CLUSTER 4. ENERGY EFFICIENCY AND RENEWABLE ENERGY

The Energy Efficiency regulations and requirements apply to public sector and different sectors of Economy. The Energy Efficiency matters in the context of CE should be seen first of all their relation with the sectors of Economy, while public sector is engaged indirectly (through construction and delivery of electricity and heating services). Among the sectors of Economy, some sectors have a special importance and place in the entire system aimed on increasing Energy Efficiency. These specific sectors are: Construction and Energy Sector (generation, transmission, distribution). Thus, the cluster 4 is represented by Construction, Energy sector and all other businesses, who are considered as energy consumers and also have certain obligations in terms of supporting energy efficiency.

- Construction Sector
- Energy Sector (generation, transmission, distribution)
- First Category Enterprises

Enterprise of the first category is an enterprise whose performance indicators at the end of the annual reporting period meet a least 2 of the following 3 criteria:

- the total value of its assets exceeds 50 million GEL;
- its income exceeds 100 million GEL;
- its average number of employees in the reporting period exceeds 250.

► **Construction:**

Sector nomination and NACE Index (NI): Construction (NI/ 41 - 43); Input in GDP (Mln GEL): 3,680.8 Mln GEL / 8.5%; Annual Production value: 9,074.00 Mln GEL

► **Electricity (Electric power generation, transmission and distribution)**

Sector nomination and NACE Index (NI): Electric power generation, transmission and distribution (NI/ 35.1); Input in GDP (Mln GEL): 1009.1 Mln GEL* / 2.3%; Annual Production value: 1,650 Mln GEL

► **Manufacture of gas; distribution of gaseous fuels through mains**

Sector nomination and NACE Index (NI): Extraction of crude petroleum and natural gas (NI/ 6); Input in GDP (Mln GEL): 8.7 / 0.2%; Onshore transport and transport via pipelines (NI/ 49); Input in GDP (Mln GEL): 1065.9 Mln GEL* / 2.5%

3.4.1 Current Situation and Gaps

3.4.1.1 Energy Efficiency and Renewable Energy Policies and Targets

National Energy Policy is based on the law of Georgia on Energy and Water Supply (Article 7(1)). Policy is developed at least for 10 – year period.

The Integrated National Energy and Climate Plan (NECP) is the annex of National Energy Policy and includes the measures and target indicators which Georgia must achieve by 2030. NECP contains also a vision till 2050.

The NECP includes five key dimensions, one of which is **Energy Efficiency.**

Targets for renewable energy (RE), energy efficiency (EE) and reduction of greenhouse gas emissions (GHG) are agreed with the European Union and the Energy Community Secretariat (EnCS):

- 47% - reduction of greenhouse gases in 2030 compared to 1990 according to the nationally defined contribution;
- 27.4% share of renewable energy in final energy consumption by 2030;
- following target have been agreed with EU and EnCS - 2030 primary energy consumption - 5,45 Mtoe; 2030 final energy consumption - 5,00 Mtoe;
- 1% energy-efficient renovation of buildings (this obligation increases to 3% by the end 2025); Provided target for renovation of building arises from the amendments Energy Efficiency Law (according to the EE Directive recast).

The annual losses of energy in transmission lines and distribution networks constitute 76.3 thousand tons of oil equivalent or 887.7 GWh (7.7% of total annual consumption).

Gas transit via the mainline gas pipelines is not associated with losses. However, the internal gas distribution network is not in a good condition and losses here are significant. In 2015, the total losses in the distribution network amounted to 103.8 million m^3, 64% of which came from KazTransGas-Tbilisi.

Georgia's energy balance (Geostat) shows that average losses of natural gas during 2018 - 2020 accounted for 96,967,000 m3 (3.7% of inflow and 5.1% of Final Consumption). According to the Integrated National Energy and Climate Plan (NECP), it is planned to reduce losses by 4% by 2030. To achieve this figure, it is planned to invest 144,140,000 GEL by 2030.

3.4.1.2 Energy Efficiency and Renewable Energy Legislation

► **Renewable Energy**

On December 20, 2019, the Law of Georgia "On Promotion of Production and Use of Energy from Renewable Sources" (also known as Law on Renewable Energy) was adopted, which provides for the requirements of Directive 2009/28/EC. Currently 8 secondary acts are already adopted. The final draft of amendments to the Law on the Promotion of Energy Consumption and Production from Renewable Sources (based on the recast of RED II) and related secondary legislation has been developed.

The main objectives of the law are:

- Establishing the legal framework for promoting the use of all types of renewable energy sources;
- Setting the goal of increasing the share of renewable energy in the country's total energy consumption (including the transport sector). With current amendments the RE targets are moved to NECP and won't be present in RE law
- Several by-laws have already been adopted; and additional by-laws are being developed.

► **Energy Efficiency**

Energy efficiency legislation in Georgia is developed following EU Directives:

- Energy Efficiency Directive (2012/27/EU) (Amended law has been approved in June 2024 according to the recast directive)
- Energy Performance of Buildings Directive (2010/31/EU) (Amended law has been approved in June 2024 according to the recast directive)
- Regulation (EU) 2017/1369 setting a framework for energy labelling and repealing Directive 2010/30/EU

Subsequently, the following laws were passed and put into effect during 2019-2020:

- Law of Georgia on energy efficiency (28/05/2020) Amended in June 2024;
- Law of Georgia on Energy Efficiency of Buildings (28/05/2020) Amended in June 2024;
- Law of Georgia on Energy Labelling (26/12/2019)

Amendments to the Law on Energy Efficiency have been approved in accordance with the revised Energy Efficiency Directive (2018/2002/EU).

The Law on Energy Efficiency applies to:

- Public Sector
- First Category Enterprises
- Energy Sector (generation, transmission, distribution)

In addition, Amendments to the Law on Energy Efficiency of Buildings have been approved in accordance with the revised EPBD directive.

3.4.1.3 Energy Efficiency and Renewable Energy: Actions and Timeline

Short-term Actions

► **First Category Enterprises:**

- Implement the legislation, bylaws, regulations, strategies, policy and strategic action plans developed in a field of energy efficiency and renewable energy

- Mandatory energy audits / implementation of ISO 50001 Energy management systems
- Voluntary energy audits for SMEs

► Energy Sector (generation, transmission, distribution):

- Implement the legislation, bylaws, regulations, strategies, policy and strategic action plans developed in a field of energy efficiency and renewable energy
- 27.4% share of renewable energy in final energy consumption by 2030
- Energy distributors (must ensure efficient energy consumption by end users through various measures)
- Facilitating the gradual introduction of smart meters
- Implement the projects aimed on rehabilitation of the transmission lines to minimize energy losses in the mainline transmission lines managed by GSE to meet the target levels and timelines set forth in NECP. The target for 10 years (till 2030) is to reduce the losses from 7.7% to 5.0% as minimum[13]. Reduction of losses by 2.7% means 311 GWh annually or 0,05% of current GDP (about 21,5 Mln GEL)
- Georgia's energy balance (prepared by Geostat) shows that average losses of natural gas during 2018 - 2020 accounted for 96,967,000 m3 (3.7% of inflow and 5.1% of Final Consumption). According to the Georgian Integrated National Energy and Climate Plan (NECP), it is planned to reduce losses by 4% by 2030. To achieve this figure, it is planned to invest 144,140,000 GEL by 2030

► Public Sector:

- Implement the legislation, bylaws, regulations, strategies, policy and strategic action plans developed in a field of energy efficiency and renewable energy
- 1% energy-efficient renovation of buildings (this obligation increases to 3% from the end of 2025)
- Public procurement (monetary thresholds, building certification, energy labeling)
- Promotion of ESCO market (introduction of energy performance contract practice)

► Construction:

- Implement the legislation, bylaws, regulations, strategies, policy and strategic action plans developed in a field of energy efficiency and renewable energy
- Establish/improve the construction supervision system to ensure implementation of the Nearly-Zero Consumption Buildings Strategy
- 1% energy-efficient renovation of buildings (this obligation increases to 3% from the end of 2025)

Mid-term and Long-term Actions

► First Category Enterprises

- Mandatory energy audits / implementation of ISO 50001 Energy management systems

[13] Integrated National Energy and Climate Plan (NECP) of Georgia, MoESD & MoEPA. 2023

- Voluntary energy audits for SMEs

Energy Sector (generation, transmission, distribution)

- Energy distributors (must ensure efficient energy consumption by end users through various measures)
- Facilitating the gradual introduction of smart meters

Public Sector

- 1% energy-efficient renovation of buildings (this obligation increases to 3% from the end of 2025)
- Public procurement (monetary thresholds, building certification, energy labeling)
- Promotion of ESCO market (introduction of energy performance contract practice)

Construction

- Implement the legislation, bylaws, regulations, strategies, policy and strategic action plans developed in a field of energy efficiency and renewable energy
- Establish/improve the construction supervision system to ensure implementation of the Nearly-Zero Consumption Buildings Strategy
- Continue energy-efficient renovation of buildings following new – long-term targets

3.4.1.4 Entities responsible for the implementation of the Planned Actions

- Ministry of Economy and Sustainable Development
- Governmental CE Commission
- GSE
- Ministry of Environmental Protection and Agriculture
- Businesses engaged in construction; energy generation and operation of the electric networks; natural gas distribution.

3.4.1.5 Economical and financial viability of the actions in long-term and scheme of the initial investments

Initial investments for development and implementation of the strategies, action plans and developing basic infrastructure (energy storages; rehabilitation of transmission lines) should be incurred by the Government of Georgia (Development of strategies, legislation, action plans; rehabilitation of GSE transmission lines) or by the private companies (some types of the energy storages; rehabilitation of transmission lines and gas distribution networks operated by the private companies). The established system of the infrastructure operations and maintenance will ensure sustainable management of the energy delivery systems without further gross investments from the government: the energy fee collection mechanisms and export incomes ensures sustainable operation of the systems.

Investments in the energy efficiency in mid-term and long-term is beneficial for the businesses and public.

Specific Features of Georgia's Economy and CE Roadmap

3.5 SPECIFIC FEATURES OF GEORGIA'S ECONOMY AND CE ROADMAP

3.5.1 Specific Features of Economic Structure of Georgia and Specific Priorities for CE Transition

To develop a roadmap and then a strategy and action plan for the transition to a circular economy model, it is necessary, first of all, to describe the general structure of the Georgian economy, its features that determine the current level of circularity and prospects for the development of circular models. Naturally, the description should reflect the specifics of Georgia's economic structure. At the same time, it is important to take into account that the circular economy model is not limited to the issue of waste reduction and recycling, but also includes optimization of resource management, material consumption and energy consumption. Any changes that lead to an increase or preservation of the contribution to GDP, while reducing the consumption of materials and energy and the natural resources used (land, water, minerals, etc.), should be considered as a shift towards the circular model. The ultimate goal of preliminary assessments of the economic structure is to identify possible types of interventions that are practically feasible and at relatively low cost of material and human resources, would achieve maximum results in terms of increasing the level of circularity.

The brief overview of the features of the Georgian economic system presented above has been developed with this specific task in mind and does not pretend to cover a wide range of economic issues. On the contrary, the review focuses only on those aspects that allow us to assess the degree of circularity of different sectors of the economy, identify the most promising areas and specific features important for effective interventions. The review is mainly based on the materials of the Circularity Mapping for Georgia 2022 (monograph prepared in 2022 with financial assistance from SIDA).

- Agriculture is the leading sector of the economy in Georgia by its input in GDP and number of employees
- About 60% of production belongs to the food industry, 11% falls on the manufacturing of mineral fertilizers and 17% on the production of base metals
- Machinery and equipment, computers and telephones, household items and household chemicals are produced in extremely small quantities and are mainly imported
- Wholesale and retail trade provides input to GDP equal to 15.6%
- Tourism is an essential branch of the economy: in the statistical tables, tourism is not singled out as a separate type of activity, but indicators related to tourism are indirectly reflected in the nomination Accommodation and food service activities
- Construction is another sector that provides significant input in GDP during the last years. In 2023 this input was equal to 7.9%.
- Agriculture, trading and constructions represent the sectors, which engages most part of employees

The extremely low level of manufacturing goods and products other than agriculture products results that the actions aiming increasing durability and life span of the products are not directly applicable in Georgia and could be taken into account only in trading schemes, via participation in international CE platforms.

The unusually high level of losses in gas distribution networks and power transmission lines makes it efficient and significant in terms of increasing circularity the actions aimed on rehabilitation of infrastructure and minimization of losses and GHG emissions[14].

The improper management of pastures and deterioration of the old irrigation systems makes it important to improve the resource management systems. This is assumed that improvements in this field will enable to increase the material productivity and input in GDP without using new land resources.

The waste recycling in different sectors is not well established practice and provides a space for further improvements. Thus, the actions aimed on waste collection, recycling and recovery of materials are among the priority activities to increase circularity.

Awareness raising, educational and capacity building programs are seen as necessary instruments for transition to the CE models.

The proposed **short-term actions** in general comprise:

- Development of binding, permissive and encouraging regulations
- Development of policies, strategies and Strategic Action Plans
- Start works on developing indicators and standards for estimation of the circularity performance of stakeholders
- Development of consultancy services, capacity building and awareness raising programs
- Establishment of business incubators
- Implementation of the pilot projects

The proposed **mid-term and long-term actions** in general comprise:

- Implementation of new binding, permissive and encouraging regulations; creation of the efficient enforcement mechanisms
- Implementation of the developed policies, strategies and Strategic Action Plans aimed in CE transition
- Completions of works on developing indicators and standards for estimation of the circularity performance of stakeholders; Establishment of the standardization system and ecolabling.
- Development of consultancy services, implementation of the capacity building and awareness raising programs
- Establishment of business incubators
- Development of the international CE platforms

[14] Direct losses of methane in gas distribution network and additional energy production due to losses of electricity.

3.5.2 Summary of the Proposed Short-term, Mid-term and Long-term actions to increase the Circularity of Georgia

Table 9 Proposed Short-term Actions (5 years): 2025 – 2030 to increase the circularity level in Georgia

No	Actions	Clusters	Implementing Stakeholder
	Agriculture, Fishing and Manufacture of Food Products		
1.	Complete the Law on Sustainable Pasture Management (the law is under the development currently)	Cluster 1	- Ministry of Environmental Protection and Agriculture
2.	Develop the Pasture Management Strategy and Action Plan for 2025 – 2030 in compliance with the National Pasturelands Management Policy Document (NPMPD)		- Ministry of Environmental Protection and Agriculture
3.	Implement Irrigation Strategy for Georgia 2017-2025		- Ministry of Environmental Protection and Agriculture; - Georgian Amelioration LTD;
4.	Develop Irrigation strategy for 2025 – 2030		- Ministry of Environmental Protection and Agriculture; - Georgian Amelioration LTD
	Electricity, (Electric power generation, transmission and distribution)		
5.	Implement the projects aimed on rehabilitation of the transmission lines to minimize energy losses in the mainline transmission lines managed by GSE to meet the target levels and timelines set forth in NECP. The target for 2030 is to reduce the losses from 7.7% to 5.0% as minimum.[15] Reduction of losses by 2.7% means 311 GWh annually or 0,05% of current GDP (about 21,5 Mln GEL).	Cluster 1	- Ministry of Economy and Sustainable Development; - GSE;
6.	Establish/improve the system of supervision over the power distribution companies and enforcement mechanisms to ensure duly rehabilitation and maintenance of the transmission lines and minimization of the energy losses		- Ministry of Economy and Sustainable Development; - GSE;
7.	Develop strategy, action plan and particular projects aimed on optimization of the import-consumption-storage-export schemes; Develop strategy, action plan and projects of energy storages (batteries; Hydropumped reservoirs etc.)		- Ministry of Economy and Sustainable Development; - GSE;
8.	Develop Strategy and Action Plans to promote Energy efficiency in compliance with the Law of Georgia On Energy Efficiency (2020); Develop Net-Zero Consumption Buildings Strategy in compliance with the Law of Georgia On Energy Efficiency of Buildings (2020)		- Ministry of Economy and Sustainable Development; - Ministry of Environmental Protection and Agriculture;

[15] Georgian Integrated National Energy and Climate Plan (NECP), MoESD & MoEPA. 2023

No	Actions	Clusters	Implementing Stakeholder
	Manufacture of gas; distribution of gaseous fuels through mains		
9.	Implement the projects aimed at the rehabilitation of the Gas transport networks to reduce losses of gas in networks by 4% by 2030, as it is planned in NECP.	Cluster 1.	- Ministry of Economy and Sustainable Development; - GOGC;
10.	Implement the strategic gas storage projects till 2030.		- Ministry of Economy and Sustainable Development; - GOGC;
11.	Promote and develop a project of delivering in Greece and Italy LNG and receiving the same amount of natural gas by Georgia [project Under the Projects of Energy Community Interest (PECI) and Projects of Mutual Interest (PMI)]		- Ministry of Economy and Sustainable Development; - GOGC;
	Mining and Manufacture of basic metals		
12.	For the next 5/10 years the target could be recovery of materials reprocessing at least 5% of tailings stored near the mines and basic metal manufacture facilities.	Cluster 2	- Ministry of Economy and Sustainable Development; - Ministry of Environmental Protection and Agriculture; - Mining and metal manufacture companies;
13.	Update the waste management legislation and regulations to specifically address the issue of the metal mining and manufacture tails. Include in legislation mandatory requirements requesting recycling of tails and recovery of valuable materials. Include permissive clauses, enabling the private companies to use their own waste (tailing) for recovering materials.		- Ministry of Environmental Protection and Agriculture - Ministry of Economy and Sustainable Development;
14.	Promote and develop a policy and strategic action plans to manage tailings and hazardous wastes related to mining sector		- Ministry of Environmental Protection and Agriculture - Ministry of Economy and Sustainable Development
15.	Develop particular projects to eliminate hazardous waste associated risks		- Ministry of Environmental Protection and Agriculture

No	Actions	Clusters	Implementing Stakeholder
	Municipal Waste Streams Management; **Waste Streams Management related to basic economic activities;**		
16.	Further development and implementation of the EPR regulations or similar binding regulations (packaging, forestry and wood production; food and animal husbandry wastes; construction waste; etc.);	Cluster 3	- Ministry of Environmental Protection and Agriculture
17.	Development of the strategy, action plan and regulations for managing mining and basic metal production wastes, construction wastes, wood industry wastes, food and animal husbandry wastes		- Ministry of Environmental Protection and Agriculture
18.	Implement the law “On Food Losses, Food Waste Reduction and Donation".		- Ministry of Environmental Protection and Agriculture
19.	Implement the provisions of the “Donation” law, support creation of the charity organizations engaged in food redistribution and donation		- Ministry of Environmental Protection and Agriculture
20.	Create a regulatory framework that supports and incentivizes CE activities, in particular, collection and recycling of the wastes.		- Ministry of Environmental Protection and Agriculture; - Ministry of Economy and Sustainable Development; - Ministry of Finances;
21.	Develop technical standards and accountability standards to estimate circularity degree of the companies; Develop and implement Ecolabeling schemes		- Ministry of Environmental Protection and Agriculture; - Ministry of Economy and Sustainable Development; - Governmental CE Commission;
22.	Develop technological and business consulting capacity and business incubators to assist commercial companies and community associations in developing waste recycling projects		- Ministry of Environmental Protection and Agriculture; - - Governmental CE Commission;
23.	Work with businesses (producers and traders) to increase circular awareness. Implement Awareness building programms		- Ministry of Environmental Protection and Agriculture;
24.	develop inert waste disposal facilities and a proper system for managing inert waste collection and disposal		- Ministry of Economy and Sustainable Development; - Governmental CE Commission
25.	elaborate regulations and financial mechanisms motivating the constructing companies and waste operators to develop inert waste recycling enterprises		- Governmental CE Commission;

No	Actions	Clusters	Implementing Stakeholder
	Energy Efficiency and Renewable Energy		
	→ **First Category Enterprises**		
26.	Implement the legislation, bylaws, regulations, strategies, policy and strategic action plans developed in a field of energy efficiency and renewable energy	Cluster 4	- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
27.	Mandatory energy audits / implementation of ISO 50001 Energy management systems		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
28.	Voluntary energy audits for SMEs		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
	→ **Energy Sector**		
29.	Implement the legislation, bylaws, regulations, strategies, policy and strategic action plans developed in a field of energy efficiency and renewable energy	Cluster 4	- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
30.	27.4% share of renewable energy in final energy consumption by 2030.		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
31.	Energy distributors (must ensure efficient energy consumption by end users through various measures)		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
32.	Facilitating the gradual introduction of smart meters		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
33.	Implement the projects aimed on rehabilitation of the transmission lines to minimize energy losses in the mainline transmission lines managed by GSE to meet the target levels and timelines set forth in NECP. The target for 10 years (till 2030) is to reduce the losses from 7.7% to 5.0% as minimum.[16] Reduction of losses by 2.7% means 311 GWh annually or 0,05% of current GDP (about 21,5 Mln GEL).		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;

[16] Integrated National Energy and Climate Plan (NECP), MoESD & MoEPA. 2023.

No	Actions	Clusters	Implementing Stakeholder
34.	Georgia's energy balance (Geostat) shows that average losses of natural gas during 2018 - 2020 accounted for 96,967,000m3 (3.7% of inflow and 5.1% of Final Consumption). According to the Georgian Integrated National Energy and Climate Plan (NECP), it is planned to reduce losses by 4% by 2030. To achieve this figure, it is planned to invest 144,140,000 GEL by 2030		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
	→ **Construction**		
35.	Implement the legislation, bylaws, regulations, strategies, policy and strategic action plans developed in a field of energy efficiency and renewable energy	**Cluster 4**	- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
36.	Establish/improve the construction supervision system to ensure implementation of the Net-Zero Consumption Buildings Strategy		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
37.	1% energy-efficient renovation of buildings (this obligation increases to 3% from the end of 2025)		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;

Table 10 Proposed Mid-term Actions and Long-term Actions (10 and more years): 2030-2035 / 2035-2050 to increase the circularity level in Georgia

No	Actions	Clusters	Implementing Stakeholder
	Agriculture, Fishing and Manufacture of Food Products		
1.	Implement the Pasture Management Strategy and Action Plan for 2025 – 2030 in compliance with the National Pasturelands Management Policy Document (NPMPD)	**Cluster 1.**	- Ministry of Environmental Protection and Agriculture
2.	Implement Irrigation Strategy for Georgia 2025 – 2030		- Ministry of Environmental Protection and Agriculture; - Georgian Amelioration LTD;
3.	Create a capacity building programmes, technological and business consulting capacity that supports Sustainable Pasture Management.		- Ministry of Environmental Protection and Agriculture;
4.	Create a capacity building programmes, technological and business consulting capacity that supports Sustainable Management of the Irrigation Systems at the community/end users level (creation and management of the irrigation associations)		- Ministry of Environmental Protection and Agriculture; - Georgian Amelioration LTD;

No	Actions	Clusters	Implementing Stakeholder
	Electricity (Electric power generation, transmission and distribution)		
5.	Develop particular projects aimed on optimization of the import-consumption-storage-export schemes: projects of energy storages (batteries; Hydropumped reservoirs etc.)	Cluster 1	- Ministry of Economy and Sustainable Development; - GSE;
6.	Establish the system for financing and managing Energy efficiency projects		- Ministry of Economy and Sustainable Development;
7.	Establish/improve the construction supervision system to ensure implementation of the Net-Zero Consumption Buildings Strategy		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
	Manufacture of gas; distribution of gaseous fuels through mains		
8.	Promote and develop a project of transforming the natural gas in other products (LNG and CNG) and generating LPG from oil	Cluster 1	- Ministry of Economy and Sustainable Development; - Governmental CE Commission; - GOGC;
9.	Develop strategies for natural gas storage and schemes for generation of additional incomes due to variations of gas prices (gas storage; gas products; generation of electricity etc.);		- Ministry of Economy and Sustainable Development; - GOGC;
	Mining and Manufacture of basic metals		
10.	Awareness building programs	Cluster 2	- Ministry of Economy and Sustainable Development; - Governmental CE Commission
11.	Provide technological consulting capacity, networking opportunities and financial mechanisms supporting the producers in developing the waste recycling and material recovery projects		- Ministry of Economy and Sustainable Development; - Governmental CE Commission
	Municipal Waste Streams Management; **Waste Streams Management related to basic economic activities;**		
12.	Propose and Participate in development of the international platforms for better engagement of all participants of the production/consumption chain (producers, exporters, importers, distributors, end users) in the EPR process	Cluster 3	- Ministry of Economy and Sustainable Development; - Governmental CE Commission
13.	Further develop and implement the binding EPR regulations (packaging, forestry and wood production; etc.) or develop similar regulations;		- Ministry of Economy and Sustainable Development; - Governmental CE Commission
14.	Further develop and improve a regulatory framework that supports and incentivizes CE		- Ministry of Economy and Sustainable Development; - Governmental CE Commission
15.	Embed accountability standards to estimate circularity degree of the companies; Develop and implement Ecolabling schemes		- Ministry of Economy and Sustainable Development; - Governmental CE Commission
16.	Develop technological and business consulting capacity and business incubators to assist companies in developing waste recycling		- Ministry of Economy and Sustainable Development; - Governmental CE Commission

No	Actions	Clusters	Implementing Stakeholder
	Energy Efficiency and Renewable Energy		
	→ **First Category Enterprises**		
17.	Mandatory energy audits / implementation of ISO 50001 Energy management systems	Cluster 4	- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
18.	Voluntary energy audits for SMEs		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
	→ **Energy Sector (generation, transmission, distribution**		
19.	Energy distributors (must ensure efficient energy consumption by end users through various measures)	Cluster 4	- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
20.	Facilitating the gradual introduction of smart meters		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
	→ **Construction**		
21.	Implement the legislation, bylaws, regulations, strategies, policy and strategic action plans developed in a field of energy efficiency and renewable energy	Cluster 4	- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
22.	Establish/improve the construction supervision system to ensure implementation of the Nearly-Zero Consumption Buildings Strategy		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;
23.	Continue energy-efficient renovation of buildings following new – long-term targets		- Ministry of Economy and Sustainable Development; - Governmental CE Commission;

4 VISION OF GEORGIA AS A REGIONAL LEADER IN CIRCULARITY

The vision for the circularity in Georgia is that by 2050, a regenerative circular economy drives Georgia to a sustainable, fair and participatory development path that puts people at the centre. This is achieved through the care of nature and its living beings, the responsible and efficient management of our natural resources, and a society that uses, consumes, and produces in a sustainable and conscious way, promoting the creation of green jobs and opportunities for people and organizations through the country.

4.1 ACHIEVING THIS VISION DEMANDS A FUTURE WHERE...

Georgia as a regional leader in circularity

The circular economy has been embedded in the culture of the country, generating sustainable production and consumption patterns in all levels of society. People and organizations are fully aware of the problems presented by the linear economy and incorporate this awareness into their decisions and actions. And all this has been possible thanks to the incorporation of the principles of the circular economy in the spheres of education and communication, the wide availability and dissemination of information, and the learning of the various types of skills that the transition requires.

Circular practices have driven the regeneration of nature, positively and sustainably impacting the lives of people and the environment. People and organizations pay special attention to the care of soils, waters and ecosystems that host biodiversity, avoiding the use of problematic substances, the inappropriate disposal of waste, and other types of pollution. Spatial planning instruments incorporate a regenerative outlook. And all this has increased the resilience, biodiversity, and natural wealth of the country, promoting the health and well-being of people.

The innovation potential of the circular economy has been fully tapped into, igniting the creativity of people for the design and implementation of more efficient and sustainable production systems. Organizations conducting research have focused on generating relevant information to solve the problems of the linear economy, and circular entrepreneurship has become common. Circular business models, low-impact design standards, and clean technologies that started out as great innovations have become the norm. And all this has allowed the country to position itself as a global leader in innovation for the circular economy.

The circular economy has reached all regions of the country, promoting sustainable local development compatible with the visions and vocations of each place. The transition to the circular economy has recognized the geographic diversity of the country. Local economies of all regions have strengthened based on the sustainable use of their natural wealth. And all of this has contributed to the resilience of the territories, the diversification of their productive activities, and the respect for the multicultural identity of the communities that inhabit them.

The circular economy has become a generous source of opportunities, enabling a fair transition. Numerous new jobs have been created in occupations as diverse as product design, management of materials, repair and remanufacturing, logistic services and distribution, regeneration of natural

systems, among other activities, many of them novel. Attention has been put into identifying vulnerable groups and facilitating skills training, and assuring that the opportunities that are generated are open to them, ensuring justice in the transition process.

The profound changes brought about by the transition have been the result of the collaborative and participatory work of a diverse set of actors. People from different sectors – civil society, academia, private sector, public sector – have managed to work together on the common challenges that need to be faced, generating synergies, and leveraging resources from different sources. And there has been a sensible, coherent, gradual, and balanced articulation among the initiatives promoted by all these actors, which has given strength to the transition process towards the circular economy.

4.2 TEN GOALS, FOUR PILLARS FOR ACTION

Ten intermediate and long-term goals are being set to guide Georgia's transition to a circular economy, based on standard indicators and adapted to Georgia's context and priorities:

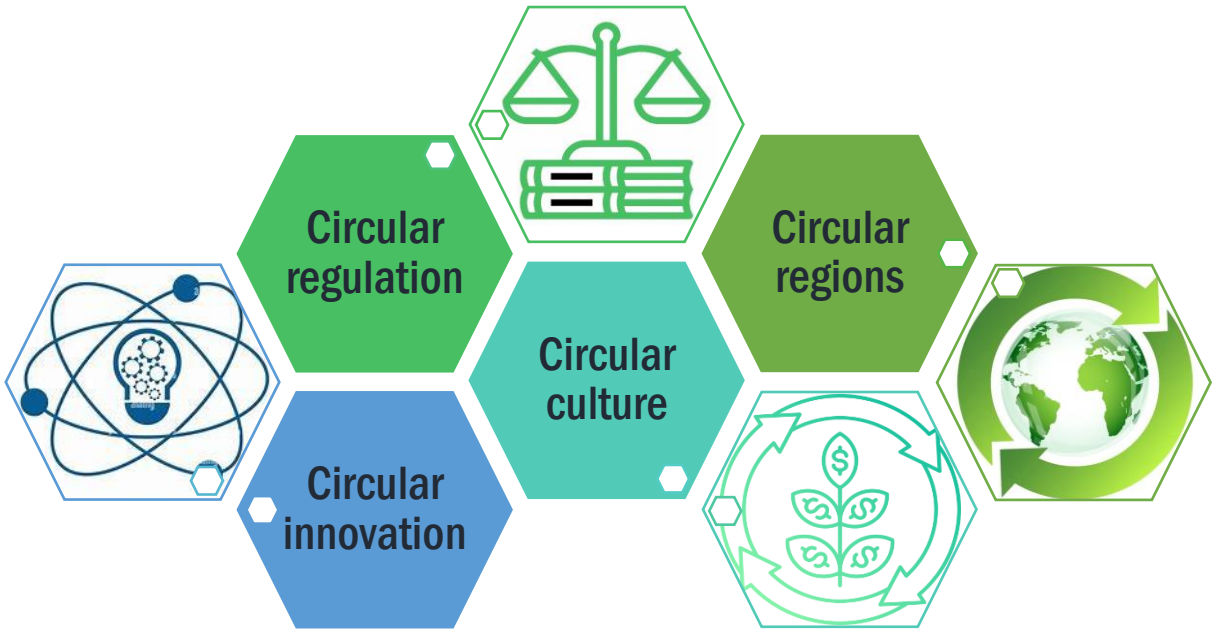
1. Generate new green jobs
2. Decrease municipal solid waste per capita
3. Decrease total waste generation
4. Increase material productivity
5. Increase general recycling rate
6. Increase municipal solid waste recycling rate
7. Recover land affected by illegal dump sites
8. Minimize the energy and material losses in transport networks
9. Increase energy efficiency
10. Improve the land and water resource management and material productivity

These goals are grouped into four pillars:

- **Circular innovation** includes actions to create a robust national innovation system for a circular economy in Georgia, by embedding circular design principles in the creation of products, services, and processes.
- **Circular culture** includes actions to make circular habits and practices the norm, through education and skills development, communications campaigns, and actions to strengthen transparency and monitoring.
- **Circular regulation** includes actions to adjust Georgia's regulatory framework to support circular practices, by expanding the range of products subject to the Extended Producer Responsibility scheme, promoting reuse and recovery of waste, and incentivising and facilitating waste separation at source.
- **Circular regions** include actions to adapt to the different contexts and priorities of Georgia's regions, and distribute resources across the country, by providing waste management infrastructure, developing regenerative rural production, and growing secondary markets for local materials.

TEN GOALS TO GUIDE GEORGIA'S TRANSITION TO A CIRCULAR ECONOMY

1. Generate new green jobs
2. Decrease municipal solid waste per capita
3. Decrease total waste generation
4. Increase material productivity
5. Increase general recycling rate
6. Increase municipal solid waste recycling rate
7. Recover land affected by illegal dump sites
8. Minimize the energy and material losses in transport networks
9. Increase energy efficiency
10. Improve the land and water resource management and material productivity



5 KEY GOALS OF THE ROADMAP

5.1 GENERATION OF GREEN JOBS

For a fair transition to the circular economy, it is essential to ensure that it contributes strongly to the generation of green jobs, recognizing that this should not be taken for granted and that it is everyone's task to assure inclusiveness and equity throughout the process. Jobs must not only be green, but also decent, as defined by the International Labour Organization[17]: productive, remunerated with fair wages, secure, with social protection, and opening opportunities for personal development and social integration.

The transition is expected to increase the proportion of various types of jobs. With the deployment of EPR in Georgia employment in waste management and recycling will increase rapidly. Employment in activities related to the repair and maintenance of products and infrastructure is also expected to increase significantly. Increases are also expected in specialized activities such as Eco-design, materials science, bioprocesses design, or ecological consultancy.

By 2050 Georgia will significantly increase a number of green jobs related to the repair and maintenance of products and infrastructure, specialized activities such as eco-design, materials science, bioprocesses design, or ecological consultancy. These jobs will be productive, remunerated with fair wages, secure, with social protection, and opening opportunities for personal development and social integration. The assessment of the precise targets will be carried out at the stage of developing the Circular Economy Strategy and Action Plan.

The first long term goal of the Roadmap:

- **By 2050 Georgia will significantly increase a number of green jobs related to the repair and maintenance of products and infrastructure, specialized activities such as eco-design, materials science, bioprocesses design, or ecological consultancy.**

5.2 DECREASE IN THE GENERATION OF MUNICIPAL SOLID WASTE PER CAPITA

The generation of municipal solid waste (hereinafter, MSW) is a notable effect of the linear economy. In the case of Georgia, this waste stream corresponds to around 900,000 tons annually in average. For 2022 the MSW volumes disposed in landfills equals 1045.1 ton. Reducing MSW largely depends on the production and distribution decisions of the firms that design, produce and market products, which decide how much effort to make sure that the products they put on the market are durable, or what kind of packaging is used to sell them, among many other things. But it also depends crucially on the lifestyle choices and consumption decisions of citizens, who must

[17] https://www.ilo.org/topics/decent-work

constantly decide how to spend their resources, and can integrate the environmental dimension into their purchasing decisions.

In the last 22 years, the generation of MSW per capita has been on the rise. While in 2015, the country's inhabitants generated 207.8 kg/capita/year on average; by 2022 this had risen to 279.4kg/capita/ year. Although this still places Georgia below the OECD average of 535 kg/capita/year, its trend is contrary to that of the block.

For the country to move towards a circular economy, it must aim for a sharp decrease in the generation of MSW, promoting Eco-design and circular distribution systems, sustainable lifestyles and consumption patterns, and a decrease of food loss and waste.

For these reasons, the second long-term goal of this Roadmap is:

- **The Generation of Municipal Solid Waste Per Capita Has Been Reduced by 25%,**
- **and that by 2030 The Reduction Has Already Reached 10%.**

The second long-term goal of the Roadmap:

- **The Generation of Municipal Solid Waste Per Capita Has Been Reduced by 25%,**
- **And that by 2030 The Reduction Has Already Reached 10%.**

5.3 DECREASE IN TOTAL WASTE GENERATION

At the same time, it is essential to decouple economic growth from waste generation. The achievement of this objective should translate into a decrease in the total generation of waste in the country for each unit of gross domestic product generate

Thus, the third long-term goal of this Roadmap is:

- **Waste/GDP has been reduced by 30%,**
- **And that by 2030 this reduction has already reached 15%.**

The third long-term goal of the Roadmap:

- **Waste/GDP has been reduced by 30%,**
- **And that by 2030 this reduction has already reached 15%.**

5.4 INCREASE IN MATERIAL PRODUCTIVITY

A second way to measure the decoupling between economic development and resource use is to observe the evolution of the value generation indicators such as GDP in relation to the evolution of the resource use indicators such as domestic material consumption (DMC), which represents the amount of materials consumed by an economy. By dividing GDP by DMC, the material productivity of a country can be calculated. This indicator serves to understand the value that an economy generates for each unit of material used. The economic gains that a more rational use of resources can bring, and the strong expansion of services for a circular economy that the transition

entails, are opportunities to greatly speed up the increase of the material productivity of the country's economy.

Considering this, the fourth long-term goal of this roadmap is:

- **The material productivity of the country has increased by 60%,**
- **And that by 2030 this increase has already reached 30%.**

The fourth long-term goal of the Roadmap:

- The material productivity of the country has increased by 60%,
- And that by 2030 this increase has already reached 30%

5.5 INCREASE IN THE GENERAL RECYCLING RATE

While reducing the waste generation is essential, it is also important to ensure that the residues generated are kept in the economy for as long as possible. The recycling rates of a country are a fundamental indicator to measure progress in this area. There are several reasons to expect an accelerated development of the recycling sector in the country. On the one hand, the implementation of the EPR Law, and its possible future extension to other products, will trigger a significant investment wave. Added to this is the drive that will be given through the implementation of the initiatives of this roadmap. Finally, as technological development for a more circular economy continues, new technologies in fields such as materials science or chemical recycling will move the frontier of what is possible today.

Based on this, the fifth long-term goal of the roadmap is:

- **The general recycling rate of the country has reached 75%,**
- **And that by 2030 this rate has already reached 40%.**

The fifth long-term goal of the Roadmap:

- The general recycling rate of the country has reached 75%,
- And that by 2030 this rate has already reached 40%

5.6 INCREASE IN THE RECYCLING RATE OF MUNICIPAL SOLID WASTE

Recycling of MSW faces different challenges when compared to recycling of other types of residues. The cause of this distinction is the distribution of its generation: in small quantities throughout all human settlements, as opposed to industrial residues, in which generation points are less dispersed, and the generation is in larger quantities. This makes the recycling of MSW particularly difficult and expensive, as it depends on the coordinated action of a large numbers of actors, including citizens who must actively participate by separating residues at their source and in coordination with their local recycling systems.

In Georgia, the recycling rate of MSW barely reaches 17%, However, international experience shows that high MSW recycling rates can be achieved. For example, for 2016, the European Union block reached an average rate of 46%, while countries such as Germany or Slovenia reached rates

of 66% and 58%, respectively. The case of Slovenia is of special interest: over a 14-years period, between 2002 and 2016, its MSW recycling rate increased from 20% to 58%.

The recycling of MSW in the country will receive a huge boost from the implementation of EPR, particularly EPR of packaging, where progressive and mandatory collection and recovery targets have already been set up.

Hence, the sixth long-term goal of this roadmap is:

- **the recycling rate of municipal solid waste has reached 65%,**
- **and that by 2030 this rate has already reached 30%.**

The sixth long-term goal of the Roadmap:

- **The recycling rate of municipal solid waste has reached 65%,**
- **And that by 2030 this rate has already reached 30%**

5.7 RECOVERY OF SITES AFFECTED BY ILLEGAL WASTE DISPOSAL

There are several waste dumps in Georgia. Many of these garbage dumps are on public land, and some on private lands. Communities affected by nearby waste dumps are generally the most vulnerable. People living near these sites face a series of negative effects on their health and quality of life: air pollution, water pollution, proliferation of disease vectors, and loss of property value, among other multidimensional effects. However, improper waste disposal affects not only people, but the entire environment: it has been calculated that one hectare of landfill means losses of 525 kg of fertile soil and 15,000 tons of groundwater each year.

The fundamental goal for Georgia is that people are no longer affected by improperly disposed waste in their daily lives. To do this, all the residues that are generated and that still cannot be recovered, must at least be disposed of properly. And the areas that have been degraded by illegal disposal of waste must be recovered.

Thus, the seventh long-term goal of this roadmap is:

- **90% of the area, occupied by illegal waste dumps has been recovered,**
- **and that by 2030 this recovery has already reached 50%.**

The seventh long-term goal of the Roadmap:

- **90% of the area, occupied by illegal waste dumps has been recovered,**
- **And that by 2030 this recovery has already reached 50%.**

5.8 MINIMIZE THE ENERGY AND MATERIAL LOSSES IN TRANSPORT NETWORKS

The energy and material losses associated with the poor condition of the transport and distribution infrastructure is a characteristic problem in Georgia, which determines the specific features of the country's circularity profile.

The annual losses of energy in transmission lines and distribution networks constitute 76.3 thousand tons of oil equivalent or 887.7 GWh (7.7% of total annual consumption).

It is important to Implement the projects aimed on rehabilitation of the transmission lines to minimize energy losses in the mainline transmission lines managed by GSE to meet the target levels and timelines set forth in NECP. **The target till 2030 is to reduce the losses from 7.7% to 5.0% as minimum.**

The target for 2050 could be established as reduction of losses to 2%.

The eighth long-term goal of the Roadmap:

- **To reduce energy and material losses in transport network from 7.7% to 5.0% till 2030,**
- **And to reduce losses to 2% by 2050.**

Georgia's energy balance (Geostat) shows that average losses of natural gas during 2018 - 2020 accounted for 96,967,000m3 (3.7% of inflow and 5.1% of Final Consumption). According to the Integrated National Energy and Climate Plan (NECP), it is planned to reduce losses by 4% by 2030.

Long-term target for 2050 could be further reduction of losses and permanent maintenance of infrastructure to ensure that losses do not exceed 1.0% of consumption (having in mind that total consumption volumes will increase).

5.9 INCREASE ENERGY EFFICIENCY AND SHARE OF RENEWABLE SOURCES

Energy Efficiency is an important field in terms of increasing circularity, as improving energy efficiency leads to minimisation of the energy losses and GHG emissions.

The Integrated National Energy and Climate Plan (NECP) is the annex of National Energy Policy and includes the measures and target indicators which Georgia must achieve by 2030. NECP contains also a long-term vision till 2050. Targets for renewable energy (RE), energy efficiency (EE) and reduction of greenhouse gas emissions (GHG) are agreed with the European Union and the Energy Community Secretariat (EnCS):

- 47% - reduction of greenhouse gases in 2030 compared to 1990 according to the nationally defined contribution;
- 27.4% share of renewable energy in final energy consumption by 2030.
- 1% energy-efficient renovation of buildings (this obligation increases to 3% from by the end 2025); Provided target for renovation of building arises from the amendments Energy Efficiency Law (according to the EE Directive recast).

The ninth long-term goal of the Roadmap:

- **47% reduction of greenhouse gases by 2030 compared to 1990,**
- **27.4% share of renewable energy in final energy consumption by 2030,**
- **Primary energy consumption - 5,45 Mtoe by 2030 and final energy consumption - 5,00 Mtoe by 2030,**
- **1% energy-efficient renovation of buildings**

5.10 IMPROVE THE LAND AND WATER RESOURCE MANAGEMENT AND MATERIAL PRODUCTIVITY

The researches show that the difference in crop yields between irrigated and not irrigated parcels is significant. The difference in crop yield between irrigated and not irrigated parcels is especially significant in the case of Hazelnut, Red grape, White grape, Herbs, Potato, Maize and Wheat. We can roughly estimate that in average replacement of non-irrigated land by irrigated will increase the yield by 40%. Current input of agriculture in GDP is about 7- 8% (7.1% in 2019) and half of that corresponds to plant growing (annual and permanent crops, including grapes).

The total area of Irrigated land for 2015 was about 40,000ha. In Soviet time maximum of irrigated area was 400,000ha. According to the "Irrigation Strategy for Georgia 2017 – 2025" Rehabilitation investment is expected to increase the irrigable area to 200,000 hectares by 2025; As a target for the long-term (by year 2050) – 250,000ha could be defined.

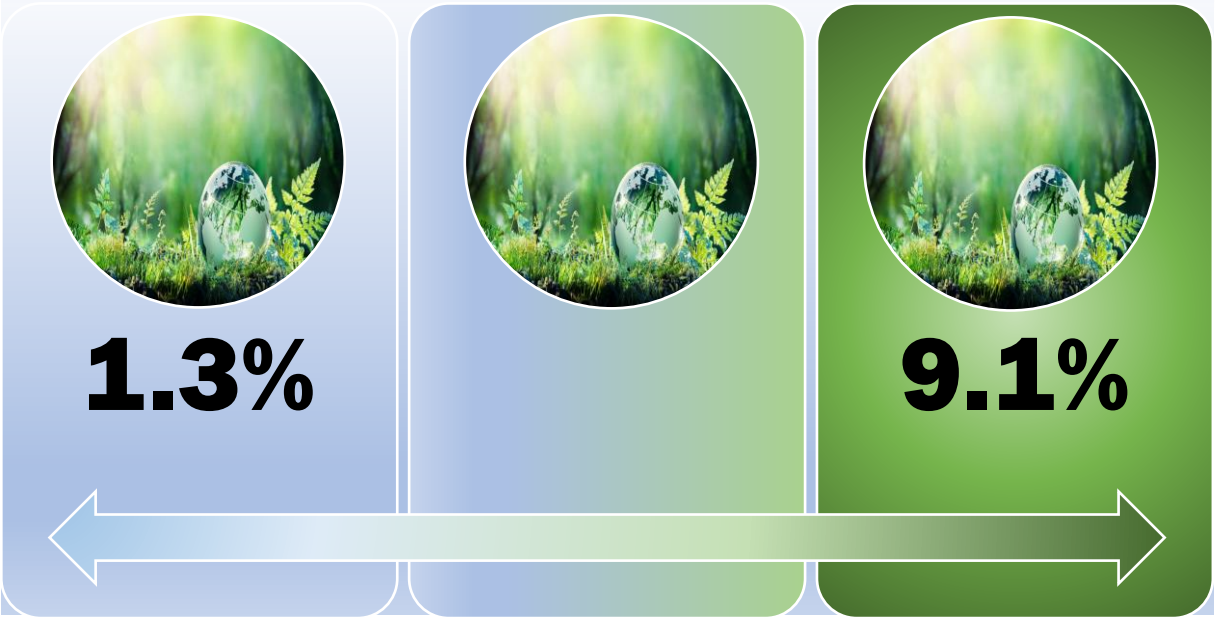
Pastures in Georgia cover around 1.7 million ha (or 1.9 million ha if haylands are included). The significant part of pastures in Georgia are low productive due to improper management.

The expected benefits from improved pastures are: a) increased carrying capacity on improved pasture compared with that on native pasture; **b)** growth rates of 90 to 160 kg/year compared with 40 to 80 on native pasture; **c)** breeder pregnancy rates of 85% compared with 55%; **d)** branding rates of 80% compared with 40 to 50%; **e)** death rates in each class of stock of only 2% compared with 5% to 15% or higher; **f)** weaner weights up to 180 kg at five to six months compared with 120 kg on native pasture.

- **Short-term target: upgrade 30% of pastures by 2030**
- **Mid-term target: upgrade 50% of pastures by 2050**

The tenth long-term goal of the Roadmap:

- **Upgrade 30% of pastures by 2030**
- **Upgrade 50% of pastures by 2050**



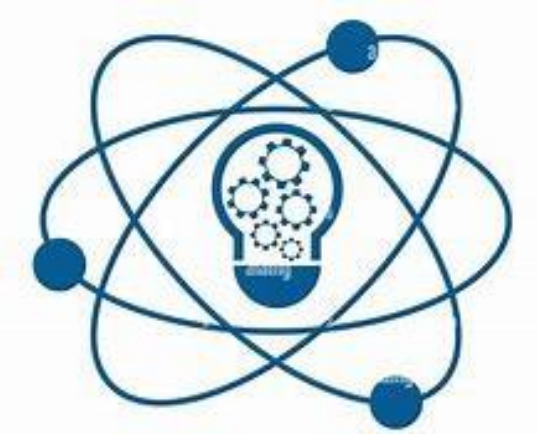
5.11 SUMMARY OF SHORT-TERM AND MID/LONG TERM TARGET VALUES

GENERATION OF GREEN JOBS	
Short-term actions	To carry out the assessment of the precise targets for green jobs at the stage of developing the circular economy strategy and action plan.
Mid and long-term actions	By 2050 Georgia will significantly increase a number of green jobs related to the repair and maintenance of products and infrastructure, specialized activities such as eco-design, materials science, bioprocesses design, or ecological consultancy.
DECREASE IN THE GENERATION OF MUNICIPAL SOLID WASTE PER CAPITA	
Short-term actions	The reduction of waste generation per capita by 10% by 2030
Mid and long-term actions	The reduction of waste generation per capita by 25% by 2050
DECREASE IN TOTAL WASTE GENERATION	
Short-term actions	Waste/GDP reduction has already reached 15% by 2030
Mid and long-term actions	Waste/GDP has been reduced by 30%,
INCREASE IN MATERIAL PRODUCTIVITY	
Short-term actions	By 2030 this increase has already reached 30%
Mid and long-term actions	The material productivity of the country has increased by 60%,
INCREASE IN THE GENERAL RECYCLING RATE	
Short-term actions	By 2030 this rate has already reached 40%.
Mid and long-term actions	The general recycling rate of the country has reached 75%,
INCREASE IN THE RECYCLING RATE OF MUNICIPAL SOLID WASTE	
Short-term actions	Recycling rate of municipal solid waste has reached 30% by 2030
Mid and long-term actions	Recycling rate of municipal solid waste has reached 65%
RECOVERY OF SITES AFFECTED BY ILLEGAL WASTE DISPOSAL	
Short-term actions	50% of the area, occupied by illegal waste dumps has been recovered by 2030
Mid and long-term actions	90% of the area, occupied by illegal waste dumps has been recovered

MINIMIZE THE ENERGY AND MATERIAL LOSSES IN TRANSPORT NETWORKS	
Short-term actions	The target till 2030 is to reduce the losses from 7.7% to 5.0%
Mid and long-term actions	The target for 2050 could be established as reduction of losses to 2%
INCREASE ENERGY EFFICIENCY AND SHARE OF RENEWABLE SOURCES	
Short-term actions	– 47% - reduction of greenhouse gases in 2030 compared to 1990 according to the nationally defined contribution; – 27.4% share of renewable energy in final energy consumption by 2030. – following target have been agreed with EU and EnCS - 2030 primary energy consumption - 5,45 Mtoe; 2030 final energy consumption - 5,00 Mtoe; – 1% energy-efficient renovation of buildings
Mid and long-term actions	– 29.5% share of renewable energy in final energy consumption by 2050 – According to NECP energy savings are estimated: 24% -in 2030; 31% - in 2040; 35% - in 2050. – From 2026 - 3% of administrative buildings will be subject of energy-efficient renovation annually.
IMPROVE THE LAND AND WATER RESOURCE MANAGEMENT AND MATERIAL PRODUCTIVITY	
Short-term actions	upgrade 30% of pastures by 2030
Mid and long-term actions	upgrade 50% of pastures by 2050

6 FOUR PILLARS OF THE TRANSITION: CIRCULAR INNOVATION, CIRCULAR CULTURE, CIRCULAR REGULATION, AND CIRCULAR REGIONS

6.1 CIRCULAR INNOVATION



The circular innovation pillar focuses on the need to encourage innovation and creativity in the productive sector to be oriented towards the implementation of production systems with lower socio-environmental impacts throughout life cycles. With the initiatives and actions of this pillar, what is sought is more life cycle thinking in the design of products, services, and processes; more circular business models; more recovery of industrial waste; more financing for circular investment projects; and more research, development, and innovation for the circular economy.

- Zero waste firms.
- Promotion of circular models.
- Research and development for a circular economy.
- Strategic collaboration for high impact circular economy solutions.
- Scale-up of high potential circular solutions.
- Information systems for modelling the local environmental impact of goods and services.
- Technical standards for the circular economy.
- Circular public procurement.

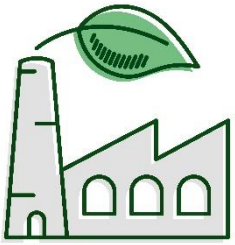
Overcoming the linear economy presents a series of major challenges that will demand great creativity from a wide range of actors from different productive systems in the country. As many stakeholders as possible should be involved; starting with those that use a large amount of resources or generate a large amount of waste and other negative impacts, in their operations. Innovation is necessary in many different areas: designing and implementing more efficient productive processes that use less material resources, water, and energy; implementing new business models that deliver the same or more value with less material and impacts along value chains; and also, creating better products, different sources.

Furthermore, innovation must take place at different levels of organization of productive systems. Firms must individually move to a more circular operation, according to their contexts and realities. Work should also be done at the sectoral level, where the different business associations that operate in the country are key actors. And some issues need to be addressed by looking at entire systems and value chains, as in the case of the food system which needs to be addressed as a whole. Also, the circular economy opens up new avenues for research and development. If R&D is

aimed at increasing knowledge about linear economy problems, and expanding the universe of possible solutions, this can have a large impact on the speed and direction of the transition.

Funding for the circular economy should come from different sources. The financial sector should expand its offer of green financing for circular projects and firms, which will require mechanisms to identify and certify such projects and firms. And the state should keep playing its key role in this area, expanding the range of mechanisms to channel public funding towards circular initiatives. It will also be essential to ensure that innovation for the circular economy favours a lifecycle approach, so that the environmental benefits obtained from an intervention are not offset by the generation of new environmental impacts in other areas, as is often the case.

6.1.1 Zero Waste Firms



Promote the transition of firms towards the circular economy model, especially those that work with large flows of physical resources and generate high amounts of waste.

- Establish a definitive recognition for productive facilities, using criteria of continuous improvement in the field of circular economy, based on the evaluation of the experience generated by the EU[18].
- Promote the development and use of tools for the diagnosis and measurement of circularity at the organizational level, which consider process indicators (existence of information systems, enabling organizational structures and management systems, etc.) and results indicators (reduction of the use of resources, reduction of waste generation, increase in recovery rates, etc.), and that enable the identification of priority areas for improvement.

6.1.2 Promotion of Circular Models

Promote, through grants and other mechanisms, the development of a broad base of SMEs operating under the logic of the circular economy, that is, that adopt circular strategies and business models to offer products with less socio-environmental impacts than the alternatives available in the market, and services that support the transition.

- Implement a program of circular economy business rounds that generate direct connections and collaborations among different actors of the local circular innovation ecosystem under development.
- Implement an open innovation challenges program in order to support companies and public organizations in identifying and formulating their challenges in the face of the transition to the circular economy, providing support to bring these challenges to entrepreneurs and innovators who are capable of proposing effective solutions, and jointly generating pilots and validation instances in real conditions.
- Promote the development of a community of practice around the theme of Eco-design in Georgia, which facilitates learning about life cycle analysis, eco- design methodologies and practices, and their application to the local context, provide access to specialists in the

[18] https://blueauditor.com/eu-taxonomy-and-circular-economy/

area, and highlights local advances in the field through the visibility and dissemination of the most notable projects.

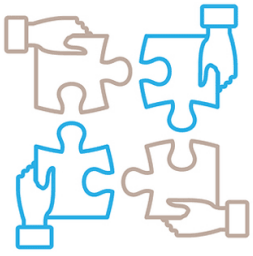
- Promote the development of reverse and collaborative logistics systems that enable the circulation of reusable containers and packaging for the transport of products, for example, retail products that are acquired through mobile applications.
- Disseminate widely, through different platforms, successful local cases of circular economy, narrating its genesis and development trajectories, and characterizing its business models and positive impacts, in order to generate a demonstration effect that encourages others.
- Promote the development of supplier development programs that encourage larger companies, in the largest sectors of the country, to increase the demand for goods and services with low environmental impact and produced locally, through mechanisms such as the articulation of networks of specialized companies and technical collaboration with the latter.

6.1.3 Research and Development for A Circular Economy

Promote the creation of lines of research, development, and applied innovation with potential to accelerate the transition to the circular economy in the country.

- Promote the development of a line of research, development, and applied innovation projects for the generation of by-products from different type of organic residues in particular from the food system; from the mining and metal manufacture tailings; from construction wastes.
- Promote the development of a line of research, development, and applied innovation projects that open the field of nature-based solutions.
- Promote the development of a line of research, development, and applied innovation projects that increase knowledge about the design of goods and services with low environmental impact.
- Promote the development of a line of research, development, and applied innovation projects on the use of digital and advanced manufacturing technologies for circular economy applications.

6.1.4 Strategic Collaboration for High Impact Circular Economy Solutions



Articulate actors from the main production systems, value chains and industrial areas of the country, for the development and implementation of joint circular economy interventions, that overcome information and coordination failures that limit the scope of action; and that aim to achieve high-impact and systemic changes.

- Develop characterization and diagnosis studies of the potential for transition to circular economy for different production systems, value chains and areas of high industrial concentration.

- Promote investment in the implementation of collaborative circular economy pilot projects, scaling up the most successful results and disseminating learnings.
- Promote the development of interactive platforms for the development of markets for secondary materials, which enable the generation of permanent links between actors that generate potentially valuable waste and those that could use them; taking advantage of the latest technologies to generate timely and effective links, and starting with flows of high potential waste, such as those from construction and agriculture.
- Promote the evolution of industrial parks and other areas of high concentration of productive activity towards the model of industrial symbiosis.

6.1.5 Scale-Up of High Potential Circular Solutions

Widen the range of possibilities available to scale-up high potential circular economy solutions, facilitating access of companies and ventures to new markets and national and international funding.

- Identify national firms offering circular products and services, and promote their export and internationalization.
- Channel international impact investing funds towards national projects of circular economy with high potential and scale-up financing needs.
- Provide technical support to local banks for the identification of circular economy projects and the characterization of their environmental benefits, risks, and business models, etc.; and the definition of funding priorities in the topic.

6.1.6 Information Systems for Modelling the Local Environmental Impact of Goods and Services

Create broad and easily accessible national information systems that allow quantifying the environmental impacts of goods and services through their lifecycles, ensuring that have permanent support and resources to ensure their continued development and update in time.

- Gather available data on indicators of environmental relevance (e.g., use of material resources, water and energy, carbon footprint, generation of waste, etc.) and use the information to accelerate progress in the areas of the Eco-design and ecolabelling.
- Develop national databases of life cycle inventory that serve as open repositories of information on the total impacts of energy and resource use, waste generation and emissions, expressed in multiple categories of impacts (e.g., climate change, ozone layer depletion, human toxicity, acidification, land use, among others); to enable manufacturers, designers and developers of products, services, and processes to make design decisions based on life-cycle impact considerations.

6.1.7 Technical Standards for The Circular Economy

Develop a series of technical standards to specify and establish minimum requirements for different circular economy applications.

- Elaborate a technical standard with specifications and minimum requirements for compostable plastics
- Elaborate a technical standard with specifications and minimum requirements for conducting building demolitions under a circular economy approach
- Elaborate a set of technical standards to facilitate the reuse of recycled rubber granule in different applications
- Elaborate a technical standard with quality specifications and minimum requirements for the generation of alternative liquid fuels produced from used lubricant oils.
- Elaborate a technical standard with quality specifications and minimum requirements for the generation of alternative fuels produced from tires out of use.
- Elaborate technical standards to facilitate the reuse of construction materials such as recycled aggregates.

6.1.8 Circular Public Procurement

Use the purchasing power of the state to encourage the development of the circular economy, incorporating the environmental dimension in the purchase decisions of products and services, giving priority to circular strategies and business models, and giving preference to suppliers that can demonstrate excellence in the sustainability dimension.

- Propose the modification of the legislation on administrative contracts for the supply and provision of public procurement in order to: enable the possibility of transferring or selling underused assets owned by the state; and enable sharing the use of assets among different state agencies.
- In coordination with other relevant Green Economy Programs, provide support for the development of pilot tenders that incorporate circularity considerations for products, services, and suppliers, allocating resources for the analysis of results and the dissemination of learning.
- Promote framework agreements with sustainability considerations.
- Incorporate circularity requirements and criteria in public infrastructure and social housing financed by the state, for example, the requirement to incorporate a minimum amount of secondary materials.

6.2 CIRCULAR CULTURE

The circular culture pillar focuses on the profound changes that must take place throughout society to achieve the vision that has been presented. With the initiatives and actions of this pillar, what is sought is more sustainable lifestyles based on circular habits and practices; an educational system focused on environmental awareness and skills for the circular economy; more transparency and traceability around waste management; and more forward-thinking in monitoring of progress towards sustainable development.

The transition to the circular economy will not take place unless more and more people become aware of the risks and impacts of the linear economy and adopt more circular lifestyles. It is essential to leave behind the throwaway culture and ensure that more circular habits, practices, patterns of use and consumption, and waste management models become the norm. To do this, it will be essential to develop integral systems of environmental education that, considering the different contexts of people, promote the development of a conscious attitude towards the environment and prepare people to face the challenges and seize the opportunities presented by the transition.

At the same time, the transition to the circular economy will require the dissemination of different sets of skills, some of a general nature, and others more specific. On the general side, it is required, above all, to firmly install systemic thinking, that is, a thinking that complements reasoning based on causes and effects with reasoning based on patterns and relationships between the components of the complex system of society. And on the specific side, it will be especially important to infuse disciplines such as design, architecture, agricultural sciences, engineering, and many others, with the principles of the circular economy.

To enable the development of more circular lifestyles and use/consumption patterns, it will be important to ensure a wide availability and dissemination of adequate and transparent information, so that it is possible to know which options have less environmental impact. Therefore, it will be crucial to invest heavily in the development of information and traceability systems with greater coverage than the current ones, which will be relevant information for decision-making. Finally, the circular economy requires rethinking what progress means, integrating issues such as the conservation of natural capital, ecosystem services, and biodiversity into its definition.

The following initiatives seek to promote the development of a circular culture in the country:

6.2.1 Dissemination of Circular Habits and Practices

Encourage the development of a culture that highlights efforts to avoid the impacts of the linear economy and raises awareness about different ways to avoid them, promoting the dissemination of circular habits, and practices and more sustainable lifestyles.

- Develop a communication campaign to raise awareness about food loss and waste, and promote different strategies to avoid them.
- Develop a communication campaign to promote diets with high nutritional value and low environmental impact.
- Develop a communication campaign to raise awareness about the impacts of fast fashion.
- Develop a communication campaign to promote the repair and reconditioning of home appliances.
- Develop a communication campaign to raise awareness about the impacts of water pollution, including marine pollution.

6.2.2 Circular Economy in The School Community

Spread knowledge about circular economy and circular habits and practices in the school community. Actions could include the following:

- Promote the reuse of school supplies such as books, uniforms, and others with the potential to extend their useful life in educational establishments.
- Promote the implementation of science, technology, and innovation contest and activities on circular economy, where groups of students develop applied projects on the subject and practical learning is enabled.
- Promote the use of free hours of educational establishments for the implementation of participatory activities on circular economy issues, for example, workshops on repairing things, development of school gardens, or the implementation of recycling and composting systems.
- Publish content and pedagogical resources on topics related to the circular economy in different channels and platforms.
- Include circular economy contents in different curricular instruments and disseminate them in educational communities.

6.2.3 Skills for A Circular Economy

Promote the learning of skills that will be key to accelerate the transition, increasing the offer of technical, professional, and postgraduate courses on these subjects throughout the higher and continuing education systems, including technical training bodies, technical training centres, professional institutes, and universities. The actions could include the following:

- Develop programs to raise awareness on the costs and impacts of linear practices and provide mentoring for the implementation of circular alternatives, tailor-made for different sectors and organizational roles.
- Increase the offer and quality of technical and continuing education courses on specific circular economy topics, such as, life cycle analysis, Eco-design, circular business models, or repair and remanufacturing.
- Include the fundamentals of the circular economy in the curricula of different careers, through introductory courses for undergraduate and professional degree, and specialized courses, where appropriate.
- Create profiles of labour competencies in order to recognize the value of artisanal skills and knowledge for the circular economy, such as, repairing things or artisanal production based on recycled inputs.

6.2.4 Ecolabelling System for Georgia

Launch an integrated voluntary eco-labelling system that structures, facilitates and ensures a minimum standard for the development of eco-labelling initiatives for products and services, based on objective and comprehensive criteria of environmental impact. Actions could include the following:

- Elaborate and publish the certification and labelling regulation.
- Integrate the existing voluntary eco-labelling initiatives into the new system.
- Implement new eco-labels for different categories of products and services within the framework of the new system.

6.2.5 Transparency and Traceability for The Circular Economy

Strengthen information and traceability systems for waste flows generated in the country. Actions could include the following:

- Establish mechanisms and incentives to increase the percentage of residues declared on the National Waste Register System, especially waste flows that are known to be under-declared, such as construction and demolition residues.
- Promote the collection of data on food loss from the different crops grown in the country.
- Strengthen the generation of information on food waste in distribution chains and households.

6.2.6 Monitoring Progress Towards A Circular Economy

Develop tools that make visible the progress towards a circular and sustainable economy in the long term. Actions could include the following:

- Implement a permanent monitoring system of the country's progress in the transition to the circular economy, which distinguishes between process and results indicators, and is capable of accounting for progress in the

implementation of initiatives and progress in the fulfilment of the long-term goals of this Roadmap.

- Establish the methodological and institutional basis for the systematic measurement of the number of green jobs in the economy.
- Incorporate the accounting of natural capital and ecosystem services into the monitoring system of the circular economy and other relevant information systems.

6.2.7 Gender aspects of a Circular Economy

Gender equality and the empowerment of women is one of the three universal values for the SDGs and prerequisite of the sustainable development[19,20], which is an overriding goal of the circular economy. Gender equality can enable and accelerate the achievement of all the SDGs, and gender considerations must be included in all sustainable development work and climate action[21]. Still, the SDG framework only recognizes a few environment-gender interlinkages. While there are no SDG 12 targets or indicators explicitly linked to gender equality or gender disaggregation, mainstreaming gender equality in SDG 12 (Responsible Consumption and Production) would help achieve its underlying targets.

A gender-equal social, economic and political structure is a necessary foundation for the circular economy to create a sustainable, comprehensive and just model to deliver systemic solutions. [22] Although circular economy is not a new concept, its social dimension is often overlooked.[23]

So far, work on the circular economy has largely focused on the environmental and business aspects of circularity, while there has been little analysis of the social implications, in particular the role of women in leading the necessary transformations in the circular economy, the skill set needed, and the impact on women's job opportunities[24]. At the same time, women's positive transformative impact on profitability and competitiveness of businesses, environmental sustainability and corporate social responsibility is acknowledged and evidenced[25].

It is widely acknowledged that unsustainable production, waste generation and pollution have distinct harmful impacts on women, in particular those from socially disadvantaged societal and economic layers. Women are disproportionately affected by the strain on natural resources on which they depend for subsistence. On the other hand, the role of women in driving change towards more sustainable production and consumption patterns is also recognized. As reported in OECD

[19] UNSDG | 2030 Agenda - Universal Values https://unsdg.un.org/2030-agenda/universal-values

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[24] OECD (2021), Gender and the Environment: Building Evidence and Policies to Achieve the SDGs, OECD Publishing, Paris, https://doi.org/10.1787/3d32ca39-en.

[25] FP Analytics. Women as Levers of Change. Unleashing the Power of Women to Transform Male-Dominated Industries. (n.d.)

(2021), various studies identify women as key drivers of change in the transition to a low-carbon and more sustainable economy, where they would have different roles as part of the labour force, as consumers, and as decision makers, in both the public and private sectors:

- Women impact natural resource management through their various roles in households, the economy, and society;
- As primary caregivers, women make major decisions on household consumption and waste disposal;
- Women are more likely to recycle, minimise waste, buy organic food and eco-labelled products and engage in water and energy savings initiatives at the household level;
- Women place a higher value on energy-efficient transport and in general are more likely to use public transport than men;
- Women tend to be more sustainable consumers and are more sensitive to ecological, environmental and health concerns.
- Through their purchasing habits, women can influence how products are being developed, produced, used and potentially reused;
- Women are generally more involved in their children's socialization and education and as a result, they are crucial in spreading the message of conservation and responsibility for natural resources[26].
- Companies with greater gender diversity on boards were found to have better environmental performance. Mission-driven women are also helping their organizations respond to regulatory pressure and societal backlash against pollution by advancing greener production processes and innovating environmentally sustainable alternatives. While women at the forefront of operations are focusing on environmental improvements in day-to-day production processes, other women - particularly those heading major industry associations - are leveraging their unique positions and influence to promote sustainable practices and standards on a broad scale; [27]
- A positive correlation between gender diversity on corporate boards and companies' profitability and ESG performance has been also found.[28]

These are only some of the actual or perceived contributions of women in the circular economy, as the role of women in sustainably managing natural resources, reducing waste generation, and moving towards more sustainable production and consumption patterns at national, local and household levels is not sufficiently visible or adequately prioritised (OECD 2021).

The green economy affords great potential for women to engage in green jobs and participate in green innovation, but only if there is an enabling policy and social framework in place. However, only few countries effectively integrate a gender perspective into their sustainable consumption and production strategies and policies (OECD 2021). At the EU level, the new Circular Economy

[26] www.circularinnovationlab.com

[27] FP Analytics. Women as Levers of Change. Unleashing the Power of Women to Transform Male-Dominated Industries. (n.d.)

[28] ibid

Action Plan does not report any differentiated gender actions[29]. In the context of Georgia, existing climate change and disaster risk reduction frameworks and initiatives lack comprehensive consideration of the specific needs of women and girls[30]. Some other barriers and gaps preventing full participation of women in the transition to circularity include:

- Prevailing social and cultural norms that limit women's access to economic opportunities in environmentally sustainable activities and in environmental leadership positions in both the public and private sectors (OECD 2021). Persistent gender disparities in the labor market, where man consistently outpace women is evidenced in Georgia too: women exhibit a significantly lower economic activity rate than man[31, 32].
- Women's contribution to the government and business sectors is hampered by a structural governance gender gap, with few women in leadership positions (OECD 2021). The underrepresentation of women among enterprise owners and top managers is evident in Georgia as well. Gender gap is also identified in public sector, which is wider in leadership and decision-making positions[33].
- The gender gap in access to resources, assets and decision-making undermines women's ability to efficiently contribute to the economy and promote sustainable development (OECD 2021). Women suffer limited access to various resources (including land, assets, finances, digital resources, etc.) in Georgia as well.[34]
- Considerable lack of data on the gender-environment nexus is faced globally despite numerous international and national initiatives (OECD 2021). The lack of data, robust analysis and reporting of the gender nature of climate and disaster risks is the case of Georgia as well that challenges developing and implementing progressive and inclusive climate and disaster risk reduction policies, plans and interventions in the country[35,36].

Due to distinct environmental impacts on women, the effects of gender inequality on environmental outcome and discussed positive effects of different roles of women, their empowering and gender equality is crucial to ensuring a balanced approach to the economic, social and environmental dimensions of sustainable development and respectively circular economy.

Acknowledging that gender equality represents an integral component for achieving inclusive and sustainable development, the following gender-oriented actions could be recommended for the transition to a more circular economy:

[29] EC (2020), A new Circular Economy Action Plan - For a cleaner and more competitive Europe, European Commission, Brussels

[30] UN Women. Country Gender Equality Profile – Georgia 2023

[31] UN Women. Country Gender Equality Profile – Georgia 2023

[32] Parliament of Georgia. Gender Equality in Georgia: Barriers and Recommendations. Updated Edition. Part II. 2021

[33] UN Women. Country Gender Equality Profile – Georgia 2023

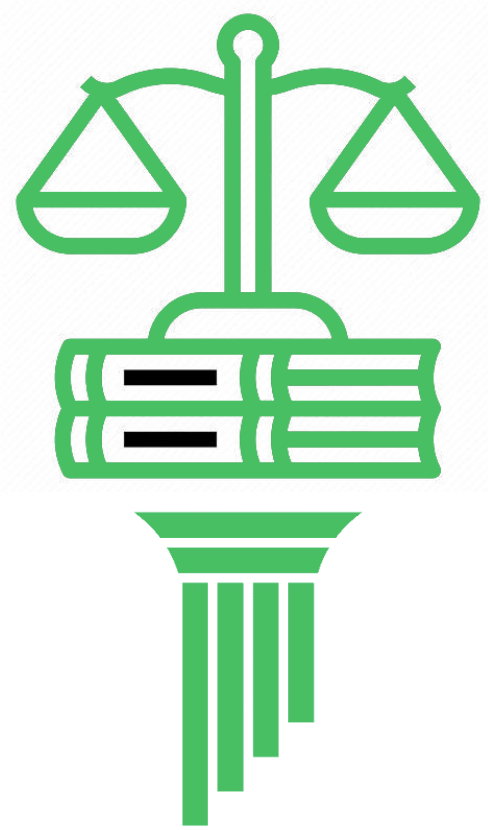
[34] ibid

[35] ibid

[36] Parliament of Georgia. Gender Equality in Georgia: Barriers and Recommendations. Updated Edition. Part II. 2021

- Circular economy programmes and policies must integrate social inclusion to address this gap by including policies and actions that promote equal access to services and enable citizen participation in the decision-making processes that affect their lives.
- A systematic gender equality perspective on the circular economy strategies and action plans shall be ensured, where targeting gender roles and behavioral preferences in consumption as well as waste generation and prevention could be a key pillar.
- Gender-disaggregated evidence on the environmental damage caused by unsustainable production and consumption patterns must be collected to overcome data gap and to leverage and address the gender-environment nexus.
- Gender-responsive skills strategies must be developed to strengthen women's career opportunities in green economy sectors.
- Possibility and necessity of the development of financial support mechanisms that could promote green female entrepreneurship and employment must be studied.
- Women must be engaged in the circular economy through raising awareness on sustainable consumption and encouraging their participation in leadership and managerial roles.

6.3 CIRCULAR REGULATION



The circular regulation pillar focuses on changes that should be drive level of the state, including ministries and sectoral services. With the i pillar, what is sought is more use of economic instruments to pro complement the sanitary approach of waste regulation with a circul incentives for the involvement of citizens in solving problems of the collaboration and joint work among key actors for the circular econom

Inadequate waste management generates a series of negative exter and people, especially those most directly exposed to its consequen nearby waste dumps. In the case of the latter, the impacts have h dimensions, making the problem multidimensional.

For an economy to be circular, it is essential that the regulatory fram consequences to be paid by society and the environment. On the ensure that waste generators bear the cost of the measures that mus waste management. This is what is known as the polluter pays princ Law. The principle affirms that waste generators are responsible for well as for internalizing the costs and negative externalities a management. However, the circular economy is not limited to the poll on this and others principles. And, as the Ellen MacArthur Foundat additional ones such as: (i) eliminate waste from design, which is a re the first place, the best way to save on waste management is to generated; (ii) keep products and materials in use for as long as possible, which is an invitation to stop seeing the residues as a problem, and start seeing them as an opportunity; and (iii) regenerate natural systems, which is a recognition of the fact that we are part of the ecosystems that we inhabit, and that, therefore, caring for and regenerating them is essential for our own well-being. A

[37] https://www.ellenmacarthurfoundation.org/

regulatory framework for the circular economy should encourage the kind of solutions found at the highest levels of the waste hierarchy without neglecting the challenge of ensuring the provision of adequate final disposal sites for residues that cannot yet be recycled or reused.

6.3.1 Expand the Range of Products Subject to Extended Producer Responsibility (EPR)

Expand the range of products subject to the Extended Producer Responsibility Law, so that new priority products are gradually included. Actions could include the following:

- Conduct comparative feasibility and potential studies in order to evaluate candidates for new priority products; this, for example, for fishing and aquaculture gear, expired medicines, expired pesticides, furniture, cigarettes, or textiles.
- Select, based on these studies, which will be the next priority products, and prepare and issue the respective decrees that establish the goals for each of them.

6.3.2 Update the Regulatory Framework for Waste Management to Facilitate Reuse and Recovery

Adjust the regulatory framework to promote the reuse of products and the recovery of residues under conditions that protect people's health and the environment. Actions could include the following:

- Simplify and standardize, at the national level, the processes of sanitary authorization of recovery projects.
- Prepare and issue a sanitary regulation on the management of composting plants.
- Prepare and issue a sanitary regulation on the management of residues from construction and demolition activities, which addresses the stages of transfer, recovery, and final disposal.
- Prepare and issue a regulation to establish the sanitary conditions to be met by grey water reuse systems.
- Prepare regulations to enable the recovery of non-hazardous industrial waste, establishing clear procedures and conditions under which certain residues can be recovered.
- Update the regulations and procedures of the Environmental Impact Assessment System in order to establish specific criteria for recovery facilities, in accordance with their real potential environmental impacts.
- Regulate the use of recycled material in packaging in contact with food.
- Enable, by regulatory means, the sale of different types of bulk products, such as, food, personal hygiene products, and household hygiene products.

6.3.3 Incentives and Information for the Separation of Waste at Source

Establish incentives for waste separation at source through different mechanisms, as the territorial coverage of recycling infrastructure and door-to-door collection systems for packaging increases. Actions could include the following:

- Prepare a standard municipal ordinance to support municipalities in establishing the obligation to separate waste at source.
- Gradually ban the sending of specific waste streams to landfills, such as those that are already collected selectively and could easily be recovered, for example, urban gardens and trees pruning waste.
- Evaluate the impact of charging specific fees for the final disposal of specific flows of residues, such as construction and demolition or organic residues, considering the macroeconomic and social situation of the country.
- Incorporate in the regulations for the construction of residential, commercial, and public buildings, minimum standards for the provision of infrastructure and equipment for the separation and storage of waste, for example, spaces for the collection of recyclables, equipment for the composting of organic residues, or differentiated containers for recycling.

6.3.4 Review and Consider Fee for Municipal Solid Waste Management Services

Evaluate the impact of: i. Charging a fee for municipal waste management services that is correlated with the level of non- recyclables generation; ii. Progressively reduce the base of properties exempt from paying for municipal waste management services, taking into consideration the ability to pay; and iii. Designing an efficient and effective payment collection mechanism to ensure the timely arrival of the funds collected to the municipalities. This evaluation should take into special consideration the macroeconomic and social situation of the country. Actions could include the following:

- Evaluate improvements in the application of rates in order to increase efficiency (i.e. to ensure that the cost of collecting payments is only a small fraction of revenue) and effectiveness (i.e., to ensure that a high percentage of properties pay the rate)
- As the EPR's integrated packaging management systems reach the different municipalities of the country, evaluate the impact and feasibility of implementing rate schemes correlated with the level of non-recyclable waste generation.
- Evaluate the economic and social impact and the technical and regulatory feasibility of reducing, progressively and in solidarity, the base of properties with discounts or exempt from paying for municipal waste management services.

6.3.5 Product Standards in the Circular Economy

Increase the quality and durability standard of the products sold in the national market. Actions could include the following:

- Establish, by regulatory means, and based on international experience, a label or other mechanism that allows people to better evaluate the useful life of products before purchasing them and that leads producers and distributors to increase their quality and durability and facilitate their repair.
- Evaluate the establishment of minimum standards for the importation of second-hand products and waste for recovery to avoid the generation of negative environmental impacts.
- Review and evaluate the expansion of the range of products subject to the mandatory safety and quality standards established by the consumer protection rights law, in order to limit the risk of contamination by dangerous substances.

6.3.6 Strengthening the Inspection of Inadequate Waste Disposal

Strengthen the institutional framework and capacities of the country in the regulatory enforcement of the adequate disposal of waste, considering environmental and sanitary dimensions, and taking advantage of the availability of technologies with the potential to greatly increase efficiency and effectiveness. Actions could include the following:

- Strengthen the enforcement of Law, which penalizes the transport of residues to illegal disposal sites.
- Develop platforms or specific mechanisms to better involve people in environmental monitoring, for example, generating distributed, georeferenced, and real-time data on environmental problems such as illegal waste dumps.
- Use data science and remote monitoring technologies to strengthen the regulatory compliance of projects subject to environmental permits resulting from Environmental Impact Assessments.
- Develop a program to strengthen the resources, skills, and capabilities of municipal environmental control, with a territorial approach and a systemic outlook that seeks synergies with other key actors.

6.3.7 Help Drive the Circular Economy at the International Level

Ensure the active participation of Georgia in international initiatives to promote the circular economy, gathering information and exchanging experiences, with special emphasis on cooperation in the Caucasus Region. Actions could include the following:

- Actively participate in the EU initiatives under a New Circular Economy Action Plan[38].

[38] https://environment.ec.europa.eu/strategy/circular-economy-action-plan_en

- Ensure the materialization of the vision embodied in the New Plastics Economy Global Commitment[39].
- Actively participate in the Platform to Accelerate the Circular Economy (PACE)[40]
- Actively participate and collaborate with the Global Alliance for Circular Economy and Resource Efficiency (GACERE)[41].

6.4 REGIONAL INITIATIVES FOR CIRCULAR ECONOMY

The circular regional initiatives pillar focuses on the changes that should be promoted mainly by territorial actors such as regional governments, municipalities, social organizations, and business associations from specific regions. With the initiatives and actions of this pillar, what is sought is more presence of circular economy principles in the regional development trajectories; more distinction of the particularities of each region in the planning of its transition processes; more participation of citizens in the decisions that affect their local environment; more preference for production techniques that allow caring for and increasing the country's natural capital; and more infrastructure and equipment that enables circular solutions at the territorial level.

To make Georgia circular by 2050, it is necessary for the country's regions to be able to address their challenges in accordance with their local realities, attending to their specificities and leveraging their potentialities. Achieving a more harmonious relationship with the Georgia's regions requires that the people who live in them have a greater impact on their development trajectories. In this way, a sustainable and regenerative use of natural resources will be facilitated, generating well-being for all.

6.4.1 Circular Economy for the Reactivation of Regions

Channel investment and productive development efforts - within the framework of economic reactivation towards regional circular economy projects with triple impact and high potential. The actions could include the following:

- Design programs that allow progress in the development of secondary markets, with a focus on productive sectors and priority material flows for each region; and apply them for public financing funds.

[39] https://www.unep.org/new-plastics-economy-global-commitment

[40] https://pacecircular.org/

[41] https://www.unep.org/gacere

- Promote the development and implementation of circular economy strategies, roadmaps or action plans for specific sectors and regions.
- Articulate and activate regional innovation ecosystems and their different actors through the generation of meeting and exchange instances such as conferences, entrepreneurs' meetings, social innovation festivals, and others, with a focus on the circular economy.
- Collect and disseminate information on circular economy projects and initiatives that can be replicated in different territories and with potential for job creation.

6.4.2 Provision of Meeting and Participation Spaces and Channels for The Transition

Promote, facilitate, and enable the management and implementation of community programs and projects that, with the participation of neighbours, stimulate the development of a social, collaborative, and circular economy on a neighbourhood scale. Actions could include the following:

- Promote the provision of permanent meeting spaces for the exchange of knowledge, mutual services, and second-hand goods, where activities such as flea markets or training sessions in repair skills can be carried out.
- Promote the development of urban agriculture and community composting projects that generate community bonds, produce food, and enrich food culture.
- Encourage the development of solidarity economy initiatives, such as food banks and microbanks that receive and donate unsold food products suitable for human consumption.
- Implement a national program for the recovery of public spaces turned into waste dumps.
- Provide communities with greater and better channels of citizen participation to influence the development of their regional environment, strengthening their role and municipal resources in the matter, and taking advantage of tools such as participatory budgets in order to achieve substantive influence.

6.4.3 Recognition and Inclusion of Waste Pickers

Recognize the work of waste pickers throughout the country and ensure their inclusion in the transition to a circular economy through a wide range of opportunities for decent work and participation. Actions could include the following:

- Implement the National Plan for Inclusion of Waste Pickers, and promote their self-organization in order to facilitate dialogue with key actors for the future of their activity, such as municipalities and management systems.
- Provide technical and professional training opportunities to waste pickers.
- Facilitate access for waste pickers access to finance equipment and storage facilities to carry out their activities.

6.4.4 Regenerative Agricultural Production Systems

Generate knowledge, educate and promote the development of resilient rural production systems that promote biodiversity, ensure the provision of ecosystem services, and contribute to the increase of the natural capital of the country. The actions could include the following:

- Promote the articulation between key actors linked to the gastronomic and tourism sector in order to spread the use of local ingredients, products and preparations produced with sustainable practices.
- Encourage the development of forestry systems and techniques with the capacity to regenerate ecosystems and promote the biodiversity in the environments in which they are inserted, and discourage techniques with greater environmental impact.
- Regenerate the lands requiring irrigation. Implement proper pasture management schemes; Improve the veterinary services in villages to minimize losses and increase material productivity.

6.4.5 Local Infrastructure and Equipment for The Circular Economy

Provide municipalities, cities and regions with infrastructure, equipment and services for proper management and recovery of residues, including reception points, collection centres, distribution centres, recycling plants, composting plants, material banks, sanitary landfills, etc., leveraging public and private financing with innovative business models. The actions could include the following:

- Launch a program to support municipalities and regional governments in the implementation of organic waste management and recovery systems at different scales, in order to achieve the goal of recovering two thirds of municipal organic waste.
- Ensure the availability of infrastructure, equipment, and services for the disposal of construction and demolition waste and bulky residues and promote the development of facilities for the recovery of these types of waste.
- Ensure adequate availability of refrigerant gas regeneration centers.
- Ensure the availability of infrastructure for the collection and recovery of residues from prioritized products subject to the Extended Producer Responsibility.

6.4.6 Incorporation of A Circularity Focus on The Planning of Regional and Communal Development

Incorporate knowledge about circular economy strategies in the design and implementation of local development activities and different instruments of regional strategic planning, seeking to promote specific lines of action that address the local context, challenges, and opportunities. The actions could include the following:

- Carry out diagnoses and potential studies that identify the specific opportunities presented by the transition to the circular economy for the different regions or localities of the country,

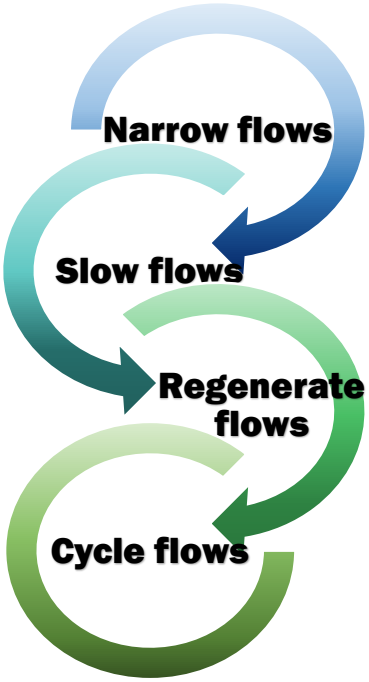
that include detailed analysis of the flows of materials available in the territories, and that consider the economic, social and environmental dimensions.

- Promote the incorporation of the principles of the circular economy in the elaboration of regional development plans.
- Ensure that the Regional Development Plans include conditions for the location of recycling facilities differentiated by level of impact, in order to speed up the process of obtaining operating permits.
- Promote the incorporation of circular economy principles and strategies in action plans and development of touristic zones.
- Develop specific training programs in circular economy for public sector workers that focus on reaching key profiles and roles for the transition, that have a practical approach and that ensure a balanced participation from all regions.
- Launch a system of regional circularity indicators, which allows permanent and participatory monitoring of the gaps and progress in different territories, in the transition to the circular economy.

7 SUMMARY OF KEY RECOMMENDATIONS FROM THE 2022 CIRCULARITY MAPPING REPORT

The following recommendations for the Roadmap follow the key outcomes of the 2022 Circularity Mapping Report. They focus on the following principles:

- **Narrow flows — use less**: Sharing and rental models, material lightweighting, multifunctional products or buildings, energy efficiency, digitisation.
- **Slow flows — use longer**: Durable material use, modular design, design for disassembly, repair, remanufacturing, refurbishing, renovation and remodelling over building new structures.
- **Regenerate flows — make clean**: Regenerative and non-toxic material use, renewable energy, regenerative agriculture and aquaculture.
- **Cycle flows — use again**: Design for recyclability (both technical and biological), design for disassembly, recycling, upcycling, reuse.



7.1 SHARED VISION OF STAKEHOLDERS ON FINANCIAL AND NON-FINANCIAL POLICY CHANGES

Shared Vision on Financial and Non-Financial Policy Changes	Key Actors	Contributors
Characterize circular economy projects through metrics and taxonomy	– MoEPA	– MoESD; – Inter-Ministerial CB
Promote and clarify the enabling role of public authorities	– MoEPA	– MoESD; – Inter-Ministerial CB
Build capacity to make the transition to a circular economy	– MoEPA	– MoESD; – Inter-Ministerial CB
Ensure cooperation and coordination between governing bodies	– Inter-Ministerial CB	– MoESD; – MoEPA
Ensure appropriate level of partnership	– Inter-Ministerial CB	– MoESD; – MoEPA

7.2 NON-EXHAUSTIVE SET OF ACTIONS

Proposed Actions	Key Actors	Contributors
Subsidies should be removed and the negative externalities of linear economic activities internalised;	– MoESD	– MoEPA; – Inter-Ministerial CB
Public tools such as public procurement should be used to accelerate the market for circular economy products and services. The use of GPP should be incentivised;	– MoESD – Ministry of Finance	– MoEPA; – Inter-Ministerial CB
Public funds should be activated as a 'de-risking' instrument to mobilise more private capital for scale-ups with a circular scope;	– MoESD – Ministry of Finance	– MoEPA – MoEPA
Technical assistance should be provided to help businesses and local administrations understand linear risks and the economic and societal benefits of the circular economy;	– MoESD – MoEPA	– Inter-Ministerial CB
Response measures which mitigate the economic and social impacts of communities, sectors and regions particularly exposed to the legacy of linear economic systems (e.g., mining) should be introduced;	– MoEPA – MoESD	– MoRDI – Ministry of Finance – Inter-Ministerial CB
Priority should be given to policy interventions that comprehensively address multiple environment, social and governance risks.	– MoEPA – MoESD	– MoRDI – Ministry of Finance – Inter-Ministerial CB
Develop reporting standards for Georgian companies aligned with those proposed within EU for linear risks of investments and businesses and incorporate them into standard accounting practices could help to ensure that linear risks are sufficiently evaluated and disclosed.	– MoEPA – MoESD – Ministry of Finance	– Geostat – Inter-Ministerial CB
The reporting standards would provide a methodology for corporates and financial institutions to identify the exposure to linear risks within their portfolios or operations.	– MoEPA – MoESD – Ministry of Finance	– Geostat – Inter-Ministerial CB

Proposed Actions	Key Actors	Contributors
Further refine the definition for the circular economy and develop a definition of circular economy finance.	– MoEPA – MoESD – Ministry of Finance	– Inter-Ministerial CB
Establish in Georgia technical and financial advisory services to support the development of business models for circular economy businesses or projects seeking finance that effectively capture and articulate the benefits of circular economy strategies.	– MoEPA – MoESD – Ministry of Finance	– Inter-Ministerial CB
Establish a dedicated proportion of finance within selected financial instruments existing or planned in Georgia to support circular economy investments and businesses.	– MoEPA – MoESD – Ministry of Finance	– Inter-Ministerial CB
Develop metrics and indicators to complement the existing in Georgia macroeconomic indicators adopted at national level.	– MoEPA – MoESD – Ministry of Finance	– Geostat – Inter-Ministerial CB
Make circular economy indicators mainstream part of statistical reporting.	– Geostat	– MoEPA – MoESD – Inter-Ministerial CB
Set targets using suitable indicators. Where mandatory targets are not politically feasible, set non-binding aspirational targets that can serve as a basis for voluntary agreements with industries.	– MoEPA – MoESD – Geostat	– Inter-Ministerial CB
Map where national fiscal policies in Georgia provide subsidies and price signals in favour of the linear economy.	– MoESD – Ministry of Finance	– MoEPA – Inter-Ministerial CB
Expand the scope of EPR schemes, currently under implementation in Georgia, to additional products.	– MoEPA	– MoRDI – Inter-Ministerial CB
Analyse where the existing EPR systems need to be modified in order to favour the production of high-quality secondary materials, e.g. via modulated fees.	– MoEPA	– MoRDI – Inter-Ministerial CB

Proposed Actions	Key Actors	Contributors
Set national target dates for ending landfilling. Reduce landfilling and incineration by applying increasing taxes on these activities.	– MoEPA – MoRDI	– MoESD – Inter-Ministerial CB
Develop benchmarks for circular aspects of product performance, including benchmarks for durability, reparability, recyclability, minimum recycled content and hazardous substances content,	– MoEPA – MoESD	– Inter-Ministerial CB
Apply these benchmarks to remove underperforming products from the national market (e.g. via implementing measures such as those stipulated by the EU Eco-design Directive[42] that extend to non-energy related products).	– MoEPA – MoESD	– Inter-Ministerial CB
Stimulate the adoption of high-performance products through fiscal and 'reputational' incentives (e.g. reduced VAT, eco-labels). Make the information about circular aspects of products available in business to business and business to consumers transactions through product information requirements (e.g. the product passports) or publicly accessible databases.	– MoEPA – MoESD – Ministry of Finance	– Geostat – Inter-Ministerial CB
Conduct checks and revisions of existing and planned relevant sectoral policies which may conflict with the objectives and actions described above.	– MoEPA – MoESD – Ministry of Finance	– Inter-Ministerial CB
Develop regional and national circular economy strategies that include collaboration with other countries and regions; on the regional level, ensure that regional authorities include circular economy opportunities in their smart specialisation strategies.	– MoEPA – MoESD – MoRDI	– Inter-Ministerial CB
Link the circular economy to other societal challenges and transitions, such as climate change in order to create a coherent strategic environment for businesses and facilitate synergies across different public initiatives.	– MoEPA – MoESD – MoRDI	– Inter-Ministerial CB

[42] https://single-market-economy.ec.europa.eu/single-market/european-standards/harmonised-standards/ecodesign_en

Proposed Actions	Key Actors	Contributors
Develop innovative forms of collaboration within and between value chains and innovative ways of sharing costs and benefits of circular economy projects between companies who otherwise have no market incentive to collaborate.	– MoEPA – MoESD – MoRDI	– Inter-Ministerial CB
Allocate public funds to circular projects that bring significant benefits to the community to ensure that these projects materialise and are financially viable. This may include direct payments for public services but also indirect support such as guarantee schemes.	– MoEPA – MoESD – Ministry of Finance	– MoRDI – Inter-Ministerial CB
Stimulate demand and create new markets for circular products and services through Green Public Procurement.	– MoESD – Ministry of Finance	– MoRDI – MoEPA – Inter-Ministerial CB

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