



CHIȘINĂU
GREEN
CITY

Green City Action Plan for the City of Chișinău

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Message of the Mayor of Chişinău

Dear citizens of Chişinău,

It is our pleasure and privilege to present to you a document where we have integrated all our project ideas that will make Chişinău a more liveable and environmentally friendly capital city. Our main goal is to enhance the quality of life of every citizen. The document in front of you includes a collection of actions that will help us to achieve this goal.

Our city is growing very fast and we all would like to have access to good public transport services, well organised and maintained roads, safe and reliable municipal infrastructure services such as drinking water, wastewater collection, wastewater treatment, waste management, etc. We know that you are all aiming at living in a clean and well organised city. We ensure we are keen on making this a reality.

The Green City Action Plan was initiated by EBRD in order to help us defining the development priorities of the city and structure the investment needs. It is an overarching document that focuses on 7 sectors (energy, water, waste, industry, buildings, land use and transport) and their needs for developments. We have considered that the city development needs to be an integrative process. Thus, we have defined 5 strategic development objectives for the city that incorporates the 7 sectors and looks at their linkages and complementarity. The objectives are referring at sustainable mobility and transport system, climate resilient blue-green infrastructure, energy efficiency, sustainable resource and waste management and last, but not least at enhanced capacities and urban governance.

Our top priority is to help citizens. We know that a document is not going to improving the quality of life unless we work towards putting it into practice. We are ready to start the implementation of the GCAP and our top priorities are fully reflected into it. On short term, we will focus mainly on improving the waste management system of the city by establishing a performant collection, transport and treatment system. Further on, we will continue the efforts for developing a coherent public road infrastructure in conjunction with development, modernizing and restructuring the public transportation system.

We are confident that GCAP will help our city development and we are keen on working together with any stakeholder that is ready to support our project ideas. We strongly encourage each citizen of Chişinău to be engaged and to contribute as much as possible for implementing the GCAP actions.

Chişinău municipality and the team of experts that have worked on GCAP development would like to express their gratitude towards the Austrian Federal Ministry of Finance and Austrian Embassy in Chişinău for the financial support allocated for this project. Also, we would like to thank the representatives of European Bank for Reconstruction and Development and the team of consultants that worked for the GCAP development, for their guidance and constant support for Chişinău Municipality. We hope that our cooperation will continue, and we will implement together many GCAP projects.

We hope that every citizen of Chişinău will be proud of our future green city.

Mayor of Chişinău

Disclaimer

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Contents

Acronyms	8
Executive Summary.....	9
Chapter 1.	13
Introduction	13
1.1. Background/context.....	13
1.2. Purpose of the plan	13
1.3. Structure of this document.....	14
Chapter 2.	15
Methodology	15
2.1. Methodology for GCAP development.....	15
2.2. Institutional setup and stakeholder consultation for GCAP Development in Chişinău	15
2.3. Tailoring GCAP methodology for Chişinău.....	18
Chapter 3	21
Baseline	21
3.1. City overview	21
3.2. City baseline: key findings of the technical analysis of the indicators database	28
Chapter 4	36
Overall Vision and strategic objectives.....	36
Chapter 5	39
Strategic Objective 0. Enhanced institutional capacities for the implementation, assessment and monitoring of the sustainable urban development process.....	39
0.1.3. Developing and enhancing the capacities of the staff within the Municipality of Chişinău	45
0.2.1. Develop and/or update the local action plans	47
0.3.1 Develop and/or update the local regulations.....	49
Chapter 6	51
Strategic Objective 1. Sustainable mobility and transport.....	51
1.1.1 Renewing the urban bus fleet.....	54
1.1.2 Introducing one car-free day annually in the city centre.....	57
1.2.1 Creating controlled parking areas, managed by the municipal parking agency.....	59
1.2.2 Developing and operating three principal bus corridors.....	61
1.2.3 Connecting urban parks and green areas with a cycle route and a bike sharing system.....	63
1.2.4 Traffic calming in areas with schools, developing a network of connected sidewalks between schools.....	65
1.3.1 Road rehabilitation and maintenance	67
1.3.2 Creating an Urban Traffic Centre for traffic monitoring and traffic light optimisation	69

Chapter 7	71
Strategic Objective 2. Climate resilient blue-green infrastructure	71
2.1.1 Improvement of public rainwater drainage system	74
2.1.2 Cleaning and rehabilitation of the river Bîc and its tributaries in Chişinău municipality, to withstand climate change.....	76
2.1.3 Pilot project: Rainwater retention at residential/ neighbourhood level, permeable landscaping	79
2.2.1 Preserve current valuable blue-green spaces and revitalize open spaces	81
2.3.1 Nature-based landslide prevention.....	84
2.3.2 Pilot project – Revitalizing decommissioned industrial areas (brownfields)	87
2.3.3 Tackling degraded cultural heritage features, which are a source of pollution in the city	89
Chapter 8	91
Strategic Objective 3. Sustainable and efficient energy	91
3.1.1. Residential building energy efficiency programme.....	94
3.1.2. Municipal building energy efficiency programme	96
3.1.3. Pilot project – Promoting green and smart buildings.....	98
3.1.4. Street lighting energy efficiency programme	100
3.1.5. District heating energy efficiency programme	102
3.2.1. Pilot project – Installing PVs on public transport parking lots.....	104
3.2.2. Identifying Renewable Energy Projects.....	106
3.3.1. Implementing energy management at city level	108
Chapter 9	110
Strategic Objective 4. Sustainable resources and waste management	110
4.1.1. Extending the waste collection services to the suburbs	113
4.1.2. Modernization of the waste collection, transfer and transport system	115
4.2.1. Introducing source separation of waste into two fractions for the entire area of the municipality ..	117
4.2.2. Developing and operating 5 centres for collection of Waste Electrical and Electronic Equipment (WEEE), bulky waste and other types of waste	120
4.2.3. Implementing Material Recovery	122
4.2.4. Collecting and composting green waste generated in gardens and parks, using the compost in green areas of the city	124
4.2.5. Collecting and recycling of construction and demolition waste	126
4.3.1. Improvement of the Țânțăreni disposal site and disposal practices.....	128
Chapter 10	130
Summary of actions and financial details	130
Chapter 11.	142
Description of the Monitoring Framework.....	142
Evaluation and Reporting	143
Annexes	Error! Bookmark not defined.

Table 1 Consultation meetings	17
Table 2 Summary of Chişinău Municipal budget	23
Table 3 Major ongoing investment projects in Chişinău Municipality	25
Figure 1 Institutional setup for GCAP development	16
Figure 2 GCAP Approval and consultation process	16
Figure 3 Examples of online surveys.....	17
Figure 4 Extract from a newsletter and dedicated web section	18
Figure 5 PSR framework	19
Figure 6 Data sources used for the Indicators Database	20
Figure 7 Data validation process	20
Figure 8 Administrative units of Chişinău Municipality; Source: Chişinău Municipality Territory Plan. Territorial Development Strategy, April 2007	21
Figure 9 General simplified organogram of the municipal administration	22
Figure 10 Municipal departments and enterprises engaged in green development	22

Acronyms

CAPEX	Capital Expenditure
CPZ	Controlled Parking Zone
EBRD	European Bank for Reconstruction and Development
EE	Energy Efficiency
EIB	European Investment Bank
ELV	end-of-life vehicles
EPC	Energy Performance Contract
EPR	Extended Producer Responsibility
ESCO	Energy Service Company
GCAP	Green City Action Plan
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GUP	General Urban Plan
ICLEI	International Council for Local Environmental Initiatives
IFC	International Finance Corporation
MDL	Moldavian Leu
MSW	Municipal Solid Waste
NPV	Net Present Value
nZEB	nearly-Zero Energy Buildings
OECD	Organisation for Economic Co-operation and Development
OPEX	Operational Expenditure
PPP	Public-Private Partnership
PSR	Pressure-State-Response
RES	Renewable Energy Sources
SIDA	Swedish International Development Agency
SO	Strategic Objective
SpO	Specific Objective
SUMP	Sustainable Urban Mobility Plan
WEEE	Waste electrical and electronic equipment

Executive Summary

This document is a strategic plan for the City of Chişinău, prepared by the Municipality of Chişinău with the support of a team of international consultants, experts in various fields of environment protection and sustainable urban development. The purpose of the plan is to provide a comprehensive framework for green development and define priority actions that maximize positive environmental change in our city where it is most needed. Through the proposed actions, we aim at enhanced institutional capacities, sustainable mobility and transport, climate resilient blue-green infrastructure, sustainable and efficient energy, and sustainable resources and waste management.

The process of greening our city

The Green City Action Plan (GCAP) is a milestone in the green development of the city. It has been initiated as part of the **European Bank for Reconstruction and Development (EBRD) Green Cities Programme**, the largest integrated urban development programme of its kind, attracting participation of more than 20 cities and aiming at reaching 100 cities by 2025.

The planning process started in August 2018, and is foreseen to be approved in the Municipal Council in December 2019, with an implementation period spanning until the end of 2024. Throughout the project, we are applying the methodology for GCAP development prepared for EBRD by the Organisation for Economic Co-operation and Development (OECD) and Local Governments for Sustainability (ICLEI). According to the methodology, we follow four main steps: we established a i) Green City Baseline, developed the present ii) Green City Action Plan; following the approval of the Plan, we will pursue with iii) implementation, and iv) reporting on progress and outcomes. *It is to be noted though that a full revision of both the baseline and of the action plan is foreseen every 3-5 years in order to refine the actions and to adapt them to the achieved results as well as to changes occurred in state of the environment or national/local legislation.*

The GCAP builds on the findings of a comprehensive data collection and analysis on the quality of the environment. The resulting **baseline** reveals the priority environmental challenges in urban sectors important for the green development of the city.

Throughout the development of the Green City Action Plan, the methodology provided by EBRD has been applied, based on a **Green City Pressure-State-Response (PSR) framework**. The PSR framework identifies human activities that exert **pressures** on the urban environment in the transport, energy, building, industry, water, solid waste, and land-use and change its **state** in terms of environmental performance. It also identifies how society **responds** to these changes through general environmental, economic, social and sectoral policies, investments, and through changes in behaviour, thus affecting the pressures caused by human activities. The Green City PSR framework therefore builds causal linkages between the environmental performance of a green city; the key associated economic activities of different social groups; and investment, services and policy instruments to respond to these challenges.

Priority environmental challenges in our city and our responses so far

Large cities are both a significant source of pressure on the environment due to the high energy demand, increased CO₂ emissions, and hubs for innovations regarding sustainable urban development. Therefore, greening the urban environment can be regarded as both a necessity and as a set of challenges a well governed city is ready to uptake.

The city of Chişinău is no exception from this phenomenon, with its population of around 800,000 representing approximately one-fifth of the total population of Moldova. Partly due to the rapid pace of urban population growth, our city faces environmental challenges resulting from human activity in the urban development sectors. Our **priority environmental challenges** are related to the vulnerability to extreme weather events and impacts of climate change, to poor surface water quality, and to scarce and decreasing green space. These are caused by multiple factors, the most important ones being the deficiencies in the energy, transport and waste management sectors, the lack of clear urban land use regulation, the high energy intensity of both public and private building stock, and the lack of preparedness to climate change impacts.

In conclusion, we have identified the following priority environmental challenges for the city: air, water, biodiversity, land use, climate mitigation, climate adaptation; priority pressures: transport, land use, energy & buildings, solid waste.

Recently, our efforts have turned to address these challenges and remedy the situation, some of the main outcomes of our efforts being the rehabilitation of public buildings, the construction of new road infrastructure, renewing the city bus and trolleybus fleet, gradual introduction of energy efficient public lighting, rehabilitation of the water operations and wastewater treatment technology, preparatory work for Țânțăreni landfill rehabilitation, etc. Simultaneously, we are issuing policies, regulations and implementing projects which can be aligned with our green city objectives, the most ambitious ones being the Local environmental Plan for Chişinău (2010); the Public Transport Strategy of Chişinău (2014); the cleaning of the Bîc riverbed (21 within Chisinau) supported by the government of Romania; the Moldova Sustainable Green Cities program launched by UNDP resulting in a Sustainable Urban Mobility Plan for Chisinau; the Strategic Plan for Socio-Economic Development of Chişinău up to 2020.

However, further action is needed in a systematic way to transform Chişinău into a green city. In this context, we joined the Green Cities Programme launched by the EBRD and undertook the development of the Green City Action Plan (GCAP) for the City of Chişinău. This is in line with our recent efforts as we increasingly work together with our citizens, recognizing that our future well-being depends on our ability to improve the environment and increase the quality of life in Chişinău. The streamlining of actions towards green development is also aligned with the UN's 2030 Agenda for Sustainable Development and the Sustainable Development Goals (UN 2015) and particularly Goal 11 calling for governments to make cities and human settlements inclusive, safe, resilient and sustainable.

GCAP vision and actions

Chişinău is a leafy, safe and clean city, proving that city governance and culture are working for urban development. The task at hand is to protect and build on those values through a strong local governance, community participation and integrated planning. We are determined to build on and reinforce the spirit of community of the inhabitants of Chisinau. Our overall vision guiding the GCAP process therefore is centred on people in order to ensure them a safe, resilient and healthy environment: **to connect people for a better quality of life in a green city.**

The strategic objectives and specific objectives emerged in the thematic areas of **mobility, blue-green infrastructure, energy and resources and waste management**. The actions are interdependent and enhance each other. For example, active transport such as biking or walking is more likely in greener public spaces or bike-lanes and footpaths set in green corridors. At the same time greening helps control overflowing of drainage in case of heavy rains, which is one of the main problems of the city.

The priority areas we need to have our focus on are the following:

- **Institutional capacity.** In order to implement the green urban development actions at the city level, we need to further enhance our institutional, legal and regulatory capacities, at the Municipality level. Our priorities include institutional cooperation between our departments, trainings and dedicated workshops for our staff members and development of regulatory framework.
- **Policies & Investments.** The indicator analysis highlighted areas where further investments and feasibility studies are needed. These findings were reinforced by existing plans and policies. Our main focus is to set up a prioritisation of these investments and determine financing sources.
- **Public awareness.** We intend to engage more in public awareness campaigns in order to improve the environmental performance and comfort in Chişinău and to educate our citizens towards a green behaviour.

The vision will be achieved by working on the strategic objectives and specific objectives identified in key development areas in the next section.

Thus, the following table presents our strategic and specific objectives.

Strategic objective
Rationale

Specific objectives

SO 0. Enhanced institutional capacities for the implementation, assessment and monitoring of the sustainable urban development process Enhanced capacities and urban governance will enable the municipality of Chişinău to excel in integrated and participative governance oriented to green development.	SO 0.1 Functional framework for integrated project management SO 0.2 Integrated planning SO 0.3 Elaboration of regulatory acts
SO 1. Sustainable mobility and transport Sustainable mobility and transport will create easy and safe commute to connect parts and people of the city in an environmentally safe, healthy and pleasant mobility.	SO 1.1 Increasing the energy efficiency of public transport SO 1.2 Switch to public transport and active means of transport SO 1.3 Improving the reliability of the transport system
SO 2. Climate resilient blue-green infrastructure Climate resilient blue-green infrastructure reduces urban floods connecting green spaces through natural corridors and turns currently polluted and hazardous areas into green growth opportunities.	SO 2.1 Rainwater drainage SO 2.2 Increasing functionality of green and blue areas SO 2.3 Revitalizing polluted and hazardous areas
SO 3. Sustainable and efficient energy Connecting suppliers, users and energy managers to bring Chişinău up to speed with state of the art renewable energy and energy efficiency standards.	SO 3.1 Increasing energy efficiency SO 3.2 Energy from renewable sources SO 3.3 Energy management of the city
SO 4. Sustainable resources and waste management Sustainable resources and waste management creates a healthy and clean environment for citizens encouraging source separation and recovery of all materials with intrinsic value.	SO 4.1 Extend and improve waste collection and transfer system services for a clean and healthy environment SO 4.2 Implement circular economy solutions SO 4.3 Ensuring waste disposal and environmental protection

The implementation plan included in the GCAP shows a feasible pathway for turning Chişinău into a green city through hard work and determination from all the stakeholders involved.

Overall implementation costs

Strategic objective	CAPEX	OPEX	Potential funding source				
	EUR	EUR	Municipal budget	National budget	IFIs, loans, credit lines	Private sector	Others
0. Enhanced institutional capacities	830,000	55,000	✓		✓		
1. Sustainable mobility and transport	159,333,000	21,300,000	✓		✓	✓	✓
2. Climate resilient blue-green infrastructure	29,325,000	588,700	✓		✓		✓
3. Sustainable and efficient energy	139,545,000	65,000	✓	✓	✓	✓	✓
4. Sustainable resources and waste management	36,229,000	17,513,000	✓		✓	✓	✓
Total	365,262,000	39,521,700					

Section

1

Methodology and baseline

Chapter 1.

Introduction

1.1. Background/context

Cities are dynamic and vital parts of society and are the main engines of social, economic and technological development. According to the UN, around half of the world's population now lives in urban areas, and by 2030 this is likely to exceed 60 per cent of the global population.

In order to provide their populations with the myriad of demanded services, cities need inputs of large quantities of resources. As such, cities are a source of significant environmental impacts. For example, research indicates that cities already account for up to 70 per cent of energy use and 80 per cent of greenhouse gas emissions, figures which are set to rise over time. These issues are present in Chişinău as well, as the quality of air, traffic congestion and limited green space, land and water resources give rise to concerns regarding the quality of the environment.

While urban activities deeply affect the environment and the overall quality of life of our citizens, cities also offer opportunities for innovations fostering sustainable development. Increasingly, our local government and citizens work together recognizing that our future well-being depends on our ability to transform Chişinău into a green city. This thinking is also very much in line with the UN's 2030 Agenda for Sustainable Development and the Sustainable Development Goals (UN 2015) and particularly the Goal 11 calling for governments to make cities and human settlements inclusive, safe, resilient and sustainable.

Chişinău faces environmental challenges resulted from human activity in the urban development sectors. The high energy intensity and energy inefficiency is reflected in the poor energy performance of both public and private buildings, old means of transportation (both public and private), poor waste management and low recycling rates. Recently implemented measures attempt to address these challenges and remedy the situation, e.g. rehabilitation of public buildings, the construction of new road infrastructure, renewing the city bus and trolleybus fleet, gradual introduction of energy efficient public lighting, rehabilitation of the water operations and wastewater treatment technology, preparatory work for Țânțăreni landfill rehabilitation.

Further action is needed to improve the environment and increase the quality of life in Chişinău, in a systematic way. In response to this context, the EBRD has launched the Green Cities Programme and the development of the Green City Action Plan (GCAP) for the City of Chişinău. The Methodology for the development of the GCAP, prepared with OECD and ICLEI, is meant to guide our City through four main steps – from establishing a i) Green City Baseline, developing a ii) Green City Action Plan, all the way through iii) implementation and iv) reporting on progress and outcomes.

1.2. Purpose of the plan

This document is a strategic plan for the City of Chişinău, which indicates priority investments for a green and prosperous city.

The plan builds on past strategies and current findings of a thorough data collection and analysis on the quality of the environment, presented in the baseline. This assessment reveals the priority environmental challenges in urban sectors important for the green development of the city.

Thus, the above mentioned initial process offers a solid ground for the actions defined together with experts and stakeholders. By presenting these concrete actions in a concise and visual manner, we hope to entice the readers' imagination and allow them to envisage the result of implementation and be inspired to turn Chişinău into a city with good air and water quality, sustainable industry and infrastructure, and welcoming green areas.

The implementation plan included in the GCAP shows a feasible pathway for turning Chişinău into a green city through hard work and determination from all the stakeholders involved.

1.3. Structure of this document

When developing this strategic document, we were guided by the endeavour to produce a coherent, well-structured action plan, to make it comprehensive, yet easy to read, understand and use.

Thus, the document is structured in **three main sections**: Section 1 provides a comprehensive background in terms of the methodology used, city overview and baseline; Section 2 is the core part of the document, as it presents the actions envisaged on the basis of the findings in Section 1; finally, Section 3 presents the plan for the monitoring of the implementation of the actions.

The sections consist of several **chapters**, as follows:

SECTION 1. METHODOLOGY AND BASELINE

Chapter 1. Introduction – *explaining the background of the GCAP*

Chapter 2. Methodology – *detailing how the EBRD's GCAP methodology was adjusted to the City of Chişinău*

Chapter 3. Baseline – *providing a thorough review of the city, the priority environmental challenges it faces, and the findings of the data collection and analysis*

SECTION 2. GREEN CITY ACTION PLAN

Chapter 4. Overall vision – *it summarises our vision to transform through GCAP actions the city of Chişinău into a green city, with people enjoying a good quality of life*

Chapter 5-9. **Actions** – *structured along the 5 strategic objectives*

Strategic objective 0. Enhanced institutional capacities for the implementation, assessment and monitoring of the sustainable urban development process

Strategic objective 1. Sustainable mobility and transport

Strategic objective 2. Climate resilient blue-green infrastructure

Strategic objective 3. Sustainable and efficient energy

Strategic objective 4. Sustainable resources and waste management

Chapter 10. Summary of actions and financial details

SECTION 3. MONITORING, REPORTING AND VERIFICATION

Chapter 11. Description of the Monitoring Framework

Annexes with detailed data (indicators and problem trees) are included at the end of the document.

Chapter 2.

Methodology

2.1. Methodology for GCAP development

Throughout the development of the Green City Action Plan, we have applied the methodology developed by OECD and ICLEI for EBRD, based on a **Green City Pressure-State-Response (PSR) framework**.

The Green City PSR framework identifies human activities performed in the transport, energy, building, industry, water, solid waste, and land-use sectors that exert pressures on the urban environment, and change its **state** in terms of environmental performance. It also identifies how society **responds** to these changes through general environmental, economic, social and sectoral policies, investments, and through changes in behaviour, thus affecting the pressures caused by human activities. The Green City PSR framework therefore builds causal linkages between the environmental performance of a green city; the key associated economic activities of different social groups; and investments, services and policy instruments to respond to these challenges.

Allocating the city's financial and human resources to addressing the identified challenges will optimize environmental benefits, as well as social and gender co-benefits, therefore resulting in a safe, affordable, accessible and sustainable city.

In order to have a clear and objective view on the state of the environment and challenges faced by the city, we conducted a **baseline** assessment, along the collected indicators revealing the extent of the pressures on the urban environment, the resulted state of the environment and the efficiency or shortcomings of actions addressing these pressures.

The baseline assessment is followed by the process of benchmarking and prioritisation of green city indicators: first, these indicators are adjusted to the specificities of Chişinău, then an analysis is performed to compare these indicators with international benchmarks. As a result, indicators are ranked, corresponding to traffic light thresholds ("green", "amber", "red"). This method also allows for identifying priority environmental challenges. The linkages between priority state, pressure and response indicators are depicted in problem trees. Problem trees are used to assess and select/discard priority challenges during stakeholder consultation.

Policy actions, including policy, investment and behaviour change actions are identified only for priority environmental challenges building on the already existing and ongoing efforts in the city for improvements. First, a long list of ideas is drawn for each priority challenge and discussed with the technical staff of the municipality. The short list of ideas emerges from this technical assessment; these ideas are further developed and prioritized through stakeholder consultation. The selected and prioritized ideas are then detailed and included in the action plan.

Both the prioritisation of challenges and green city actions/policy options follow a **three-step participatory assessment**: (1) technical assessment, (2) stakeholder-based prioritization and a (3) political assessment that can be done working flexibly with a set of tools available in the methodology.

2.2. Institutional setup and stakeholder consultation for GCAP Development in Chişinău

Chişinău municipality has adopted a formal institutional setup for managing the GCAP, consisting of a Working Group and a Steering Committee responsible for the implementation of the project. The Working Group members include heads of relevant municipal technical departments and enterprises. The Steering

Committee includes the acting mayor, the secretary of the council and the head of the Department of Housing and Public Utility. Members of the Working Group and Steering Committee were committed and engaged throughout the GCAP development working together with the team of experts.

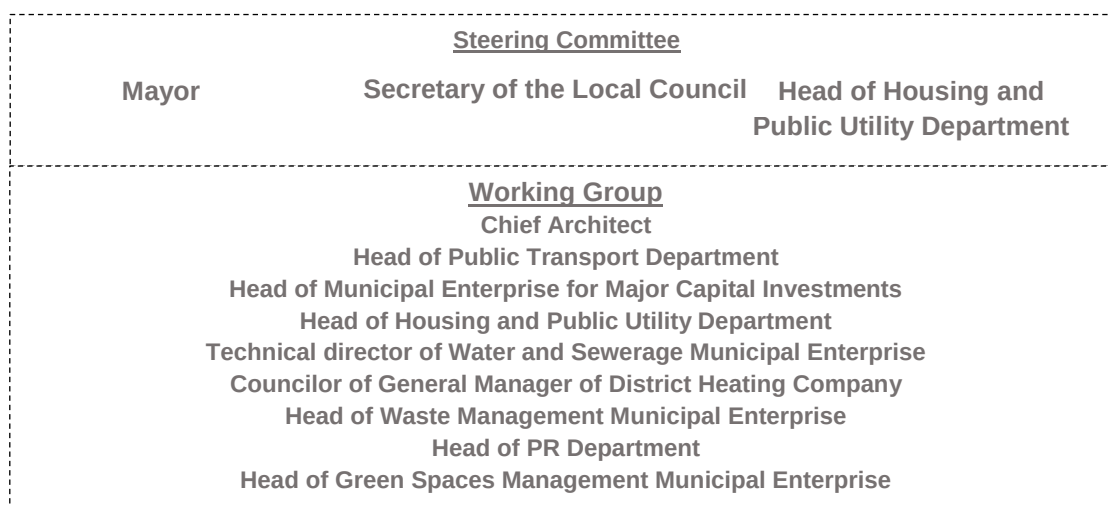


Figure 1 Institutional setup for GCAP development

The municipality is keen on participatory working methods, therefore the three-level assessment process for both the baseline and the plan turned into multiple rounds of consultation and iterative processes on technical details with municipal departments and enterprises as shown in the figure below:

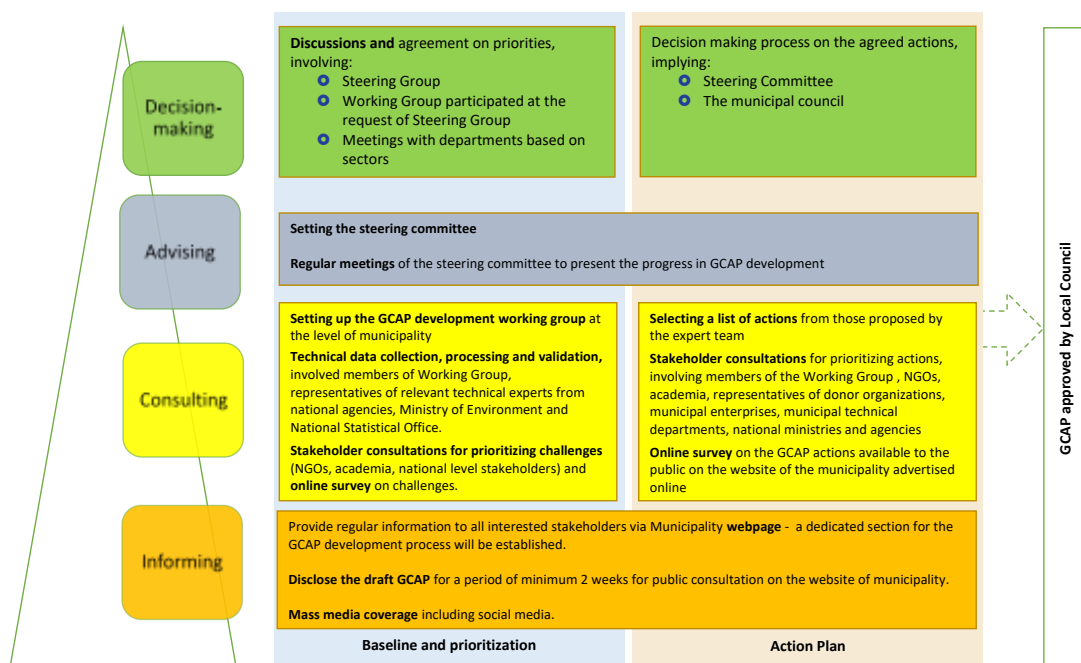


Figure 2 GCAP Approval and consultation process

The main objective of the consultation activities was to make sure that the GCAP actions are in line with the strategic development objectives of the city, with the existing legal framework and with citizens' expectations.

During the GCAP development our team with the support of the consultant team organized several consultation meetings, the two main ones were those concerning the prioritization of challenges and of actions.

Table 1 Consultation meetings

Consultation meeting for prioritizing challenges	Consultation meeting for prioritizing actions
The meeting was held at the end of December 2018. The representatives of the working group established at the level of Municipality of Chişinău and 4 external stakeholders attended this meeting and actively engaged in determining the most important green challenges for the city. 	The meeting was held on the 19th of April 2019 in Chişinău where about 70 participants, representing the local and national authorities, NGOs and other interested parties, discussed the proposed actions in detail and expressed their view on some of these actions. 21 NGOs from different sectors participated in the stakeholder consultation process 

We have organized public consultation for the proposed GCAP challenges in December 2018 and one for the actions in April 2019. As part of the consultations two online surveys were initiated. These surveys gave the opportunity to all interested parties to score each challenge and proposed action and to give written feedback on a dedicated comments and suggestions section for each challenge and/or action. In total, more than 360 citizens have completed the survey. During the meetings, we worked to identify initiatives focusing on promoting gender equality and economic inclusion of less advantaged social groups.

Online survey for challenges



Formular Consultativ - Provocările Municipiului Chişinău

Provocările Municipiului Chişinău

Vă rugăm să marcaţi gradul de importanţă al fiecărei provocări, descrie mai jos *

1 = Nu este relevantă 2 = Este relevantă 3 = Este foarte relevantă 4 = Este extrem de relevantă

	1	2	3	4
Creşterea numărului de vehicule private poluante (medii, înconjurătoare)	☐	☐	☐	☐
Creşterea numărului de vehicule private poluante (medii, înconjurătoare)	☐	☐	☐	☐
Creşterea numărului de vehicule private poluante (medii, înconjurătoare)	☐	☐	☐	☐
Creşterea numărului de vehicule private poluante (medii, înconjurătoare)	☐	☐	☐	☐

Online survey for actions



Acţiuni propuse pentru Municipiul Chişinău

Vă rugăm să marcaţi gradul de importanţă al fiecărei acţiuni, descrie mai jos *

1 = Nu este relevantă 2 = Este relevantă 3 = Este foarte relevantă 4 = Este extrem de relevantă

1.1.1 Reînnoirea parcului de autobuze

Obiectiv: Parcul auto pentru transport public este învechit, parcată - şi nu asigură confortul necesar pentru călătorii. Se vor da 30% din bugetul şi 80% din acţiunile necesare reînnoirii.

Beneficii:

- Reducerea poluării aerului
- Reducerea numărului de accidente de circulaţie
- Creşterea confortului pasagerilor în mijlocul de transport public

Figure 3 Examples of online surveys

The GCAP development was a transparent and inclusive process as besides conducting the online surveys, we have published on the website of our municipality, www.Chişinău.md, all the available information related to the project, including draft and final deliverables.

Also, information related to GCAP Chişinău were disseminated via:

- Press releases issued by us in order to inform the population about the project milestones and achievements
- Information on the EBRD dedicated website <https://www.ebrdgreencities.com/>
- Coverage of GCAP development in social media – several announcements were made on Twitter, Instagram, LinkedIn, Facebook pages of our municipality and our partner's social media accounts; and
- Newsletter sent to the stakeholders.



Figure 4 Extract from a newsletter and dedicated web section

All these efforts were done in order to provide information in a timely and appropriate manner to interested parties. Furthermore, we have always been available to discuss and invited interested parties to provide feedback, suggestions and comments to the GCAP. Our official communication channels (phone, mail, email) were provided to all interested parties in order to be able to contact us anytime.

2.3. Tailoring GCAP methodology for Chişinău

This part presents the data collection and validation process in Chişinău Municipality. The main findings on priority environmental challenges were refined and finalized through stakeholder consultation meetings and an online consultation. These are presented in [Chapter 3.2. City baseline](#).

As far as data collection and analysis is concerned, we followed the Pressure-State-Response (PSR) Framework as defined by the EBRD GCAP methodology and illustrated below.

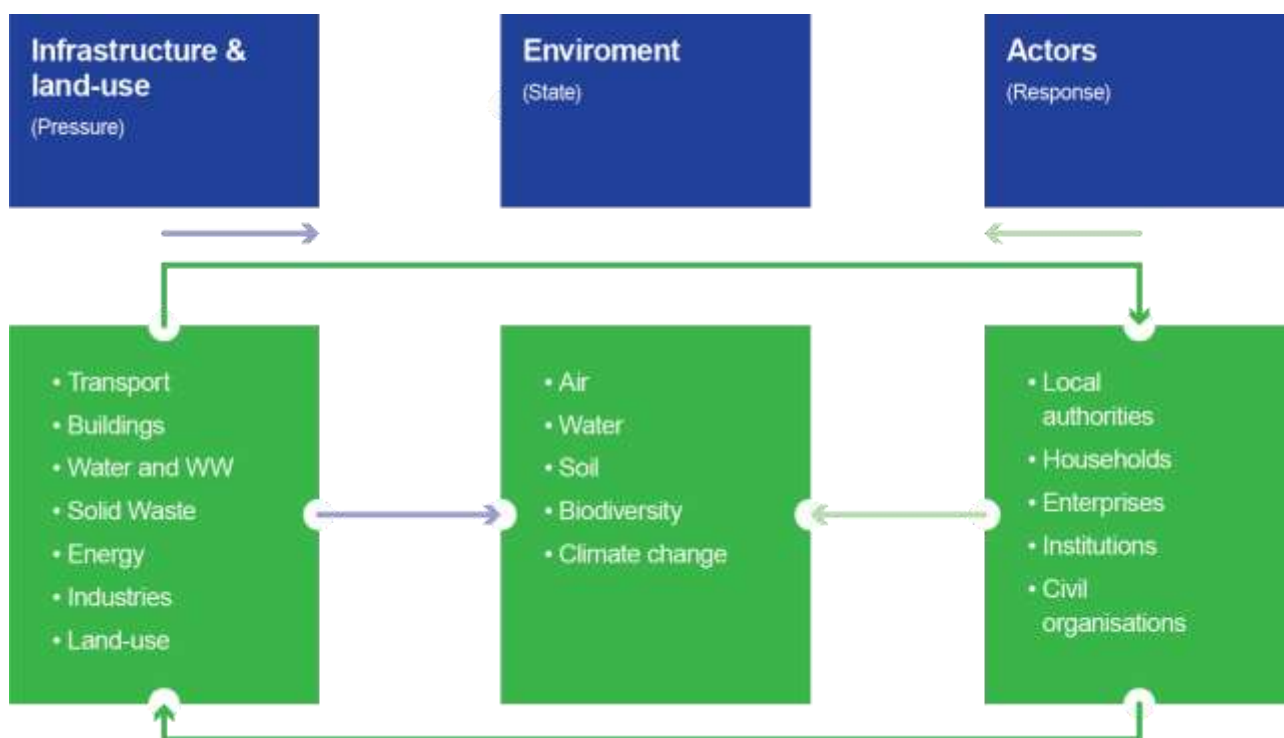


Figure 5 PSR framework

Data availability for the indicators is quite scarce and has significant gaps in terms of consistency throughout the years. We tackled this challenge through thorough data collection considering various sources and an iterative data validation process as described below.

Data collection. The local team did the bulk of data collection supported by Romanian speaking international experts. The analysis of pressure and state indicators was performed by experts, divided on sectors, based on the expertise and sector related knowledge of the team members. Several on-line and in person meetings have been held among experts, ensuring a streamlined understanding of the indicators and quality checks for the identified data.

We sent out official requests for data to relevant departments of the municipality and municipal enterprises, held meetings with technical staff of municipal departments, enterprises, local and national institutions and independent experts in Chişinău. The data was cross checked with online queries of statistical databases, as well as consultation and critical review of various relevant documents.

Stakeholders contacted for data collection include but are not limited to: Chişinău Urban Planning and Land Use Department, Department of Housing and Public Utility, Department of Transport and Communication, Department for Emergency Situations, Financial Department, Public Relations Department, Termoelectrica District Heating Company, Municipal Water and Sewerage Enterprise, Waste Collection Municipal Enterprise, Enterprise for Operation of Roads and Bridges, Enterprise for Major Capital Investments, Enterprise for Green Space Management, the National Energy Efficiency Agency, Ministry of Agriculture, Regional Development and Environment.

Data sources. The sources of data used for populating the database and the priority of each of these sources considered are described in the figure below.

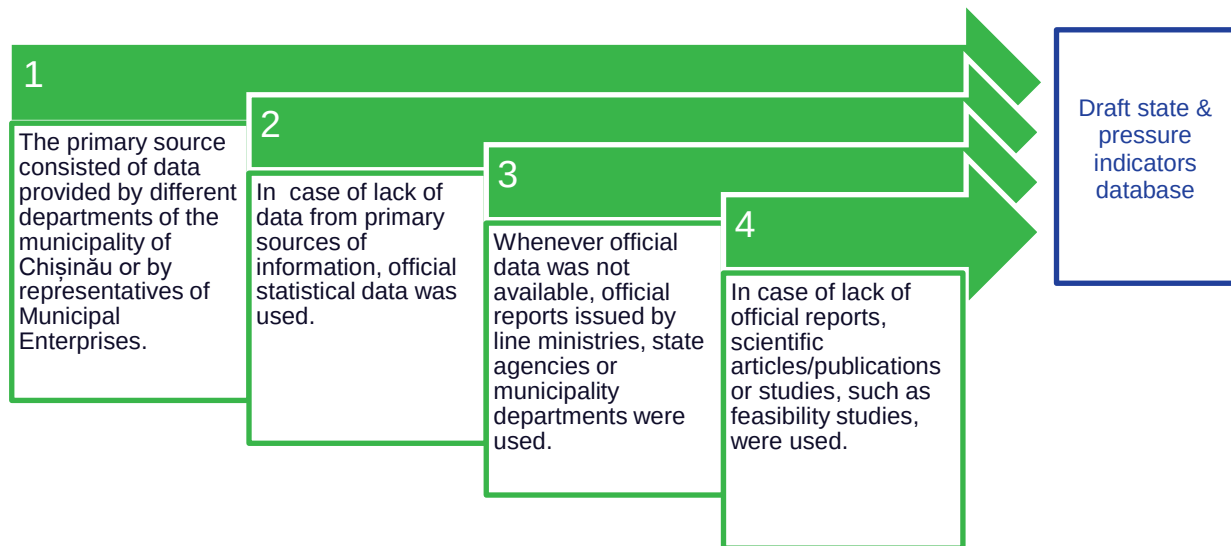


Figure 6 Data sources used for the Indicators Database

Data validation. The draft database containing state and pressure indicators has gone through several validation stages as illustrated in the figure below:

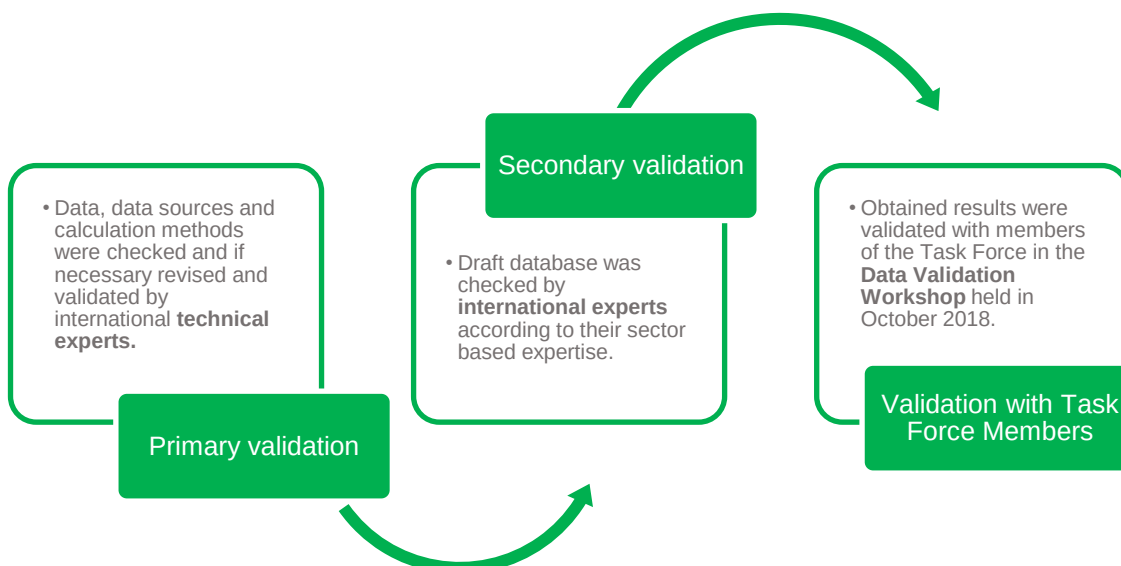


Figure 7 Data validation process

As a result of the analysis of the technical data, a series of challenges have been identified for Chişinău municipality, highlighting current priority environmental challenges of the municipality. In order to prioritise the identified challenges in Chişinău problem trees were drawn and discussed with stakeholders. They represent linkages between red PSR indicators; some amber indicators were included as well, if stakeholder consultation input and expert judgement indicated that they can worsen in time and require special attention. The problem tree diagrams are included in Annex 2.

Chapter 3

Baseline

3.1. City overview

The administrative and institutional setup of Chişinău

Chişinău Municipality includes the following administrative units, as it can be seen in the map below:

- the City of Chişinău – organised in 5 city districts; and
- 18 suburbs administrative units – 6 towns and 12 villages.

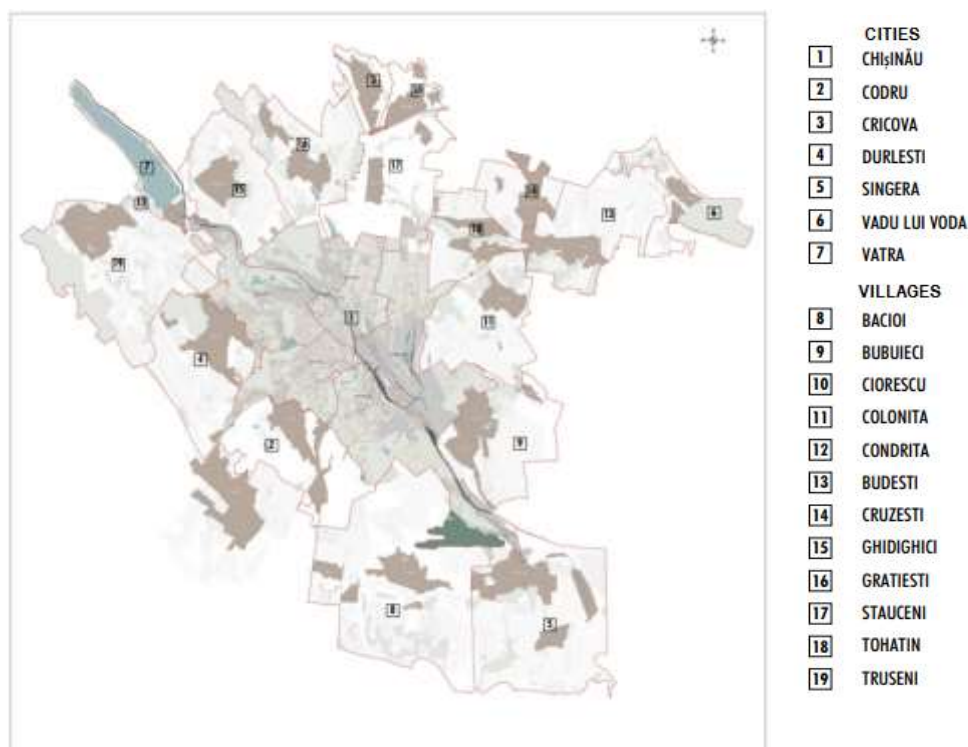


Figure 8 Administrative units of Chişinău Municipality; Source: Chişinău Municipality Territory Plan. Territorial Development Strategy, April 2007

Each administrative unit in the Municipality of Chişinău has its own Local Council and Mayor.

Chişinău Municipality is given first level authority in public administration according to the Law of Public Administration of Moldova (Law No. 436/2007), and the Municipal Council is mandated to approve budgets, programs, plans, strategies relevant for our Municipality, making these mandatory for the suburbs.

The Mayor of Chişinău, the Municipal Council of Chişinău and the 18 Local Councils of the settlements in the suburbs cooperate to solve problems and implement projects of municipal interest.

However, according to article 113 of the Constitution of the Republic of Moldova, there is no relationship of subordination between the Municipal Council and the Local Council of the towns and villages in the suburbs. This creates a legal gap that enables the Local Councils to escape the mandatory nature of budgets and plans approved by the Municipal Council.

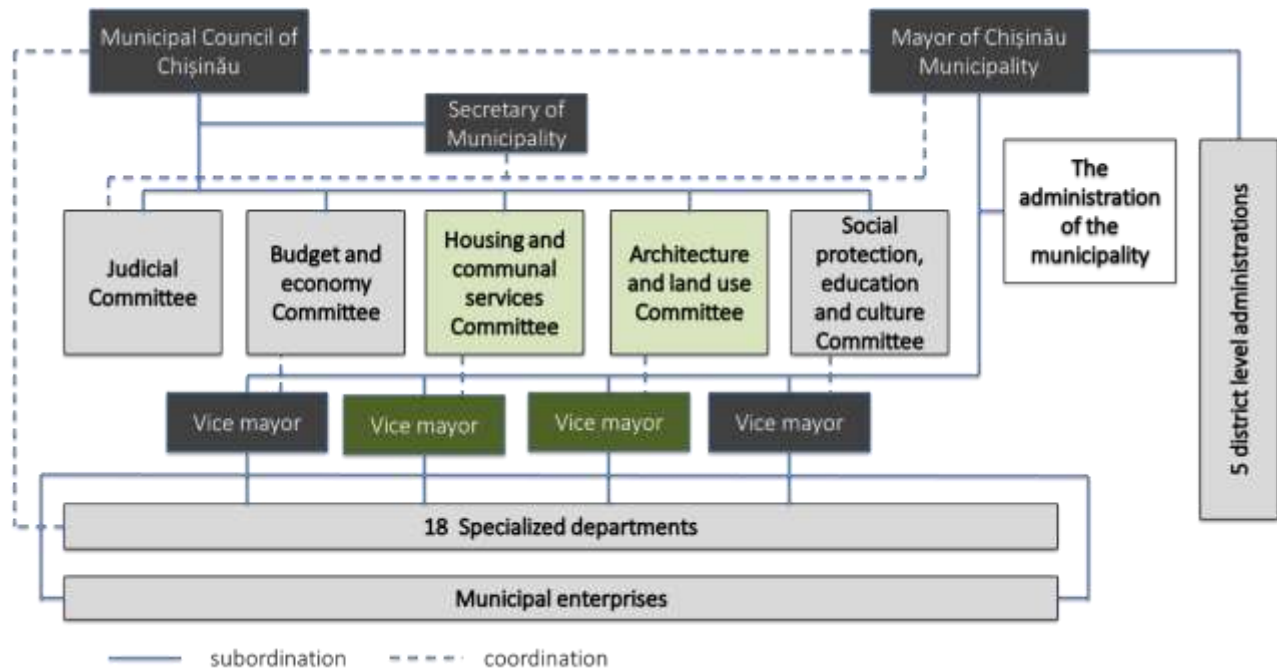


Figure 9 General simplified organogram of the municipal administration

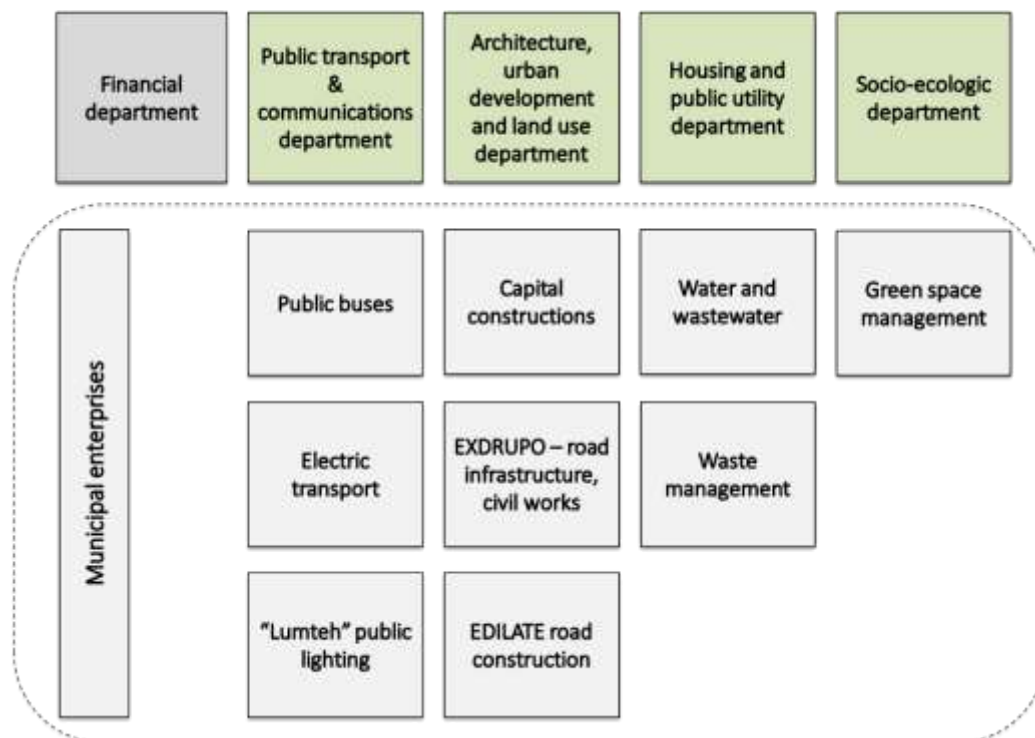


Figure 10 Municipal departments and enterprises engaged in green development

Economic overview



Moldova is a lower middle-income country. Driven by private consumption, Moldova's economy grew by 4.5% in 2017. Fuelled by remittances, strong growth in wages and the indexation of public transfers in 2016, consumption increased by 4.9% in 2017. Improved financial conditions and the recovery from the 2015 decline in public investments led to a recovery in gross fixed investments (+5.3%). Export growth was robust (+12.7%, y/y), supported by the good harvest of the previous two years. Imports rapidly increased, propped by a stronger MDL. On the production side, the main growth impulse came from retail and wholesale trade, followed by agriculture and industry.

Chişinău is the financial and business capital of Moldova. Its GDP comprises about 60% of the national economy that in 2015 reached the amount of 6.3 billion EUR. Thus, GDP per capita in the country in the same year was 1,650 EUR while in Chişinău it was 1,728 EUR. By way of comparison, in 2017 the GDP per capita on average in the EU countries was 30,000 EUR, while in Romania the GDP per capita amounted to 9,600 EUR. Labour force participation of both men (46%) and women (40%) is very low compared to other countries in the region, due to a high international labour emigration.

As the economy is growing, nominal monthly gross average earnings in Chişinău also increased by 13.2% and exceeded the average for the country by 19.0%. Earnings in the second quarter of 2018 were 7,577.2 MDL (389.62 EUR).

Recent municipal budget

The budget of the municipality of Chişinău is made up of the municipal budget and the local budgets of the villages (communes) and of the cities in the municipality.

Fiscal decentralization reform commenced with the adoption of the legislation on public finance and decentralization in the early 2000s, and it is being further developed.

The following table gives a summary of the budget for the last 3 years:

Table 2 Summary of Chişinău Municipal budget

Thousand €	2016	2017	2018	2018
	execution	execution	plan	share
Revenue, total	160,587	171,387	174,139	
I. Basic Revenue	76,033	79,092	81,423	47%
1. Direct and full receipts (own revenues)	18,228	21,014	23,012	

Property taxes - total	5,717	8,382	10,096	
Local taxes - total	9,586	9,765	9,809	
2. Deductions from State Taxes and Fees	57,804	58,078	58,411	
Tax on income of individuals	51,162	58,078	58,411	
Road tax	6,642	0	0	
II. Receipts from paid services	3,038	3,327	3,524	2%
III. Payment for the lease of public assets	784	815	816	
IV. Fee for foreign currency purchases by indiv	505	460	562	
V. Internal voluntary donations	56	55	69	
VI. External voluntary donations	0	138	0	
VII. Transfers	80,171	87,501	87,746	50%
education	72,020	75,909	75,909	
social assistance	1,812	1,769	2,015	
sports schools	2,462	2,571	2,571	
road infrastructure	0	5,403	5,403	
Expenditure - total	163,809	192,748	206,736	
education, culture, health protection, social	106,325	115,928	130,837	63%
communal services, transport and road	49,009	62,295	55,854	27%
capital investments	7,896	6,954	17,202	8%
executive authorities and administrative bodies	6,616	6,852	6,417	
other expenses (reserve fund, servicing loans)	3,409	4,866	4,433	
Financing of part of expenditure and of budget deficit by sale of municipal apartments to population and new loans	-3,222	-18,608	-14,838	-7%

There is a negative budget balance standing at -7%, source is long-term borrowing for capital investment. The revenue at the level of municipality composed of local taxes, share of national taxes and receipts from paid services, generally considered as own revenue sources in case of creditworthiness analysis is 50%. This is considered a good standing for future loans.

There are several ongoing investments, mostly funded by international loans and grants.

Table 3 Major ongoing investment projects in Chişinău Municipality

Investment projects	Start year	Million €	Source of finance
Water supply services	2015	59.0	EBRD, EIB, EU
Urban road infrastructure	2015	31.5	EBRD, EIB, municipal budget
Public building EE	2018	25.0	EBRD, EIB, SIDA
Water supply and road	2010	10.0	IFC
Transport	2010	13.0	EBRD, EIB, EU
Transport	2015	0.6	private bank
Social housing	2008	0.3	private bank
EE in high rise buildings	2014	0.9	private bank
Medical services	2008		The Japan International Cooperation Agency

The modernization of the water supply services, sewage collection and treatment project is the largest ongoing project, financed by blending loans and EU grant, with an extended deadline till 2021.

The second largest investment project is the urban road and infrastructure modernization project. It is implemented in two separate stages. The first stage was completed in 2018.

A public building energy efficiency project financed by EBRD and EIB was launched in 2018.

Social overview



While the population of Moldova is projected to decrease over the years, the population of Chişinău shows a steady increase. The municipality currently has a population of around 800,000, approximately one-fifth of the total population of Moldova. The City has a population of almost 700,000 people (87% of the total population of the municipality).

While there is a tendency of rapid population growth, the municipality struggles with overcapacity of utilities and a burden of maintenance. The disproportional planning originates from the Soviet era, when the rate of population growth and the capacity of the utilities and municipal infrastructure were oversized, and led to inefficiencies and failures of the urban infrastructure, and a degradation of the state of the environment. Significant differences are noted in terms of access to and use of services between men and women. For instance, on average, women spend 76.5% of their travel in public transport, whereas men spend nearly 40% (ILO, 2016a).

The political landscape of GCAP Chişinău

In order to be able to embed the Green City Action plan into the political landscape of Moldova, we pursued a political framework analysis with connection to GCAP areas and sectors at international, national and local (municipal) levels. Mapping the relevant policies and regulations have enhanced the relevance of the GCAP also in terms of filling eventual gaps in this area and ensuring substantial arguments for the further improvement of green governance.

At the international level, the EU has a strong tradition of formulating and promoting directives in the field of environmental protection and climate change. Regarding Moldova, even if such EU regulations and directives are not fully implemented yet, they are aspirational and provide guidance for development.

Through the **Association Agreement between the European Union and the European Atomic Energy Community and their Member States and the Republic of Moldova**, a comprehensive framework for dialogue and cooperation was created in multiple fields, including environment and climate action. By signing the Agreement on June 27, 2014 (ratified by the Parliament of the Republic of Moldova on July 2, 2014 and by the European Parliament on November 13, 2014), Moldova took the path of progressive convergence of policies and regulation.

Following the signature of the **Agreement**, the country committed to implement the relevant environmental legislation of the European Union into its national legal system by adopting or changing national legislation, regulations and procedures aiming at political association and economic integration with the EU.

The Association Agreement includes binding provisions, regulatory norms and broader cooperation arrangements in all sectors of interest. Therefore, the EU directives have become directly relevant to all aspects of green city development.

The achievement of commitments started with the adoption of the **National Implementation Plan of the EU-Moldova Association Agreement for 2014-2016 by Government Decision 808/2014**. It includes key priorities for cooperation in order to ensure political association and economic integration with the EU and represented the basic tool for internal monitoring of the European integration process during 2014-2016.

At a broader international level, the UN **2030 Agenda for Sustainable Development** is recognised as the overarching framework for cooperation. It links social, environmental and economic development commitments, addressing poverty and sustainability in combination and requiring a multi-stakeholder approach (the UN, governments at all levels, private enterprises and civil society) to secure implementation.

In July 2017 the Government of Moldova, through the State Chancellery, adapted the **2030 Sustainable Development Agenda**, and nationalised the Sustainable Development Goals, thus guaranteeing political commitment to working towards these goals. The Moldova Sustainable Green Cities program, through its pilot actions and sector specific planning exercises raises awareness and thereby complements the GCAP.

The National Strategy on Adaptation to climate change by 2020 and the Action Plan to implement it, approved by Governmental Decision 1009/2014 is the main document guiding the national level efforts to develop resilience in different regions across the key sectors.

In the following sections, we summarise the most important findings of the Political Framework Report regarding the local situation at the time of elaborating the political framework analysis.

Environmental quality and cross sector policies

Sustainable development. In 2010, the Local Environmental Plan for Chişinău (LEAP) was developed following the National Strategic Plan for Environmental Protection (1995) and the National Environmental Action Plan (1995). Its main purpose was to identify the local priority environmental challenges and create a set of actions to overcome these in the context of limited financial resources. The document includes a baseline and covers several aspects and indicators considered in the GCAP methodology.

Climate change. At municipal level, climate change was referred to in the development strategy of the municipality (2020) and in other sectoral strategic documents, but no dedicated policy has been yet

developed and approved by the Municipal Council of Chişinău. We hope that the GCAP would contribute significantly to the shaping of national climate change mitigation and adaptation objectives and targets. Through its energy, transport, buildings, waste and wastewater sectors, Chişinău is a large contributor to the national greenhouse gas emissions, and can also be a significant actor in mitigation.

Air quality. Since Chişinău is one of the settlements with the highest air pollution in the country, while developing the GCAP, our team considered the existing information on air quality and attempted to make sure that any envisaged priority and action would contribute to improving the air quality in the city. Also, the GCAP considers the forthcoming air quality monitoring strategy that is currently drafted at national level in Moldova.

Soil quality. Since no specific strategic documents related to soil quality are available for Chişinău, GCAP analysed the existing data on soil quality in Chişinău and made sure that proposed actions would take into consideration the existing situation of degraded lands and other soil quality aspects.

Biodiversity. The institutional setup is in place at local level as there is a specialised department responsible for ensuring the proper maintenance of the urban environment, and a municipal enterprise set up and functioning with the main scope of maintaining urban green areas. However, there is no policy document or action plan for urban biodiversity at local level. GCAP envisages to cover this gap. Also, GCAP will consider the existing situation of the natural protected areas within the city as well.

Green city sector policies

Urban planning. The General Urban Plan and the Urban Planning Regulation of the Municipality need to be updated in order to ensure a solid central governing document for urban development. The municipality is currently working on the forthcoming General Urban Plan of Chişinău, intended to dedicate areas for green, public spaces or urban infrastructure in order to converge with green city actions and targets. The GCAP informs the ongoing Urban Planning process.

Transport. The main document for public transport is the Public Transport Strategy of Chişinău prepared in 2014, which includes objectives directly relevant for GCAP such as to increase access of citizens to public transport, to create an intermodal public transportation system and to increase the overall environmental performance of public transportation system among others.

Water and wastewater. The Water and Wastewater Strategy of Moldova establishes the need to develop a sector master plan by local authorities at municipal or inter-municipal levels. This requirement is directly relevant to GCAP. Such plan does not yet exist at the level of Chişinău Municipality. However, the water sector is considered one of the best performing GCAP sectors in Chişinău at least as far as sanitation services and drinking water is concerned, even in the absence of a master plan for the sector.

Waste management. The Waste Management Strategy of the Republic of Moldova for 2013-2027 (approved in 2013) has major implications for waste management in the country as it lays out the way for regionalization of the services. In this sense Chişinău is no exception and the facilities to be built in the region are prescribed by the strategy, though their location and capacity should be established based on feasibility studies. Chişinău needs a local policy for waste management. The current feasibility study in this sector focuses on important aspects such as the efficiency of collection, transport and ensuring capacity of sanitary landfilling. There is room for actions on source separation and separate collection of waste for a close alignment to the National Strategy objectives and the relevant EU policies.

Energy. The Termoelectrica District Heating Company has elaborated a Development Strategy, with major objectives regarding the improvement of energy performance and reducing the environmental impact of the heating system. The GCAP refers to some of the objectives set in this strategy, since their bases are aligned with the international and national frameworks. Other policy initiatives in this sector at the local level were not adopted.

Buildings. The Department of Housing and Public Utility has elaborated a strategy to address the issues created in the field of housing. We have found it relevant to include in the GCAP the main elements of this strategy, since they are aligned with the international and national frameworks, including the use of new building elements and materials, equipment according to international standards.

Industry. Though at municipal level there are no specific provisions for this sector, as a general rule, Moldova has adopted the Polluter's pay principle and included this principle in its primary legislation via the Law on Payment for Environmental Pollution (1996).

In conclusion, the local urban plans of Chişinău require update in order to ensure a solid central governing document for urban development; in this sense, GCAP is timely and can inform, together with the Sustainable Infrastructure Development Plan the forthcoming General Urban Plan. The Republic of Moldova has initiated the process of transposing the EU legislation in many sectors, including environmental protection, regional development and energy. However, further efforts are planned in order to streamline these at the municipal level. Clear targets and objectives need to be formulated regarding infrastructure modernisation, climate change and land use. At the same time, we have developed strategic documents for our municipality in the fields of public transportation and energy efficiency of buildings, on which the green city actions build and rely on.

3.2. City baseline: key findings of the technical analysis of the indicators database

Following the data collection on indicators and technical analysis, we present below a series of key findings on the state of the environment and pressure factors affecting environmental aspects of the city.

A. Priority environmental challenges



Priority environmental challenges are presented below, grouped by environmental aspects.

Key issues regarding **air quality**:

- The average annual concentration of Total Suspended Particles is relatively high; it registered values around 50-60 $\mu\text{g}/\text{m}^3$ in 2015 and 2016, with a significant decrease from 100 $\mu\text{g}/\text{m}^3$ in 2014. Given the expected increase in traffic levels and construction activities occurring during the warmer months of the year, seasonal variations in air quality and a general worsening trend are expected.
- The road infrastructure quality is often poor, which leads to air emissions from the transport sector.
- Air quality is also affected by the waste sector, with GHG emissions from organic fractions from green and household waste being generated at the disposal site.

Key issues regarding **water quality**:

- Biochemical Oxygen Demand (24.8 mg/L) and Ammonium concentration (18 mg/L) in the river Bîc are very high as measured downstream of Chişinău. According to the National Annual Report assessment based on national benchmarks, the status of surface waters, the water quality of river Bîc was assessed as being polluted upstream of Chişinău and very polluted downstream of Chişinău.
- There is a high degree of pollution of the natural reservoirs within the municipality. The National Agency for Public Health issues regular warnings against bathing in lakes that were originally designated for recreational purposes.

Key issues regarding **green space**:

- Share of green spaces within urban limits, at 29.7 % is slightly lower than the 'yellow' benchmark value. Given the weak regulation for green spaces, their rapid deterioration and disappearance, it is

worth flagging as one of the key issues of Chişinău. Moreover, existing green spaces are rarely maintained and used to their full potential.

Issues identified regarding **biodiversity**:

- There is a lack of biodiversity studies and data, this fact impeding the identification of scientifically sound measures for biodiversity conservation in the municipality.
- Low water quality and insufficient green corridors in the city are an indicator of the need for improvement of biodiversity. In addition, our technical staff in municipality departments in charge with green space management have noticed the foliage of trees in the city turning yellow much sooner than in previous years, without a clear indication of factors causing this.
- Degraded riverbanks, silted riverbed and littering along the river and smaller rivulets in the municipality also has a significant impact on biodiversity, whilst being an indicator of low awareness among the population of all ages on environmentally responsible behaviour and the value of ecosystem services.

Key issues regarding **climate change mitigation and adaptation**:

- Emissions of CO₂ per GDP are high compared to international benchmarks. Although estimates are available only at national level (with values being more than double the value for 'red' benchmark) and even though in absolute terms the emissions have decreased each year, it is likely that emissions at the city level are higher than the national ones, as there is higher energy consumption for heating and traffic is much more intense in the capital as compared to the rest of the country. This indicator shows an energy-intensive economic activity.
- Frequent urban flooding during intense rains and emergence of new flood areas due to climate extremes, construction of buildings and other infrastructure which leads to impervious areas, coupled with low rainwater drainage capacity;
- There is no publicly available updated hazard map covering the entire municipality and therefore citizens' awareness and resilience to disasters is low.
- Urban flooding is bound to become more intense and frequent in the near future due to the impacts of climate change. According to climate change scenarios for the region, the intensity and frequency of extreme weather events, such as severe rainstorms, is expected to increase in the area, and subsequently in our city. Urban flooding events are caused by a variety of issues, among which limited drainage capacity by design, the lack of maintenance of the rainwater drainage system causing clogging of pipelines and gutters. The capacity of the rainwater drainage system is diminished as a result of mud and debris accumulation, leading to frequent overflows throughout the city. Although some initiatives have been implemented in tackling this issue, they are hardly sufficient. This comes in the context of generally low awareness and preparedness of citizens and local businesses towards natural disasters, including floods.

Given the available data and time series trends for the state indicators, coupled with expert knowledge of the local context, it can be concluded that the most concerning indicators for our city are related to:

- ❑ **Vulnerability to extreme weather events**, as the city is unaware and unprepared for the increasing occurrence of such events,
- ❑ **Poor surface water quality** due to values for BOD and NH₄ considerably exceeding values of 'red' benchmarks,
- ❑ **High climate change impact** due to energy, transport and waste sectors and
- ❑ **Scarce and decreasing green space within urban limits** due to a lack of clear urban land use regulation and registry of all types of green spaces and the current construction patterns.

B. Priority challenges in each sector

Note: The indicator database is provided in **Annex 1**, while problem trees per sector are provided in **Annex 2**.

Priority challenges are presented based on the analysis of indicators, field observation and knowledge of our technical staff of the status of the urban development sectors, technical consultations within the Municipality departments and public consultations.

Land use



Our General Urban Plan from 2007 included planning of main transportation routes, functionality of each land plot in the Municipality and the designated urban development areas as residential, industrial, public or green spaces. Even though the General Urban Plan had specific objectives outlined, like Ensuring the proper conditions for the preservation, restoration and extension of the existing natural heritage, Enhancing the accessibility of the economic space of Chişinău by the European freight corridors, coupled with the improvement of mobility within the Municipality, in the absence of a council approval, its implementation was rather weak, with most of the actions still pending. As a first step towards updating the General Urban Plan, we have started developing the Infrastructure Sustainable Development Plan.

Priority land use and green spaces challenges include:

- Obsolete land use regulations which do not meet the current development needs of the municipality;
- Development of high density residential areas without access to public services;
- Share of green space areas within urban limits is low and decreasing (currently 29%);
- Lack of public access to the Green Spaces Registry that defines, and limits plots designated for construction;
- Surface covered by asphalt is increasing; new constructions of infrastructures and buildings are decreasing soil permeability;
- Some agricultural lands are now being used for constructions.

Transport



We are continuously investing in the public transport sector, especially in renewing and extending the bus and trolleybus fleet, thus this is a sector that is well-managed, though potential areas for improvement remain due to rapid urbanization. Priority remaining challenges include:

- Rapid and growing car ownership, private cars being the preferred means of transport.
- Average age of car fleet is very high at 12-16 years for cars, buses, minibuses and trolleybuses, leading to high air pollution from road traffic. There is a lack of incentive schemes for energy efficient, low-polluting vehicles.
- The length of roads dedicated exclusively to public transportation is very low (2.6 km), causing a slow speed of the public transport service, which currently is only 16.9 km/h on major thoroughfares.

- Public transport fleet is insufficient, resulting in high average waiting times. Busses and trolleybuses need to include design features for people with disabilities, old citizens and pregnant women. Besides, public transport management needs improvement in case of emergencies, in order to increase the resilience of transport systems.
- There is no infrastructure dedicated exclusively to cycling; developing this type of infrastructure would encourage citizens to use bicycles as an alternative means of transport, which will result in lower air pollution from road traffic.
- No information and awareness campaigns promoting public and non-motorized transport are being conducted, this adding to highly motorized traffic.
- There is a high pressure of traffic congestion and lack of parking spaces. Traffic demand and congestion need to be improved, using smart technologies.



Solid waste

Municipal solid waste (MSW) collection in Chişinău is provided to the 5 districts of the municipality, thus 98% of the population in the city benefits of weekly collection services. However, waste collection coverage is either lacking or of low quality in more than half of all 18 suburbs. There is also a lack of coordination between the MSW collection system and the activities of the recycling companies. A private sorting facility, ABS, cooperates with the municipal waste management company but mostly mixed waste is delivered for sorting, so the recycling rates at the facility are low and the materials extracted are low grade.

Priority challenges in the waste sector include:

- Insufficient collection coverage in the suburbs.
- Low share of municipal solid waste which is sorted and recycled (7.6%), although there are more than 10 private sector companies operating in the recycling sector which only collect the most valuable materials (e.g. packaging materials and plastic).
- Significant amounts of green waste are generated, being collected separately and disposed of at the dumpsite, as there is no municipal solid waste composting facility. This results in significant amounts of solid waste disposed at the dumpsite and increased emissions of CH₄.
- The remaining life and capacity of the current landfill is relatively low, estimated at 11 years unless disposal practices are changed, and the disposal site undergoes upgrade works. The reopening of Țîntăreni landfill was accepted for a short period, until the end of 2019, and may be suspended in the future unless investments for upgrades are implemented. Besides, Țîntăreni landfill has no leachate treatment or gas collection, waste is being dumped on the landfill site.
- There is no solution for treatment of special waste streams such as bulky waste, Waste electrical and electronic equipment (WEEE), used oil, batteries and accumulators, end-of-life vehicles (ELV) and construction and demolition waste.
- Large quantities of industrial waste and chemicals with an expired term are still deposited on site of large enterprises, mostly in Chişinău. According to preliminary assessment¹ around 1000 tonnes of hazardous waste is still accumulated in Chişinău and there is no collection or treatment system for such waste flows.
- There is a lack of information and awareness campaigns among households and businesses for prevention, reuse and recycling.

¹ The estimation of these quantities of waste has been carried out in 2013-2014 by the Environmental Pollution Prevention Office within the project "Inventory, Evaluation and Remediation of Anthropogenic Pollutants in the Lower Danube Region of Ukraine, Romania and the Republic of Moldova" - MIS ETC 995 through a study in which 87 inventories of Dangerous Chemicals (including hazardous waste) from identified 133, including state-owned enterprises, public institutions and private enterprises, were inventoried. The analysis of this study shows that the largest quantities of industrial waste and chemicals with an expired term are accrued in the machinery and equipment industry enterprises founded during the Soviet period. Most of them are located in Chişinău and Bălţi. At present, in the Republic of Moldova there is no other public database on the stocks of expired chemicals and historical hazardous waste.



Water

The municipal water enterprise, S.A. “Apă-Canal Chişinău”, provides a steady and continuous water supply for the city. We are implementing a modernization project for the water supply, sewage collection system and wastewater treatment facilities to increase the efficiency of the supply network, to test smart technologies and increase the capacity and quality of the wastewater treatment plant. The EBRD/EIB/NIF project includes highest priority measures such as water supply network rehabilitation of approximately 190 km of network, sewerage network rehabilitation of 15 km of piping, and reconstruction of water pumping stations, rehabilitation of wastewater treatment plant, rehabilitation of water reservoirs, construction of chlorination unit, equipment, vehicles, and implementation of the SCADA monitoring and management system.

Priority water sector related challenges include:

- Urban flooding in case of heavy rains, due to insufficient capacity, poor maintenance, as well as soil sealing of the rainwater drainage system. Resilience to floods could be further improved through the development of drainage facilities, among other investments in this sector. There is an institutional challenge due to the fact that the rainwater collection system is owned by the Municipality and managed by the Department of Transport and Communication, through works performed by the municipal enterprise Exdrupo, slowing down all processes and investments directly connected to rainwater collection and drainage. All these entities are separate from the municipal enterprise for water supply.
- Water saving and reuse and business and community resilience are not encouraged through awareness campaigns and water metering systems. In some areas, the consumption is not measured, rather it is estimated based on the number of users in a household.
- Wastewater pre-treatment is mandatory for polluting industries, however there are enterprises that do not have pre-treatment plants leading to illegal wastewater discharges into the municipal sewerage system. Although improvements have been made, there is still a high percentage of damaged sewerage network and in other cases some sewerage networks are silted due to low wastewater flow.
- There are a significant number of households and business entities using water from unauthorized deep well drilling. Besides, unauthorized private connections to the municipal water supply and sewerage systems are encountered, increasing the demand for services in the system.
- Suburbs are not fully covered with centralized sewerage networks and still use decentralized solutions - latrines – potentially leading to soil and groundwater contamination. The water supply municipal enterprise S.A. “Apă-Canal Chişinău” is the responsible authority for monitoring groundwater quality, but not soil quality. Their reports state that water quality currently meets the national requirements.



Energy and buildings

Chişinău does not benefit from renewable energy sources for district heating or electricity, except for a small share of population using biomass for heating and a few commercial entities using PVs for electricity (approx. 500kW). In the past years, citizens of Chişinău have taken advantage of a national funding project, which encouraged private users to install solar collectors and photovoltaic systems through fiscal instruments.

Recent EBRD support programme has enabled investment in energy efficiency for the public buildings, 119 buildings will undergo deep renovation works. The district heating company, Termoelectrica, invested in a higher efficiency of the district heating supply network, a reduction of losses throughout the networks, as well as a reduction of the environmental impact. Termoelectrica has installed individual thermal points in 30 blocks of flats, achieving a reduction of 5-8% of thermal energy losses. Besides, they have deployed a public information and awareness campaign regarding the advantages of district heating for private users and solutions for modernising heating systems in buildings, which resulted in an increase of the number of customers (the heat load increased approximately 5% per year in 2016 and 2017). There is still considerable room for further investments in this sector.

Other challenges in the Buildings and Energy sectors are as follows:

- Although direct use of electricity for heating is not widespread in Chişinău, the high electricity consumption in residential buildings (27-31 kWh/m²) and high heating consumption in public buildings (178 kWh/m²) results in a negative impact on the environment. It is also common that both private and public buildings are under heated, leading to low thermal comfort for the occupants.
- There are no Building Standards for Green Buildings or nearly-Zero Energy Buildings (nZEB), nor are there buildings certified according to International Green Buildings Certification Systems (BREEAM, LEED etc.).
- Investment in energy efficiency in buildings and renewables needs improvement through public and private financial schemes and incentives.
- The district energy networks are, in some cases, old and located above ground, requiring investments to improve their efficiency and relocate the networks underground, including individual metering and control systems for heating, as thermal energy consumption is measured in some cases at the level of block of flats and in some other cases for the individual user.
- Street lighting is insufficient and inefficient. This might negatively influence citizens safety (particularly causing insecurities in case of women).
- Although the law requires, in some cases, that new buildings must be connected to the central system, there is a growing number of local heating systems (e.g. small building boilers) making district energy network less viable financially. Out of the total number of newly erected buildings, approximately only 5% have been connected to the district heating system, the others having individual heating systems.
- Most apartments connected to the centralized heating system do not have individual contracts or metering systems for the thermal energy installed, resulting in a low tendency to save and undertake energy efficiency measures at housing unit level.
- Intermediate-depth earthquakes from the Vrancea seismic zone located in Romania affect the territory of the Republic of Moldova. Major earthquakes have happened in 1977 and 1986 and minor earthquakes are common. At the moment there is no official document to report buildings and city infrastructures at risk in case of a major earthquake or other disasters.

Industry



There is insufficient data available regarding industry, however information provided by the Municipality and stakeholders indicates that there is a need for improvement in the industrial waste and especially hazardous waste management and wastewater pre-treatment.

Wastewater pre-treatment is mandatory, however there is a significant number of enterprises that do not have pre-treatment plants.

Studies have identified several industrial sites with large stocks of obsolete chemicals and hazardous waste, namely in former large enterprises and industrial sites in Chişinău.

Addressing priority challenges through action

This brings us to a close on the section of analysis of state and pressure indicators. We have identified the following priority environmental challenges for the city: air, water, biodiversity, land use, climate mitigation, climate adaptation; priority pressures: transport, land use, energy & buildings, solid waste.. In the next section we will turn to identify responses to these challenges, focused on institutional capacity, policies & investments and improving public awareness.

- **Institutional capacity.** In order to implement the green urban development actions at the city level, we need to further enhance our institutional, legal and regulatory capacities, at the Municipality level.

Our priorities include institutional cooperation between our departments, trainings and dedicated workshops for our staff members and development of regulatory framework.

- **Policies & Investments.** The indicator analysis highlighted areas where further investments and feasibility studies are needed. These findings were reinforced by existing plans and policies. Our main focus is to set up a prioritisation of these investments and determine financing sources.
- Public awareness. We intend to engage more in public awareness campaigns in order to improve the environmental performance and comfort in Chişinău and to educate our citizens towards a green behaviour.

Section

2

Green City Action Plan

Chapter 4

Overall Vision and strategic objectives



Chişinău is a leafy, safe and clean city, proving that city governance and culture are working for urban development. The task at hand is to protect and build on those values through a strong local governance, community participation and integrated planning.

The vision will be achieved by working on the strategic objectives and specific objectives identified in key development areas and presented in this section.



Strategic Objective

0

Enhanced institutional capacities for the implementation, assessment and monitoring of the sustainable urban development process



Strategic Objective

1

Sustainable mobility and transport



Strategic Objective

2

Climate resilient green-blue infrastructure



Strategic Objective

3

Sustainable and efficient energy



Strategic Objective

4

Sustainable resources and waste management

The objectives and sub-objectives emerged in the thematic areas of mobility, blue-green infrastructure, energy and resources and waste management. The proposed actions are interdependent and enhance each other. For example, active transport such as biking or walking is more likely in greener public spaces or bike-lanes and footpaths set in green corridors. At the same time greening helps control overflowing of drainage in case of heavy rains, which is one of the main problems of the city.

For all strategic objectives policy actions include investments and soft measures such as regulatory and capacity building action and those targeting behaviour change. These may be part of the specific objectives or part of steps for implementing investments, depending on the importance and magnitude of these.

Annex 5 illustrates a map of all mappable actions.

Chapter 5

Strategic Objective 0. Enhanced institutional capacities for the implementation, assessment and monitoring of the sustainable urban development process

Note to the reader: the below section on SO 0 is under development and needs to be discussed and confirmed during a workshop with the municipality as suggested before. Unfortunately, this workshop was postponed due to political changes.

5.1. Rationale

This objective targets the institutional, legal, regulatory and capacities framework for implementing green urban development actions. We aim to focus on governance and show in a clear way the streamlining and preparation as planned through the governance related specific objectives. The actions proposed under this overarching objective are linked to the investments and policy actions proposed for the sectors.

In the absence of an updated General Urban Plan the municipality has developed in a fragmented, inertial manner in the last decade. Chişinău is a leafy city with many parks and streets lined with trees. However, the lack of adequate land use regulation and enforcement has led to the disappearance and degradation of green spaces that have not been properly registered and belong to no one. This void in urban planning has led to loosely authorized constructions, mixed and ad hoc land use for different purposes in the inner city but also in the 18 settlements forming the suburbs of the municipality.

The transport, water and wastewater sectors have developed feasibility studies or master plans that helped streamline efforts and investments in these fields. The initiatives in the waste, energy and buildings sectors have been scattered and underfinanced as the plans, even if drawn up, were not approved by the council. The industry sector and district heating, which are important part of the urban fabric, fall outside of the direct jurisdiction of the municipality and are not regularly part of an urban development vision, strategy or planning. The need for integrated development with packaged multi-purpose actions is recognized by the municipality and stakeholders and is reflected in the vision. Likewise, stakeholders aim to ensure that the low safety in public spaces, the need for support facilities (care facilities, public toilets and gender-sensitive infrastructure), incidents of gender based violence, the need for differentiated mobility patterns are all taken into account in order to ensure that all the benefits and economic opportunities urban areas can offer are accessible by both women and men.

Institutional streamlining is under-way in Chişinău, but more attention is needed towards projects that require cooperation between departments and stakeholders, such as rehabilitation of the river Bîc or initiatives in energy efficiency in heating. The development of the regulatory framework and that of an urban plan is of urgency for protecting green spaces and managing land-use. Last but not least, the specialized staff of the municipality needs to be up to speed with latest urban solutions and technologies to be able to plan, implement and monitor initiatives efficiently.

Vision: **Enhanced capacities and urban governance** will enable the municipality of Chişinău to excel in integrated and participative governance oriented to green development.

SO 0.1 Functional framework for integrated project management

SO 0.2 Integrated planning

SO 0.3 Elaboration of regulatory acts

5.2. Actions



Strategic objective 0. Enhanced institutional capacities for the implementation, assessment and monitoring of the sustainable urban development process.

Strategic objective

0

SPECIFIC OBJECTIVES ON MEDIUM-TERM (2024)	SHORT-TERM ACTIONS	MEDIUM AND LONG-TERM ACTIONS
SpO.0.1 Functional framework for integrated project management	0.1.1. General institutional framework for project management on municipal level 0.1.2. Creating a functional institutional setup at sectoral level 0.1.3. Developing and enhancing the capacities of the staff within the Municipality of Chişinău, in order to be able to: - Collect and manage data - Monitor projects and programmes - Acquire specific competences in their fields of activity - Transfer information and replicate competences within the departments of the Municipality	
SpO.0.2 Integrated planning	0.2.1. Develop and / or update the local action plans Updating the General Urban Plan with elements of GCAP Chişinău Public transport plan Urban Sustainable Mobility Plan Traffic management plan including conventional and smart elements Local action plan for energy efficiency Integrated resource and waste management plan	
SpO.0.3 Elaboration of regulatory acts	0.3.1. Develop and / or update the local regulations Planning regulation at condominium level Legal regulations regarding the distances within the city in order to ensure free access to green areas Legal regulation of the parking system Land use regulations Updating the green areas cadastre at city level Ecological public procurements (Euro 6 standards, waste prevention, energy performance standards etc.)	Reforming the tariffs for public utilities

0.1.1. General institutional framework for project management on municipal level

Description

The first specific objective focuses on establishing a functional framework for integrated project management within our Municipality. This can be achieved via two actions. First, by setting up the institutional structure responsible for GCAP implementation and second by developing and enhancing the capacities of our staff. The two actions are presented separately but they are interconnected and should be implemented together.

As of today, Chişinău Municipality implements a considerable number of projects financed directly from its own budget or with international financial support. These projects are implemented mainly by specialised sectorial units and municipal enterprises or departments under the direct coordination of the Mayor. There is no dedicated unit for Project Management established within the Municipality. This leads to fragmentation and discrepancies in development and the way we approach development in our city.

The GCAP is a strategic policy document developed by the Municipality together with a wide range of stakeholders. Stakeholders include both internal departments and agencies / municipal service providers and external ones such as academia, NGOs and interested persons.

During the GCAP development, we focused on defining the most suitable institutional setup that will ensure an effective implementation of the identified policy actions. There are two elements that we have considered:

- **the coordination of the overall GCAP implementation** – this is foreseen as an overarching, well structured, result oriented process; and
- **the implementation of GCAP actions (projects)** – considering that for each envisaged action included in the GCAP, there is a short description that should be transformed into a feasible project ready to be implemented.

We are committed to work towards establishing a Project Management Division that will be responsible for coordinating the implementation of the GCAP actions and other integrated development projects. This division will be under the direct subordination of the executive body of the Municipality, the Mayor's office. The main tasks to be performed by the team responsible for coordinating GCAP implementation will focus on ensuring that sectoral policies and plans developed hereto will include GCAP actions; supervise the GCAP implementation in terms of effectiveness and efficiency (time, resources allocated, progress and impact); lobby and advocacy for GCAP at all levels; fund raising and coordination of efforts for ensuring that sufficient resources are allocated for GCAP implementation; communication, transparency and accountability; data collection and management of information (digitalization) related to all GCAP project monitoring and results, dissemination of information, reporting to internal and external stakeholders and initiating and overseeing the periodical update of the plan.

Based on previous experience, the implementation of development projects (e.g. in the water sector) will be done via dedicated Project Implementation Units established at the level of each sectorial municipal enterprise that will be considered the project beneficiary. The implementation of each GCAP action and/or their corresponding measures include but do not limit to, specific tasks such as: searching for potential donor organisations for GCAP actions – attracting funds, fund raising; coordinating the preparation of pre-feasibility, feasibility studies; preparing tendering dossiers, conducting tendering process, evaluation; overseeing the project implementation and ensuring technical coordination, financial coordination, monitoring and evaluation; internal and external reporting; engaging with the representatives of local communities – developing programme for activating them for taking part in the implementation of GCAP actions.

The legal format of the two entities presented above is not yet decided. A legal review and a thorough analysis will be conducted in order to define the most suitable legal format for the two entities.

Scale and Location/ Area of implementation

The current action is to be implemented at the level of Municipality of Chişinău. The institutional setup will impact all the departments and units under the direct coordination/subordination of the Municipality.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău, Mayor's Office.

Legal Framework and Enabling Factors

The Municipality has conducted an institutional analysis and defined the new structure that will ensure a more efficient and effective management of resources and development. According to the existing legal framework in Moldova, setting up a new entity responsible for Project Management is a common practice and is possible. Law no. 436 / 2006 stipulates that the local administration may decide to establish a new entity either for public service enterprises or commercial entities that are for the benefits of the community.

Implementation steps

The following steps are needed in order to setup the institutional framework for GCAP implementation:

1. Conduct a legal review of the options for institutional setup for GCAP implementation. At present, there are two options under our review:
 - a) establishment of a Regional Development Agency (RDA) that will integrate the two entities presented above under one roof.
 - b) establishment of a Project Management Division (PMD). This will be an external unit under coordination of the Mayor's office and will function on commercial basis, ensuring and managing its own budget from projects that will be implemented by the division.
2. Drafting and approving the local council decision related to establishment of the most suitable institutional framework.
3. Allocate resources for setting up the institutional structure.
4. Selection of employees.

Targets

- Institutional structure for GCAP implementation is in place;
- Number of projects annually attracted and implemented;

Benefits

- Efficient use of available resources.
- Enhanced management practices for city development.

Cost estimate

Parameter	Value
Costs of legal review and defining the most appropriate institutional framework	5,000 €
Setup capital cost including costs with equipment and training for the staff	50,000 €
CAPEX	55,000 €
OPEX	tbd based on the chosen option
Possible source of funding	Municipal budget, IFIs

Estimated timeframe

Completion expected 6 months after GCAP approval

0.1.2. Creating a functional institutional setup at sectoral level

Description

The current institutional framework of Chişinău Municipality includes several departments and municipal enterprises designed based on sectors. For some sectors, responsibilities for management, monitoring, control, regulation, daily operation, etc., are scattered between several entities. This leads to situations where decision making processes are more difficult at sectoral level due to inadequate coordination between entities and/or lack of proper management practices.

Via the current GCAP we are envisaging to develop the targeted sectors (transport, waste, water, land use, building, energy efficiency, industry) in order to increase the overall environmental performance of the city and thus to enhance the quality of life of our citizens. In order to do this, we are committed to strengthen the capacities of our municipality by monitoring the existing situation more thoroughly, by providing our departments with tools and other means that will enable them to control and design regulatory frameworks for each target sector.

The main focus area of this action on the short term is related to transport sector and in particular to the following components:

- **Public Transport** – the current institutional setup at municipality level includes a Public Transport Management Entity responsible for the operation of public transportation routes but with no clear responsibilities for planning, regulation or monitoring of the overall public transportation system (including private operators). It would be beneficial to include such tasks under the responsibilities of this entity.
- **Road maintenance** – at the municipality level there is more than 1 entity dealing with road maintenance tasks. It would be beneficial if a Road Maintenance Task Force would be established for coordination of all road maintenance work throughout the entire municipality.
- **Parking** – the current parking system in Chişinău is underdeveloped. We are working towards enhancing our capacities for establishing controlled parking zones. In order to have this, we also have to consider the following institutional aspects that need to be sorted out:
 - a) Change and complete a new Contravention Code on offenses (contraventions) in the controlled parking area
 - b) Change and complete a new Enforcement Code of Republic of Moldova, in particular in relation to vehicle clamping and removal
 - c) Elaborate Draft Regulations on vehicles parking in public places in Chişinău to change the perspective such that within the controlled parking zone users are only allowed to park in designated bays/areas
 - d) Change the legislation on local public administration, to complete contravention and enforcement legislation with provisions on enforcement and sanctions for parking violations linked to the Regulations proposed for vehicles parking in public places
 - e) Conclude Agreements with relevant authorities (in particular the Public Services Agency) to exchange information about owners of parked vehicles both with the Municipality and with the parking contractor on behalf of the Municipality.

All the above are just examples and we will conduct a full analysis of all sectors and their responsible departments/entities in order to understand their roles and functions and to design a more robust institutional setup at sectoral level that will maximize the work efficiency. This is a long term commitment and we are keen on working towards this together with external consultants and other national and/or local stakeholders.

Scale and Location/ Area of implementation

The current action is to be implemented at the level of Municipality of Chişinău and all its entities under subordination / coordination.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău, all departments and municipal enterprises;

Cooperating Stakeholders: Police, especially the Road and Traffic Control Police Department; Department for Emergency Situations; Private operators of public transportation services.

Legal Framework and Enabling Factors

The current legal framework both at national and local level supports the development and strengthens the institutional setup at local authorities' level. The only limitation is related to the availability of funds for implementing such programmes.

Chişinău Municipality will work towards including in all the projects that are about to be implemented a component aiming at capacity building and strengthening their monitoring and control capabilities.

Implementation steps

The following steps will be made in order to setup the institutional framework at sectoral level:

1. Conduct a complete analysis of the departments and entities under subordination/coordination of Chişinău Municipality in order to understand all their roles and responsibilities.
2. Identify the sectoral needs for enhancement of local capacities for regulation and control of sectors.
3. Define most suitable sectoral institutional setup in conjunction with cooperating stakeholders.
4. Create the necessary institutional setup at sectoral level or revise the internal procedure of existing institutions in order to include responsibilities related to regulation and control activities – monitor and evaluate its effectiveness on a yearly basis.

Targets

- Sectoral institutional frameworks for regulation and control are either in place or existing ones are officially empowered to perform such activities;
- Database with sectoral information available and shared with key stakeholders;

Benefits

- Strengthen the local capacities for improving project management competencies and monitoring and evaluation competencies at sectoral level.
- Reduce costs / expenditures from municipal budget.

Cost estimate

Parameter	Value
CAPEX	50,000 €
OPEX	25,000 €/ year
Possible source of funding	Municipal budget, IFIs

Estimated timeframe

Completion expected 18 months after GCAP approval

0.1.3. Developing and enhancing the capacities of the staff within the Municipality of Chişinău

Description

Chişinău Municipality has implemented several development projects with existing resources and capacities. Still, the current institutional framework is not yet fully functional, and the municipality lacks highly trained and qualified people that could support the GCAP implementation process.

The municipality aims at developing its capacities for:

- Collect and manage data
- Monitor projects and programmes
- Specific competences at sectorial level
- Transfer information and replicate competences within the departments of the Municipality.

All the above will be done via a Human Resource Development Programme (HRDP) that will be designed and implemented by Chişinău Municipality. This programme will include but not limit to: trainings, participation at study visits, cooperation with external consultants that will transfer know-how, coaching and guiding programmes, etc. The HRDP will also consider ensuring sustainability and systemic impact on the promotion of gender equality and equal opportunities policies and practices within their workforce as well as within the municipal service providers.

Scale and Location/ Area of implementation

The current action is to be implemented at the level of Municipality of Chişinău and all its entities under subordination / coordination.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău – all departments and municipal enterprises.

Legal Framework and Enabling Factors

The current legal framework both at national and local level support the development of human resource development programmes. The only limitation is related to the availability of funds for implementing such programmes.

Chişinău Municipality will work towards including in all the projects that are about to be implemented a component aiming at capacity building and strengthening the level of competencies of employees.

Implementation steps

The following steps will be made in order to enhance the capacities of the staff within the Municipality of Chişinău:

1. Conduct a training needs assessment for all the departments and entities under subordination/ coordination of Chişinău Municipality.
2. Design a Human Resource Development Programme (HRDP).
3. Implement the programme – monitor and evaluate its effectiveness on a yearly basis.

Targets

- HRDP is in place;
- All municipality employees trained in the area of HR policies and practices on equal opportunities, design and provision of gender-sensitive services, disaggregated by sex and position;

- Increased awareness of municipality staff of gender-responsive services provision and of equal opportunities (e.g. measured by allocating or strengthening a role of a focal point responsible for social/gender within their staff); Increased number of women in senior decision-making positions in the municipalities;
- Increased work efficiency;
- Employees satisfaction level to be verified through regular evaluation discussions;

Benefits

- Increase employees' satisfaction level.
- Increase employees' awareness and understanding of gender equality.
- Strengthen the level of competencies available at the level of municipality.

Cost estimate

Parameter	Value
Costs of developing the HRDP	15,000 €
Estimated costs for one training / person	500 €
CAPEX	15,000 €; 500 €/training
Possible source of financing	Municipal budget, IFIs

Estimated timeframe

Ongoing activity throughout the entire lifespan of the GCAP implementation period

0.2.1. Develop and/or update the local action plans

Description

The GCAP actions are cross sectorial and aim at ensuring a coherent and balanced development of the city in line with its ambitions related to enhancing the quality of life of its citizens and environmental protection goals.

In order to be able to achieve this, the local action plans currently available at the municipality level will be assessed and updated and in case needed, new ones will be developed. As of today, we are working on updating the **General Urban Plan**. This is the most important document that we are working on and we will make sure that GCAP elements are fully incorporated in it. Also, we are committed to work towards including elements that are focusing on ensuring the access to public areas/institutions for persons with physical disabilities and persons with strollers, address the lack of playgrounds for children and other socially oriented measures.

Further on, we will work on updating and/or developing other sectoral action plans, such as:

- Public transport plan
- Urban Sustainable Mobility Plan
- Traffic management plan including conventional and smart elements
- Local action plan for energy efficiency
- Sustainable Energy and Climate Action Plan – Covenant of Mayors
- Integrated resource and waste management plan
- Plans for safety in public spaces and support facilities (care facilities, public toilets, gender-sensitive infrastructure etc.) and access for persons with disabilities.

Some of the above action plans are also referenced at specific sectoral GCAP actions presented in the next chapters. Also, some of these plans are already under revision or currently under updating process.

The newly established Project Management Division will work with, coordinate and support the relevant sector units in order to drive implementation, reporting and generally facilitate financing for implementing the existing/new municipal planning documents. Also, the planning, implementation and reporting/monitoring will be feedback looping where one feeds the other to periodically update planning process and implementation cycle, contracting forms etc.

All the above plans will be developed /updated following a participatory process and will be publicly consulted. Suggestions from any interested stakeholder will be incorporated whenever feasible.

Scale and Location/ Area of implementation

The current action is to be implemented at the level of Municipality of Chişinău and all its entities under subordination / coordination. Some of these plans may have regional impacts or may involve surrounding settlements in case feasibility considerations or other requirements indicate this.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău – all departments and municipal enterprises.

Legal Framework and Enabling Factors

The current local legal framework supports or requires the development and/or update of action plans. The only limitation is related to the availability of funds for implementing such activities and lack of sufficient specialised human resources (qualified).

Chişinău Municipality will work towards including in all the projects that are about to be implemented a component aiming at developing and /or updating existing sectoral action plans, whenever the case.

Implementation steps

Update the existing Master Plans, Policies, Action Plans.

Targets

- Approved Master Plans, Policies, Action Plans;

Benefits

- Coordination is under development and there is a clear development pathway.
- Effective monitoring and evaluation.

Cost estimate

Parameter	Value
Cost of updating the General Urban Plan	300,000 €
Writing or updating the 7 plans mentioned above at average cost of 50,000 € per plan	350,000 €
CAPEX	650,000 €
Possible source of financing	Municipal budget, IFIs

Estimated timeframe

Completion expected 1 year after GCAP approval

0.3.1 Develop and/or update the local regulations

Description

The development of action plans ensures that the development process is on the right route and offers us the possibility to measure the progress and guide the investments in the best way possible. Still, the action plans do not give us the warranty that the process is also effective. We need to consider also the development and / or update of our local regulations in order to make sure that best solutions are to be implemented so that citizens feel the change we are envisaging in the quality of life and the quality of environment.

In the medium and long term tariff reform will be initiated in the municipality. We have control over setting the tariffs in the waste sector and the parking/ transport sector. These are hotly debated topics in the council and will likely be the first ones to change from all tariff schemes. The need for tariffs, ticketing, pricing is included in the relevant sectoral policy actions in the steps. Energy tariffs are decided at the national level. Water sector tariffs are currently under restructuring, water tariffs being decided on by the national authorities.

We are committed to work towards introducing new regulations in the following sectors:

- Green areas – first, we will establish a cadastre of all green areas at city level. Then, we will define the legal regulations regarding the distances within the city in order to ensure free access to green areas. One measure could be provisions in the construction authorizations for buildings, to include the development of green areas in coordination on private property and adjacent public space.
- Planning regulation at condominium level
- Regulation of the parking system
- Land use regulations
- Green public procurements (including Euro 6 standards, waste prevention, energy performance standards etc.)
- Process of transition from public to private property in case of multi-family residential units
- Regulation for safety in public spaces and support facilities (care facilities, public toilets, gender-sensitive infrastructure etc.) and access for persons with disabilities.

All the above regulations will be developed/updated following a participatory process and will be publicly consulted. Suggestions from any interested stakeholder will be incorporated whenever feasible.

Scale and Location/ Area of implementation

The current action is to be implemented at the level of Municipality of Chişinău and all its entities under subordination / coordination.

Owner and Cooperating Stakeholders

Owner: Municipality of Chişinău – all departments and municipal enterprises.

Legal Framework and Enabling Factors

The current local legal framework supports the development and/or update of regulatory documents. The only limitation is related to the availability of funds for implementing such activities and lack of sufficient human resources (qualified).

Chişinău Municipality will work towards including in all the projects that are about to be implemented a component aiming at developing and /or updating existing sectoral regulations, whenever possible and if the case.

Implementation steps

The following steps will be made in order to setup the regulatory framework for GCAP implementation:

1. Analyse existing Sectoral Regulatory Framework at local level.

2. Define the targets/ambition level for each regulatory framework.
3. Update the existing Sectoral Regulatory Framework.
4. Develop new Regulatory document when the case.

Targets

- Approved Regulatory Frameworks;

Benefits

- Enhanced environmental conditions.
- Enhanced quality of life.

Cost estimate

Parameter	Value
Estimated average costs for updating one Regulatory Framework	10,000 €
CAPEX	10,000 € / one RF
Possible source of financing	Municipal budget, IFIs

Estimated timeframe

Completion expected 1 year after GCAP approval

Chapter 6

Strategic Objective 1. Sustainable mobility and transport

6.1. Existing responses in the transport sector

Chişinău has registered a significant growth rate over the recent years, from 674,000 inhabitants in 2014 to 825,000 inhabitants in 2018. The urban area is extremely dense and concentrated with more than 80% of the population living in the city and 20% of the population living in the outskirts of the municipality.

Like most cities in Eastern Europe, formerly Chişinău has had a very low motorization rate, but at present it is constantly growing. Despite this trend, the use of urban public transport is still high. The public transport comprises trolleybuses, trams and privately operated minibuses. Investment costs in public transport are high, but financing is scarce. Moreover, public transport costs are rather high, because too often available areas are being allocated to vehicle traffic instead of public transport lanes. Moreover, much of the public space is destined to parking cars. The efficient organizing of parking is an underestimated asset, which would be not only profitable, but could serve multiple goals.

On institutional level, the transportation system is not planned in an integrated way. The lack of monitoring and lessons learned of ongoing recurrent actions hinders the effective implementation of measures that were proposed in several all-encompassing policy studies in the field of public transportation, parking policy, road maintenance etc.

In general, Chişinău is a safe, clean and a green place to live. This aspect, mainly determined by policy actions and by human behaviour, proves that politics can induce real change in Chişinău and that people are sensitive to policy decisions. In the transportation sector however, problems require urgent measures: people do not enjoy using public transportation means in the city, simply because the system is poorly organized and the focus is wrong: driving and stationary cars are “subsidized” by the municipality, and active modes of mobility (walking/cycling) are an outcast, although they give colour and life to a city. With several low-cost interventions, supported by political power and administrative capacity building, behavioural change can be expected towards a sustainable and smart urban transportation system.

First steps are slowly and carefully taken:

1. During the last 8 years, no new buses were purchased. Only at the beginning of 2019, the procurement of 30 new buses and minibuses was initiated, currently being an ongoing process. Lessons learned encourage us to focus our resources towards a smooth procurement in the future to gradually replace the rolling stock, which is old and in poor technical condition..
2. The Municipality started to implement a Road Rehabilitation and Maintenance Program through performance contracting, meaning that the company who rehabilitates or constructs the road stays responsible for maintenance. Experience from implementing this programme will help develop a larger program for the urban roads.
3. By the end of 2019, 10 smart traffic lights will be implemented in Chişinău. This might become the beginning of an operational urban traffic centre.
4. UNDP has recently launched the “Moldova Sustainable Green Cities” program that consists of a series of pilot projects through the Green City Lab. One of the flagships is to develop a Sustainable Urban Mobility Plan for Chişinău Municipality. This widespread urban strategic planning instrument addresses specific local transport and mobility problems, such as air quality improvement and CO2-reduction, congestion, traffic safety, accessibility. Together with the ongoing General Urban Plan (GUP), this is a great opportunity towards integrated planning and policy actions for an attractive and liveable city disposing over an attractive, safe, sustainable and cost-effective urban transport system.

6.2. Rationale

Nobody is enjoying travelling in the city, since transport is weakly organized, and priority is given to cars rather than mobility. Driving and stationary cars are favoured by current management practices, public transport is not prioritized and there is a lack of infrastructure for the active modes of transport (walking/cycling). Focusing more on active transport gives liveliness and buzz to city life besides it being environmentally friendly, healthy and cheap.

The specific objectives in transport are targeting the most stringent problems. Symptoms of an inadequate transport system, such as congestion do not immediately point to the preferred solution. Increase of car ownership and car use is the underlying issue leading to capacity problems and increased traffic.

The lack of a parking policy and lack of parking spaces have far reaching consequences to transport and beyond. Organizing transport in a more efficient way, introducing regulation, increasing awareness to reduce the use of highly polluting cars and encouraging active transport modes will lift the pressures on the environment and the transport system. Making public transport travel times and comfort competitive with that of private cars will lead to modal shift.

Last but not least, the reliability of transport needs to improve also through a better traffic management and road maintenance.

Vision: Sustainable mobility and transport will create easy and safe commute to connect parts and people of the city in an environmentally safe, healthy and pleasant mobility.

SO 1.1 Increasing the energy efficiency of public transport

SO 1.2 Switch to public transport and active means of transport

SO 1.3 Improving the reliability of the transport system

6.3. Actions



Sustainable mobility and transport.

Chişinău will provide attractive, comfortable and energy efficient transportation alternatives.

Strategic objective

1

SPECIFIC OBJECTIVES ON MEDIUM-TERM (2024)	SHORT-TERM ACTIONS	MEDIUM AND LONG-TERM ACTIONS
SpO.1.1 Increasing the energy efficiency of public transport	1.1.1. Renewing the urban bus fleet 1.1.2. Introducing one car-free day annually in the city centre	- Gradually limiting imports of old vehicles - Establishing Reduced Emission Zones and/or introducing congestion charges - Increasing the energy efficiency of public transport through acquisition of natural gas and electric vehicles and phasing out diesel vehicles - Increasing the share of electric buses and trolleybuses in the total number of public transport vehicles
SpO.1.2 Switch to public transport and active means of transport	1.2.1. Creating a controlled parking area, managed by the municipal parking agency 1.2.2. Developing and operating three principal bus corridors 1.2.3. Connecting urban parks and green areas through a cycle route and a bike sharing system 1.2.4. Traffic calming in areas with schools, developing a network of connected sidewalks between schools	- Developing infrastructure for efficient modal interchanges - Developing a cycle route network - Pedestrianizing public areas - Implementation of the parking policy
SpO.1.3 Improving the reliability of the transport system	1.3.1. Road rehabilitation and maintenance 1.3.2. Creating an Urban Traffic Centre for traffic monitoring and traffic light optimisation	- Developing a traffic management plan including conventional and smart elements - Implementing smart transport solutions



1.1.1 Renewing the urban bus fleet

Impact indicators – 1: low, 3: high



Air quality	3
Energy use	3
Material use	3
Economic return for investors	3
Public health	3
Climate change mitigation	2

Description

Renewing the bus fleet is a high priority towards a greener, more comfortable and reliable bus service in Chişinău. The average age of the public buses and trolleybuses in Chişinău is very high. During the last 8 years, no new buses were purchased. Only at the beginning of 2019, the procurement of new trolley buses, buses and minibuses was initiated. Lessons learned of this process will be taken towards a smooth procurement process in the future. The pace of procurement of new buses and trolleybuses will be increased and we will seek and allocate additional financing for the operation of the bus park. This includes capacitating and recruiting additional personnel for procurement, planning, operation of the fleet, including bus drivers and maintenance staff.

Besides the public buses and trolleybuses, the advanced age and poor technical condition of the privately-owned micro-buses need to be tackled. Presently this is done through imposing gradually stricter standards when tendering out the operation of the different routes, including requirements regarding the engine, which must be currently at least a Euro 5.

Scale and location

At present, about 30% of the trolleybuses and 80% of the large buses need replacement, while 100% of the currently used mini-buses need to be replaced with suitable small and medium capacity buses. The measure includes GPS systems for the buses, which allows for the monitoring of the public transport. For a well-functioning system to accommodate the new fleet, investments into the rehabilitation of 200 of the 500 public transport stops is needed, as well as the extension of the trolley bus line system.

Owner and cooperating stakeholders

Owner: Department of Transport and Communication;

Cooperating stakeholders: Regia Transport Electric Chisinau/ Electric Public Transport Municipal Enterprise (RTEC) and Parcul Urban de Autobuze/ Urban Bus Fleet Municipal Enterprise (PUA) as public operators;

Legal framework and enabling factors

Several studies about the need of renewing the bus fleet and reorganisation of the public transport in Chişinău were made. In “The Public Transport Strategy of Chişinău (2013)”, the City approved as one of the objectives of the strategy that “The average age of vehicles should be eight years and the maximum age for a vehicle should be 12 years by 2020. All new vehicles purchased must be equipped with large double doors and low floor boarding for better accessibility and suitable seats and provision for standing passengers sitting.”

Implementation steps

1. Gradually introduce quality standards for the minibuses.
2. Evaluate the process of acquiring low-emission public transport vehicles (procurement, available financial resources, timing).
3. Monitor the realization of the policy action towards the renewal and greening of the (trolley)bus fleet.
4. Design features to ensure passenger safety and prevention of harassment incidents.
5. Speed up the procurement program for new (trolley)buses.
6. Invest in capacity building throughout the entire life cycle of the bus (personnel for procurement, planning, exploitation and bus drivers, maintenance staff).
7. Update the Public Transport Strategy to better reflect current needs and goals in terms of renewal of fleet.

Targets

- The average age of vehicles to be 8 years and the maximum 12 years by 2023;
- 50% of vehicles to be compatible with Euro 3 or more;

Benefits

- The use of lower emission technologies reduces carbon emissions and improves air quality
- Modern buses increase comfort of public transport users
- Lower exploitation cost (fuel savings) and more reliable public transport

50% of vehicles compatible with Euro 3 or more will reduce CO₂ emissions 30% CO₂ reduction or 323 tonnes/year²

Revenue from gradual increase of tickets to 1 EUR per ticket

Cost estimate

Parameter	Value
Replace rolling stock of fleet: 50 trolleybuses and 150 buses	60,000,000 €
Rehabilitation works for 200 of the 500 public transport stops	3,000,000 €
Replacing and extending the trolleybus networks (200 km cables)	40,000,000 €
CAPEX	103,000,000 €
OPEX	20,000,000 €/ year
Possible source of funding	IFIs, loans, ticketing

Estimated timeframe

- Updating quality standards for public transport vehicles - 2020;

² Source: The Public Transport Strategy of Chişinău (2013)

- Designing features to ensure passenger safety & establishing technical requirements for new vehicles- 2020;
- Replacing the rolling stock of buses and trolley-buses- 2021-2024;



1.1.2 Introducing one car-free day annually in the city centre

Impact indicators – 1: low, 3: high



Climate change mitigation	2
Safety	2
Social inclusion	2
Air quality	1
Land use	1
Public health	1

Description

The increase in car ownership over the last few years is of great concern. It is particularly worrying that this increase will continue in the coming years. Moreover, in 2010 Moldova abolished the customs taxes for vehicles less than 7 years old. Currently an age limit of 10 years is applied for all imported automobiles. The overwhelming occupation of cars on the urban roads and public space in Chişinău urges to action, since an increased use of high-polluting vehicles affects mainly the high-dense metropolitan area of Chişinău. A local action that can be taken in the short term to increase the awareness of air pollution is a car-free day. The car free day could be organized during weekend, carefully selected so that it does not collide with national holidays when traffic would be low anyway. A city wide monitoring of air quality at key congestion points will be implemented in parallel to display air quality in visible places and to increase awareness of citizens. When political and public awareness about air quality increases, a system of banning/reducing polluting vehicles (Low-emission zones) could be taken into consideration.

Scale and location



Preparatory studies have already been done, and the location of the car free day will be in the city centre. The area defined in the Controlled Parking Zone (CPZ) can be a good starting point to demarcate the car-free zone.

The exact zoning depends on the actual road circulation scheme to minimize impact of the traffic circulation.

Owner and cooperating stakeholders

Owner: the Public Relations Department of the Municipality;

Cooperating stakeholders: key NGOs for organizing events; the Ministry of Environment and the Environmental Protection Agency for the air quality monitoring; the Police for putting in restrictions for traffic;

Legal framework and enabling factors

In 2014, the Air Quality Governance project has developed legislation and basic procedures and ensured planning for key environmental sectors. It included enhancing administrative capacities for emission control, including for monitoring, enforcement and inspection, thus there is experience with initiatives regarding air

quality monitoring. A local decision by the municipality is needed to implement a car-free day, there is no national legal impediment to prevent such action from the municipality.

Implementation steps

1. Design and implement an awareness raising campaign to promote the car-free day and to reduce traffic use in city centre and especially the use of highly polluting vehicles.
2. Install and monitor air quality at key traffic congestion points in the city.
3. Organize and implement the car-free day, include cultural and awareness raising events to be carried out during the day in the city centre.

Targets

- A yearly increase of public awareness of using sustainable transport modes in the city centre;

Benefits

- NO₂ reduction around 20% -40% of usual levels in a day³.
- Increased awareness related to negative impacts of car use and especially high polluting cars will lead to behaviour change and reduced car- trips in the city. As a result, air pollution will be reduced, mainly fine particles, nitrogen dioxide and indirectly ozone.
- Improved air quality impacts the quality of life in terms of reduction in lost working days, lower healthcare costs, especially the quality of life of vulnerable groups such as children, the elderly and others with respiratory problems or asthma.
- Improved ecosystem health due to reduced nitrogen pollution (eutrophication) and reduced acid rain.

Cost estimate

Parameter	Value
Study a system of banning/reducing polluting vehicles	50,000 €
Implement monitoring system for air quality	500,000 €
CAPEX	550,000 €
OPEX (awareness raising campaigns)	100,000 €/ year
Possible source of funding	Municipal budget

Estimated timeframe

- Designing & performing awareness raising activities - 2020;
- Installing air quality monitoring system- 2023;
- Organizing and implementing the car-free day- starting with 2021;

³ European Commission,
https://ec.europa.eu/environment/integration/research/newsalert/pdf/car_free_cities_healthier_citizens_476na1_en.pdf



1.2.1 Creating controlled parking areas, managed by the municipal parking agency



Impact indicators; 1-low, 3-high

Material use	3
Economic returns for investor	3
Air quality	2
Energy use	2
Land use	2
Safety	2
Public health	2

Description

Public space is sacrificed for the sake of parked cars. Organized parking is an underestimated asset by the city since it generates income and serves many goals (accessibility, liveability, attractiveness of the city centre). The economic value of organized parking will even increase when parking becomes a place to charge the battery of our electric vehicles. Thus, the installation of a controlled parking zone, managed by a municipal parking agency is a clear quick win. It is essential to update studies in order to understand current conditions and behaviours related to parking, and to update the existing Action Plan, Parking Policy and Regulation that were developed but never successfully implemented in the city. In 2015, the Parking Action Plan of 2013 resulted in a tender to organise the parking policy in the city centre. The contract was awarded in 2017 to an international consortium, however due to alleged corruption the contract was cancelled.

Scale and location

A good starting point for defining the parking regulation and piloting area is the Chişinău Parking Policy Document of 2013 that includes defined Controlled Parking Zones (CPZ). A parking regulation is not static, but a dynamic policy tool: car users will adapt their behaviour, which, in turn, might ensue in a need to redefine the CPZ; new activities or new parking lots might also lead to changes in the parking policy. The parking regulation will specify that no parking areas will be developed in currently green areas.

Owner and cooperating stakeholders

Owner: Parking Agency to be established within the Department of Transport and Communication;

Cooperating stakeholders: National Car Registration Office holds registry of vehicle ownership and has to share this information with the Municipality or Police Department. Police will enforce the CPZ policy;

Legal framework and enabling factors

Within the framework of the Parking Action Plan developed in cooperation with EBRD in 2013 a Gap Analysis was included. In this report, the legislative amendments needed towards a parking policy were identified. Some of the most important amendments include the need to change and complete a new Contravention Code on offenses in the controlled parking area and Enforcement Code in relation to parking related enforcement measures.

Awareness raising and acceptance of the parking policy can be obtained by engaging the citizens along the process of developing and adopting the updated Parking Action Plan.

Municipal decision on parking policy is needed.

Implementation steps

1. Organise an inventory of actual parking situation in selected zone (occupation, duration, vehicle type, origin of vehicle).
2. Updating parking action plan of 2013 with detailed and feasible action plan based on lessons learned and including a gradual roll-out plan.
3. Setup institutional framework, including Municipal Parking Agency with appropriate mandate and staffing.
4. Awareness raising and gaining acceptance of a parking policy.
5. Implement pilot project and monitor the effects on a regular base. Priority parking spaces for disabled persons/older persons/pregnant women, with associated signs, will be included.
6. Anchoring parking policy in the updated General Urban Plan and the SUMP (Sustainable Urban Mobility Plan).
7. Give a higher prioritisation of roads in the CPZ in the programme of road works.

Targets

- Controlled Parking Zones covering all the city centre area;

Benefits

- The reduction in air and noise pollution and visual intrusion.
- Reductions in car traffic will contribute positively towards liveable streets and attractive local economy.
- Parking policy which prevent obstructions for pedestrians can bring benefits of accessibility and improved safety, especially for people with limited mobility and for children.
- Reductions in car use will help to reduce road accidents.

Annual revenues	1,700,000 €
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Cost estimate

Parameter	Value
Monitoring and developing the rules and implementation plan for one zone	15,000 €
Updated parking action plan	50,000 €
Setup capital cost including equipment and training for the staff, ticket and permitting process, equipment for maintenance	900,000 €
CAPEX	965,000 €
OPEX	600,000 €/ year
Possible source of funding	Municipal budget

Estimated timeframe

- Performing an inventory of actual parking situation; revise & update the existing parking action plan; set-up the Municipal Parking Agency; performing awareness raising activities - 2020;
- Implementing pilot project- 2021;



1.2.2 Developing and operating three principal bus corridors

Impact indicators; 1-low, 3-high



Figure 19: City Centre network map, Phase 3, showing the finalised dedicated BRT infrastructure

Air quality	3
Energy use	3
Land use	3
Climate change mitigation	2
Economic returns for investor	3
Public health	3
Access to basic services	3

Description

The goal for the public transport in competition with private cars is attracting the maximum number of users. By separating bus lanes from conventional car lanes, public transport would be decongested and more rapid, thus more attractive for passengers. In 2013, an ambitious Public Transport Strategy was approved by the City and includes the following objectives:

- increase accessibility of citizens to public transportation network
- increase the speed of public transportation vehicles
- intermodal public transportation system
- increase comfort for passengers that are using the public transportation system
- increase overall environmental performance of public transportation system.

Due to the lack of stability/capacity on political and administrative level, little have been implemented, for instance for the last 8 years, no new buses were bought. However, in spring 2019, the procurement of 30 new buses and minibuses was successful.

Since 2013, new concepts of park&ride, multimodal hubs, inclusion of sharing initiatives (car, bike, step, ...) were introduced in the public transport sector worldwide. The public transport Strategy of Chişinău has not yet taken into account these new trends.

Scale and location

A good starting point to define the routes of the principal bus corridors is the proposed network in the Public Transport Strategy. Three principal bus corridors were defined:

- A north-west axis, especially on Strada Ion Creanga in the direction of Buiucani and indirectly Vatra and Truseni,
- An east axis, especially along Bulevardul Grigore Vieru,
- A south axis, especially on Bulevardul Iuri Gagarin and Bulevardul Decebal in the direction of Botanica.

Owner and cooperating stakeholders

Owner: Department of Transport and Communication;

Cooperating stakeholders: Regia Transport Electric Chişinău/ Electric Public Transport Municipal Enterprise (RTEC) and Parcul Urban de Autobuze/ Urban Bus Fleet Municipal Enterprise (PUA) as public operators;

Legal framework and enabling factors

“The Public Transport Strategy of Chişinău (2013)” is a planning instrument that already establishes the need for the principal bus corridors and their location, this will likely need to be updated and adjusted to current needs and realities. An updated action plan can be included in the Sustainable Urban Mobility Plan, which is currently developed with the assistance of the UNDP.

Implementation steps

1. Assess the proposed principal bus corridors and define the routes for the principal bus corridors, while updating the Strategy. This process will need to include public consultation regarding the final principal bus corridors.
2. Update the public transport strategy with new concepts of park&ride, multimodal hubs, inclusion of sharing initiatives in the disruptive public transport sector.
3. Implement dedicated lanes on the established routes.
4. Optimize bus stations and introduce new ones as needed on the principal bus corridors.
5. Implement integrated ticketing for urban public transport.

Targets

- A minimum commercial speed of 18 km/h for the entire network should be achieved by 2020 in the centre and by 2025 the entire city.
- Commercial speed principal bus corridors should reach at least 20 km/h by 2025.
- Reliability of services will reach the level of 90% of all trips made within six minutes late and 95% with a maximum delay of 3 minutes and only 1% of all public transport trips will be cancelled by 2020.

Benefits

- By moving people more efficiently, public transit is safer and produces significantly less air pollution than cars.
- Since public transport can move more people in much less space than cars, it avoids traffic congestion caused by personal cars.

Cost estimate

Parameter	Value
Updated strategy including the three principal bus corridors	100,000 €
Implement three bus rapid corridors	7,000,000 €
CAPEX	7,100,000 €
Possible source of funding	IFIs, Loans, municipal budget

Estimated timeframe

- Defining the routes for the principal bus corridors- 2020;
- Implementing dedicated lanes; optimization of bus stations- 2021- 2023;
- Implementing an integrated ticketing system- 2023-2024;



1.2.3 Connecting urban parks and green areas with a cycle route and a bike sharing system

Impact indicators; 1-low, 3-high



Climate change mitigation	3
Economic returns for investors	3
Social inclusion	3
Public health	3
Access to basic services	3

Description

At present, cycling is not considered as a valuable alternative to car use in Chişinău. However, cycling is promoted as an environmentally friendly, healthy, cheap and flexible transport mode. Where there is an aim to develop cycling as a daily transport mode, city infrastructure needs to be adapted to ensure that riding a bicycle is safe, efficient, attractive, comfortable and convenient. Evidence shows that some cities have been able to dramatically increase the modal share of cycling through the implementation of a comprehensive package of measures.

There are many inspiring examples where a rapid increase in cycling can be achieved in a city and culture where bicycle use was previously very rare.

The ambition of this project is to make people proud of their city by a transportation project: connecting the urban parks and green areas with a cycle route of cycle lanes and infrastructure, and bike sharing at locations providing connection to public transport. Involving the public in an early stage is a crucial element.

Within a year this could become the number 1 “thing to do in Chişinău”. The bike friendly climate and relief in Chişinău will quickly convince citizens to buy a bike and use it for functional trips. Soft lining the route with blue-green infrastructure and turning it into a green corridor will add to the utility and attractiveness of the project.

Scale and location

The scale and location of the project comprises the entire city of Chişinău. The cycle routes connect the different green areas of the cities and are interconnected with the public transport network, including a system of bike-sharing.

Owner and cooperating stakeholders

Owner: Department of Transport and Communication;

Cooperating stakeholders: NGOs, CSOs;

Legal framework and enabling factors

The Municipality has the authority to design and implement the cycle routes and the bike-sharing system. Moreover, citizen involvement is needed to decide on the specific route and the soft lining that can be done in the different sections of the route to optimize attractiveness and utility.

Implementation steps

1. Involve citizens in selecting the exact route to connect the public spaces and parks.
2. Develop a concept that includes as much as possible multi-purpose blue-green infrastructure and green corridor along the bicycle path.
3. Ensure a good connection of the network to public transport.
4. Install a pilot bike-sharing scheme at key points of the network.
5. Introduce a city-card for tourists with lower fees for using the bike-sharing service and other touristic attractions.

Targets

- Increased use of bicycle in Chişinău by 20% by 2021;

Benefits

- The project has the potential to create a cycling culture and become the number 1 thing to do in the city both for the citizens and tourists. The project has a high potential to positively impact tourism.
- Increased cycling modal shares provide opportunities for social interaction and reductions in noise and air pollution.
- Increased trips by bicycle and reduced car use will lead to reduced CO₂ emissions, other air pollution and noise pollution.
- Some groups of people with lower incomes may benefit from the cheap form of mobility cycling provides. Improving the safety of cyclists encourages others to start cycling.
- Increased levels of cycling can have a host of benefits for communities, including increased opportunities for social interaction, when compared to car travel.
- Implementation of a cycle network would benefit all social and geographic groups, with greatest potential to increase mobility options for those groups with relatively low levels of car ownership, particularly for short trips.
- Where cycling becomes more common, this has the potential to increase use of local shops and services, helping to support the local economy.

Cost estimate

Parameter	Value
Bikes, 1000	400,000 €
Stations, 80	1,600,000 €
Green cycle routes	1,500,000 €
CAPEX	3,500,000 €
OPEX	500,000 €
Possible source of funding	Private sector financing, crowdfunding

Estimated timeframe

- Defining route for cycling lanes; design blue-green infrastructure features- 2022;
- Performing works for cycling lanes implementation- 2023-2024;
- Installing a pilot bike-sharing scheme- 2024;



1.2.4 Traffic calming in areas with schools, developing a network of connected sidewalks between schools

Impact indicators; 1-low, 3-high



Climate change mitigation	3
Public health	3
Access to basic services	3
Safety	3
Air quality	2

Description

Walking is the only transportation mode which is always part of any journey whether they are car based trips or otherwise.

Providing safe and attractive pedestrian areas/routes will influence pedestrian behaviour. Design of public space needs to take into account disabled people, elderly and children. Walking on dedicated open spaces inspires and encourages communication. Integration is a particular key to the overall success of pedestrianisation strategies.

We will start at school zones to create a network of connected sidewalks. This can be supported by traffic calming measures (30 km/h in school zone), parking measures (Kiss&Ride parkings) and education (of children & parents).

Scale and location

The scale and location of the project comprises the entire city of Chişinău, with a focus on the city centre and 60 school areas.

Owner and cooperating stakeholders

Owner: Department of Transport and Communication;

Cooperating stakeholders: NGOs, CSOs;

Legal framework and enabling factors

The Municipality has the authority to design and implement these actions. Citizens, and in this case school children and parents in particular, should have the possibility to comment on these ideas and develop interesting actions.

Implementation steps

1. Define route for foot path connecting schools, subject to public consultation.
2. Identify a concept that will allow soft lining and developing attractive blue-green infrastructure alongside this route.
3. Establish traffic calming rules to be implemented around schools and identify parking areas for "Kiss&Ride" parking.

4. Speed management, removing visual obstacles and restricting parking space in residential streets, single-lane roundabouts, play streets, specific traffic courses for children violating the traffic rules, bicycle inspection.
5. Implement the pilot project in close collaboration with the school.
6. Monitor and upscale to develop pedestrian areas through new school areas.
7. Education by installing traffic safety parks and educational routes.

Targets

- Reducing the number of car accidents in the nearby school areas;
- A higher qualitative public space in the school area;
- An increase in the use of sustainable transport in school-work trips;

Benefits

- Pedestrianisation provides higher levels of accessibility for all users of public space.
- Walking is healthy, environmental friendly, cheap and flexible mode of transport.
- Pedestrianisation of school areas improves safety for children by reducing the conflicts between cars and pedestrians, therefore reducing the number of accidents.
- Pedestrianisation leads to increased economic activity and should benefit some sectors of retail.

Cost estimate

Parameter	Value
CAPEX	500,000 €
OPEX	50,000 €
Possible source of funding	Private sector financing, crowdfunding

Estimated timeframe

- Defining route for walking paths; design traffic calming principles and blue-green infrastructure features- 2021- 2022;
- Implementing pilot project- 2023;
- Monitoring and upscaling- 2023-2024;
- Performing educational activities- 2024;



1.3.1 Road rehabilitation and maintenance

National road rehabilitation with EU, EBRD, EIB, MCC, WB support



Impact indicators; 1-low, 3-high

Material use	3
Economic returns for investor	3
Access to basic services	3
Air quality	2
Economic growth	2
Employment	2

Description

Roads in Moldova and in Chişinău are in poor condition. Besides a national road rehabilitation program, there is a high need for road maintenance also at municipal level.

In 2011, the EBRD commissioned the “Chişinău Urban Roads Project Technical Due Diligence”. This study resulted in the following recommendations, relevant for the transport sector:

- Institutional Strengthening in relation to Project/programme management, procurement, engineering design, site inspections, quantity surveying/cost consultancy.
- Priority should be given to roads with demonstrably higher traffic flows and parking demand.
- Rehabilitation should include the removal of the entire asphalt layer and the enhancement of the structural capabilities of the recycled materials, generating environmental benefit and delivering the most efficient solution.
- Review the overall drainage strategy for the city centre.
- Follow a robust open procurement.
- Road rehabilitation and footway improvements for 12 priority roads.
- Supporting actions such as detailed traffic counts, a parking policy, a coherent overall transport strategy, a set of key performance indicators, a comprehensive road signage strategy, a pavement management system, additional post mounted traffic lights at ger junctions, pedestrian lights, a traffic control system, a set of standard details for road construction.

At present, most of these recommendations are still valid. Despite the urgency, actions are lagging behind and a clear monitoring of the results achieved is not currently available.

The Municipality started to implement a Road Rehabilitation and Maintenance program through performance contracting, meaning that the company who rehabilitates or constructs the road stays responsible for maintenance. Experience from implementing this programme will help develop a larger program for the roads.

Scale and location

Road rehabilitation and footway improvements will address the following segments:

- 31 August 1989 Street, Tighina Street, Alexandru cel Bun Street;
- Ion Creangă Street;
- Albişoara Street and its extension towards Mesager Street.

Owner and cooperating stakeholders

Owner: Department of Transport and Communication;

Legal framework and enabling factors

Municipal decision on road rehabilitation programme.

Implementation steps

1. Prioritisation of the entire road network, based on their network function into primary, secondary and local roads.
2. Design a feasible and realistic investment program for road maintenance by updating the EBRD-study of 2011.
3. Continue investments into Road Rehabilitation based in the updated prioritization.
4. Introduce a Pavement Management System.

Targets

- Better roads are beneficial for all road users and citizens of Chişinău.

Benefits

- Better maintenance will increase capacity, but repair work can create temporary congestion.
- Improved road conditions may reduce journey time and allow delayed departure time.
- Improved road conditions can reduce congestion, speed, safety, emissions and noise pollution, and fuel consumption.
- Maintenance might reduce diversions which would otherwise be chosen due to poor road condition. This could limit overall distance travelled.
- Maintenance of footways and carriageways improves safety for pedestrians and cyclists, and encourages increased use of these modes. However, improved conditions may encourage greater use of private motor vehicles as well.
- Planned maintenance can reduce overall costs of repair.
- Public transport would benefit from improved reliability, potentially more pleasant journeys, and (if cost savings are passed on) passengers may benefit from lower fares due to lower fuel consumption and reduced vehicle wear.

Cost estimate

Parameter	Value
CAPEX for soft measures	220,000 €
CAPEX for road rehabilitation	41,478,000 €
OPEX	50,000 €
Possible source of funding	Municipal budget, IFIs

Estimated timeframe

- Elaborating investment program for road maintenance- 2020;
- Perform road rehabilitation works- 2020-2024;
- Introducing Pavement Management System- 2024;



1.3.2 Creating an Urban Traffic Centre for traffic monitoring and traffic light optimisation

Impact indicators; 1-low, 3-high



Air quality	3
Energy use	3
Economic returns for investors	3
Economic growth	3
Access to basic services	3
Safety	3

Description

Traffic management measures can be used to realise safety, liveability, capacity and environmental objectives. Implementing these measures start by monitoring traffic in intersections and focusing on measures to fluidize traffic there. The following measures are designed to optimize the movement of traffic on an existing network:

- traffic light optimization
- route restrictions; (e.g. one way systems)
- right of way restrictions (e.g. priority regulations or signals) including junction redesign
- speed limits.

The objective therefore is to implement a traffic management that balances the increased efficiency and safety of some movements with the delay to others might occur.

Scale and location

This action implies the entire road network of Chişinău. Priority should be given to public transport axes, major access roads, school areas and suburbs.

Owner and cooperating stakeholders

Owner: Department of Transport and Communication;

Cooperating Stakeholders: Police, Municipal Design Institute "Chişinăuproiect";

Legal framework and enabling factors

Awareness raising and gaining acceptance of the guidelines can be obtained by involving/informing the public when setting up the test zones.

Implementation steps

1. Create an inventory of the best practices of conventional traffic management in Chişinău.
2. Design a set of measures to be implemented in selected intersections and on selected routes, including traffic light optimization, one-way streets, junction redesign, banned turns (pilot project).
3. Implementation and enforcement of the proposed measures.

4. Monitor traffic in the pilot areas, assess existing situation according to best practices and develop optimization planning and guidelines in traffic management.
5. Feed lessons learnt into the SUMP process and define a longer term programme for more integrated traffic management.

Targets

- An improved road safety and a better functioning of the road network;
- Higher readability of the infrastructure for road users, resulting in a lower need for enforcement;

Benefits

- Reduction of travel time, air and noise pollution and accidents
- Smoother driving conditions

Cost estimate

Parameter	Value
CAPEX	2,020,000 €
Possible source of funding	Municipal budget, IFIs

Estimated timeframe

- Elaborating an inventory of the best practices of conventional traffic management; establish a set of measures to be implemented- 2022;
- Implementation of proposed measures- 2023-2024;
- Monitoring & developing optimisation plan- 2024;

Chapter 7

Strategic Objective 2. Climate resilient blue-green infrastructure

7.1. Existing responses in the land use, industry and water sectors

Chişinău's built-up areas are predominantly on the tops of five hills, with the river Bîc flowing through the east side of the city centre, alongside a railway track. Given its geographical features and considering the impacts of climate change, due to which the intensity and frequency of extreme weather events are expected to increase, Chişinău faces year by year higher risks of natural disasters such as landslides and flash floods.

This will require a better water management in the city in order to avoid impacts on the population and economic activities. Within the vicinity of the city centre, there are several artificial lakes in park areas that can serve as water retention basins and prevent flooding to a certain extent. However, this does not prevent flooding along the Bîc river and its tributaries, posing risks to houses and buildings on several streets that run parallel to the southern bank of the Bîc river.

Poor water quality of the Bîc river is one of the major environmental issues in Chisinau. New flood areas emerge due to constructions sealing surface areas with concrete, preventing natural water infiltration (e.g. Calea Leşilor bvd. area). Today, there is no up-to-date hazard map covering the entire municipality (though a version of such a map could be found at the Department for Emergency Situations).

Causes for urban flooding events in Chişinău include limited drainage capacity by design and the lack of maintenance of the rainwater drainage system, which in time led to clogging of drainage pipes. The capacity of the rainwater drainage system is diminished as a result of mud and debris deposits leading to frequent overflow throughout the city during high rain events.

A cleaning initiative of the Bîc river segments ensured a better outflow of water during high rain events, but these initiatives are insufficient as they only cover part of the city area and are not sustainable in the long term. Furthermore, low awareness and preparedness of citizens and local businesses for natural disasters fails to ensure adequate prevention.

We have responded to some of the more urgent problems identified above, especially those affecting the water supply and wastewater collection and treatment. Currently we are implementing an EBRD project that covers the water supply network, the sewerage network, a water treatment plant and the rehabilitation of the wastewater treatment plant. Today, only part of the capacity of the water treatment system is in use, while parallel local facilities are planned in other parts of Chişinău so water does not need to be transported to a single treatment facility. New investments are planned to increase both the treatment capacity and quality of the effluent. A plan for the coming 5 to 10 years has been developed and requires intensive investment in the wastewater infrastructure, both at the site of the current wastewater plant and in the suburbs.

As of now multiple actors are involved in water management issues such as floods, drainage, water use and water quality. There is a need for introducing integrated management through a newly established river basin management unit. Such unit would also allow the focus to be on the longer-term, ensuring the expected impacts of climate change at the city level are accounted for. One of the responsibilities of an overarching service could be to develop legislation or policy for a plan on water safety, allowing room for the integration of blue-green infrastructure in the urban plan, as well as necessary standards on water retention areas for property developers.

A feasibility study has been done for the cleaning and restoring the Bîc river to prevent floods. A short segment was cleaned (Renaşterii-Petru Rareş streets) and riverbanks were strengthened, however, this is insufficient. A second part of cleaning the river and collectors is planned. Further improving the river Bîc and its tributaries into a green area has the potential to lead to a reduction of flood risk and to improve the quality of life.

Measures are needed to solve the clogging of the system and assure maintenance, while also slowing down water run-off. Improving the drainage system is often a costly and insufficient way for preventing local

flooding. It is key to combine the drainage system with other water retention measures, ensuring local water infiltration or rainwater use by the citizens. Natural water retention measures can be developed within the city area, leading to blue-green infrastructure embedded in the urban fabric, also providing benefits such as shading, recreation, air quality, overall quality of life improvement etc.

Over recent years little have been done to preserve the green values of Chişinău. There is a need to revitalize the public spaces in order to establish playgrounds and green spaces and to preserve and enhance the current blue-green values of the city. Urban green areas fulfil many functions in an urban context that benefits citizens and visitors' quality of life. The presence of natural urban assets (e.g. urban green areas, urban public parks, and urban green belts) contributes to healthy living.

UNDP has recently launched the "Moldova Sustainable Green Cities" program that consists of a series of pilot projects through the Green City Lab. Project ideas identified through stakeholder discussions and relevant in the context of blue-green are: the creation of a SMART district with green spaces and efficient management of parks, the restoring of the Bîc river and preventing floods on the territory near the Tracom Plant, and the development of a Sustainable Urban Mobility Plan (SUMP) for Chişinău Municipality. On the lines of urban planning, an update of the General Urban Plan (GUP) is planned, however, with a focus on engineering solutions. Both developing the SUMP and updating the GUP provides great opportunity to include the needed future Chişinău blue-green network that can deliver multiple benefits to Chişinău citizens i.e. water drainage and storage, flood control, etc.

In summary, the current infrastructure of Chişinău does not allow to provide the quality of life to citizens in relation to risk reduction due to current and expected climate change impacts. The current drainage, water supply and treatment require considerable investment, but especially regarding challenges of the water drainage, blue-green infrastructure could provide the most cost-effective solution tailored to the city of Chişinău, considerably improving the quality of life for citizens.

7.2. Rationale

Whenever it rains in Chişinău, several parts of the city get flooded and muddy, obstructing traffic and making it difficult for people to use the side walks. The underlying issue is related to drainage capacity limitations due to lack of infrastructure in some areas and to low maintenance of existing rainwater drainage system in other areas. Therefore one of the specific objectives targets improvements in drainage through a combination of grey infrastructure and blue-green infrastructure.

Another focus area is the degraded river system of the Bîc and its tributaries in the city. Addressing this issue will result in revitalizing adjacent areas and creating leisure spaces and soft mobility in the area and also in other parts of the city featuring blue and green infrastructure.

In recent years, while the city developed without following regulations specified in the General Urban Plan, several pollution hot spots and degraded urban spaces and buildings have emerged. These include degraded historical buildings and industrial platforms/spaces that are out of use. The third objective targets some of these areas for revitalizing, re-purposing and re-development that create safe, environmentally friendly and green growth opportunities.

Vision: **Climate resilient blue-green infrastructure** reduces urban floods, connects green spaces through natural corridors and turns currently polluted and hazardous areas into green growth opportunities.

SO 2.1 Rainwater drainage

SO 2.2 Increasing functionality of green and blue areas

SO 2.3 Revitalizing polluted and hazardous areas

7.3. Actions



Climate resistant blue-green infrastructure.

Chişinău will become a safe, green and attractive city.

Strategic objective

2

SPECIFIC OBJECTIVES ON MEDIUM-TERM (2024)	SHORT-TERM ACTIONS	MEDIUM AND LONG-TERM ACTIONS
SpO.2.1 Rainwater drainage	2.1.1. Improvement of public rainwater drainage system 2.1.2. Cleaning and rehabilitation of river Bic and its tributaries in Chişinău municipality, to withstand climate change 2.1.3. Pilot project – Rainwater retention at residential/ neighbourhood level, permeable landscaping	- Revitalizing riverside areas in order to foster the polycentric development of the city – economic development, residential and recreational areas, sustainable mobility - Introducing fiscal instruments in order to encourage the development of buildings with green roofs and facades, using flow rate reduction systems, and systems reusing or reducing the quantity of the rainwater, which otherwise would flow into the sewage system
SpO.2.2 Increased functionality of green and blue areas	2.2.1. Preserve current valuable blue-green spaces and revitalize open spaces	- Participatory budgeting for projects targeting the planning and connection of green areas in the city - Green-blue corridors at city level included in the Zonal Urban Plan
SpO.2.3 Revitalizing polluted and hazardous areas	2.3.1. Nature-based landslide prevention 2.3.2. Pilot project – Revitalizing decommissioned industrial areas (brownfields) 2.3.3. Tackling degraded cultural heritage features, which are a source of pollution in the city	- Assessing the earthquake risk for buildings and highlighting buildings under increased risk using visual tools/information panels - Restoring the façade of buildings in the centre belonging to the historical built heritage - Remediating contaminated sites



2.1.1 Improvement of public rainwater drainage system

Impact indicators; 1-low, 3-high



Water quality	2
Climate change adaptation	2
Economic growth	2
Employment	2
Public health	2
Safety	2

Description

The current drainage system is either deteriorated or missing for many streets and areas of the municipality of Chişinău. According to 2017 figures by EXDRUPO Municipal Enterprise, the system only has capacity to process only 10% of the total amount of rainwater, while 90% of the approximately 220 km of rainwater drainage network is silted. The current rainwater drainage system needs improvement, especially in flood-risk areas in the event of heavy rainfall, i.e. by ensuring the connection of rainwater runoff from buildings and detached houses to the overall drainage system (including water storage systems), slowing down water runoff and having a plan in place for clearing and preventing pipeline silting. Furthermore, the plan needs to provide a maintenance protocol for the drainage system, indicating who has responsibilities for drainage pipe cleaning. In addition, the opening-up of areas, by developing green spaces with natural water retention capacity, and implementing water harvesting measures should be included to keep the network efficient and sustainable. Implementing such measures will make the drainage system more cost-effective, as less piping will be necessary, leading to resources and emission savings. This action, coupled with measures foreseen in action 2.1.3, improve resilience in the context of a changing climate.

Scale and location

This action is especially needed in flood-risk areas in the event of heavy rainfall.

Areas which often get flooded in case of heavy rain have been identified by EXDRUPO. The areas and necessary works include:

- Calea Iesilor (in the area of number 55): cleaning of discharge point for Ø 1500 parallel collectors with simultaneous cleaning of the flow bed of existing stream in Calea Iesilor – Ghidighici street is necessary.
- Calea Iesilor – Alunelul Park: cleaning of Ø 2000/2500 collector, simultaneous with cleaning of stream flow bed.
- Calea Iesilor – Ion Creanga Street: additional collectors needed, together with cleaning of existing Ø1000 collector, simultaneous with cleaning of stream flow bed.
- Cleaning of Bîc river bed in the vicinity of cross cut of Albisoara Street with Renasterei Boulevard.
- Cleaning of Bîc river bed and the Ø 2000/2500 collector on Muncesti 280/1 street, cleaning of flow beds of nearby streams, demolition of constructions situated on top of collector.
- Intersection of Albisoara and Ismail streets: construction of additional rainwater collection network, connecting it to the existing Ø2000/2500 collector, cleaning of existing collector and discharge point.

There is a detailed project design in progress on Albisoara street and collector systems for pluvial water are getting installed. Other areas identified as being vulnerable are Ion Inculet, Mesterul Manole, Uzinelor and Pan Hallipa streets, Posta veche neighbourhood and Ghiocilor street in the vicinity of Durlăşti.

Owner and cooperating stakeholders

Owner: Chişinău Municipality, through the Department of Transport and Communication;

Cooperating stakeholders: the Municipal Enterprise for the Operation of Roads and Bridges in Chişinău "EXDRUPO";

Legal framework and enabling factors

The Strategic Plan for Socio-Economic Development of Chişinău up to 2020 foresees the modernisation of residential areas and rehabilitation of municipal infrastructure. Works would need to be in line with the General Urban Plan and corresponding Regulation, as well as the Zonal Urban Plan for the City Centre.

Implementation steps

1. Conduct a study to identify the capacity needed for drainage and alternative solutions to improve natural rainwater retention/harvesting and drainage; identify priority areas.
2. Develop an investment and maintenance plan, including a timeline and all responsible parties, with details regarding the adequate management of waste from cleaning activities.
3. Ensure regular review of the maintenance and investment plans and follow up on the actions.

Targets

- 100% cleaning of drainage network in first 2 years of implementation, annual maintenance and frequent routine inspection (monthly) according to plan, further on;
- At least 30% reduction of number/impact of local flooding events compared to previous years with similar rainfall regime, upon cleaning of existing drainage system is complete;

Benefits

- Avoided overflow during peak rain events (30% reduction estimated), as well as associated costs.
- Less resources needed for piping and drainage infrastructure (see action 2.1.3).
- Increased water availability in the city for private use through rainwater harvesting.

Climate change mitigation benefits of permeable landscape for water infiltration planted with trees

Average carbon sequestration potential of trees in urban areas: 0.28 kg C / m² of tree cover per year

Cost estimate

Parameter	Value
Plan and budget of initial cleaning works	10,000 €
Tender documentation for purchase of equipment combining hydrodynamic and vacuum cleaning	5,000 €
Cleaning and rehabilitation of drainage system, including purchase of equipment	8,000,000 €
CAPEX	8,015,000 €
OPEX	400,000 €/ year
Possible source of funding	Municipal budget, IFI's, loans

Estimated timeframe

- Study to identify needs for drainage, better maintenance plan and alternative solutions and development of an investment plan- 2021;
- Tendering and implementation of work for investments needed (improving current drainage network plus instalment of natural water retention measures in various areas in the city)- 2022.



2.1.2 Cleaning and rehabilitation of the river Bîc and its tributaries in Chişinău municipality, to withstand climate change

Impact indicators; 1-low, 3-high



Economic growth	3
Safety	3
Climate change adaptation	2
Water quality and use	2
Public health	2
Land use	2

Description

The river Bîc is silted with waste, mud and debris, reducing its drainage capacity, and causing flooding in case of abundant rainfall. The river suffers from bank erosion due to lack of protective vegetation corridors and does not fulfil its potential function of blue-green corridor through the city.

The water system of the river Bîc should be improved and revitalized, and the potential blue-green corridor needs enrichment and upgrading, to work towards a functioning blue-green city infrastructure with adequate drainage capacity and better surface water quality. Furthermore, the development of anti-littering awareness campaigns and a maintenance plan (including restoration works) can ensure the quality of the river banks, optimize rainwater buffering, ensure an ecological flow during dry periods. For the non-canalized sections, the possibility to include natural solutions for stabilizing river banks, as well as created wetlands and river adjacent ponds should be considered for an attractive, biodiverse natural system with added flood prevention functions.

Riverbanks, walkways and bicycle paths can be lined with trees and shrubs, delineating between routes, promoting biodiversity and consolidating the riverbank.

Scale and location

The government of Romania has allocated 10 million EUR for the cleaning of the Bîc riverbed between Bucovăț village located upstream of Chişinău and Grădina Botanica Street in Chişinău (25 km in Chişinău with additional 21 km upstream). Works include the development of a leisure area with pedestrian and bicycle lanes, public lighting, etc. The current project foresees concrete embankments for the river in the central area, but we suggest exploring the possibility to replace these with nature-based solutions, where suitable. Project documentation is expected until end of 2019 and works between 2020-2021.

Owner and cooperating stakeholders

Owner: the Municipality of Chişinău, through the Urban Planning and Land Use Department;

Cooperating Stakeholders: Environmental authorities, State Ecologic Inspectorate, Apele Moldovei, local environmental engineering consultants, universities, local nature or community-concerned associations.

Legal framework and enabling factors

Currently, there is no river basin management plan available for the river. Water and wastewater management, protection and land use legislation is partially harmonised with the EU (Water Law 272/2011). Enabling factors include national-level policy documents related to climate change. At municipal level no dedicated climate policy has been yet developed and approved by the city council of Chişinău.

Implementation steps

1. Implement the existing project financed by the Romanian Government on cleaning the river Bîc, making sure that the below steps are also considered, including an annual maintenance plan and the necessary maintenance works for the river system and water bodies in the system.
2. Develop of an action plan to prevent littering, including investment costs, responsible parties and a timeline, as well litter prevention awareness campaign.
3. Outsource/perform a study to evaluate the potential to increase the value of the existing blue-green corridor, using expected river flow, hydrological and geomorphological conditions as a baseline for adequate solutions for natural embankment combined with recreational area and soft mobility.
4. In parallel to the above, develop/enhance community networks promoting and monitoring the Bîc blue-green corridor, including a demonstration on benefits of improved water quality and a natural river system.
5. Raise awareness on local climate adaptation issues such as flooding, droughts, storms and heat waves, linking this to the further development of the blue-green river Bîc area as a solution.

Targets

- Improved river and surface water quality indicators (annual improvement and reaching 'green' level in 5 years);
- Reduced weight of yearly collected litter in Bîc river area (50% less in 1st year, then 10% yearly);
- Increased recreational areas (in m²) (10% increase of usable area versus degraded area per year);
- Increased economic development, revenue from concession taxes to be used for river maintenance;

Benefits

- Health benefits, increased coverage of green space, reduced air pollution and carbon sequestration.
- Avoided cost of flooding.
- Increased economic development due to revenue related from riverine activities.

Climate change mitigation benefits of preserving/planting trees along the river	Average carbon sequestration potential of trees in urban areas: 0.28 kg CO ₂ / m ² of tree cover per year ⁴
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Cost estimate

Parameter	Value
Project and design revision towards nature-based solutions	30,000 €
Initial cleaning, landscaping pedestrian tracks, lighting	2.3 million €, or 100 €/m
CAPEX	2,330,000 €
OPEX	2.5 €/m/ year or 60,000 €/ year
Possible source of funding	Romanian Government grant, loans, potential revenue from bike rental or concession taxes for food/beverage stands in leisure areas

⁴ D.J. Nowak et al., Carbon storage and sequestration by trees in urban and community areas of the United States, Environmental Pollution 178 (2013) 229e236, available at <https://doi.org/10.1016/j.envpol.2013.03.019>, last accessed September 2019

Estimated timeframe

- Bîc river cleaning and maintenance plan- 2020; Feasibility study for improving the Bîc river area as a blue green corridor- 2020;
- Investment works Bîc riverine area- 2021-2022;



2.1.3 Pilot project: Rainwater retention at residential/neighbourhood level, permeable landscaping

Impact indicators; 1-low, 3-high



Climate change adaptation	3
Land use	2
Water quality and use	2
Access to basic services	2
Safety	2

Description

Currently the drainage system is only able to process 10% of the total amount of rainwater, meaning that the capacity of the system for water drainage is insufficient. Furthermore, excessive construction works cause the appearance of new flood areas, which is mainly experienced in the lower-lying areas (nearby the river bed). This problem will only increase in the future due to climate change. By converting hard surfaces into multifunctional blue-green areas allowing for water drainage, and by implementing water retention measures, the infiltration of rain water can be improved, and local floods can be avoided. Considered water retention measures are: green roofs at the neighbourhood level, increasing the number of permeable surfaces (e.g. pavement that allows for infiltration), and water buffering and infiltration (e.g. infiltration trenches in the streets, rainwater storage tanks for new buildings). Such measures can be implemented along roads with low traffic, sidewalks, as well as along paved cycling and walking paths.

Scale and location

Water retention measures are particularly cost-efficient when new building areas are being constructed or old streets are being redeveloped. Permeable landscaping can be implemented along Traian Boulevard and Independentei Street, as flooding often occurs around 17/1 Traian Boulevard in case of heavy rain. The total lengths are approximately 1.2 km in case of Traian Boulevard and 2.2 km for Independentei street.

Owner and cooperating stakeholders

Owner: the Municipality of Chişinău;

Cooperating stakeholders: Environmental protection authorities, Department of Transport and Communication.

Legal framework and enabling factors

The Strategic Plan for Socio-Economic Development of Chişinău up to 2020 foresees the modernisation of residential areas and rehabilitation of municipal infrastructure. The General Urban Plan and corresponding Regulation, as well as the Zonal Urban Plan for the City Centre include details on the functionality of each land plot in the city and basic principles/guidelines for the development of the central area of the city. The implementation of the pilot project will be developed in line with the aforementioned plans.

Implementation steps

1. Map the areas where local rainwater excess and flood risk occur regularly and develop an investment plan.

2. Liaise with the Department of Transport and Communication to explore possible areas and solutions for flood risk reduction (infiltration trenches along streets, permeable landscaping alongside with street rehabilitation actions).
3. Include special requirements in the building permits for water harvesting, including a range of possible water retention measures. Give example of good practices when doing works on public grounds.
4. Stimulate citizens/ investors to invest in water retention/ reuse measures when restoring buildings, roofs, through subsidies/tax exemptions. Set up an awareness campaign together with NGOs.
5. Conduct water audits for public buildings and support water audits for industrial and residential facilities.
6. Research and develop adequate (subterraneous) large water storage to buffer heavy rain falls.
7. Include the provision of water retention measures in the update of urban planning documents for the city.

Targets

- All apartment buildings newly authorized for construction to be fitted with rainwater harvesting (capacity > 5000 litres); open areas with permeable landscaping (> 30% of land plot);
- Aim for at least 2% of rooftop area to be green roofs by 2050;
- Reduction of number/impact of local flooding events; long term goal: maximum 10 cm of water on the road in case of 100-year rain event;

Benefits

- Reduced need, costs for grey infrastructure investments; reduced associated CO2 emissions .
- Carbon sequestration function of green spaces, climate resilience.
- Rainwater use by citizens reduce cost in water needs.

Climate change mitigation benefits of green roof implementation	Annual CO2 reduction between 1.70 and 1.89 kg CO2/m ² /year of green roof, from energy savings; Annual C sequestration 336 – 751 g C/m ² /year; NPV: -90 €/m ² ; ENPV 300 €/m ² ;
Climate change mitigation benefits of permeable landscape planted with trees	Average carbon sequestration potential of trees in urban areas: 0.28 kg C / m ² of tree cover per year ^{Error! Bookmark not defined.}

Cost estimate

Parameter	Value
Development of plan for water retention measures	50,000 €
Permeable landscaping public areas	7,320,000 € (43 €/m ²)
Green roofs, private	50 €/m ²
Rainwater harvesting system, private areas	400 € for 1 m ³ tank 3000 € for 15 m ³ tank
OPEX- Permeable landscaping public areas	15,000 €/ year
OPEX- Green roofs	6 €/m ² / year
OPEX- Rainwater harvesting system	50-150 €/tank/ year
Possible source of funding	IFI's, loans

Estimated timeframe

- First investment on prioritized water retention measures- 2020-2024;
- Followed by an evaluation – longer-term investment needed;



2.2.1 Preserve current valuable blue-green spaces and revitalize open spaces



Impact indicators; 1-low, 3-high

Land use	3
Economic return for investors	3
Economic growth	3
Public health	3
Employment	2
Access to basic services	2

Description

Over recent years much of valuable green spaces have gone lost, and little opportunities have been taken to preserve what is/was there. There is a need to revitalize the green spaces and open public spaces in the city in order to establish playgrounds and green spaces full with natural elements for leisure and recreation. Open spaces in the city could be transformed into functional spaces for citizens (e.g. public markets), to revitalize the city. The priority of which projects to be redesigned first can be influenced by public voting.

Scale and location

The scale and location of the projects depend on the outcome of studies on the state and potential of the existing blue-green values. Blue-green measures and elements should be multipurpose and implemented from the designing or re-designing phase of projects. The aim is to have a network of multipurpose blue-green corridors throughout the city in the future, which have a high socio-economic value. The municipality has planned to develop a panoramic area in Ciocana neighbourhood, with a surface of 180 m² (30x60m) (150 K EUR investment). Other valuable green spaces in the city which the municipality has planned to revitalize are the park and lake on Dacia Boulevard (approximate area of 0.2 km²) and the forest and park in Râşcani neighbourhood on N. Dîmo street (approximate area of 0.25 km²).

Owner and cooperating stakeholders

Owner: the Municipality of Chişinău, through the Municipal Enterprise for Green Space Management, which is part of the Urban Planning and Land Use Department;

Cooperating Stakeholders: Urban Planning and Land Use Department within the Municipality of Chişinău, local nature or community concerned associations, schools, citizens participating in the decision making;

Legal framework and enabling factors

Any implemented initiative will be in line with policy document, plans and legal provisions at national and local level, such as the Strategic Plan for Socio-Economic Development of Chişinău up to 2020, the General Urban Plan and corresponding Regulation, the Zonal Urban Plan for the City Centre. Moldova has adopted the polluter pay's principle and included this principle in its primary legislation via Law 787/1996. Law 182/2010 on industrial parks makes reference at the importance of conducting an environmental impact assessment of the industrial park prior to its construction. At municipal level, Chişinău Municipal Council has adopted Decision 5/13 of 24.07.2018, in line with Law 591/1999 on the elaboration, approval and maintenance of the Green Spaces Cadastre..

Implementation steps

1. Map the current blue-green values and open spaces and score them regarding their value to the community, assessing benefits and social value of blue-green spaces including e.g. recreation, well-being, general amenity etc.
2. Develop/enhance community networks to engage local people in local climate issues.
3. Outsource a study to evaluate the potential to increase the existing blue-green values, to enhance biodiversity and enhance their value to the community.
4. Decide on the areas that carry the highest priority, but also areas where local environmental pressures could be (partially) solved by upgrading the blue-green elements for that location.
5. Launch a working group to brainstorm about how to add value and revitalize, also using the results of the benefits assessment. Include both relevant authorities as local associations and universities in this working group. Encourage local specialists to participate in the working group, in order to promote the use of suitable local species in the selection of nature-based solutions.
6. Develop an investment plan to implement the ideas from the working group that are supported the most.
7. Investigate best practices in implementing and financing nature based solutions in other cities, associated with innovative financing schemes including crowd-funding and land value capture as examples.
8. Stimulate private investors to consider the revitalization and periodic maintenance of the city in the design of blue-green values, open spaces and urban infrastructure.
9. Include the opportunities to preserve blue-green values and to revitalize open spaces in the update of urban planning documents for the city.

Targets

- Aim for at least 5% increase in number of users of existing green spaces and outdoor leisure areas within the city compared to same period of previous year;
- Citizen satisfaction with regards to the quality of green spaces throughout the city monitored annually through online surveys, with the target to improve rating with 5% each year up to at least 80% satisfaction within 5 years of project start;

Benefits

- Social and psychological benefits for the community.
- Improved air quality and public health.
- Enjoyable green environment, improving well-being.
- Increased biodiversity.
- Improved resilience to floods and climate change.

Cost estimate

Parameter	Value
Park development plan and budget	20,000 €
Ciocana park and a panoramic area, 1,800 m ²	150,000 €
Dacia Boulevard, park and lake area, 200,000 m ²	5,000,000 €
Forest and park in Râşcani neighbourhood, 250,000 m ²	6,250,000 €
CAPEX	11,420,000 €
OPEX (Ciocana park, Dacia Bld, Forest and park in Râşcani)	112,900 €/ year
Possible source of funding	Municipal budget

Estimated timeframe

- Evaluating current green spaces, establishing citizen communities and stakeholder groups, and outsourcing a study to evaluate the potential to increase blue green values in the city, focusing on existing areas and possible future areas- 2020- 2021;
- Various investment programmes and collaborations with authorities and private investors, as well as the community to increase number of green sites in the city- 2022-2024;



2.3.1 Nature-based landslide prevention



Impact indicators; 1-low, 3-high

Soil quality	2
Land use	2
Safety	2
Access to basic services	2

Description

Soil erosion caused by flowing water is by far the most common reason for landslides. Natural streams and rivulets, as well as faulty drainage of rainwater from the homes which have been constructed on the hilltop, can increase the risk of landslides, as they have the tendency to slowly erode a chunk of the slope to an extent wherein the entire slope just gives in to increasing pressure. In some cases, a fairly simple way to prevent landslides may be to stabilize the areas under risk of landslides through nature-based solutions, e.g. the planting of trees and small shrubs on the slope. As these trees and shrubs grow, their roots hold soil together, and help to reduce erosion of soil. In fact, there exist quite a few species of plants with shallow roots which are specifically used to protect the top layer of the soil in mountainous regions. Also, water drainage ditches can be constructed to ensure a safe drainage of rainwater. In some cases, the ecological maintenance of slopes and nature-based solutions for landslide protection might not be suitable or sufficient and there may be a necessity for more engineering based measures. Such situations should be dealt with accordingly and are not the subject of this action.

Scale and location

A revision of the current landslide risk maps of the city is needed, which would take into account areas where new buildings or roads were constructed, without taking measures to mitigate the risk of landslides. Streets where constructions need to comply with particularly high earthquake risk, such as Albişoara, Bucureşti and Bernardazzi streets⁵, should be particularly targeted by a study to determine whether these areas could be fitted with nature-based solutions for landslide prevention, or more complex measure are necessary.

Owner and cooperating stakeholders

Owner: the Municipality of Chişinău;

Cooperating Stakeholders: Environmental Protection Agency, State Ecologic Inspectorate; Ministry of Agriculture, Regional Development and Environment;

Legal framework and enabling factors

The Strategic Plan for the Socio-Economic Development of Chişinău up to 2020 foresees the modernisation of residential areas and the rehabilitation of municipal infrastructure. In addition to this, the General Urban Plan and the corresponding Urban Planning Regulation, as well as the Zonal Urban Plan for the City Centre include details on the functionality of each land plot in the city and basic principles/guidelines for the

⁵ https://noi.md/md/news_id/204471

development of the central area of the city. Any implemented initiative will be in line with the aforementioned plans.

Implementation steps

1. Update and make available to the public the landslide risk map.
2. High risk areas for landslides and erosion should be visualised through awareness raising activities. Construction measures should be taken to reduce this risk. Using the risk-based approach should also identify where partial stabilisation/hybrid solutions would be appropriate.
3. Outsource/perform a study to gain knowledge on the priority areas and potential measures to take to reduce the risk of landslides and erosion. The study should include, but not be limited to: identification and characterization of priority areas for landslide prevention through nature-based solutions; research on the species which are native to the area and have soil-fixating properties.
4. Development of a prevention plan for erosion and landslides. This plan should define the actions to be taken to reduce the risk of landslides, including the investment costs, responsible parties and a timeline. The focus should be on the ecological maintenance of the hills, in order to restore the natural drainage capacity and to fixate the soil through the planting of trees and shrubs.
5. Plant the earlier defined trees and shrubs on the slopes of the hills whereof the risk for landslides is significant and these solutions prove suitable.
6. Include special requirements in the building permits to enhance water harvesting. Include a range of water retention measures to choose from (e.g. rainwater storage tanks, water drainage ditches) to ensure a safe drainage of rainwater. Options may include 'avoidance' by demarcating areas of "no-build" zones or "open spaces" to avoid possible impacts.

Targets

- Reduction of number/impact of landslides and erosion events;
- % of rainwater captured through natural water retention;
- Landslide risk map updated by 2020 and every two years afterwards;
- 50% of areas which are identified as suitable have nature-based solutions for landslide prevention implemented in 5 years from study;

Benefits

- Improved rainwater drainage, prevention of soil erosion, landslides and associated damage.
- Creation of attractive landscapes with increased natural value and climate change mitigation benefits.
- Improved air quality and public health through increased green surface in the city.
- Improved biodiversity.
- Improved well-being and life quality.

Cost estimate

Parameter	Value
Study for identification of priority areas and applicability of nature-based solutions	20,000 €
Planting trees and shrubs	20,000 €/ha
CAPEX	20,000 € + 20,000 €/ha 100,000 €
OPEX (Planting trees and shrubs)	200 €/ha/ year
Possible source of funding	Municipal budget

Estimated timeframe

- Update and publish the landslide risk map for the city, mark high risk areas through information panels; identify priority areas for landslide remediation measures and solutions- 2021;
- Implement solutions, starting with high-priority areas- 2022-2023;



2.3.2 Pilot project – Revitalizing decommissioned industrial areas (brownfields)

Impact indicators; 1-low, 3-high



Economic returns for investors	3
Land use	3
Safety	3
Access to basic services	2
Soil quality	2

Description

Decommissioned industrial areas, or brownfields, are lands which have previously been used for industrial purposes with known or suspected pollution including soil contamination due to hazardous waste. Regardless of the possible sources of pollution, decommissioned industrial areas represent an untapped economic and environmental potential.

Former decommissioned industrial platforms and structures could be repaired and re-used in the natural and/or economic circuit, by:

- promotion of circular economy through industrial symbiosis (waste from an enterprise could be a raw material for another industry) or through;
- transformation of decommissioned industrial areas into areas with multiple functionalities, such as: green spaces, recreation areas, tourism, educational, commercial, residential.

Scale and location

The scale and location of the project will depend on the outcome of mapping the current decommissioned industrial areas and of the analysis of the soil contamination.

Former industrial areas in Chişinău, which could be investigated to assess their potential for redevelopment include the Circus area, industrial area on Ismail street, Albişoara street near the river, as well as the former industrial area located between Renaşterii Boulevard and Mihai Viteazu Street.

Owner and cooperating stakeholders

Owner: the Municipality of Chişinău;

Cooperating Stakeholders: the environmental and planning authorities, local nature or community-concerned associations, general public;

Legal framework and enabling factors

The Strategic Plan for Socio-Economic Development of Chişinău up to 2020 foresees the modernisation of residential areas and the rehabilitation of municipal infrastructure. In addition to this, The General Urban Plan and corresponding Urban Planning Regulation, as well as the Zonal Urban Plan for the City Centre include details on the functionality of each land plot in the city and basic principles/guidelines for the development of the central area of the city. Any initiative implemented will be in line with the aforementioned plans.

Implementation steps

1. Map the current decommissioned industrial areas and score them regarding their potential future value to the community, economic and environmental potential, as well as according to environmental risks/impact of sites.
2. Analyse the soil contamination of the brownfields, and outsource a study to evaluate potential remediation techniques, including in situ, bioremediation, phytoremediation (which uses deep-rooted plants to soak up metals).
3. Consider the possibility to increase biodiversity on the former brownfields and to enhance the value for the community. Also assess if other ecosystem services could be strengthened through the redesign of the areas.
4. Request and take into account the input from the community networks, when evaluating the value to the community. Cooperate with the local associations for the realisation of certain projects to revitalize the former brownfields.
5. Promote circular economy through industrial symbiosis. Actively search potential partners (depending on the outcome of the soil contamination analysis) to participate in industrial symbiosis. This could be implemented on current functioning industrial platforms which are not exploited to their full potential.
6. Stimulate private investors to consider the revitalization of the brownfields to enhance the blue-green values, open spaces and overall city life quality.

Targets

- 20% increase in the number of users per year of redeveloped areas, in the first 5 years of implementation;
- Aim for 30% reduction in the number/size of contaminated/decommissioned sites in the first 5 years of implementation, and yearly 5% reduction from year 6 onwards;

Benefits

- Reducing the number/size of contaminated sites.
- Improved soil and groundwater quality.
- Economic benefits for developers and for the green economy.
- Positive economic activity in surrounding areas.
- Improved air quality and public health.
- Social and psychological benefits for the community.
- Cooling effect on city level, enjoyable green environment, improving well-being and quality of life, improved biodiversity if spaces redeveloped with blue-green infrastructure.
- Areas 'returned' to citizens, the urban, natural and economic environment.

Cost estimate

Parameter	Value
Mapping abandoned/decommissioned industrial spaces	20,000 €
Feasibility studies for options for redevelopment	50,000 €
CAPEX	70,000 €
Possible source of funding	Municipal budget

Estimated timeframe

- Map and score decommissioned areas according to community value, economic value and environmental risk; analyse contamination level and commission study for identification of remediation solutions- 2020;
- Implement solutions, starting with high-priority areas- 2021.



2.3.3 Tackling degraded cultural heritage features, which are a source of pollution in the city

Impact indicators; 1-low, 3-high



Land use	3
Safety	3
Public health	3
Air quality	2
Economic returns for investors	2

Description

Abandoned patrimony buildings or buildings in a state of advanced degradation are a source of pollution in the city due to the collection of dust and debris, an accumulation of waste, in addition to being accident hazards. A city's approach on how to handle these degraded cultural heritage features should be developed. In order to tackle the degradation of these buildings and heritage elements, efforts must be made both to restore the buildings to good conditions, and to assign new functions to these buildings and cultural features in order to assure a good care of the condition in the future.

Scale and location

The scale and location of the project will depend on the outcome of mapping the current abandoned patrimony buildings or buildings in a state of advanced degradation. The municipality has drafted a list of historic monuments of local importance for the city, which is available on its website. First candidates for renovation works should be public/municipality owned buildings from the list, which are degraded in proportion of more than 30% as per the classification methodology.

Owner and cooperating stakeholders

Owner: the Municipality of Chişinău;

Cooperating stakeholders: Urban Planning and Land Use Department within the Municipality of Chişinău; building owners, local urban planning and architecture professional associations; the Ministry of Education, Culture and Research; civil society (consulted on solutions).

Legal framework and enabling factors

The Strategic Plan for Socio-Economic Development of Chişinău up to 2020 foresees the modernisation of residential areas and rehabilitation of municipal infrastructure. In addition to this, the General Urban Plan and corresponding Urban Planning Regulation, as well as the Zonal Urban Plan for the City Centre include details on the functionality of each land plot in the city and basic principles/guidelines for the development of the central area of the city. The Zonal Urban Plan for the City Centre delineates areas that are considered important from a cultural heritage perspective. Any initiative implemented will be in line with the aforementioned plans.

Implementation steps

1. Assess the current situation, prioritize buildings based on the assessment of the safety risk for the abandoned buildings and highlight the buildings at high risk by visual measures/informative panels.
2. Set up a working group to establish the legal and institutional framework to address new functions to these buildings and cultural heritage features (e.g. recreational areas, museums, residential, etc.).
3. Outsource a study or brainstorm on the potential functions and value that the buildings and cultural heritage features can have for the community, including on job creation for all social groups.
4. Request and take into account the input from the community networks. Cooperate with the local associations for the realisation of certain projects to revitalize abandoned patrimony buildings and cultural heritage features. Consider crowdfunding as a possibility to finance certain projects, or engaging the private sector in financing/sponsoring the works, if/where possible.
5. Identify and make decisions on the responsibilities and obligations of stakeholders (e.g. the responsibility to ensure safety of residents and visitors).
6. Develop a renovation programme on how to approach the abandoning of cultural heritage features and buildings, particularly the ones in the city centre. The goal of the action plan is to culturally/economically revitalize these buildings and features.
7. Showcase renovated buildings in tourism related initiatives.

Targets

- 5% yearly increase in the number of tourists, compared to previous year;
- 50% of identified priority buildings captured in Municipality investment budgets in the first 5 years of implementation;

Benefits

- Improved well-being.
- Protection of cultural heritage buildings and features of the city.
- Development of new functions for abandoned buildings and heritage elements.
- Improved look and tourist potential of the city.
- Improved safety of residents and visitors.
- Revitalization of the city.

Cost estimate

Parameter	Value
Study for identification and prioritisation of historic monument buildings of safety hazard risk	20,000 €
CAPEX	20,000 €
Possible source of funding	Municipal budget.

Estimated timeframe

- Prioritisation of buildings based on safety risk and public notice for the high-risk ones. Set up working group for addressing selected buildings, identify solutions- 2020;
- Supervise and facilitate implementation of solutions- 2021- 2024;

Chapter 8

Strategic Objective 3. Sustainable and efficient energy

8.1. Existing responses in the energy and building sectors

According to the UNECE Committee on Housing and Land Management⁶, over 60% of the housing stock in the Republic of Moldova was built between 1976 and 1993, so it is relatively new. Within the Municipality of Chişinău, the main typology of the housing stock is represented by apartments in multi-family housing units, over 63% of the total, followed by individual housing.

Even though the housing stock is not very old, it was insufficiently maintained and no capital repair works were undertaken, resulting in highly deteriorated housing stock, including low energy-efficiency performance. This is the case for both public and private buildings.

Taking into account that the Republic of Moldova has a considerable number of emigrants living abroad, it is estimated that up to 10% of the apartments are empty, thus unmaintained and deteriorated.

District heating in Chişinău is powered by two stated owned electric heating plants, two local and 19 suburban heating plants belonging to Termoelectrica SA, the network service company. As the infrastructure is inherited from Soviet times, the heating supply company faces major technical and structural challenges such as outdated and aging infrastructure, high energy costs and low efficiency, all resulting in high prices for end users. This is also the reason for some of the customers switching to individual gas heating units, leading to increased maintenance costs for the district heating networks

Energy in the Republic of Moldova relies mostly on imports, making the country highly dependent on external resources and resulting in accentuated insecurity with regards to energy prices. In Chişinău, only 5% of the energy results from renewable sources, mainly biomass and small PV installations owned by private commercial enterprises. This clearly shows that the Municipality should focus their resources in ensuring energy security at the local level and increasing the energy efficiency in the city.

In response to the above mentioned challenges, certain solutions have already been developed, in order to improve the quality of the environment and users' wellbeing and comfort.

Termoelectrica has undertaken modernization works of the main heat distribution networks, on over 30% of their length, by replacing old transmission and distribution pipes with pre-insulated pipes; replacing compensators and bellows; mounting ball valves; and installing monitoring systems. Furthermore, Termoelectrica has upgraded some of the thermal power plants producing thermal energy and implemented an automated system, optimizing the number of staff and reducing production costs. According to information provided by Termoelectrica, as a result of the measures for the rehabilitation of the thermal networks within the district heating distribution network SACET Chişinău, the losses of thermal energy decreased from about 400000 Gcal annually in the period 2008-2014 to about 335000 Gcal in the period 2015-2018. The network losses are significant and further investments are needed in order to increase the energy efficiency of the overall district heating system.

Currently an EBRD- EIB-E5P project is running that covers the rehabilitation of municipal buildings in the city, targeting energy-efficiency measures and thermal refurbishment. The buildings, part of three main categories (Education, Kindergartens, Hospitals) will be subject to deep renovation interventions like thermal insulation of the building envelope, replacement of existing windows and doors, replacement of indoor lighting system, improving the efficiency of the heat distribution system, installing solar collectors for hot

⁶ UNECE, Housing and Land Management, Republic of Moldova

water consumption. At present, public tenders are launched for feasibility assessment for implementation of the renovation measures at different groups of buildings.

Chişinău Municipality has signed a loan contract with a local bank in order to fund modernization and installation of energy-efficient doors and glazing systems in the common use areas of multi-storey blocks of flats. Minimum quality and technical requirements should be specified for the renovation measures and these should be closely followed-up in order to meet energy-efficiency and quality standards. Besides, the development of a maintenance plan can ensure the quality and durability of works.

A wide rehabilitation project is currently undergoing in Chişinău, aiming at the modernization and renovation of public street lighting. Ten major arteries will undergo rehabilitation works for the lighting systems, including replacing of old existing lamps with LED lamps, replacing power cables and consoles for road and sidewalk lighting. The expected outcomes include up to 45% decrease in electricity consumption, increased road safety for pedestrians, cyclists and drivers.

Over the recent years building renovation works have been implemented at a small scale and mostly for public buildings. The existing buildings stock is aging and there is a need for refurbishment works in order to increase the buildings' structural and energy performance, but also the occupants' comfort and wellbeing, all resulting in less energy consumption and air pollution. Energy mapping of the city is a major priority, being the first step necessary for an estimation of the potential energy savings. An integrated approach assembles a wide range of data inputs, which will result in a baseline for energy consumption and generation in the city. This baseline will help the Municipality to advance and prioritize local energy planning initiatives for buildings renovation and energy efficiency increase, rehabilitation of public street lighting and implementation of renewables projects.

8.2. Rationale

Increased greenhouse gas emissions in the energy and buildings sector are the results of high energy consumption in buildings, inefficient energy use and small share of energy derived from renewable sources.

Introducing incentives for increasing the energy efficiency of buildings and public lighting infrastructure, nearly zero energy building development and promoting green and smart buildings through pilot projects will lift the pressure on the environment, increase comfort and ensure safety for citizens of Chişinău.

The second specific objective aims to diversify the energy supply, reduce dependence on imported fuels and low-efficiency fossil fuel combustion, and increase the share and use of renewable energy.

The last specific objective proposed is to strengthen the institutional capacity in order to achieve local policy goals, in compliance with European energy targets. This objective follows the learning-by-doing approach combining trainings and specialized courses for Municipality personnel, development of a public procurement strategy and implementing the energy management at city level.

Vision: Connecting suppliers, users and energy managers to bring Chişinău up to speed with state of the art **renewable energy and energy efficiency** standards.

SO 3.1 Increasing energy efficiency

SO 3.2 Energy from renewable sources

SO 3.3 Energy management of the city

8.3. Actions



Sustainable and efficient energy.
Chişinău will invest in enhancing the energy efficiency of buildings and public lighting, increasing the share of energy from renewable sources, and improving the comfort of the population.

Strategic
objective
3

SPECIFIC OBJECTIVES ON MEDIUM-TERM (2024)	SHORT-TERM ACTIONS	MEDIUM AND LONG-TERM ACTIONS
SpO.3.1 Increasing energy efficiency	3.1.1. Residential building energy efficiency programme 3.1.2. Municipal building energy efficiency programme 3.1.3. Pilot project – Promoting green and smart buildings 3.1.4. Street lighting energy efficiency programme 3.1.5. District heating energy efficiency programme	• Promoting buildings generating energy (proZEB) • Implementing electronic metering systems and autonomous regulation systems for thermal heating at user level in residential buildings • Installing devices to monitor the air quality inside public buildings
SpO.3.2 Energy from renewable sources	3.2.1. Pilot project – Installing PVs on public transport parking lots 3.2.2. Identifying Renewable Energy Projects	• Pilot project – Eco House, buildings using ecological materials
SpO.3.3 Energy management of the city	3.3.1. Implementing the energy management service at city level	• Pilot project – Decreasing taxes for green buildings • Introducing IT and telemetry systems for energy measurement • Decreasing property taxes for buildings completed from ecological materials



3.1.1. Residential building energy efficiency programme

Impact indicators; 1-low, 3-high



Energy use	3
Climate change mitigation	3
Green behaviour and awareness	2
Public health	2
Water use	1

Description

Implementation of energy efficiency retrofit measures in both private and municipal residential buildings is essential for Chişinău, in order to reduce the buildings' energy consumption and associated pollution.

The project aims to promote the retrofit of residential buildings (e.g., social housing) with measures targeting energy efficiency and thermal refurbishment, including smart energy meters and control systems at individual user level (heat cost allocators and thermostatic control valves, temperature telemetric sensors etc.) and installation of solar water heating systems, considering existing or possible connection to the DH system. Besides, non-EE measures will be included: drainage, asbestos roofs replacement, ventilation systems etc. It is aimed that the retrofitted buildings improve their indoor air quality and energy certification, according to EU EPBD⁷ framework, in a minimum of two levels.

The project will consist of a retrofit plan using own capital, credit lines or via alternative financing schemes such as energy performance contracts (EPCs) in partnership with energy service companies (ESCOs) for financing eligible residential energy efficiency improvements.

Scale and Location/ Area of implementation

Investments in energy efficiency retrofit of residential buildings (up to 100 blocks of flats, approximate area per building 7,000 m²) aim to renovate up to 70% of their total area and result in minimum improvement of two levels in their energy certification.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău. Cooperating Stakeholders: ESCOs, private sector;

Legal Framework and Enabling Factors

The existing legislation enables promoting and financing measures related to the improvement of the energy performance of buildings. Law 139/2018 for Energy efficiency, Article 8, states that local public authorities, should ensure the integration of actions improving the energy performance of buildings into energy efficiency programs and plans; moreover, they should contribute to the promotion among the local community of the need to improve the energy performance of buildings.

⁷ Directive (EU) 2018/844 of the European Parliament and of the Council of 30 May 2018

Implementation steps

1. Develop a regulation specific for housing units with regards to the process of transition from public to private property.
2. Elaborate the Terms of Reference which will include all components mentioned above. The Terms of Reference should include ambitious performance indicators and eligibility criteria for the contractor.
3. Develop a feasibility study for modernization of the residential buildings and set up an implementation plan which will include also measures mentioned above. Identify and assess financing opportunities. Promote financial incentives in coordination with the awareness campaigns.
4. Perform renovation and modernization works according to the implementation plan.
5. Monitor implementation and evaluate performances. Promote results through information and awareness campaigns, organising a site visit and press releases.

Targets

Higher energy efficiency and increased use of energy renewable sources;
Improving the energy performance level at housing unit with at least two levels.

Benefits

- Building owners, developers and investors are encouraged to invest in energy efficient renovations, which will secure a good indoor air quality, a better quality of life for occupants and lower operational costs, with a minimum environmental impact.
- Improved user controllability and awareness of the energy consumption due to smart meters.
- The Project will generate transition impact by demonstrating the benefits of energy conservation and promoting the expansion of energy efficiency lending and energy service companies (ESCOs).
- Promotion of the construction industry and creation of jobs especially for SMEs, which represent the major share of enterprises active in the sector.

Energy savings annual	47,320,000 kWh/ year
Annual savings	1,850,642 €/ year
CO2 emissions avoided ⁸	9,558.64 tCO2/ year

Cost estimate

Parameter	Value
Scope	100 blocks, each 7000 m2, 70%
Measure	490,000 m2
Unit cost	55 €/m ²
CAPEX	26,985,000 €
OPEX	0 €/ year
Possible source of funding	ESCOs, private financing

Estimated timeframe

- Developing a specific housing regulation; establish renovation solutions and implementation plan- 2020- 2021;
- Performing renovation and modernization works- 2021-2024;

⁸ The CO2 emissions avoided were calculated using CoM Default Emission Factors for the Member States of the European Union Dataset Version 2017



3.1.2. Municipal building energy efficiency programme

Impact indicators; 1-low, 3-high



Energy use	2
Climate change mitigation	2
Green behaviour and awareness	3
Community involvement	1

Description

Promoting minimum environmental and comfort standards in public buildings is an important goal for Chişinău, in order to secure increased quality of life for its citizens. This will be achieved through the elaboration of a guide for energy efficiency retrofit in public buildings and an information and training campaign, provided by Chişinău Municipality, in addition to the EBRD Energy Efficiency Project.

Scale and Location/ Area of implementation

All existing public buildings belonging to Chişinău Municipality within the city boundaries are eligible for this action. This action is complementary to the ongoing EBRD Energy Efficiency Project which aims at improving energy efficiency in public building. Out of 150 public buildings which were analysed during the feasibility phase, 119 were included in the EBRD project. So far, energy audits have been developed for 23 buildings and renovations are expected to start soon.

A general design guide for retrofit of buildings will be developed and consulted when public buildings are undergoing deep renovation measures. Besides, trainings and information campaigns will be developed, including: Training for public buildings administrators after handing over the renovated buildings- in the 119 buildings included in the ongoing EBRD Energy Efficiency Project; Energy efficient users' guide for all occupants of public buildings; Site visits to promote results achieved in 3 different buildings.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău;

Cooperating Stakeholders: NGOs (coordinating awareness raising campaigns)

Legal Framework and Enabling Factors

The existing legislation enables promoting and financing measures related to the improvement of the energy performance of buildings. Law 139/2018 for Energy efficiency, Article 8, states that local public authorities, within the limits of the financial possibilities and in the order of their hierarchy of priorities, have the following basic attributions in the field of energy efficiency of buildings: ensuring the integration in energy efficiency programs and plans of actions to improve the energy performance of buildings; contributing to the co-financing of national programs to improve the energy performance of buildings; informing the local community to promote the improvement of the energy performance of buildings; contributing locally to the implementation of state policy on the energy performance of buildings.

Implementation steps

1. Develop the Terms of Reference which will include all activities mentioned above. Assess ambition indicators and eligibility criteria for the contractor and include these in the Terms of Reference.

2. Develop an energy efficiency and comfort design guide for future buildings retrofits. This guide will be part of the Terms of Reference in the following renovation projects and will include measures like thermal refurbishment, green technologies, mechanical ventilation, rainwater harvesting, with the main objective of increasing the energy performance class to A or B.
3. Develop an Energy Efficient Users' Guide to be distributed in public buildings through information and awareness raising campaigns. The guide should suggest ways of reducing the energy consumption, easy to implement by users.
4. Organise trainings for the public buildings administrators responsible for the renovated buildings. The trainings include technical sessions, where administrators will learn how to operate the newly installed equipment, how to set the heating temperature and the monitoring and verification process.
5. Monitor implementation and evaluate performances. Promote results through information and awareness campaigns, organising 3 site visits and press releases.

Targets

Increased level of awareness among Chişinău citizens regarding energy efficiency and energy saving;

Benefits

- The Municipality will play an active role in achieving local policy goals by promoting energy efficiency in buildings.
- Green behavioural increase of public buildings users as a result of the information and awareness raising campaigns.
- Increased performance of the public buildings administrators resulting in optimal energy building performances.
- Leverage from the results in the public sector to the private sector setting the retrofitted buildings as "good practice examples".

Cost estimate

Parameter	Value
Design Guide	10,000 €
User's Guide & Posters & Stickers	6,000 €
Trainings	11,000 €
Information & awareness campaign	10,000 €
CAPEX	37,000 €
OPEX	0 €/ year
Possible source of funding	Municipal budget

Estimated timeframe

- Developing the Design Guide and the User's Guide- 2020;
- Performing trainings and awareness raising activities- 2021;



3.1.3. Pilot project – Promoting green and smart buildings

Impact indicators; 1-low, 3-high



Green behaviour and awareness	3
Public health	2
Climate change mitigation	3
Energy use	3
Material use	2

Description

The Municipality of Chişinău aims to promote green and smart, nearly-zero energy buildings through a pilot project, developing a new public building which will serve as a good practice example.

Green buildings contribute towards climate adaptation goals, addressing issues of increased urban heat island effect and storm water management. Healthy indoor environment, natural daylight and acoustics contribute significantly to occupants' wellbeing and performance. The pilot green building will promote the use and reuse of materials in the most productive and sustainable way across its entire life cycle, reducing maintenance requirements, water and energy consumption, and the use of toxic chemicals.

This action will encourage the Municipality to invest and access funding for green measures in order to create positive impacts on the natural environment, preserve natural resources and improve users' quality of life by implementing new green and high technologies with an increased energy efficiency.

Scale and Location/ Area of implementation

The astronomy observatory building, located on Stephen the Great Boulevard, has been severely damaged during the last decades. In order to preserve the educational value of the astronomy observatory, a new representative public building will be built by the Municipality. An 8000 sqm green, smart and nearly-zero energy building will combine both resource efficiency and high-tech solutions, in order to reduce its overall impact on the natural environment and improve the indoor environmental quality. Measures taken into account for designing and building this building will include: highly insulated building envelope, use of sustainable materials and low-VOC emission materials, green roof, indoor mechanical ventilation, low water use and water harvesting equipment, energy from renewable sources, energy management system, resource efficiency through natural daylight, waste reduction techniques, smart control technologies.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău;

Cooperating Stakeholders: NGOs (coordinating awareness raising campaigns)

Legal Framework and Enabling Factors

The existing legislation enables promoting and financing measures related to improvement of the energy performance of buildings. Law 139/2018 for Energy efficiency, Article 8, states that local public authorities, should ensure the integration in energy efficiency programs and plans of actions to improve the energy performance of buildings; contribute to the co-financing of national programs to improve the energy performance of buildings; contribute to informing the local community to promote the improvement of the energy performance of buildings.

Implementation steps

1. Develop the Terms of Reference which will include all activities mentioned above.
2. Develop a feasibility study for construction of a green and smart, nearly-zero energy building. Identify and assess financing opportunities.
3. Develop the technical design and build the green and smart, nearly-zero energy building.
4. Organise a training for the building's administrators regarding technical details on how to operate the newly installed equipment, and on the monitoring and verification process.
5. Monitor implementation and evaluate performances. Organise awareness raising campaigns.

Targets

- Low energy and water consumption (30 to 70% lower in comparison with a standard building);
- Share of energy from renewable sources (10 % of RES out of total energy consumption in a year);
- Good light and air quality indoors, according to on site measurements;
- Sustainability certification of the building;

Benefits

- Healthy indoor environment: good indoor air quality, lighting, acoustics; increased users' thermal comfort; resources and materials efficiency.
- Promoting sustainable practices: water reuse, waste management & recycling, green energy.
- Creating local jobs and increasing demand for skilled building professionals.

Annual energy savings*	780,000 kWh/ year
Annual direct savings	30,505 €/ year
Annual CO2 avoidance*	157.56 tCO2

* Compared to a standard existing building

Cost estimate

Parameter	Value
Dimension	8,000 m2 new nZEB building
Feasibility Study	25,000 €
Technical project & design	110,000 €
Construction and implementation	6,000,000 €
Training of staff	10,000 €
Information & awareness campaign	10,000 €
CAPEX	6,155,000 €
OPEX	15,000 €/ year
Possible source of funding	Credit lines; Grants

Estimated timeframe

- Developing the technical design solutions- 2023;
- Building the green and smart, nearly-zero energy building- 2023-2024;
- Performing trainings and awareness raising activities- 2024;



3.1.4. Street lighting energy efficiency programme

Impact indicators; 1-low, 3-high



Energy use	3
Climate change mitigation	3
Green behaviour and awareness	2
Employment	3
Safety	2

Description

Public lighting in Chişinău is old, highly inefficient and insufficient. Although rehabilitation works have been performed this year, the coverage area is very small and further investments are necessary.

This action envisages the implementation of a large scale programme aiming for the replacement and improvement of the public lighting network including, amongst others, high efficiency street lighting and traffic lights, according to the national legislation and norms. The project entails the use of best available energy efficient technology, namely LED, centralized automated control solutions. Besides, it will replicate best practices in procuring performance-based design, financing, installation, operation and maintenance of energy efficient solutions. Where possible, new ways of finance with a focus on Energy Service Companies (ESCOs) and EPCs (Energy Performance Contracts) will be considered.

Scale and Location/ Area of implementation

The street lighting system will be rehabilitated for streets within the Chişinău boundaries, both where inefficient systems are present and where street lighting is not available or it is insufficient, covering an overall length of maximum 24,000 meters, including pedestrian areas.

Rehabilitation works will include the following components: centralised control centre for the street lighting network; modern system monitoring solutions; retrofit of the existing out-dated street lights with best available energy efficient technology, namely light-emitting diodes ("LED") luminaries; replacement of the deteriorated street lighting poles and cable networks (underground, where feasible). Where street lighting is not available or it is insufficient, will be installed new/upgraded street lighting network.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău;

Legal Framework and Enabling Factors

The existing legislation enables financing measures for projects related to energy efficiency and renewables. Law 139/2018, for Energy efficiency states that one of the responsibilities of the implementing authority for energy efficiency policies is to finance and/or co-finance projects in the field of energy efficiency and renewable energy and monitor the progress of their implementation until completion. Law 10/2016, for Promoting the use of energy from renewable sources details the legal guarantees for switching to use of energy from renewable sources.

Implementation steps

1. Develop the Terms of Reference which will include all activities mentioned above. Assess ambition indicators and eligibility criteria for the contractor and include these in the Terms of Reference.
2. Develop a feasibility study for the rehabilitation of the public street lighting system. Develop an implementation plan. Identify and assess financing opportunities.
3. Perform renovation and modernization works according to the implementation plan.
4. Train administrative personnel.
5. Monitor implementation and evaluate performances. Promote results.

Targets

- Improved light quality during night time;
- Increased pedestrian/cycling traffic;
- Increased coverage of public lighting in the city;

Benefits

- The Project will generate transition impact by demonstrating the benefits of energy conservation and promoting the expansion of energy efficiency lending and energy service companies (ESCOs).
- Reduced maintenance costs (EUR/year).
- Improved street lighting controllability through control centre and system monitoring solutions.

Annual energy savings	1,200,000 kWh/year
Annual direct savings	120,000 €/year
Annual CO2 avoidance ⁹	516 tonnes CO ₂ /year

Cost estimate

Parameter	Value
Scope	24,000 m street lighting
Dimension	2,400 lamps, smart control system
Feasibility Study & Implementation plan	20,000 €
Construction and implementation	2,500,000 €
Training of staff	10,000 €
Information & awareness campaign	10,000 €
CAPEX	2,540,000 €
OPEX	30,000 €/year
Possible source of funding	Credit lines; National funding from the Energy Efficiency Agency

Estimated timeframe

- Identifying the streets and areas where public street lighting needs to be modernised or installed; establish renovation solutions and implementation plan- 2020;
- Performing renovation and modernization works- 2021-2024;

⁹ Grid Emission factors for EBRD countries of operation, 2016



3.1.5. District heating energy efficiency programme

Impact indicators; 1-low, 3-high



Energy use	3
Climate change mitigation	3
Green behaviour and awareness	2
Employment	2

Description

Joint Stock Company “Termoelectrica” is the main producer of electricity in cogeneration regime, producer, distributor and supplier of thermal energy and hot water in Chişinău. The company owns 2 local heating plants, South Thermal Plant and West Thermal Plant and 19 suburban heating plants located in the suburbs of the city, all utilizing natural gas as fuel. Besides, Termoelectrica uses two national CHP plants, which produce both electricity and thermal energy. They supply annually about 1,370 thousand Gcal of thermal energy for heating and for the preparation of domestic hot water.

Termoelectrica has undergone modernization works for the main heat distribution networks, over 30% of their length, by replacing existing old transmission and distribution pipes with pre-insulated pipes, replacing the existing compensators and bellows; mounting ball valves; and installing monitoring systems. Furthermore, Termoelectrica has upgraded some of the thermal power plants producing thermal energy and implemented an automated system, resulting in the optimization of the number of staff and the reduction of production costs. As a result of the measures for the rehabilitation of the thermal networks in SACET Chişinău, the losses of thermal energy decreased from about 400,000 Gcal annually in the period 2008-2014 to about 335,000 Gcal in the period 2015-2018. The network losses are significantly high and further investments are needed for increasing the energy efficiency of the overall district heating system and network.

Scale and Location/ Area of implementation

The company is undergoing a large Project for Improving the Efficiency of the District Heating Supply System (SACET), implemented with the support of the World Bank, the Government of Sweden and the Consolidated Unit for the Implementation and Monitoring of Projects in the field of Energy. Modernization works described in this action are based on the results of the feasibility study undergone in the above-mentioned project and they include:

- Modernization of existing generation sources and integration in the technological circuit of modern sources for cogeneration;
- Rehabilitation of District Heating Networks;
- Installation of Individual Heat Substations in Residential Houses;
- Installation of smart energy meters and control systems at the user level for 2000 housing units;
- .

Owner and Cooperating Stakeholders

Owner: Termoelectrica SA District Heating Company

Cooperating Stakeholders: the Municipality of Chişinău;

Legal Framework and Enabling Factors

The existing legislation enables financing measures for projects related to energy efficiency. Law 139/2018, for Energy efficiency states that one of the responsibilities of the implementing authority for energy efficiency policies is to finance and/or co-finance projects in the field of energy efficiency and renewable energy and monitor the progress of their implementation until completion.

Implementation steps

1. Identify and assess financing opportunities.
2. Perform renovation and modernization works according to the existing Feasibility Study and implementation plan.
3. Monitor implementation and evaluate performances through indicators mentioned below.
4. Promote results through information and awareness campaigns, organising a site visit and press releases.

Targets

- Increased amount of electricity produced in cogeneration (about 50% compared to the thermal energy currently produced);
- Reduction of CO₂ emissions (approx.. 20 %);
- Increased no of customers connected to SACET;

Benefits

- Modernization of existing generation sources and introducing new sources into the technological circuit based on high efficiency cogeneration.
- Termoelectrica and the Municipality will play an active role in promoting energy efficiency in the city and fighting energy poverty.
- Creation of jobs especially for SMEs, which represent the major share of enterprises active in the sector.
- Lower energy consumption related to district heating (kWh/year).
- Lower CO₂ equivalent emissions (CO₂eq).
- Reduced maintenance costs (EUR/year).
- Improve population awareness and controllability regarding energy consumption through energy meters and control systems.

Cost estimate

Parameter	Value
CAPEX	99,458,000 €
Possible source of funding	Credit lines

Estimated timeframe

- 2020- 2024;



3.2.1. Pilot project – Installing PVs on public transport parking lots

Impact indicators; 1-low, 3-high



Energy use	3
Climate change mitigation	3
Green behaviour and awareness	3
Economic returns for investor	2
Employment	2

Description

Energy in Republic of Moldova relies mostly on imports, making the country highly dependent on external resources and resulting in accentuated insecurity with regards to energy prices. In Chişinău, only 5% of the energy results from renewable sources, mainly biomass, clearly showing a high need for implementing clean energy projects.

Parking areas are unexploited brownfields which have a high potential for generating renewable energy. Buildings roofs and solar carports can enhance the trolleybus parking lots and improve the economic and environmental performance of the area.

By installing photovoltaic panels above the public transport parking lots, clean electricity will be generated, which can be used for public transport, in trolleybuses and to charge electrical buses; additionally, sunshade over the car fleet will overcome the overheating, resulting in less energy use. This action encourages the Municipality to invest and access funding for green technologies in order to generate energy which produces no greenhouse gas emissions from fossil fuels and reduces air pollution.

Scale and Location/ Area of implementation

The photovoltaic panels will be installed on buildings and above the parking areas of the trolleybus fleet, in three different locations, as it follows: Trolleybus park no.1 - 2 ha, Trolleybus park no.2 - 3 ha, Trolleybus park no.3 - 6 ha. The solar car park will include a metallic carport frame, which will support the photovoltaic panels installed above the parking area. The generated energy will be used by the trolleybuses and for the buildings on site.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău;

Cooperating Stakeholders: NGOs (coordinating awareness raising campaigns)

Legal Framework and Enabling Factors

The existing legislation enables financing measures for projects related to energy efficiency and renewables. Law 139/2018, for Energy efficiency states that one of the responsibilities of the implementing authority for energy efficiency policies is to finance and/or co-finance projects in the field of energy efficiency and renewable energy and monitor the progress of their implementation until completion.

The Energy Efficiency Agency finances projects in the field of energy efficiency and renewable energy implemented by public authorities.

Implementation Steps

1. Develop the Terms of Reference which will include all activities mentioned above. Assess ambition indicators and eligibility criteria for the contractor and include these in the Terms of Reference.
2. Develop a feasibility study for the construction of a solar car park in all three trolleybus parks, including charging solutions for trolleybuses and electric busses. Develop an implementation plan which will include the future possibility of adding charging stations for electrical buses. Identify and assess financing opportunities.
3. Build the carport frames and install the photovoltaic panels.
4. Monitor implementation and evaluate performances. Promote results through information and awareness campaigns, organising a site visit and press releases.

Targets

- Introduce % of RES energy used by the transport public company;

Benefits

- Air quality improvement due to green technologies which produce no global warming emissions.
- Improved public health due to avoided air and water pollution.
- Diversifying energy supply and reducing dependence on imported fuels.
- Reduced air conditioning energy consumption (even for fuel buses) resulting from parking under the carports shade.
- Creating economic development and jobs in manufacturing, installation and maintenance and increasing demand for skilled professionals.

Avoided grid electricity	2,575,000 kWh/ year
Annual savings	257,500 €/ year
CO ₂ emissions avoided ¹⁰	1107.25 tCO ₂ / year

Cost estimate

Parameter	Value
Scope	3830 PV modules on roofs- 6450 m ² 3600 PV modules above parking- 6000 m ²
Unit cost	300 €/m ² PV module without frame 330 €/m ² PV module with frame
CAPEX	3,915,000 €
OPEX	20,000 €/ year
Possible source of funding	Credit lines; Grants; National funding from Energy Efficiency Agency

Estimated timeframe

- Developing technical solutions and implementation plan- 2020- 2021;
- Performing modernization works- 2021-2024;

¹⁰ Grid Emission factors for EBRD countries of operation, 2016



3.2.2. Identifying Renewable Energy Projects



Impact indicators; 1-low, 3-high

Energy use	3
Climate change mitigation	3
Green behaviour and awareness	3
Economic returns for investor	2
Employment	2

Description

Republic of Moldova is highly dependent on external resources for energy, resulting in accentuated instability of the energy prices. In Chişinău, only 5% of the energy results from renewable sources, mainly biomass, clearly showing a high need for implementing clean energy projects.

This policy action refers to the elaboration of 5 feasibility studies which aim at studying the potential for implementing renewable energy projects in Chişinău. Its results will lead to investments through public funds provided by the Energy Efficiency Agency and/or private funds and investors' involvement.

This action will encourage the Municipality to invest and access funding for green technologies in order to generate energy which produces no greenhouse gas emissions from fossil fuels and reduces air pollution.

Scale and Location/ Area of implementation

Feasibility Studies will explore the potential of implementing renewables projects in Chişinău, analysing both small and large-scale projects. Topics / areas of study for the feasibility studies may include:

- Incorporating solar thermal collectors and PV panels on top of public buildings;
- Renewable power plants on vacant territories owned by the Municipality;
- Heat pumps for public buildings;
- Renewable based heat supply;
- Waste-to-energy technologies, including a biogas station;

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău;

Cooperating Stakeholders: Department of Housing and Public Utility;

Legal Framework and Enabling Factors

The existing legislation enables financing measures for projects related to energy efficiency and renewable energy. Law 139/2018, for Energy efficiency states that one of the responsibilities of the implementing authority for energy efficiency policies is to finance and / or co-finance projects in the field of energy efficiency and renewable energy and monitor the progress of their implementation until completion.

The Energy Efficiency Agency finances projects in the field of energy efficiency and renewable energy implemented by public authorities.

Implementation steps

1. Develop 5 Terms of Reference which will include all activities mentioned above. Assess ambition indicators and eligibility criteria for the contractor and include these in the Terms of Reference;
2. Develop 5 feasibility studies for increasing the share of energy from renewable sources in the city; Identify and assess financing opportunities;
3. Access funding and prepare public tenders for project implementation.

Targets

- Increase the total volume of investment in RES;

Benefits

- Air quality improvement due to green technologies which produce no global warming emissions.
- Improved public health due to avoided air and water pollution.
- Diversifying energy supply and reducing dependence on imported fuels.
- Reducing landfill waste disposal
- Creating economic development and jobs in manufacturing, installation and maintenance and increasing demand for skilled professionals.
- Achieving local policy goals.

Cost estimate

Parameter	Value
Scope	Feasibility studies
Measure	5
Unit cost	25,000 €/study
CAPEX	125,000 €
OPEX	0 €
Possible source of funding	Municipal budget National funding from Energy Efficiency Agency

Estimated timeframe

- Developing 5 feasibility studies and identify financing opportunities- 2021- 2024;



3.3.1. Implementing energy management at city level



Impact indicators; 1-low, 3-high

Energy use	3
Green behaviour and awareness	3
Climate change mitigation	2
Community involvement	1
Economic returns for investor	2

Description

Energy management is one of the most demanding issues in cities, due to the complexity of the energy systems and their vital role for the city. Implementation of the energy management for the city of Chişinău will enable the Municipality to keep track of information on energy services and allow them to monitor the impact of their resource consumption on the overall sustainability of the city and will also provide tools for the city to adopt smart cities strategies.

This policy action will enable the Municipality to perform the energy mapping of the city, establish priorities for energy projects and identify financing opportunities and solutions for future investments.

Scale and Location/ Area of implementation

The energy management for the city of Chişinău will focus on compliance with national regulations and requirements according to the energy efficiency law and monitor energy performance indicators. This action will support future projects and investments, providing a good baseline, through relevant and accurate data.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău;

Legal Framework and Enabling Factors

The existing legislation provides requirements for public authorities. Law 139/2018 for Energy efficiency states that public authorities have the following responsibilities in order to contribute to the achievement of the national targets in the field of energy efficiency and promote local energy efficiency:

- develop and approve local energy efficiency action plans targeting local government authorities of the second level as separate documents or as part of the general development plans, ensuring the execution and monitoring of their implementation;
- initiate and finance projects in the field of energy efficiency and contribute to their co-financing within the limits of local budgets;
- organize public procurement procedures for energy services and conclude contracts in this respect;
- contribute at local level to the implementation of state energy efficiency policy;
- participate, at local level, in the dissemination of information on energy efficiency, including energy efficiency financing mechanisms and instruments, and the regulatory framework adopted to meet national targets;

Implementation steps

1. Develop the Terms of Reference. Assess ambition indicators and eligibility criteria for the contractor and include these in the Terms of Reference.
2. Establish a project implementation unit made of external experts contracted and Municipality's employees. Appoint an energy manager for Chişinău, according to national legal requirements.
3. Analyse the city's overall energy consumption and elaborate the energy mapping of the city. Elaborate the local energy plan according to national requirements established by Law 139/2018.
4. Evaluate all public buildings and their energy consumption. Impose new standards for deep renovation for improving the energy efficiency and users' comfort in public buildings. Train administrators in public buildings with regards to energy and microclimate comfort aspects.
5. Conduct educational behaviour change programs and awareness campaigns.
6. Coordinate with utility companies on action plans and future investment opportunities.
7. Implement ISO 50001- Energy Management standard within Chişinău Municipality.
8. Monitor implementation and evaluate performances. Promote results.

Targets

- Municipal staff trained;
- Increased users' awareness;
- Implementing ISO 50001.

Benefits

- Improving staff expertise and performance.
- Achieving local policy goals.
- Managing and reducing energy consumption at the city level.

Cost estimate

Parameter	Value
Local energy plan	20,000 €
Evaluation of public buildings and energy consumption	20,000 €
Minimum performance requirements for energy projects	20,000 €
Educational behaviour change programs and awareness campaigns	50,000 €
Trainings for public buildings administrators	20,000 €
Implement ISO 50001 at Municipality level	200,000 €
CAPEX	330,000 €
Possible source of funding	Municipal budget, Grants

Estimated timeframe

- Establishing a project implementation unit; Appointing an energy manager for the city; Elaborating the local energy plan- 2020;
- Evaluating all public buildings and their energy consumption; coordinating with utility companies; implementing ISO 50001; conducting educational behaviour change programs and awareness campaigns- 2021-2024;

Chapter 9

Strategic Objective 4. Sustainable resources and waste management

9.1. Existing responses in the solid waste sector

The municipal enterprise Regia Autosalubritate operates waste collection services and landfill operation in most of the municipality, though in some of the suburbs small local operators have contracts with the local municipality. The management of the service falls into the responsibility of the Department of Housing and Public Utility. Waste collection is well organized based on 895 platforms in the municipality, where in the 5 districts of Chişinău 98% collection coverage rate is reported. The suburbs however need to be better covered with services.

Pilot initiatives for source separated waste collection existed over the years in Chişinău, the population participated in these initiatives but was not convinced of the efficiency of the collection services and the recycling and therefore the projects did not have much success. There are about 10 private companies who collect recyclable materials from bigger recyclable waste generators such as supermarkets or other packaging waste producers and traders. This sector is completely private and there is no coordination of the actors from the municipality. There is a private initiative for operating a sorting station. The company invested in sorting lines in the region of Bubuieci and has currently a contract of cooperation with the municipal waste management enterprise, receiving a limited amount of mixed municipal waste for sorting.

The Țânțăreni landfill was closed in 2010 due to alleged complaints regarding ground water pollution. Later this was proven to be false by a risk study we carried out. We re-opened the landfill in July 2017 knowing that necessary upgrades were still to be done for an environmentally safe disposal. We strengthened the stability of the dam as a first measure along with a tipping platform. We recently acquired a leachate treatment plant. Redevelopment of the site to fulfil sanitary landfilling standards that will allow us to operate for up to 10 years is our plan and is reflected in the current action plan. The disposal site used between 2010 and July 2017 at Bubuieci is closed now, but needs rehabilitation work and leachate treatment.

The most significant investment initiative in the sector came from a cooperation with EBRD, within which priority investment projects in the sector were established. The priority investment projects included in this feasibility study were the modernizing of the collection and transfer equipment and fleet, the modernizing of the transfer station and the Țânțăreni landfill and the rehabilitation of the Bubuieci disposal site. The latest update of the Environmental and Social Assessment of the priority projects is dated March 2018 and the feasibility study is still awaiting the approval of the council. Some of the investment projects foreseen in this package are partially carried out with respect to modernizing the disposal site and the collection fleet financed from allocations of the municipal budget.

9.2. Rationale

Chişinău is struggling with ensuring adequate waste collection services in the suburbs, the deficiencies in this field sometimes leading to inadequate disposal as well. At the same time the entire collection system needs efficiency improvements. These aspects are urgent as they are directly related to public health.

Equally important is the management of various material and resource streams from the waste in an effort to divert waste from disposal and work towards circular economy. Recycling and composting rates are low, source separation of waste is piloted in various parts of the city but needs to be improved through infrastructure and awareness raising.

The focus in these thematic areas is first to deal with issues that potentially pose public health risks, such as inadequacy or unavailability of collection system in the suburbs. Following this, the specific objectives target planning, capacity building of the municipality as client and manager of the sector and soft measures to shift attention and behavior towards circular economy solutions rather than end of pipe solutions.

Another immediate objective of the city is to improve the landfill and disposal practices at Țânțăreni, working on various aspects of the site to approximate as much as possible sanitary landfilling standards and protect the environment.

Vision: Sustainable resources and waste management creates a healthy and clean environment for citizens encouraging source separation and recovery of all materials with intrinsic value.

SO 4.1 Extend and improve waste collection and transfer system services for a clean and healthy environment

SO 4.2 Implement circular economy solutions

SO 4.3 Ensuring waste disposal and environmental protection

9.3. Actions



Sustainable resource and waste management.

Chişinău will improve the waste management and will increase the recovery rate of specific waste streams and materials for the circular economy.

Strategic objective

4

SPECIFIC OBJECTIVES ON MEDIUM-TERM (2024)	SHORT-TERM ACTIONS	MEDIUM AND LONG-TERM ACTIONS
SpO.4.1 Extend and improve waste collection and transfer system services for a clean and healthy environment	4.1.1. Extending the waste collection services to the suburbs 4.1.2. Modernisation of the waste collection, transfer and transport system	
SpO.4.2 Implementing circular economy solutions	4.2.1. Introducing source separation of waste into two fractions for the entire area of the municipality 4.2.2. Developing and operating 5 centres for collection of Waste Electrical and Electronic Equipment (WEEE), bulky waste and other types of waste 4.2.3. Implementing material recovery 4.2.4. Collecting and composting green waste generated in gardens and parks, using the compost in green areas of the city 4.2.5. Collecting and recycling of construction and demolition waste	• Installing buy-back centres for recyclables • Introducing biodigesters and composting for selectively collected organic waste (from restaurants, canteens, food industry) • Developing a mechanical-biological treatment station • Awareness raising campaigns regarding recycling, together with a bank of recyclables and a prize system the most performant communities • Reducing food waste, creating a new social canteen
SpO.4.3 Ensuring waste disposal and environmental protection	4.3.1. Improvement of the Țăntăreni disposal site and disposal practices	• Establishing a new site for waste disposal • Technologies for energy recovery from waste



4.1.1. Extending the waste collection services to the suburbs

Impact indicators; 1-low, 3-high



Public health	3
Access to basic services	3
Water quality	2
Soil quality	2

Description

Extending collection service to all the suburbs is imperative for protecting public health. The collection system will include the provision of primary containers for citizens of the suburbs and the needed collection and long-distance hauling trucks. This will enable sufficient frequency of the service and safe disposal of the waste at the Țânțăreni disposal site. The waste collection system will be extended in a one bin mixed waste collection system. Both a door-to-door collection system with Euro-bins and a kerb-side collection with containers shall be used, depending on the location.

This measure will stop waste accumulation and illegal dumping in the suburbs and also stop over-burdening the municipal service in the city due to the common practice of citizens bringing their waste to the city when commuting to their job and disposing of their garbage at one of the waste collection platforms in the city.

Four collection trucks are needed to extend and improve the waste collection system ensuring a frequency of collection of once per week. One long distance truck will be needed for transferring waste from the Ciocana transfer station, at which part of the Chişinău waste is transferred to the distant Țânțăreni landfill.

Scale and Location/ Area of implementation

The municipal enterprise for waste management of Chişinău Municipality, Regia Autosalubritatea is currently providing collection service in Crîcova, Dumbrava, Vatra, Vadul lui Voda, Cioresc and Bubueci and working on closing waste collection contracts with the local authorities in these settlements. Recent contracts have been closed in Condrîța, Ghidigici, Grățiești. Several settlements are serviced by other local private or municipally owned companies in direct contract with the local authority of the settlement.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău, through the Department of Housing and Public Utility;

Cooperating Stakeholders: local authorities of the suburbs.

Legal Framework and Enabling Factors

The Waste Management Strategy in the Republic of Moldova, approved by the Government Decision no. 248 of 10.04.2013, includes as objective the provision of quality waste collection services in the country. According to article 48 of Law on waste no. 209 of 2016 that entered into force in 2017, household waste generators are obliged to dispose of their waste in permitted waste collection systems.

Implementation steps

1. Make a full inventory of the existing infrastructure and collection coverage rate in the suburbs of Chişinău Municipality.

2. Verify and complete capital costs of extending adequate collection services to all remaining suburbs. Include costs in the city budget.
3. Continue house-to-house visits to contract all remaining households without a collection service in the suburbs by one of the contracted operators. The waste management enterprise Regia Autosalubritate already started this activity.
4. Strengthen the role of the Department of Housing and Public Utility to inspect waste collection and disposal activities of the municipal enterprise Regia Autosalubritate and the private operators currently servicing a part of the suburbs to ensure adequate collection service and disposal.
5. Strengthen enforcement measures of the legal obligation of all households of Chişinău Municipality to have a valid waste collection service contract according to the regulation related to waste management. Strengthen enforcement measures for collection of tariffs.
6. Ensure adequate legal framework for increasing tariffs for waste management as collection service coverage and quality increases.
7. Acquisition of waste collection infrastructure and vehicles for all suburbs.
8. Operation of the service.

Targets

- 100% collection coverage in the suburbs
- 90% collection rate for tariffs

Benefits

- Access to services improved and extended.
- Quality of soil and underground water will be improved as illegal dumping and waste accumulation will be reduced.
- Quality of life will be positively impacted in suburbs and the city where currently waste accumulation can cause nuisance, unpleasant odours and may attract pests.
- Overflowing of bins and waste collection platforms in the centre of the city will be reduced as people from the suburbs will not bring their waste to the centre.

Annual revenue for 50,000 citizens	945,000 €
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Cost estimate

Parameter	Value
4 collection trucks, 16 m ³ /7 t each	500,000 €
1 haulage trucks for waste transfer, 70 m ³ /28.8 t	170,000 €
1,000 metal containers, 1.1 m ³	330,000 €
CAPEX	1,000,000 €
OPEX (collection and haulage)	790,000 €/ year
Tariff (at cost recovery for collection and haulage- 50,000 citizens)	42 €/t (~ 19 MDL/person/month)
Possible source of funding	Municipal budget, credit lines from IFI or commercial loans

Estimated timeframe

2020-2024



4.1.2. Modernization of the waste collection, transfer and transport system

Impact indicators; 1-low, 3-high



Material use	3
Access to basic services	3
Water quality	2
Soil quality	2
Land use	2
Economic growth	2
Employment	2
Public health	2

Description

Collection coverage in the city is ensured through communal collection system from platforms. While the number of the platforms is assessed to be sufficient, they need to be modernized, some containers replaced or supplemented to ensure sufficient capacity. We will organize waste collection on two fractions: recyclable waste and refuse waste.

An estimated 80% of the waste collection fleet needs to be modernized to ensure a more efficient, user-friendly service. Part of the platforms need to be moved for a better efficiency of collection. Many need investments into a solid impermeable platform and a fence to improve the hygiene and control. The existing waste collection fleet needs also to be renewed with approximately 30 new trucks of different capacities.

- Efficiency of the transfer system needs to be improved by investments at the existing transfer station in the Ciocana sector and by procurement of 10 haulage trucks (70 m³/28.8 t). Also, the investments will cover waste collection containers, transfer station upgrade and covered collection sites.

Scale and Location/ Area of implementation

Improvements are needed in the waste collection system in the 5 city districts at waste collection platforms to ensure separate collection of two waste fractions and sufficient capacity for collection at the existing 895 waste collection platforms. Improvements are also needed at the waste collection rooms inside the apartment blocks where the waste collection is based on disposal chutes, 30-50% of the apartments.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău, through the Department of Housing and Public Utility;

Cooperating Stakeholders: Regia Autosalubritatea, the municipal enterprise for waste management of the city;

Legal Framework and Enabling Factors

The Waste Management Strategy in the Republic of Moldova, approved by the Government Decision no. 248 of 10.04.2013 includes as objective the provision of quality waste collection services in the country.

Implementation steps

1. Confirm in an updated feasibility study the current baseline and needs of the collection, transfer and transport system. Present project for financing and select most appropriate financing mechanisms.

2. Participative planning for finding the best locations for the bins for source segregation and the best option for collection system depending on the infrastructure. At blocks of flats with disposal chutes a system of cooperation between municipal waste management enterprise, the housing association and cleaning staff may improve capture rates of recyclables.
3. Update tariffs and plan for tariff reform in the coming years to be able to sustain an improved waste collection service. Ear mark tariff revenues for maintenance and replacement costs.
4. Launch public tender for procurement of civil works, construction, containers, vehicles and other equipment as specified in the feasibility study.
6. Strengthen the role of the municipal department to control, inspect and manage service delivery. Deliver improved services sustainably, ensuring regular maintenance, repair and replacement.

Targets

- 100% of waste collection platforms with adequate physical primary collection infrastructure;

Benefits

- Access to services will be improved.
- Quality of soil and underground water will be improved as waste accumulation will be reduced at the waste collection platforms.
- Quality of life will be positively impacted in the city where currently waste accumulation can cause nuisance, unpleasant odours and may attract pests.

CO2 emissions saved by introducing more efficient transport and transfer	130 tCO2 eq/year
Annual revenue	14,700,000 €

Cost estimate

Parameter	Value
Feasibility study update	50,000 €
30 trucks, average capacity 16 m ³ /7 t	3,750,000 €
10 haulage trucks for waste transfer, 70 m ³ /28.8 t	1,700,000 €
4,000 metal containers for residual and mixed waste, out of which 3,000 1.1 m ³ containers and 1,000 0.75 m ³ containers	1,320,000 €
1,850 covered container sites for 2 containers	833,000 €
Transfer station upgrade, including one sorting line for recyclables	850,000 €
CAPEX	8,520,000 €
OPEX (collection and haulage)	12,200,000 €/ year
Tariff (at cost recovery for collection and haulage)	42 €/t (~ 19 MDL/person/month)
Possible source of funding	Municipal budget, credit lines from IFI or commercial loans

Estimated timeframe

2020-2024



4.2.1. Introducing source separation of waste into two fractions for the entire area of the municipality



Impact indicators; 1-low, 3-high

Climate change mitigation	3
Public health	3
Access to basic services	3
Soil quality	2
Material use	2
Economic growth	2

Description

Source separation and separate collection of waste/recyclables has been introduced and piloted in Chişinău in various zones. In fact, most platforms are endowed with some infrastructure for source separation, however the quality of recyclables collected through these systems is low. Therefore in the short term we will carry out a citywide project for source separated waste collection on two fractions, i.e. mixed recyclables and residual waste. Mixed recyclables will include paper, cardboard, plastics, metals and glass. It is assumed that 50% of the volume and 20% of the weight is recyclables.

The provision of adequate infrastructure will be coupled with awareness raising campaigns repeated yearly based on a communication plan. In the medium to long term, it is planned to switch gradually to more complex source separation, on 4 or more fractions, depending on the treatment options and market development that we will implement in the city. The treatment options for the city in the medium to long term include an MBT with options such as recycling, RDF production, composting, anaerobic digestion, etc.

The inclusion of incentives for recycling in the tariffing structure will be analysed and introduced.

Scale and Location/ Area of implementation

Equipping the waste collection platforms and collection points at blocks of flats with bins or containers for source separated recyclables.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău, through the Department of Housing and Public Utility;

Cooperating Stakeholders: Regia Autosalubritatea, the municipal enterprise for waste management of the city, NGOs;

Legal Framework and Enabling Factors

The Waste Management Strategy in the Republic of Moldova, approved by the Government Decision no. 248 of 10.04.2013 includes as objective the source separated collection, increased recycling and producer responsibility. The Law on waste no. 209 of 2016 that entered into force in 2017 includes a 30% recycling target for recyclable household waste based on weight until 2020. However, it includes only a general reference to producer responsibility in Article 21.

Implementation steps

1. Confirm through feasibility study the needed equipment for upgrading the infrastructure as needed for implementing city-wide source separation on two fractions. The study should analyse and take into account current private sector (formal and informal) recycling activities, building on the existing systems. Studies will include market research for the potential up-takers of marketable materials.
2. Organize public procurement for purchasing of the necessary equipment.
3. Draft a communication / awareness raising campaign plan for source separation and recycling.
4. Organize public procurement for purchasing of the necessary equipment. Deliver improved services sustainably, ensuring regular maintenance, repair and replacement.
5. Study the opportunity to introduce incentives in the tariff scheme to enhance participation in source separation. Introduce incentive scheme for recycling.
6. Carry out awareness raising campaigns for sources separation linked to the door-to-door visits and planning work with the communities. Repeat periodically once the infrastructure for source separation is in place.
7. Set up and implement a monitoring system for recyclables.

Targets

- 100% of waste collection platforms with adequate infrastructure for at least 2 fractions of waste: recyclables and residual waste streams.
- The proposed minimum recycling rate to be achieved is 30%.

Benefits

- Disposal and associated pollution and climate change impacts from waste will be reduced.
- Resource efficiency will be improved due to the implementation of source segregation and as a consequence recycling rates are improved.
- Replacement of virgin raw materials with secondary materials with less embedded carbon leads to reduced greenhouse gas emissions.
- The increased recycling will create business opportunities and additional jobs in the recycling sector.

CO2 emissions avoided

Due to less embedded carbon in recycled materials, benefits are reported once, under the sorting station

Cost estimate

Parameter	Value
Feasibility study	50,000 €
4,200 plastic containers, 1,100 l	840,000 €
2,100 covered container sites for 2 containers	945,000 €
3 trucks, average capacity 16 m ³ /7 t	375,000 €
CAPEX	2,160,000 €
OPEX (collection)	1,323,000 €
Possible source of funding	Private sector, PPPs, municipal budget, part of the investment program together with Action 4.1.2, through a soft loan from a development bank.

Number of containers is assessed on the assumption that 50% of the waste volume is of dry recyclables and its density is 80 kg/m³ collection frequency 180 times per year. The additional number of trucks needed in case of separate collection of 2 fractions – dry and wet waste is included, so is the increase of OPEX in case of separate collection of two fractions.

Estimated timeframe

2020-2024



4.2.2. Developing and operating 5 centres for collection of Waste Electrical and Electronic Equipment (WEEE), bulky waste and other types of waste

Impact indicators; 1-low, 3-high



Water quality	2
Soil quality	2
Material use	2
Climate change mitigation	2

Description

Waste collection centres are a frequently used system in Europe, they are suitable for collecting bulky waste, Waste Electrical and Electronic Equipment (WEEE), garden waste and other special waste streams as defined by the law. Hazardous household waste such as used oil, batteries and accumulators are often collected in these places. The centres function in the “bring-in” system and often charge little to no fee for accepting waste from the special waste streams listed above. The municipality usually allocates the space and equips the centre. Waste collection centres may operate small reuse and repair shops as well for the waste streams that are brought in, thereby increasing reuse and repair.

Scale and Location/ Area of implementation

Establishment of 5 such collection centres in the 5 districts of the municipality could be a starting point for developing sufficient capacity. The location of the Centres has to be determined in agreement between the Department of Housing and Public Utility and the waste operator, it needs to be convenient from the logistics point of view and needs to be in municipal owned building or land.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău, through the Department of Housing and Public Utility;

Cooperating Stakeholders: Regia Autosalubritatea, the municipal enterprise for waste management of the city;

Legal Framework and Enabling Factors

Law on waste no. 209 of 2016 was approved by the Parliament and entered into force on 23 December 2017. It was developed in line with the specific waste stream (WEEE, packaging, ELV, etc.) directive and includes requirements for the management of these specific streams. Government decision for approving the Regulation for the management of WEEE entered into force on the 23rd of September through Government Decision 212 from March 2018. The regulation includes a collection target of 5% by 2020 and 30% by 2025. The targets are established based on the average weight of WEEE put on the market in the last 3 years.

Implementation steps

1. Identify suitable location for Waste Collection Centres.
2. Allocate land and building as available.
3. Confirm capacity and equipment needs in the investment and operation phase.

4. Establish operation method, acceptance of waste, frequency of container emptying, proper storage and occupational health and safety issues, fees, opening hours etc.
5. Establish capture targets for WEEE within the framework of the EPR system being set up, taking into account the delay time between such products are bought and discarded, according to specific conditions in Chişinău.
6. Operate the waste collection centres.
7. Include waste collection centres in the ongoing communication and awareness campaigns of the operator.

Targets

- At least 30% of WEEE generated in a given year captured in waste collection centres in the same year.

Benefits

- Disposal will be reduced, thereby pollution and climate change impacts from waste will be reduced and the useful life of disposal will be extended
- Resource efficiency will be improved due to repair and reuse of some items but also through recycling of the collected waste streams
- The increased recycling will create business opportunities and additional jobs in the recycling sector
- Reduced pollution due to adequate handling of hazardous waste streams from the household waste

Annual revenue	150,000 €
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Cost estimate

Parameter	Value
5 waste collection centres, 300,000 € each	1,500,000 €
CAPEX	1,500,000 €
OPEX	150,000 €
Tariff (not relevant?)	Costs incorporated in waste tariff
Possible source of funding	National Environmental Fund, municipal budget, funds WEEE producers and traders in the framework of implementing the EPR system

Estimated timeframe

2021-2023



4.2.3. Implementing Material Recovery

Impact indicators; 1-low, 3-high



Material use	3
Climate change mitigation	3
Water quality	2
Soil quality	2
Employment	2
Economic inclusion	2

Description

Currently sorting of low quality waste, mostly mixed waste in reduced quantities is being done in Chişinău. With the implementation of source segregation of waste in two fractions, post-sorting of recyclable materials coming from this system will make economic sense, since the quantities and the quality of recyclable materials will be higher. Optimizing sorting capacities and quantity can happen in existing sorting plants or through the development of new ones.

The Material Recovery Facilities will include sorting lines with mechanical separation of ferrous metals and non-ferrous metals and manual sorting out of paper and cardboard, PET, plastic, foil, and wood, access to infrastructure such as electricity and water, mobile equipment as wheel loaders, fork lift/telehandler, mobile crane with sorting grab, hook lift truck, containers for the secondary materials and refuse waste, press / bailing machine and other equipment for logistics.

Scale and Location/ Area of implementation

A sorting capacity of 100,000 t / year is estimated to be needed. The location of the plant will be suitable and logistically feasible for the waste management system of the municipality.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău, through the Department of Housing and Public Utility;

Legal Framework and Enabling Factors

The Waste Management Strategy of the Republic of Moldova for 2013-2027 (approved by Government Decision 248/2013) includes as objective recycling of source separated and separately collected waste.

Implementation steps

1. Analyse the feasibility of establishing and operating a sorting station in a PPP arrangement
2. Public procurement for the sorting of source separated and separately collected recyclables ensuring transparency and equity.
3. Close contract for development and operation of sorting station with the winner and negotiate contract on fair and transparent grounds.
4. Operation of sorting facility.

Targets

- 100% of the source segregated waste handled in sorting facility.

Benefits

- Resource efficiency through increased recycling
- Reduced GHG emissions through substituting virgin materials with secondary raw materials on the market
- Prolonged useful life of the existing landfill site

Annual revenue from sales of recyclables	1,400,000 €
Annual savings 9,700*7 € (landfill charge avoided)	67,900 €
CO2 emissions avoided due to less embedded carbon in materials from secondary resources as compared to virgin materials	43,000 tCO2 eq/year

Cost estimate

Parameter	Value
Feasibility study	50,000 €
2 1 MRFs, each with a total capacity of 1050,000 t dry recyclable materials	6,400,000 €
Mobile and stationary equipment for 1 MRFs	1,400,000 €
CAPEX	7,850,000 €
OPEX	1,400,000 €
Possible source of funding	Public private partnership, municipal budget, or as one project in the investment pipeline financed through a soft loan by an IFI. Extended producer responsibility may be a source of revenue financing once the system will be put in place, plans are currently vague.

Estimated timeframe

2021-2024



4.2.4. Collecting and composting green waste generated in gardens and parks, using the compost in green areas of the city



Impact indicators; 1-low, 3-high

Biodiversity	3
Land use	3
Climate change mitigation	3
Water quality	2
Soil quality	2
Employment	2

Description

The Department of Housing and Public Utility is currently handling green waste collection from the city's parks and other green spaces. Building on this experience an action is proposed for implementing a mobile chipping system and composting waste in simple windrow composting technology in 2-3 points in the city. The collection system will be gradually extended to green waste from households with yards and gardens. Currently 23 municipal enterprises are taking care for green and street waste collection and it is foreseen to reorganize them in one entity.

It is expected that an external consultant would be involved in the development of a feasibility study including the institutional reform within the municipality for the management of this waste stream and the management of public green spaces. Three windrow composting compost stations with equipment will need to be in place, together with equipment for mobile shredding and collection of green waste.

Scale and Location/ Area of implementation

2-3 pilot composting stations are envisioned for green waste collected from municipal parks, green spaces, cemeteries and gardens as well as unsold vegetable food waste from markets. The action primarily targets large gardens and public spaces or municipally owned parks in the short term, while in the longer term it can be extended to residential areas.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău, through the Department of Housing and Public Utility;

Cooperating Stakeholders: Regia Autosalubritatea, the municipal enterprise for waste management of the city, Department of Transport and Communication, Municipal Enterprise for Green Space Management;

Legal Framework and Enabling Factors

The Waste Management Strategy of the Republic of Moldova for 2013-2027 (approved by Government Decision 248/2013) includes as objective the development of composting. The Law on Waste no. 209 of 2016 sets up obligation for treatment and collection of bio-waste. There are no targets established in the law, but it is left to the local authorities to establish such targets.

Implementation steps

1. Establish capacity needs and equipment need for mobile shredders, tractors, windrow turners, land take for composting stations.

2. Identify suitable location for 3 composting stations. Acquisition and construction phase.
3. Institutional reform to streamline responsibilities related to green waste management and management of public green spaces, including parks and cemeteries.
4. Operate the green waste collection and composting system. Provide high quality compost to municipal gardens, parks, green spaces, and cemeteries. Sale of any compost that is not used internally by the municipality.
5. Awareness raising campaign for the source separation of green waste and use of natural fertilizers.

Targets

- Capturing and composting 60% of the generated green waste in the city.

Benefits

- Reduction of climate change impact that would arise from the biodegradation of green waste at the disposal site. Indirect greenhouse gas reduction benefits include replacement of carbon chemical fertilizers with high embedded with natural fertilizers and an increased carbon sequestration of soils treated with compost.
- Utilizing compost for soil improvement in the city and reduction of costs with buying fertilizer or rich soil for green space maintenance.
- Prolonging the useful life of the disposal site by diversion of waste to composting.

Annual savings, 15,000 t * 7€ landfill charge	105,000 €
CO2 emissions avoided due to avoided methane generation at disposal site	3,530 t CO2eq/year

Cost estimate

Parameter	Value
Feasibility study	30,000 €
Composting infrastructure 3 sites x 5000 t, 500,000 € each	1,500,000 €
Equipment, 3 @ 500,000 € each	1,500,000 €
CAPEX	3,030,000
OPEX	300,000 €
Possible source of funding	Municipal budget, IFIs soft loan as part of an investment pipeline

Estimated timeframe

2020-2024



4.2.5. Collecting and recycling of construction and demolition waste

Impact indicators; 1-low, 3-high



Energy use	3
Land use	3
Material use	3
Biodiversity	2
Water use	2

Description

Construction and demolition waste frequently ends up in the municipal waste stream or is illegally dumped. The collection and treatment of this waste stream is often beneficial since it is largely inert, often recyclable and occurs in large quantities, thus recycling this stream will significantly extend the capacity of the landfill in the city. The municipality will use the aggregates when carrying out constructions and maintenance and will introduce a preference for recycled materials in its procurements.

Containers, collection trucks and processing equipment will be needed to establish the collection and treatment system.

Scale and Location/ Area of implementation

Establish city wide call-on service for the collection of the construction and demolition waste.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău, through the Department of Housing and Public Utility;

Cooperating Stakeholders: Regia Autosalubritatea, the municipal enterprise for waste management of the city, Department of Transport and Communication, Enterprise for Major Capital Investments;

Legal Framework and Enabling Factors

The Waste Management Strategy of the Republic of Moldova for 2013-2027 (approved by Government Decision 248/2013) includes as objective recycling of special waste streams. Law on Waste No. 209 of 2016 establishes a recycling target of 55% of construction and demolition waste.

Implementation steps

1. Feasibility study for the collection and recycling of construction and demolition waste organized as a call-on service. The feasibility study will consider use of smart technologies and applications to optimize the collection system and connect waste generators and the service provider.
2. Allocation of land for treatment and handling construction and demolition waste, including asbestos waste, separately.
3. Public tender for purchasing the necessary collection and treatment equipment.
4. Operate the collection and treatment system.

5. Sale of aggregates and secondary construction materials and/ or use of these materials for the municipalities own construction work.
6. Awareness raising campaign for the use of call-on service for construction and demolition waste collection and for the use of outputs from recycling this waste stream.
7. Establish monitoring system including waste collection operators and recyclers to trace the amount of construction and demolition waste recycled in the system.

Targets

- Increased capture of construction and demolition waste in the waste management system, working towards the 55% recycling rate established by law.

Benefits

- Resource efficiency through recycling and reuse of construction and demolition waste
- Reduced pollution due to adequate handling of hazardous waste streams in the construction and demolition waste
- Increased life of disposal site capacity due to diversion of the construction and demolition waste stream from disposal
- Reduced illegal dumping of construction and demolition waste
- Job creation and business opportunities in the circular economy

Cost estimate

Parameter	Value
Site reinforcement and embankment	750,000 €
Crusher, shredder, loader, vibrating screen, containers	750,000 €
CAPEX	1,500,000 €
OPEX	3-4 €/t; 350,000 €
Tariff	5-6 €/t
Possible source of funding	Private commercial financing based on public procurement and provision of land by the municipality

Estimated timeframe

2022-2023



4.3.1. Improvement of the Țânțăreni disposal site and disposal practices



Impact indicators; 1-low, 3-high

Water quality	3
Soil quality	3
Biodiversity	3
Energy use	3
Land use	2

Description

Waste disposal site needs improvements to approximate to standards of a sanitary landfill. The disposal site was built in the 1970s according to soviet requirements. Reshaping of the deposited waste and the development of new cells is needed besides other improvements.

Improvements planned for the coming 2 years include:

- 4 bulldozers for reshaping the disposal site
- 4 trucks for transporting the soil for landfill coverage
- 1 excavator for loading the trucks with soil
- high voltage transmission line

Further improvements in the planning period include drainage system for rainwater, surface sealing of used cells and landfill gas recovery with electricity generation. Also, this action includes measures related to finalization of the closure process of Bubuieci old landfill.

Scale and Location/ Area of implementation

The foreseen investments are located at the Țânțăreni landfill.

Owner and Cooperating Stakeholders

Owner: the Municipality of Chişinău, through the Department of Housing and Public Utility;

Cooperating Stakeholders: Regia Autosalubritatea, the municipal enterprise for waste management of the city;

Legal Framework and Enabling Factors

Law on waste no. 209 of 2016 was approved by the Parliament and entered into force on 23 December 2017. It was developed in line with the requirements for landfilling of the EU.

Implementation steps

1. Allocate necessary budget for 1-4 years.
2. Implement measures for stability of the embankment.
3. Improve gates and fencing.

4. Purchase equipment.
5. Implement monitoring and improve safety and environmental measures.
6. Closure of old landfill in Bubuieci.

Targets

- Improved disposal standards

Benefits

- Reduced soil and water pollution due to leachate treatment
- Reduced pollution risk downstream of the disposal site due to enforcement works
- Prolonged landfill life due to compacting and improved disposal practice
- Reduced GHG emissions due to biogas collection, energy generation and fuel switch

CO2 emissions avoided	220,000 t CO2 eq/year
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Cost estimate

Parameter	Value
Upgrading of the landfill at Țânțăreni	8,369,750 €
Machineries (trucks, bulldozer)	1,125,000 €
Landfill gas collection	473,900 €
Finalizing the closure procedure for Bubuieci old landfill	700,000 €
CAPEX	10,669,000 €
OPEX	1,000,000€
Landfill charge	7 €/t
Possible source of funding	International Finance Institution and Municipal budget

Estimated timeframe

2021-2024

Chapter 10

Summary of actions

Summary of actions- General and specific health and safety aspects

All the actions presented above will have to comply with national and EBRD health and safety standards and other relevant international best practices. During their pre-implementation and implementation phases, the following aspects will be considered:

- all feasibility studies / other studies that are required for preparing an investment will include a full health and safety assessment. Detailed measures required for mitigating the identified negative impacts will also be defined and implemented.
- all tender documentation prepared for the GCAP actions will include health and safety provisions in line with national legal requirements and EBRD standards.
- health and safety will be our priority during project implementation phases (construction, operation, decommissioning). We will take all the necessary measures to ensure enforcement of EBRD standards, such as those related to occupational health and safety, construction sites, workers protective equipment, road and pedestrian safety, etc.
- employees that will be responsible for implementing the GCAP actions will be trained in advance on health and safety provisions.
- all project management units that are to be established for implementation of GCAP actions will include at least one health and safety specialist.

Summary of actions- Financial details

According to Law no. 397 (2003, last amended 27 July 2018) on Local Public Finance, the total amount of annual payments (repayment of the principal, payment of interest and other related payments) related to the servicing of the debts shall not exceed 20% of the total annual revenue of those budgets, excluding special purpose transfers (Article 15 (4)).

Annex 11 of the Chişinău Municipal budget for 2019 provides information on contracted loans and external guarantees agreements Chişinău Municipality has already committed to, repayment period, outstanding balance at the beginning of the year, disbursement (entry) of new loans, repayment of loans, outstanding balance at the end of 2019. On that base it is defined that the remaining margin of funds up to the limit of 20% is in the range of 7 to 10 million EUR in the period 2020-2023.

That is why only the implementation of City programme on the renewal of urban bus fleet, the street lighting energy efficiency programme, the extension and modernisation of waste management collection service, the introduction of composting and improvement of the Țânțăreni disposal site and disposal practices are envisaged to be funded by municipal loans.

Loans on renewal of urban bus fleet may be repaid by revenue from introduced controlled parking areas, managed by the municipal parking agency and by gradually increasing bus ticketing payment. Loans on improved waste management service can be repaid by increased waste tariff, within the affordability limit. Loans on retrofitting of the existing out-dated streetlights with best available energy efficient technology, namely light-emitting diodes, may be repaid by savings from operating costs realised with the use of LED luminaries.

The other major investment activities in the GCAP are suggested to be funded through private funding, ESCO, grants, introduction of EPR, etc. Funding for investment in drainage system and increased operation cost is possible only against increased municipal revenue, through appropriate taxation. Minor investment proposals may be accommodated within the current investment programme of the municipality

Table 4 Summary table

Sec- tors	Strategic Objective	Specific Objective	Code	Action	Investment / Policy	Implement- ing Body	CAPEX [EUR]	OPEX [EUR]	Potential Funding Sources	Implementation timeline				
										2020	2021	2022	2023	2024+
All	Enhanced institutional capacities for the implementation, assessment and monitoring of the sustainable urban development process	0.1 Functional framework for integrated project management	0.1.1	General institutional framework for project management on municipal level	Policy	Municipality of Chişinău	55,000	30,000	Municipal budget, IFIs					
			0.1.2	Creating a functional institutional setup at sectoral level	Policy	Municipality of Chişinău	50,000	25,000	Municipal budget, IFIs					
			0.1.3	Developing and enhancing the capacities of the staff within the Municipality of Chişinău	Policy	Municipality of Chişinău	55,000		Municipal budget, IFIs					
		0.2 Integrated planning	0.2.1	Develop and / or update the local action plans	Policy	Municipality of Chişinău	650,000		Municipal budget, IFIs					
		0.3 Elaboration of regulatory acts	0.3.1	Develop and / or update the local action plans	Policy	Municipality of Chişinău	20,000		Municipal budget					
Transport	Sustainable mobility and transport	1.1 Increasing the energy efficiency of public transport	1.1.1	Renewing the urban bus fleet	Investment	Municipality of Chişinău	103,000,000	20,000,000	IFIs, Loans, ticketing					
			1.1.2	Introducing one car-free day annually in the city centre	Policy	Municipality of Chişinău	550,000	100,000	Municipal budget					
		1.2 Switch to public transport and	1.2.1	Creating controlled parking areas, managed by the	Policy	Municipality of Chişinău / Private	965,000	600,000	Municipal budget					

Sec-tors	Strategic Objective	Specific Objective	Code	Action	Investment / Policy	Implement-ing Body	CAPEX [EUR]	OPEX [EUR]	Potential Funding Sources	Implementation timeline				
										2020	2021	2022	2023	2024+
Land-use / Water / Industry	Climate resilient blue-green infrastructure	1.3 Improving the reliability of the transport system		active means of transport		municipal parking agency								
			1.2.2	Developing and operating three principal bus corridors	Investment	Municipality of Chişinău	7,100,000		IFIs, Loans, municipal budget					
			1.2.3	Connecting urban parks and green areas with a cycle route and a bike sharing system	Investment	Municipality of Chişinău	3,500,000	500,000	Private sector financing, crowdfunding					
			1.2.4	Traffic calming in areas with schools, developing a network of connected sidewalks between schools	Investment	Municipality of Chişinău	500,000	50,000	Private sector financing, crowdfunding					
			1.3.1	Road rehabilitation and maintenance	Investment	Municipality of Chişinău	41,698,000	50,000	Municipal budget, IFIs					
			1.3.2	Creating an Urban Traffic Centre for traffic monitoring and traffic light optimisation	Investment	Municipality of Chişinău	2,020,000		Municipal budget, IFIs					
		2.1 Rainwater drainage	2.1.1	Improvement of public rainwater drainage system	Investment	Municipality of Chişinău	8,015,000	400,000	IFIs, Loans, municipal budget					
			2.1.2	Cleaning and rehabilitation of river Bîc and its tributaries in Chişinău municipality, to withstand climate change	Investment	Municipality of Chişinău	2,330,000	60,000	Romanian Government grant, loans					

Sec-tors	Strategic Objective	Specific Objective	Code	Action	Investment / Policy	Implement-ing Body	CAPEX [EUR]	OPEX [EUR]	Potential Funding Sources	Implementation timeline				
										2020	2021	2022	2023	2024+
			2.1.3	Pilot project: Rainwater retention at residential/neighbourhood level, permeable landscaping	Investment	Municipality of Chişinău / Private	7,370,000	15,000	IFIs, Loans					
			2.2.1	Preserve current valuable blue-green spaces and revitalize open spaces	Investment	Municipality of Chişinău / Private	11,420,000	112,900	Municipal budget					
			2.3.1	Nature-based landslide prevention	Investment	Municipality of Chişinău	100,000	800	Municipal budget					
			2.3.2	Revitalizing decommissioned industrial areas (brownfields)	Policy	Municipality of Chişinău / Private	70,000		Municipal budget					
			2.3.3	Tackling degraded cultural heritage features, which are a source of pollution in the city	Policy	Municipality of Chişinău	20,000		Municipal budget					
Energy / Buildings	Sustainable and efficient energy	3.1 Increasing energy efficiency	3.1.1	Residential building energy efficiency programme	Investment	Municipality of Chişinău / Private	26,985,000		ESCOs, private financing					
			3.1.2	Municipal building energy efficiency programme	Policy	Municipality of Chişinău	37,000		Municipal budget					
			3.1.3	Pilot project – Promoting green and smart buildings	Investment	Municipality of Chişinău	6,155,000	15,000	IFIs, Credit lines, Grants					

Sec-tors	Strategic Objective	Specific Objective	Code	Action	Investment / Policy	Implement-ing Body	CAPEX [EUR]	OPEX [EUR]	Potential Funding Sources	Implementation timeline				
										2020	2021	2022	2023	2024+
			3.1.4	Street lighting energy efficiency programme	Investment	Municipality of Chişinău	2,540,000	30,000	Municipal budget, Loan, National funding from the Energy Efficiency Agency					
			3.1.5	District heating energy efficiency programme	Investment	Termoelectrica SA	99,458,000		Credit Lines					
		3.2 Energy from renewable sources	3.2.1	Pilot project – Installing PVs on public transport parking lots	Investment	Municipality of Chişinău	3,915,000	20,000	Grants, National funding from the Energy Efficiency Agency					
			3.2.2	Identifying Renewable Energy Projects	Policy	Municipality of Chişinău	125,000		Municipal budget, National funding from the Energy Efficiency Agency					
			3.3.1	Implementing energy management at city level	Policy	Municipality of Chişinău	330,000		Municipal budget, Grants					
Solid Waste	Sustainable resources and waste management	4.1 Extend and improve waste collection and transfer system services for a clean and healthy environment	4.1.1	Extending the waste collection services to the suburbs	Investment	Municipality of Chişinău	1,000,000	790,000	Municipal budget, Loans, waste tariff					

Sec- tors	Strategic Objective	Specific Objective	Code	Action	Investment / Policy	Implement- ing Body	CAPEX [EUR]	OPEX [EUR]	Potential Funding Sources	Implementation timeline				
										2020	2021	2022	2023	2024+
			4.1.2	Modernization of the waste collection, transfer and transport system	Investment	Municipality of Chişinău	8,520,000	12,200,000	Loans, municipal budget, waste tariff					
	4.2 Implementing circular economy solutions	4.2.1	Introducing source separation of waste into two fractions for the entire area of the municipality	Investment	Municipality of Chişinău / Private	2,160,000	1,323,000	EPR system and sales of recyclables						
		4.2.2	Developing and operating 5 centres for collection of Waste Electrical and Electronic Equipment (WEEE), bulky waste and other types of waste	Investment	Municipality of Chişinău / Private	1,500,000	150,000	Municipal budget, EPR, waste tariff						
		4.2.3	Implementing Material Recovery	Investment	Municipality of Chişinău	7,850,000	1,400,000	PPP						
		4.2.4	Collecting and composting green waste generated in gardens and parks, using the compost in green areas of the city	Investment	Municipality of Chişinău	3,030,000	300,000	Municipal budget, Loans						
		4.2.5	Collecting and recycling of construction and demolition waste	Investment	Municipality of Chişinău / Private	1,500,000	350,000	Private sector funding						
	4.3 Ensuring waste disposal and environmental protection	4.3.1	Improvement of the Țânțăreni disposal site and disposal practices	Investment	Municipality of Chişinău	10,669,000	1,000,000	IFIs, municipal budget						
GRAND TOTAL							365,262,000	39,521,700						

Table 5 Financial details

Code	Action	CAPEX [EUR]	OPEX [EUR]	Potential Funding Sources	Additional annual revenue/ saving [EUR]	Yearly investment cost of implementation [EUR]				
						2020	2021	2022	2023	2024+
0.1.1	General institutional framework for project management on municipal level	55,000	30,000	Municipal budget, IFIs	55,000					
0.1.2	Creating a functional institutional setup at sectoral level	50,000	25,000	Municipal budget, IFIs	50,000					
0.1.3	Developing and enhancing the capacities of the staff within the Municipality of Chişinău	55,000		Municipal budget, IFIs	55,000					
0.2.1	Develop and / or update the local action plans	650,000		Municipal budget, IFIs	130,000	130,000	130,000	130,000	130,000	130,000
0.3.1	Develop and / or update the local action plans	20,000		Municipal budget	20,000					
1.1.1	Renewing the urban bus fleet	103,000,000	20,000,000	IFIs, Loans, ticketing	Up to full cost recovery	5,000,000	5,000,000	5,000,000	5,000,000	83000,000
1.1.2	Introducing one car-free day annually in the city centre	550,000	100,000	Municipal budget					550,000	
1.2.1	Creating controlled parking areas, managed by the municipal parking agency	965,000	600,000	Municipal budget	1,700,000	965,000				

Code	Action	CAPEX [EUR]	OPEX [EUR]	Potential Funding Sources	Additional annual revenue/ saving [EUR]	Yearly investment cost of implementation [EUR]				
						2020	2021	2022	2023	2024+
1.2.2	Developing and operating three principal bus corridors	7,100,000		IFIs, Loans, Municipal budget					100,000	7,000,000
1.2.3	Connecting urban parks and green areas with a cycle route and a bike sharing system	3,500,000	500,000	Private sector financing, crowdfunding	500,000				500,000	3,000,000
1.2.4	Traffic calming in areas with schools, developing a network of connected sidewalks between schools	500,000	50,000	Private sector financing, crowdfunding			50,000	50,000	50,000	350,000
1.3.1	Road rehabilitation and maintenance	41,698,000	50,000	Municipal budget, IFIs		15,000,000	15,000,000	11,698,000		
1.3.2	Creating an Urban Traffic Centre for traffic monitoring and traffic light optimisation	2,020,000		Municipal budget, IFIs		20,000	100,000	100,000	100,000	1,700,000
2.1.1	Improvement of public rainwater drainage system	8,015,000	400,000	IFIs, loans, municipal budget		15,000	1,143,000	1,143,000	1,143,000	4,571,000
2.1.2	Cleaning and rehabilitation of river Bîc and its tributaries in Chişinău municipality, to withstand climate change	2,330,000	60,000	Romanian Government grant, loans		30,000	2,300,000			
2.1.3	Pilot project: Rainwater retention at residential/neighbourhood level, permeable landscaping	7,370,000	15,000	IFIs, loans		50,000	732,000	732,000	732,000	5,124,000

Code	Action	CAPEX [EUR]	OPEX [EUR]	Potential Funding Sources	Additional annual revenue/ saving [EUR]	Yearly investment cost of implementation [EUR]				
						2020	2021	2022	2023	2024+
2.2.1	Preserve current valuable blue-green spaces and revitalize open spaces	11,420,000	112,900	Municipal budget		170,000	500,000	750,000	1,000,000	9,000,000
2.3.1	Nature-based landslide prevention	100,000	800	Municipal budget		20,000	20,000	20,000	20,000	20,000
2.3.2	Revitalizing decommissioned industrial areas (brownfields)	70,000		Municipal budget		20,000	50,000			
2.3.3	Tackling degraded cultural heritage features, which are a source of pollution in the city	20,000		Municipal budget		20,000				
3.1.1	Residential building energy efficiency programme	26,985,000		ESCOs, private sector	1,851,000				2,699,000	24,286,000
3.1.2	Municipal building energy efficiency programme	37,000		Municipal budget		19,000	18,000			
3.1.3	Pilot project – Promoting green and smart buildings	6,155,000	15,000	IFIs, Credit lines, Grants	31,000			20,000	110,000	6,025,000
3.1.4	Street lighting energy efficiency programme	2,540,000	30,000	Municipal budget, Loan, National funding from the Energy Efficiency Agency	120,000	20,000	504,000	504,000	504,000	1,008,000

Code	Action	CAPEX [EUR]	OPEX [EUR]	Potential Funding Sources	Additional annual revenue/ saving [EUR]	Yearly investment cost of implementation [EUR]				
						2020	2021	2022	2023	2024+
3.1.5	District heating energy efficiency programme	99,458,000				11,298,000		75,800,000	2,000,000	10,360,000
3.2.1	Pilot project – Installing PVs on public transport parking lots	3,915,000	20,000	Grants, National funding from the Energy Efficiency Agency	258,000			559,000	559,000	2,797,000
3.2.2	Identifying Renewable Energy Projects	125,000		Municipal budget, National funding from the Energy Efficiency Agency		25,000	25,000	25,000	25,000	25,000
3.3.1	Implementing energy management at city level	330,000		Municipal budget, Grants		20,000	40,000	40,000	50,000	180,000
4.1.1	Extending the waste collection services to the suburbs	1,000,000	790,000	Municipal budget, Loans, waste tariff	945,000	143,000	143,000	143,000	143,000	428,000
4.1.2	Modernization of the waste collection,	8,520,000	12,200,000	Loans, Municipal	14,650,000	50,000	1,400,000	1,400,000	1,400,000	4,270,000

Code	Action	CAPEX [EUR]	OPEX [EUR]	Potential Funding Sources	Additional annual revenue/ saving [EUR]	Yearly investment cost of implementation [EUR]				
						2020	2021	2022	2023	2024+
	transfer and transport system			budget, waste tariff						
4.2.1	Introducing source separation of waste into two fractions for the entire area of the municipality	2,160,000	1,323,000	EPR system and sales of recyclables	50,000	528,000	528,000	528,000	528,000	526,000
4.2.2	Developing and operating 5 centres for collection of Waste Electrical and Electronic Equipment (WEEE), bulky waste and other types of waste	1,500,000	150,000	Municipal budget, EPR, waste tariff	150,000	300,000	300,000	300,000	300,000	300,000
4.2.3	Implementing Material Recovery	7,850,000	1,400,000	PPP	1,400,000	50,000	780,000	780,000	780,000	5,460,000
4.2.4	Collecting and composting green waste generated in gardens and parks, using the compost in green areas of the city	3,030,000	300,000	Municipal budget, Loans	30,000	429,000	429,000	429,000	429,000	1,713,000
4.2.5	Collecting and recycling of construction and demolition waste	1,500,000	350,000	Private sector funding	550,000			750,000	750,000	
4.3.1	Improvement of the Țânțăreni disposal site and disposal practices	10,669,000	1,000,000	IFIs, municipal budget	2,100,000		776,000	776,000	776,000	8,341,000
GRAND TOTAL		365,262,000	39,521,700		24,255,000	32,660,000	30,933,000	101,677,000	20,378,000	179,614,000

Section

3

Monitoring, reporting and verification

Chapter 11.

Description of the Monitoring Framework

Monitoring and evaluation of GCAP is designed in order to understand and assess the results and outcomes of implementing the plan. It aims at identifying the most effective actions and informing the implementation team on how to adjust the ones that are not bringing sufficient results. The main purpose is to measure the impact GCAP actions have over the quality of environmental factors in Chişinău. Also, the monitoring measures the progress towards achieving the established targets for each action. Thus, both progress and impact of implementation will be monitored.

The monitoring framework includes two main spreadsheets presenting the monitoring and evaluation indicators. The first one, illustrated below, is related to our vision and target for GCAP implementation.

Vision:

Connecting people for a better quality of life in a green city

Specific Target	Indicator ID	Description	Type	Format	Timeframe/ Frequency	Responsible for implementation
50% of all established targets within GCAP to be reached in 5 years	V1	Number of GCAP projects initiated (per different stages - feasibility studies developed, tendering process completed, ready for implementation, under implementation, completed)	Progress	Excel table	annually	Mayor's office
	V2	Update the database with state and pressure indicators - see spreadsheet State and Pressure Indicators	Impact	Excel table	annually	Project Management Division within Mayor's office
	V3	Public perception of enhanced quality of life. Survey focusing on 7 sectors and overall perception of citizens on quality of life and improvements - one survey prior to GCAP implementation and then once/24 months	Impact	Report	once /24 months	Mayor's office

The second monitoring spreadsheet is detailed in Annex 3, referring to strategic objectives, actions and steps to be implemented in the next 5 years. We will update and optimise the monitoring framework after the second year of GCAP implementation.

The first spreadsheet of the monitoring framework presents progress and impact indicators for each action, while the second spreadsheet includes the state and pressure indicators as they relate to environmental assets. This latter spreadsheet helps the implementation team to observe the progress towards improving the environmental conditions in the city as compared with the baseline dataset that we have collected for the GCAP development.

A total number of 139 indicators have been identified for monitoring the GCAP vision and the corresponding 5 strategic objectives. Out of these, 71 are progress indicators and 68 are impact indicators. Please note that all the indicators included in the second spreadsheet are also impact type indicators.

For each indicator we have defined the format and measurement unit in which the data should be collected and processed, referred to the timeframe for accomplishment of related targets and/or defined frequency for data collection. We have also included the responsible stakeholder for data collection of each indicator.

Evaluation and Reporting

Within the Municipality, GCAP implementation will be closely supervised and evaluated by a Steering Committee (SC). The SC members will be decided by a Decision of the Mayor and will meet at least twice a year to analyse the progress and impact of implementation, supporting the decision making process. The outcomes of the SC meeting will be shared with EBRD.

The Project Management Division established at the level of our municipality will lead the monitoring, evaluation and reporting process. The below table presents the leading municipal representatives for each sector in collecting data and providing reliable information to PMU.

Coordination of Monitoring Evaluation and Reporting	Project Management Division within Chisinau Municipality
Transport	Department of Transport and Communication
Buildings	Department of Urban Planning and Land Use, Department of Housing and Public Utility, Enterprise for Major Capital Investments
Industry	Department of Urban Planning and Land Use
Energy	Department of Housing and Public Utility
Water	Apa-Canal Municipal Water and Sewerage Enterprise
Solid waste	Regia Autosalubritate Municipal Enterprise for Waste Management
Land use & biodiversity	Urban planning and Land Use Department

The PMD will compile all the data received from sectoral departments and will produce an annual progress report for the GCAP implementation period. A summary of this report will be also made available to public.

The GCAP monitoring and evaluation process was also one of the key areas that our staff was trained during the GCAP development. Still, this activity might require some additional training and support during the first two years of implementation. Thus, we foresee the engagement of an external consultant to support the PMD with the specific monitoring tasks and with optimising the data collections sheets.

Also, we are aiming at having two types of audits during the first 5 year period of GCAP implementation:

- internal audits – yearly, based on our internal procedures. This will focus on understanding if the internal procedures have been properly followed and if the specific targets established at the level of municipality are reached
- third party audit – once in 5 years – this will focus on conducting a full assessment of GCAP implementation process, considering all the elements, from technical to financial and utilization of resources.

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