Green City Action Plan for the City of Bishkek









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List of acronyms

CFC	Climate Finance Center of the Kyrgyz Republic
EBRD	European Bank for Reconstruction and Development
GCAP	Green City Action Plan
ID	Identification Number
IFIs	International Finance Organisations
ILO	International Labour Organisation
IMP	Impact Monitoring Plan
JPN	Japan Technical Co-operation Fund
PMP	GCAP Actions Progress Monitoring Plan
PSR	Pressure-State-Response
PUF	Policy Urban Framework
RVA	Risk & Vulnerability Assessment
SMA	Smart Maturity Assessment
SUMP	Sustainable Urban Mobility Plan
TA	Technical Assessment
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	UN Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organisation



Foreword from the Mayor

We are all acutely aware that the climate crisis we face has evolved to levels that threaten the health and life of the population. By joining the European Bank for Reconstruction and Development (EBRD)'s Green City Programme, City of Bishkek has firmly committed to improving urban environment, decreasing pollution, improving quality of life, and joining other forward-thinking cities in setting an example of sustainable development.

A year ago, Bishkek City Administration launched the process for developing a Green City Action Plan (GCAP) with the substantial support of EBRD. Today, the result of the intense GCAP development process is this report. It has enabled us to identify and prioritise Bishkek's most critical environmental challenges, including air pollution, water scarcity, and destruction of green areas in the city.

The GCAP, with its 28 actions, will help our city to tackle its most pressing environmental challenges while promoting climate change action, social inclusiveness, and smart city solutions.

Our vision is of a cleaner, greener, more functional city and I am deeply committed to making Bishkek a beautiful place to live and grow. I believe that the implementation of the GCAP will improve the quality of life for all residents and visitors while safeguarding the environment and preserving our precious biodiversity.

Strongly aligned with national development strategies, our GCAP facilitates green city actions across all relevant sectors, in particular urban transport, energy, water, solid waste and buildings. Making our vision a reality means uniting national and local institutions and gathering private sector and civil society in designing and implementing infrastructure projects, in building capacity and developing policy. We have a lot to do but the results will be exponentially beneficial for our capital.

I hope our GCAP will inspire other cities in the Kyrgyz Republic to approach their environmental and climate challenges with determination and dynamism. Bishkek is now ready to seize the many opportunities that the GCAP will generate in building resilient infrastructure, creating jobs, promoting the green economy, protecting the environment, and investing in citizens' wellbeing.

I would like to extend my deepest gratitude to the Mayor's Office representatives and all participating stakeholders from the government, private sector, and civil society for their unwavering dedication and enthusiasm. I would also like to give my heartfelt thanks to the EBRD Green Cities team and Sectors Experts; and the GCAP consulting team for helping us to take our feet off the accelerator and put them on the path to lasting, accessible change.



Executive summary

Bishkek adheres to the EBRD Green Cities framework to build a better and more sustainable future for its residents and city. The Green City Action Plan (GCAP) is the strategic document outlining valuable actions that will strongly contribute to overcoming the identified environmental challenges, improving the city's infrastructure, and enhancing social well-being.

The logical approach to development of the GCAP was based on conducting detailed assessments, identifying, and prioritising environmental challenges, and developing appropriate, relevant actions that can contribute to achieving the strategic goals and making Bishkek's Green City vision a reality. What is more, the GCAP's outcomes will deliver a framework for future investments into a sustainable and prosperous city.

EBRD's GCAP methodology was applied to the development process of the Green City Action Plan for Bishkek. It is based on a Green City Pressure-State-Response (PSR) framework, which identifies human activities that put pressure on the urban environment in relevant sectors: urban transport, energy and industry, building, water, solid waste, and land-use. Furthermore, it identifies changes in its state regarding environmental performance and how society responds to these changes through the adoption of environmental, economic, and sectoral policies, investment, awareness-raising and behavioural shifts.

As a foundation for the development of the Green City Action Plan, the Green City Baseline analysis has been conducted in close cooperation with stakeholders at workshops, meetings, through online sessions and via direct communication. The Policy and Urban Framework (PUF) provides a coherent analysis of the Bishkek urban framework in line with its implications for the GCAP development process and the potential actions. Furthermore, the PUF identifies the local and national context in political, regulatory, and financial terms, as well as issues, practices, and policies that may affect the GCAP's development and implementation. To the greatest extent possible, the developed content of the PUF is integrated into the GCAP.

Environmental and sectoral challenges

The environmental assessment, resulting in the set of PSR indicators, along with direct communication with stakeholders, demonstrate the level of pressure on the urban environment. Moreover, the assessment identifies, reviews and ranks challenges in key environmental areas: air, water bodies, drinking water, water use, soil, greenspace, biodiversity, and climate change. Following an overall assessment of the situation in the city regarding its environmental state (with the use of Pressure-State-Response Indicators), regulation and policy frameworks, institutional and governance status, sectoral situation and city services, a prioritisation of environmental challenges was performed. The relevant key findings following the GCAP elaboration process are summarised in the following environmental challenges:



Rank	Environmental challenge	Area	Description
1st	Air pollution and low level of air quality	Air 	High levels of PM2.5, PM10, NOx and SOx that exceed international limits, mainly due to fossil fuel energy, transport, waste burning, low use of renewable energy and lack of energy efficiency measures.
2nd	Surface water pollution and scarcity of drinking water	Water	Poor surface water quality upstream and downstream of Bishkek with high ammonium (NH4) levels, likely due to outdated sewer network, inappropriate treatment of wastewater, use of suburban pit latrines.
3rd	Devastation of green space and need for reconstruction and preservation of green spaces in the city	Green space	Low proportion of green space in the urban area and deteriorating trends from benchmarks due to increased population and construction.
4th	Pollution of urban soil	Soil	High level of heavy metals in urban soil.
5th	Lack of biodiversity protection	Biodiversity	Biodiversity in urban area is degraded. it is not recognised as important, and it is not protected.
6th	High level of greenhouse gas emissions	Greenhouse gas emissions	There is no clear data on emissions for the city of Bishkek, dependence on fossil fuels for energy and energy-intensive buildings and transport indicates high greenhouse gas emissions.
7th	Water Scarcity	Climate resilience	Water scarcity problems in the long term (irrigation, drinking water). Although the water use index indicates moderate water consumption, it tends to increase.

Figure 1: Key findings of environmental challenges

The urban environmental areas are under pressure and causing cross-sectoral challenges for Bishkek. These challenges, classified per sector, are as follows:

- 1. Urban transport: A large number of fossil fuel vehicles cause significant air pollution, noise, and traffic congestions in Bishkek. There is a limited level of alternative and sustainable transport with a low level of mobility for passengers and goods.
- 2. Water and wastewater: The levels of surface and groundwater for water supply have declined in recent years and there is on-going investigation into the causes of water scarcity. Drinking water is used for irrigation purposes and there is no appropriate precipitation water system. The water metering system is not fully developed and there are high losses in water supply and sewerage systems associated with aging infrastructure



and a substantial number of unauthorised water users. The wastewater treatment plant needs modernisation and upgrade.

- 3. Energy: The main fuel sources for heating are fossil fuels (i.e. coal, gas) in district heating systems and individual facilities. Low quality coal is one of the main causes of air pollution. There is a low level of renewable energy use and low implementation of energy efficiency measures in Bishkek.
- 4. **Buildings:** Bishkek has an ageing building stock, low levels of building maintenance, a predominantly fossil fuel-based energy infrastructure, low levels of the energy metering and many households that are fuel poor. A significant opportunity exists to improve the energy efficiency of new and existing buildings in the city.
- 5. Solid waste: Solid waste collection and treatment contribute pollution to many areas including air, water, soil quality and this in turn affects the biodiversity, ecosystems, and green spaces. Solid waste management in Bishkek is predominantly based on waste collection and disposal to the landfill. Furthermore, the city contends with illegal waste dumping, uncontrolled burning and inappropriate collection of recyclable materials.
- 6. Land use: Urban growth and development have wide ranging implications on all environmental areas, including land use planning and land protection in Bishkek. Fragmented land use puts pressure on infrastructure and causes traffic congestions. There is a clear risk that the development of social and communal infrastructure will not keep pace with the development of buildings and housing construction. In addition, there is a low percentage of green spaces per capita according to international indicators and a low level of green infrastructure in the city.

Vision and Strategic Goals

VISION

Bishkek strives to be an innovative, dynamic, people-oriented, and environmentally sustainable green city where the well-being of all residents is promoted through clean air, green spaces abundant with trees and fresh water, as well as welldeveloped municipal and digital infrastructure, public services, and sustainable waste management.

Strategic Goal 1 (SG1) Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health, while maintaining sustainable growth and improving infrastructure in the fields of transportation, energy, and waste management.

Strategic Goal 2 (SG2) Improve water supply and water use efficiency in Bishkek to prevent water scarcity, enhance surface water quality, and improve sewage networks and corresponding wastewater treatment. Strategic Goal 3 (SG3) Increase the area and quality of green spaces for city residents by preserving the natural heritage and biodiversity of Bishkek and protecting urban soil.



The **Vision** and **Strategic Goals** have been developed in close cooperation with stakeholders and constitute a basic guide for definition and selection of the Green City actions.

The **Vision** sets the broad direction for the green transformation of the city of Bishkek as response to the environmental and sectoral challenges and its aspirations for sustainable city growth.

Bishkek is facing high air pollution with increased emissions of harmful contaminants with fossil fuel-based energy and transport, waste burning, low use of renewable energy and lack of energy efficiency measures. Therefore, improving air quality is a fundamental environmental and health challenge and a key **Strategic Goal 1** for the Green City.

Water scarcity has increased in recent years, highlighting the necessity for improvement of the water supply system and efficient use of drinking water in Bishkek. **Strategic Goal 2** aims to improve the water supply, water use efficiency, the quality of surface water, the sewer network and wastewater treatment in the city of Bishkek.

Furthermore, **Strategic Goal 3** is related to improving the quality of green spaces, green infrastructure, urban soil protection, biodiversity, and natural heritage in the city of Bishkek and includes the following elements: Enhancing green space accessibility and green infrastructure integration, maintaining and improving Bishkek's iconic water channel networks, implementing measures to protect urban soils, and the development and enforcement of rigorous design and maintenance standards for green spaces.

Actions

The GCAP for Bishkek contains 28 actions to be implemented within the 10-year period. They consist of activities related to: Capital Investment (new and existing), Policy Development, Feasibility and Design, Monitoring and Reporting, and Awareness and Capacity Building.

Sector Action ID Title of the Action		Action Type	CAPEX (EUR)	OPEX (EUR)	
	UT01	Sustainable Urban Mobility Plan (SUMP)	Policy	600,000	98,000
	UT02	Construction of sidewalks and bicycle paths	Capital Investment – new	6,000,000	300,000
Urban Transport	UT03	The renewal of urban passenger transport, through the purchase of electric vehicles, the creation of preferential conditions for their purchase, the creation of a network of charging	Capital Investment – new	58,500,000	1,308,000

Table 1: Summary of Bishkek's Green City Actions



		stations for electric vehicles and the creation of a municipal "Green Taxi".			
	UT04	Installation of a new progressive traffic light control system	Capital Investment – new	2,000,000	60,000
	UT05	Improvement of parking in Bishkek and the introduction of paid parking spaces	Capital Investment – new	3,700,000	111,000
	UT06	Reconstruction of a bypass road around the city of Bishkek, arrangement and landscaping of roadside infrastructure	Capital Investment – new	185,000,000	3,700,000
	UT07	Road dust prevention and cleaning	Capital Investment – existing	600,000	30,000
	EI01	Promotion of heat pumps to reduce coal and gas dependence	Capital Investment – new	10,960,000	n/a
	E102	Heat loss reduction in distribution pipelines	Capital Investment – new	18,750,000	n/a
Energy and	E103	Promotion of solar thermal in municipal buildings to reduce fossil fuel consumption	Capital Investment new	1,700,000	n/a
Industry	E104	Central dispatch centre and installation of LEDs with smart control systems	Capital Investment new	3,200,000	n/a
	EI05*	Modernisation of operation of Bishkek CHP	Capital Investment - existing	17,500,000	n/a
	W01	Installation of drinking water meters with remote data transmission in multi-storey residential buildings and private households in Bishkek	Capital Investment – new	25,900,000	3,800,000
Water	W02	Reconstruction and modernisation of the Wastewater Treatment Plant in Bishkek.	Capital Investment – new and existing	35,000,000	1,100,000



		Construction and reconstruction of pressure and gravity sewer networks			
	W03	Reconstruction of groundwater intake	Capital Investment – existing	3,100,000	96,000
	W04	Reconstruction of water supply networks	Capital Investment – existing	1,330,000	6,000
	W05	Reconstruction and modernisation of the irrigation network for green areas	Capital Investment – new and existing	3,145,000	180,000
	SW02	Improvement of the municipal solid waste collection system and increase public awareness	Capital Investment – new	10,000,000	n/a
Solid Waste	Lid SW03 Cor pro	Construction of a waste processing plant	Policy, Feasibility and Design, Capital investment – new	45,000,000	n/a
	SW04	Construction of a sanitary landfill and closure / remediation of the existing landfill	Capital Investment – new	15,000,000	n/a
	B01	Energy efficient retrofitting of public non- residential buildings – Pilot scheme	Capital Investment – existing	70,000,000	n/a
Buildings	B02	Improved technical capacity and training for undertaking building energy efficiency works	Awareness and Capacity Building	3,000,000	n/a
Land Use	LU01	Planting and maintenance of green spaces in the territory of Bishkek (in squares, parks, along roads and other green places) and development of vertical greening	Capital Investment – new and existing	13,550,000	1,000,000
	LU02*	Reconstruction of scientific research Institute Botanical Garden	Capital Investment –existing	420,000	n/a



	LU03	Development of the base of MP "Bishkekzelenkhoz" for growing adapted large- sized planting material for the purpose of issuing it to the city through nursery and greenhouse optimisation and modernisation	Capital Investment – new	12,000,000	n/a
$\overline{\times}$	CC01	Development of a Roadmap of environmental safety, Environmental safety monitoring system and Information Campaign on Environmental situation	Policy, Awareness and Capacity Building	1,000,000	100,000
Cross- cutting	CC03	Purchase and install automatic air pollution monitoring stations	Monitoring and Reporting	500,000	40,000
	CC04	Feasibility study on restoration of Ala- Archa and Alamudun rivers and BChK (Big Chui Channel)	Feasibility and Design	350,000	n/a
			Total:	547,805,000	



1. Introduction

The global urban population is expanding rapidly, and sustainability of our growing cities is one of the most significant challenges in modern times. Bishkek is a growing city which faces various environmental, economic, and social issues that must be tackled to secure the sustainable development of human activities in the city that are crucial to its functioning and livelihood.

It is important to recognise the relationship between environmental aspects and economic and social issues that jointly impact the sustainable development of the city. To address these challenges, the EBRD developed its Green Cities programme, with the aim of building a better and more sustainable future for cities and their residents. The programme identifies and prioritises environmental challenges, which are then connected with sustainable infrastructure investments and policy measures, with the goal of building a sustainable and resilient future for all EBRD Green Cities.

At its core, the Green City Action Plan (GCAP) has been developed by assessing and prioritising environmental challenges and urban vulnerabilities based on specific indicators. The GCAP aims to tackle these challenges and vulnerabilities through policy intervention and sustainable infrastructure investments. These investments encompass public transport infrastructure, water supply and wastewater treatment, high-efficiency district energy solutions, municipal solid waste projects, street lighting, urban resilience, and renewable energy solutions.





2. About the Green City Action Plan

2.1 Context and structure of the GCAP

The main objective of the Green City Action Plan (GCAP) is to enhance Bishkek's environmental performance in a cost-efficient and financially sustainable manner, while simultaneously maximising economic and social co-benefits. The GCAP strives to overcome environmental challenges while ensuring sustainable city growth. Moreover, the GCAP is a strategic document that has been developed in the context of the sustainable development of the city of Bishkek. It recognises that cities face a range of environmental challenges and that improvements to related performance and resilience can only be achieved via an inter-disciplinary and integrated approach that covers all environmental topics and all urban sectors.

The GCAP, prepared within the EBRD's Green City programme connects cities' environmental challenges with sustainable infrastructure investments and regulatory measures. The GCAP assesses and prioritises environmental challenges and urban vulnerabilities based on specific indicators. These are further developed into an action plan to tackle city-specific challenges and vulnerabilities through policy interventions and sustainable infrastructure investments.

During the development of the Bishkek's GCAP, Consultant Team together with dedicated city authorities and with support from EBRD's experts strictly applied the methodology based on the Pressure-State-Response (PSR) Assessment framework.¹ The framework identifies human activities that exert pressure on the urban environment through transport, energy, building, industry, water, solid waste, and land-use and change its state in terms of environmental performance. In addition, an assessment of the current situation was conducted, and a baseline was developed on the environmental, economic, and social situation in Bishkek.

The structure of the GCAP Bishkek is based on the following key segments:

- Establishment of a Green City Baseline that includes regulatory, environmental, economic, and social assessments of Bishkek. This was presented through preparation of: a Policy Urban Framework that contains a Risk & Vulnerability Assessment (RVA) Report, a Smart Maturity Assessment, a Gender, Social and Economic Inclusion Report; and a Technical Assessment.
- Identification and prioritisation of environmental challenges and elaboration of the Green City Vision and Strategic Goals.
- Identification, analysis, and development of the Green City actions selected and described by relevant sectors.

¹ GCAP Methodology, EBRD, London, 2020



• Development of the GCAP's implementation monitoring system.

The central element in the preparation of the GCAP was the involvement of relevant stakeholders in its development through direct contact, workshops, and online communication.



Figure 3: Main steps of Bishkek's GCAP development

2.2 Green City Action Plan development process

The GCAP is a strategic document that presents Bishkek's environmental vision for 2038. The Green City approach in Bishkek is an integrated, multi-sector process in which a city's environmental challenges are identified, prioritised, and addressed through targeted investments and services, regulations, and other relevant policy instruments with the aim to enhance the city's environmental performance in a cost-efficient and financially sustainable manner, while at the same time seeking to maximise economic and social benefits. This section introduces the process conducted to develop the GCAP for Bishkek.

Overview of approach

The Bishkek' GCAP has been developed in fully line with the EBRD's Green City Plan methodology² and has been adopted to the city's specific context. The methodology guides the definition of environmentally and climate sound actions based on the three key principles relevant for Bishkek: evidence-based assessment, stakeholder participation and engagement, and political commitment to the overall Green City concept.

The approach is based on identification of sectoral activities in Bishkek that exert pressure on the urban environment in the seven GCAP sectors and change its state in terms of environmental

² Green City Action Plan Methodology, EBRD, 2020



performance. These activities were identified by research of existing documents and reports, and individual meetings with stakeholders. The Bishkek's GCAP preparation is based on the Pressure-State-Response (PSR) Assessment framework presented below.

The PSR framework provides a valuable structure to understand the linkages between activities that put pressure on the environment, the resulting state of the environment, and associated responses by the government, residents, and the private sector to address the pressures. Moreover, it identifies human activities in Bishkek that apply pressure on the urban environment, including urban transport, energy and industry, water, buildings, solid waste, and land-use, and the responses related to improving environmental conditions in the city. It is important to note that collected appropriate data and information for each of relevant sector and figures related to the selected PSR indicators.



Green City Baseline assessment

Figure 4: Pressure-State-Response (PSR) Model

In order to analyse situation and establish starting points in Bishkek, the Green City Baseline was founded. The Bishkek's Green City Baseline is the data and information basis of the GCAP. It aims to inform policy and strategic decision-making throughout the GCAP process and provides the reference for the identification and prioritisation of environmental and sectoral challenges as well as for monitoring the success of the implementation of GCAP actions. It was informed by an analysis of the regulatory framework and by identifying, collecting, and processing environmental data related to Bishkek with the results presented in the Indicators Database.

Technical assessment



The Pressure-State-Response (PSR) approach was applied in the Technical Assessment, by identification the main environmental impacts in Bishkek, describing how they affect the environment, and reporting the status and effectiveness of the actions and policy initiatives in promoting green development at the local level. As a result of the assessment, several environmental and climate challenges for Bishkek were identified, with a view to their prioritisation at the 2nd Stakeholders' engagement Workshop.

State and Pressure indicators have been compared in accordance with the EBRD GCAP Methodology³ for this project. The traffic light screening evaluation resulted in the indicators being "coloured" according to their value when compared to the benchmarks:

- Green light = high performance, in line with international standards
- Yellow light = insufficient performance, cause for concern
- Red light = low performance, in need of critical attention.

It was challenging to compare response rates, given that there are no clear criteria for solving problems, due to individual Bishkek's specificities. As such, the assessment of the response indicators refers to the level of adequacy and effectiveness in terms of problem-solving. These indicators are used in the following phases of the GCAP preparation as a starting point for identifying and selecting further actions in connection with the environmental and climate challenges resulting from the assessment of the pressure and state indicators, such as:

- Green: indicators with existing measures that are well implemented and adequately address a particular problem.
- Yellow: indicators with potential for improvement.
- Red: response indicators for which there is currently no action, or which are insufficient/poorly implemented.

The Technical Assessment is based on an expert estimation of the current situation in Bishkek and discussions with city representatives and stakeholders at individual meetings and exchanges of information. Therefore, it constitutes a baseline for prioritisation of the identified challenges. This prioritisation is built on the indicator database by selecting state and pressure indicators that indicate an urgent need for action and by identifying gaps in response through a qualitative assessment.

³ The Green City Action Plan Methodology sets all benchmarks in line with values based on international best practice in prioritizing and benchmarking green cities based on information provided by the World Health Organization, European Environment Agency, National Dutch Values initiative Inter-American Development Bank (IADB) for Ecological and Sustainable Cities (ESCI), local governments of the Organization for Economic Co-operation and Development (OECD) for sustainable development (ICLEI), European Bank for Reconstruction and Development (EBRD), National Renewable Energy Laboratory (NREL), International Energy Agency (IEA), accredited Institute of Building Engineering (CIBSE).



Table 2: Benchmark flags and criteria for response indicators⁴

With use of indicators, there was identified benchmarking indicators database. This is used for the identification and prioritisation of environmental challenges necessary for definition of strategic goals and green actions. Furthermore, these findings are used in the GCAP development process in definition of the Vision, Strategic Goals, definition and discussions of Long List of Actions, prioritisation, preparation of descriptions and discussions of the Short List of Actions, preparation of emissions reduction trajectories, mapping of actions' co-benefits and finalisation of the Green City Action Plan.



Figure 5: Bishkek's GCAP development process

2.3 Stakeholder contribution and engagement process

Stakeholders' consultations were conducted during the GCAP development process to actively engage them in creating the action plan and securing its ownership of GCAP in Bishkek. To that end, the communication with stakeholders was ensured through individual meetings, interviews, the organisation of workshops, online meetings and the exchange of documents and information. Three thematic stakeholder workshops and online meeting have been held:

- Launch Event and Introductory Workshop related to the identification of main environmental challenges of Bishkek City.
- 2nd Stakeholder Workshop related to interactive work on environmental assessment; presentation and discussion of the Policy and Urban Framework Report, Technical

⁴ Source: OECD and ICLEI (2016), op. cit.



Assessment and PSR Indicators database; Prioritisation of Identified Environmental Challenges in Bishkek; Discussion and Definition of GCAP Vision.

- 3rd Stakeholder workshop related to discussing and drafting the GCAP Vision, Strategic Goals and the Long List of Actions.
- Online meeting for discussion and finalisation of the list of Green City actions.

The Consultant Team conducted regular meetings to update and brief the city's Green Office and EBRD. Furthermore, they conducted site visits and meetings with relevant city organisations to discuss specific sectoral topics; regular online meetings with EBRD and sectoral experts; information exchanges with governmental bodies, academia, and civil society organisations, and communication and dissemination via municipal and EBRD websites. Stakeholders were involved in an inclusive manner to achieve the best results for the GCAP development through workshops, onsite and online meetings, and consultations. The list of engaged key stakeholders is presented in Table 3.

Category	Name of Institution/Organisation		
	Ministry of Energy of the Kyrgyz Republic		
	Ministry of Natural Resources, Ecology and Technical Overview of the Kyrgyz Republic		
	Ministry of Emergency Situations of the Kyrgyz Republic		
	Agency on Hydrometeorology under the Ministry of Emergency Situations of the Kyrgyz Republic		
	Ministry of Health, Department of Disease Prevention and State Sanitary and Epidemiological Surveillance		
State level	Main Directorate for Road Safety of the Ministry of Internal Affairs of the Kyrgyz Republic		
	Kyrgyz National Agrarian University		
	Scientific research Institute "Botanical Garden" under the Academy of Sciences of the Kyrgyz Republic		
	National Statistics Committee		
	JSC "Severelectro"		
	JSC "Bishkekteploseti"		
	JSC "National Electric Grids"		
City-level	Mayor's Office of the City of Bishkek		
public			
institutions	Expert Committee of the Mayor's Office of Bishkek		

Table 3: Institutions/organisations that participated in GCAP development



and public	Development Policy Department of the Mayor's Office of Bishkek
companies	Department of City Economy (Housing and Communal Services)
	Department for Capital Construction
	Department of Transport and Road and Transport Infrastructure Development
	Municipal Enterprise «Bishkek Trolleybus Department»
	Municipal Enterprise "Bishkek Passenger Motor Transport Enterprise"
	Municipal Enterprise "Centre for Information Technologies"
	Municipal Inspectorate for Control over Improvements
	Department for Control of Land Use
	Municipal Enterprise "Bishkekvodokanal"
	Municipal Enterprise "Tazalyk"
	Municipal Enterprise "Bishkedkzelenstroy"
	Municipal Enterprise "Bishkekteploenergo"
	Municipal Enterprise "Bishkek Sanitary Landfill"
	Municipal Enterprise "Bishkekglavarchitectura"
	Municipal Enterprise "Bishkeksvet"
	Municipal Enterprise "Bishkekasfalt"
	ALE "Green Alliance of Kyrgyzstan"
	Public Fund "Archa Initiative"
NGOs and academia	Ecological Public Organisation "Move Green"
	Urban Initiative "Peshkom"
	Public Fund for Sustainable Community Development "Yrystan"





Figure 6: Bishkek's GCAP events



3 City of Bishkek – Overview

3.1 Introduction to Bishkek

Bishkek, the capital of the Kyrgyz Republic, is the country's central socio-economic hub – one that is undergoing rapid urban development. This factor has contributed to the emergence of multiple challenges, such as rapid population growth, continued expansion of informal settlements, deterioration of the environment, and impacts on human health. Among the most pressing issues hindering Bishkek's socio-economic development, are traffic congestion, air pollution, seasonal water scarcity and associated negative consequences.

Bishkek has a population of approximately 1.098,6 million (2022)⁵ people and is located on one of the main transit routes through Central Asia. The city covers 160 km2 and its population has nearly doubled since 1989. Over the next 15 years, the population is predicted to grow by about 400,000 – approximately 40% of its current size. There is a critical window of opportunity to step up the delivery of inclusive and sustainable infrastructure and sustain the benefits of urbanisation. There are 47 sub-standard settlements in Bishkek today, hosting between 18% and 30% of the city's population, with many unregistered plots where people build their houses without the proper standards or solid construction procedures.

3.2 Policy Urban Framework

The Green City Baseline analysis has been conducted as a foundation for the development of the Green City Action Plan. The Policy and Urban Framework (PUF) provides a coherent analysis of the Bishkek urban framework in line with its implications for the GCAP development process and its potential actions.

The PUF consists of three relevant pillars: Policy Mapping, Risk & Vulnerability Assessment, and Smart Maturity Assessment. Furthermore, following the methodology for the development of the GCAP, the PUF identifies the local and national political, regulatory, and financial context, as well as issues, practices, and policies that may affect GCAP development and implementation. To the greatest extent possible, the developed content of the PUF has been integrated into the GCAP.

⁵ Site of National Statistics Committee of the Kyrgyz Republic: www.stat.kg/en/statistics/naselenie





Figure 7: Policy Urban Framework content

3.3 Geographic and social context

The city of Bishkek is located in the north of the country in the foothills of the Tien Shan mountains, at an altitude of 700-900 m above sea level. It is situated in a zone of high seismic risk, with an estimated seismicity of 8.5 and 9 points in most areas. The urban expansion of the city is limited from the north and south, since the northern districts of are located in the zone of 10-point seismicity, in conditions of subsiding soils where high-rises are prohibited, and in the south, the city came close to the tectonic fault and the soles of the Central and Western hills, which affect the city's density and its expansion. According to the Master Plan of the City of Bishkek, the city is slated for expansion to the east and west. However, these territories are currently within the administrative boundaries of the Sokuluk and Alamedin districts. Nevertheless, thanks to its geographical location and natural attractions, the city of Bishkek has great potential to develop as a green city and major tourist destination.

The unsystematic development of urban areas can be attributed as one of the limiting factors of progressive urban development. Today, the city is facing challenges regarding suitable sites for urban construction, especially for social and public projects. The engineering networks work are at peak capacity, accident cases are high, and access to the networks for new construction is low. All basic infrastructures need rehabilitation, modernisation, and increased capacity – notably the water and electricity supply systems. Moreover, there is a need to upgrade the sewerage system,



heating supply, street lighting, and management of communal waste. One of the most pressing issues is the development of transport infrastructure that includes ecological public transportation, efficient mass transit, bicycle infrastructure, walking passes, etc.

Three factors contributing to the environmental degradation are: rapid urbanisation, increased population density, and declining public green space. Bishkek used to be considered one of the greenest cities in the former Soviet Union with 21 square metres of green space, a figure which has dropped to 11 square metres. In recent years, the inflow from mountain rivers, including the Alamedin and Ala-Archa rivers, as well as in the BChK Big Chui Channel, has diminished, which affects the city's overall environmental well-being.

The population of the city is characterised by a rapid growth rate due to internal migration from other regions, and a high birth rate. According to the National Statistical Committee of the Kyrgyz Republic, the resident population of the city as of January 2022 was 1,098,600 people⁶. There is an acute issue around ensuring equity of access to high-quality social services, regardless of territorial location. All parts of the city, in particular residential areas, need access to social infrastructure facilities. The population of Bishkek is aging due to an increase in the number of people younger and older than working age. The sex and age structure differs from that of the country as a whole. The proportion of children and adolescents in Bishkek was lower than in the country, amounting to 31% at the beginning of 2022. The share of the population of working age also decreased, but it is higher than the national average by 0.2 percentage points – at 59.4%. The share of people older than working age is constantly growing, exceeding the national level by 4.7 percentage points, and amounting to 9.7% at the beginning of 2022.

The Risk and Vulnerability Assessment (RVA) of Bishkek has identified several natural hazards. As a result of its geographic and climatic conditions, Bishkek is vulnerable to a range of natural hazards, including earthquakes, landslides, floods, and droughts. The critical systems and services identified as being most vulnerable to these risks are energy, water supply, transportation, telecommunications, public health, public safety and security, and education. These systems have a high potential impact on the city's population and its economy, and a low capacity to adjust to the projected changes with minimal costs and disruption. One of the most pressing risks facing Bishkek is the potential for increased flooding and landslides due to changes in precipitation patterns and melting glaciers. These events could have a disastrous impact on the city's infrastructure and residents, particularly those who live in vulnerable areas. There are several exposed elements that are particularly sensitive to these risks, including critical infrastructure systems like transportation, water, and energy, as well as vulnerable communities and populations. Another significant risk facing Bishkek is the potential for increased neargy, as well as vulnerable communities and extreme weather events. These risks are likely to have a moderate to significant impact on the city's

⁶ Site of National Statistics Committee of the Kyrgyz Republic: www.stat.kg/en/statistics/naselenie



infrastructure and residents, with vulnerable communities and populations facing the greatest risk. The vulnerability matrix identified exposed elements such as healthcare and emergency services, which are critical for responding to heat-related illnesses and other weather-related emergencies. Therefore, the risk assessment highlights the need for proactive planning and investment in climate resilience measures to protect Bishkek's infrastructure and vulnerable communities. This includes investing in critical infrastructure systems that are particularly sensitive to climate risks, as well as implementing policies and programmes that promote social and economic equity and address the root causes of vulnerability.

The Smart Maturity Assessment (SMA) has been carried out systematically, considering the digitalisation of urban processes and other smart solutions, institutional aspects, stakeholders engaged in urban digitalisation and smart technologies, and including analyses of smart city elements. The SMA additionally outlines the institutional ecosystem of the city, its institutional setup, and its governance. It assesses smart maturity quality and cross-sector issues, followed by the GCAP sector policies. The main considerations for smart city solutions and the SMA are incorporated into the GCAP development. Therefore, the city acknowledges the importance of smart components and has already developed and implemented certain smart solutions in an attempt to digitise as many processes as possible. However, there is room for improvement across all GCAP sectors and at the city level. The main challenges that the city is facing concerning the digitalisation process are as follows:

- Lack of an integrated IT management system for all processes and procedures at the municipality level.
- Lack of a GIS integrated database system and the possibility of consulting real-time data.
- Lack of e-archiving options.
- Limited institutional capacities for SI and DT at the subordinate level of the municipality, which will be responsible for the implementation of the Smart and Digital Transformation Strategy.

These sectoral smart and digital challenges are presented in Table 4.



Table 4: Sectoral digital challenges

Sector	Digital Challenges		
TransportImage: Constraint of the second seco			
Energy and Buildings Lack of wide use of smart metering for energy consumption Limited support and promotion of international standards			
Water # Sewage	Limited data-sharing system Limited smart meters installed Lack of water meters integrated with the GIS system that will provide real- time data on loss of water and quantities of used water.		
Waste	Lack of an integrated monitoring system that will grant key stakeholders access to real-time data on waste management activities and quantities of waste collected, transported and processed.		
Land use	Limited usage of smart surveillance systems for public and open spaces Limited data on environmental factors in the urban area and around Bishkek city. Digital Twin City does not exist although there is some data regarding its early stage of development.		
Industry	Limited support for smart initiatives		



3.4 City finance

The main sources of the city's income are derived from tax and non-tax revenues. Regarding the tax income, the Municipal Budget, despite lacking explanatory notes and a general overview of the fiscal policy applied by the state authorities, represents a relatively comprehensive panorama from the individual tax revenue perspective. On the other hand, the non-tax revenues, are mainly composed of property income and interests, a considerable amount of financing from other budgetary institutions, diverse rental fees from tangible and intangible municipal assets, etc.

The composition of the non-tax revenues is not only insufficient in terms of size when compared to the total income, but it is also undiversified in typology. The city's power is limited by their financial resources and the capacity of authorities to introduce fiscal incentives and fines. According to the Tax Code of the Kyrgyz Republic⁷, there is only one local tax – a property tax. Fines are also set at national level by the Code of the Kyrgyz Republic on Offenses⁸ and Criminal Code⁹. All other taxes, even if collected in favour of the city's local budget (through allocation of tax income between local and national levels), are decided/set at the national level and prescribed by the Tax Code.

The City Council makes decisions on the level of tariffs for the use of drinking water, sewerage, heating supply (for the customers of ME "Bishkekteploenergo"), public transport as well as for the collection, removal, and destruction of solid domestic waste. The 'no objection' of the State antimonopoly agency is required for allocation of the tariffs. Furthermore, these tariffs make a significant contribution to financing infrastructural projects in their respective fields. The City Council can make decisions on infrastructural or policy measure (apart from those which need central government approval, (i.e. fiscal measures)) and finance their actions out of the local budget to the extent that this allows. The central government subsidises financing for the city's social institutions (i.e. schools, kindergartens, hospitals), including infrastructure.

Loans from the State budget are provided in accordance with regulations on working with them¹⁰. Project proposals must be developed bottom up by a sectoral State authority or an authorised State body. The decision of the Cabinet of Ministers on the provision of the budget loans is made within the limits of the funds provided for these purposes in the national budget for the corresponding year. If funds are not available, the issue of financing is coordinated with the

⁷ Tax Code of the Kyrgyz Republic, October 28, 2022, # 3, adopted by the Law of the Kyrgyz Republic № 4 on October 28, 2022, #4

⁸ Code of the Kyrgyz Republic on Offenses, October 28, 2021, #128 adopted by the Law of the Kyrgyz Republic on October 28, 2022, #126

⁹ Criminal Code of the Kyrgyz Republic, October 28, 2021, #127 adopted by the Law of the Kyrgyz Republic on October 28, 2021, #126

¹⁰ Resolution of the Government of the Kyrgyz Republic on Approval of a Provision on Work with Budget Loans Provided from the Republican Budget adopted on July 29, 2022, #406



relevant committee of the Parliament of the Kyrgyz Republic under the auspices of "finding additional funds".

Furthermore, if donor/IFIs financing is required, the Parliament of the Kyrgyz Republic must ratify the loan/grant agreement and the President must sign corresponding legislation. According to the Law of the Kyrgyz Republic "On International Treaties of the Kyrgyz Republic"¹¹, the treaties for the provision of loans to the Kyrgyz Republic, provision of grants and other financial assistance to the Kyrgyz Republic and other financial obligations must be ratified by Parliament.

Interested ministries, State committees and administrative departments, as well as other relevant State bodies of the Kyrgyz Republic make proposals for the ratification of such international treaties to the government in prior agreement with the authorised State body in the field of foreign affairs (Ministry of Foreign Affairs). The decision on ratification of international treaties is taken by the Parliament of the Kyrgyz Republic in the form of a Law on Ratification, which is subsequently subject to signing by the President. The process of ratification can be long, and the profile committees of the parliament consider loan agreements for 2-3 months, so that the parliament can adopt them within 5-6 months. These agreements should be carefully considered in conjunction with the government, and only then submitted to the parliament. In this case, the term for ratification of international agreements can be significantly reduced. According to the Law on Local State Administration and Local Self-Government Bodies¹², the Mayor of the City of Bishkek is appointed by the President.

Regarding the Municipality's revenue stream, it is important to note that the city has not succeeded in collecting 100% of the planned revenues in the three years prior to the writing of this report. Nonetheless, it has maintained a good collection ratio – generally above 95% of the planned amount. Revenue collection performance for the year 2020, which was understandably poor due to the effects of the Covid-19 pandemic on the economy has not been considered for this analysis as it does not represent a stable indicator for revenue collection performance.

The conclusions on the income of the Municipal Budget are as follows:

• The income flow is dependent on tax revenues. While there is a non-tax revenue stream in the Municipal Budget, it is undiversified and operates without adding any measurable increased value to the Municipal Assets. Conversely, there are no identified revenue streams with provenience from Non-Financial State-Owned enterprises, mentioned in the balance sheets. This is indirectly implying lack of operating effectiveness and financial performance of these enterprises with financial implications for the municipal budget.

¹¹ Law of the Kyrgyz Republic on International Treaties adopted on April 24, 2014, #64

¹² Law of the Kyrgyz Republic on Local State Administration and Local Self-Government Bodies adopted on October 20, 2021, #123



- A general analysis reveals that the bulk of the expenses come from housing and communal services, educational and transportation services.
- An important concern is the proportion of funds allocated to cover the credit needs of the Subsidies to Non-Financial State Enterprises which reached a staggering 22% of the balance of the total expenses in 2022.

3.5 Institutional framework

The status of Bishkek as the administrative, economic, and cultural centre of the country is enshrined under the 2013 Kyrgyz Law "On Status of the Capital"¹³ and presents the city's jurisdiction. This law defines the institutional and administrative framework of the city's governance, assigning duties and responsibilities within the elected representative body–the Bishkek City Kenesh (Council), and the executive body – the Mayor's Office. The latter is controlled by and accountable to the Council, which consists of 235 deputies elected for a four-year term.

The city of Bishkek is divided into four districts: Leninsky, Oktyabrsky, Pervomaisky, and Sverdlovsky.



Figure 8: Administrative Map of Bishkek

The city's day-to-day management is the responsibility of the Mayor's Office, which is further sub-divided into three core structures: i) municipal administration centres for each of the city districts, ii) structural departments and agencies, and iii) municipal enterprises. The municipal administration centres coordinate the delivery of services to the population in each of the four districts. Structural departments include the Policy Development Department, department in charge for urban transport, capital construction, municipal property, social, culture, health, education, and other structures responsible for

city-wide strategic planning. The municipal enterprises are responsible for the on-the-ground delivery of specific public services including water and wastewater, heating, irrigation and greening, waste management and road repairs.

The organisation in charge for the development of city strategies and action plans, and the direct counterpart to the EBRD GCAP project, is the Development Policy Department of the Mayor's Office of the City of Bishkek.

¹³ Law on Status of the Capital #128 adopted on December 12, 2013



Central Office of the Mayor Office of Bishek



Figure 9: City administration structure



4 Green City Baseline

4.1 Regulatory and governance framework

In recent years, several municipal and national plans and policies have been developed to promote sustainable urban development and support urban resilience in the country and the city. They have been developed in line with the country's international commitments towards environmental protection and climate change mitigation/adaptation. To gain a clear picture of the regulatory and governance framework relevant for Bishkek and GCAP, the assessment of the situation presented in the Policy Urban Framework (PUF) report was conducted. Analysing of relevant policies and legislation was important to identify potential gaps in addressing environmental challenges and improving the level of environmental governance in Bishkek.

International level

The international treaties to which the Kyrgyz Republic is a party and is regulating international legal relations in the field of climate change are: the UN Framework Convention on Climate Change (UNFCCC), the UN Conventions: for the protection of the ozone layer, combating desertification, and biological diversity, having the status of Global Environmental conventions, as well as the Kyoto Protocol to the UNFCCC, the Montreal Protocol to the Convention for the Protection of the Ozone Layer, the Paris Agreement under the UNFCCC and others. Since 2016, the Kyrgyz Republic has been a member of the Global Partnership for Action on Green Economy (PAGE), a joint initiative of five UN agencies – UNDP, UNEP, ILO, UNIDO and UNITAR. The goals of this initiative are to support the Kyrgyz Republic's transition to a green economy.

National level

The Consultant Team has identified and reviewed relevant policy and regulatory documents that confirm a general commitment to sustainable urban development. At national level, the National Sustainable Development Strategy for the Kyrgyz Republic for 2018-2040 is the main strategic document that covers all sides of the country's development, including environmental issues, adaptation to climate change, and risk reduction for disasters. As one of its 40 steps, the strategy pinpoints the development of urban infrastructure, which includes favourable urban development in Bishkek. As part of the first step, a set of measures has been provided for the implementation of a "Smart City".

In 2020, a new Green Economy and Climate Change Coordination Mechanism was established. To strengthen national coordination on climate change and the green economy in the Kyrgyz Republic, two separate, previously fragmented councils have been merged into one: The Green Economy and Climate Change Coordinating Council. This new coordination mechanism is led by



the Prime Minister of the Kyrgyz Republic and aims to create a comprehensive and streamlined effort in the field of climate change and green economy activities. The Climate Finance Center has been appointed as Secretariat for the new council to ensure a concerted focus on climate change and the green economy in the country. The Climate Finance Center of the Kyrgyz Republic (CFC) was established by the Government of the Kyrgyz Republic¹⁴, as a climate finance coordination mechanism. The centre's main role is to assist in attracting financial resources from climate funds and to support the development and implementation of investment projects and programs for adaptation to climate change.

The regulatory and policy framework in Kyrgyzstan covers relevant sectors related to environmental aspects of air quality improvement and combatting smog, improving water supply and sanitation systems, nature protection and conservation, climate change, sustainable transport and electrical vehicles, energy efficiency in buildings, and renewable energy.

The main national documents addressing climate change issues are the Green Economy Concept "Kyrgyzstan is a country of green economy"¹⁵, and the Green Economy Development Program for 2019-2023¹⁶ and its corresponding action plan.

The Green Economy Concept has many priority areas relevant for GCAP, namely:

- The Green Transport in a Green City priority area that covers measures to reduce demand for personal vehicles and stimulate demand for public transportation; encourage the use of environmentally friendly new cars, gas-fuelled vehicles, hybrids and electric vehicles through tax and customs preferences; transition to high quality fuel and other measures.
- The Green Energy and Energy Saving priority area that covers the introduction of lowcarbon, renewable energy sources and energy saving and energy efficiency measures, and the transition to district and individual electric and gas heating; application of new building standards and implementation of measures to improve energy efficiency in the construction industry; the introduction of remote metering of electrical and thermal energy, gas and water, etc.
- The Green Recycling priority area, which proposes economic mechanisms for waste recycling (recycling fees, tax incentives and preferences for waste processors, etc.), and developing a State programme for greening the collection, disposal and recycling of solid waste, including the introduction of mandatory separate waste collection, waste sorting, waste processing and waste incineration facilities in cities, the introduction of a complete ban on the burning of municipal solid waste (except with specialised permits), and the

¹⁴ Resolution of the Government of the Kyrgyz Republic adopted on August 14, 2017, #478

¹⁵ Green Economy Concept of the Kyrgyz Republic adopted by the Resolution of the Parliament of the Kyrgyz Republic on June 28, 2018, #2532-VI

¹⁶ Resolution of the Government of the Kyrgyz Republic on Approval of the Green Economy Development Programme, adopted on November 14, 2019, #349



introduction of appropriate administrative and other penalties for violators; development of a programme to reduce and ultimately ban the use of non-recyclable packaging plastic, while promoting the use of rapidly biodegradable alternatives in the Kyrgyz Republic.

- The Biodiversity Conservation priority area covers the consideration of the value of ecosystems and biodiversity in industrial and municipal planning.
- The Green Investment and Sustainable Finance priority area promotes green investments in renewable energy technologies, energy-saving construction; environmentally friendly technologies and irrigation systems; access to major global sources of concessional green finance (Global Environment Facility, Green Climate Fund, etc.); engaging the banking sector, IFIs and investment funds in the use of global environmental finance and other measures. The concept underlines the importance of land improvement and green space development, the need for water reuse, and the protection of human health against air pollution.

The issues of green economy were further developed in the Green Economy Development Program for 2019-2023 and its corresponding action plan that covers all parts of the Kyrgyz economy and proposes comprehensive changes to the regulatory framework at national and sectoral levels.

The programme has a separate section on development of **Green Cities** that recommends creating a legal and institutional framework for the development of green cities; to create a city management system, which considers the principles of green cities; to develop the engineering, technical and communication infrastructure of cities that ensures safety, environmental sustainability and a socially inclusive environment; to conduct information and education campaigns.

Bishkek city level

Bishkek has several policies that are relevant for preparation of the GCAP. Moreover, the GCAP has taken previously prepared action plans and strategic documents that identified actions in line with the Vision and Strategic goals of the GCAP. The most important policy documents, relevant to Bishkek GCAP are as follows:

 A roadmap to combat smog, developed during the inter-ministerial meeting at the President's Administration level on February 9, 2023¹⁷. The issue of smog has become one of the most pressing environmental problems for the city over the past few years. In February 2023, the issue was taken to the President's Administration level and a roadmap was developed at the inter-ministerial meeting. The roadmap covers the main sources and causes of smog, like the use of low-quality coal and burning waste, lack of access to

¹⁷ Resolution of the President's Administration of the Kyrgyz Republic, adopted on February 9, 2023, # 1810-34



central heating and effectiveness of the central heating station, slow gasification of the suburbs and the cost of gas, weak insulation of buildings, old vehicles, and gives orders to various ministries and organisations, including the Mayor's Office of Bishkek City, on the actions to be taken to improve air quality in Bishkek.

- A plan of comprehensive measures to improve the environmental situation in the city of Bishkek and the Sokuluk, Alamudun districts of the Chui region for 2021-2023¹⁸ aimed at improving the environmental situation in Bishkek and other regions of the Chui Oblast. The plan details 40 actions for urban planning and design, heating, water, green spaces, transportation, and air pollution, as well as the target indicators and responsible implementing agencies.
- An Action Plan for the Implementation of the City Development Programme "Bishkek 2026. Comfortable and Green Capital"¹⁹ is approved by Bishkek City Council. The goal of this Action Plan is to restore Bishkek's status as a Green Capital with exemplary cleanliness and recreation areas. The objectives of the action plan are in line with the concept of this Green City action plan. The action plan consists of 170 events planned for the development of the city.
- Programmes for the socio-economic development of the city of Bishkek for 2023 and forecast for 2024-2025²⁰ is approved by Bishkek City Council in 2022. The socio-economic programmes are developed on an annual basis for budgetary reasons. The document details allocation of financial resources for the Action Plan for the Implementation of the City Development Programme "Bishkek 2026. Comfortable and Green Capital". with more detailed planning for the first year and forecasts for the next two years.
- The resolution on the establishment of the Expert Environmental Council under the Mayor's Office²¹ is signed by the Mayor of Bishkek. An Expert Environmental Council was established to develop a mechanism of interaction with the expert community and develop proposals for improving the ecological situation in the city. In 2022, a Greening Committee was created under the Council, which includes representatives of the municipality, the academic community, and public organisations.
- Bishkek City Master Plan for 2010–025 is approved by the Resolution of the Government of the Kyrgyz Republic^{22.} This is the main document for urban planning, development, reconstruction, expansion, and other types of territorial development. The Master Plan is a technical document that has the force of law. It consists of an explanatory note and a set of drawings. The current Master Plan expires in 2025. In 2023 the city started

¹⁸ Resolution of the Government of the Kyrgyz Rep adopted on January 6, 2021

¹⁹ Resolution of Bishkek City Council adopted on August 15, 2022, #148

²⁰ Resolution of Bishkek City Council adopted on May 26, 2022, #31

²¹ Resolution of the Mayor of Bishkek City signed on December 30, 2020, #145

²² Resolution of the Government of the Kyrgyz Republic adopted on November 21, 2006, #805



preparatory work for developing the new City Master Plan which will cover the period of 15-20 years.

Furthermore, Bishkek has several rules and decisions that are in line with national policies and regulations and relevant to the process of greening the city, in particular:

- Rules for the organisation of passenger transportation on the roads of Bishkek City²³ is approved by Bishkek City Council. The rules are obligatory for all providers of public transportation services, both municipal and external private companies, and contain clauses on passenger health and safety, and environmental protection.
- Resolution on the organisation of city development financing through stimulating grants (co-financing)²⁴. The purposes of grants are creation, development, restoration, and rehabilitation of the objects of urban and territorial significance, including building renovation.
- Rules for the use of water supply and sewerage in the City of Bishkek²⁵. The rules state that purchase and installation of drinking water meters and wastewater meters is the responsibility of the customer (clause 3.6.) However, this clause is valid for enterprises/organisations and developers only.
- Rules for the provision of technical conditions and the procedure for connecting to engineering networks in the Kyrgyz Republic²⁶. The rules require installation of metering equipment by the developers of new buildings.
- Resolution of Bishkek City Council on changing the norms of water consumption and water disposal for the population of the city of Bishkek²⁷. The rules state that billing for the customers who do not have metering equipment is carried out in accordance with water consumption norms.
- Rules for the acceptance of industrial wastewater into the sewerage system of the city of Bishkek²⁸. The document sets out requirements to industrial companies regarding the quality of wastewater accepted for treatment and the acceptance order.

The analysis of the current policy framework identifies several sectoral and multi-sectoral policies that could improve the overall implementation of the GCAP. These could include the Sustainable Waste Management Plan, Sustainable Urban Mobility Plan, Sustainable Energy and Climate Action Plan, Land Use and Green Infrastructure, Air Quality Monitoring Plan, and other policies that cover gaps related to a more sustainable functioning of the city's systems. It is important to

²³ Resolution of Bishkek City Council adopted on April 5, 2022, #25

²⁴ Resolution of Bishkek City Council adopted on December 2, 2009, #114

²⁵ Resolution of Bishkek City Council adopted on December 2, 2009, # 104

 $^{^{26}}$ Resolution of the Government of the Kyrgyz Republic adopted on February 10, 2009, # 100, latest amendment – June 9, 2020

²⁷ Resolution of Bishkek City council adopted on December 2, 2009, #103

²⁸ Resolution of Bishkek City Council adopted on December 2, 2009, #119



note that the City of Bishkek follows the practice of law enforcement with lower efforts towards the development and implementation of specific local policies. This context should be taken into consideration during the development of the GCAP to ensure the feasibility of the implementation and monitoring of Green City Actions.

4.2 Environmental conditions

In recent years, Bishkek's inhabitants have significantly increased and with this, so has the level of urbanisation in the city territory. However, it faces several environmental challenges and potentially severe negative environmental impacts on the city's development, urbanisation, and functioning. A review of publicly available information indicates that the city's environmental challenges, as validated by a comparison of the indicators and stakeholders' consultations are presented in the Technical Assessment. The Technical Assessment (TA) provides a comprehensive review of the environmental and climate change situation and challenges for the city of Bishkek. The TA identifies and reviews key environmental areas (air, water bodies, drinking water, water use, soil, greenspace, biodiversity, climate change). In addition, it highlights sectoral pressures (urban transport, energy and industries, water, solid waste, buildings, and land use) and possible areas for improvement. The overall assessment is based on the selection and use of the environmental State–Pressure–Response indicators.

Indicator type and topic / source	Benchmark flag	Selected*				
Quality of Environmental Assets						
Air						
Water bodies						
Drinking water						
Water use	n/a	n/a				
Soil						
Av	ailability of Resources					
Green space						
Biodiversity and ecosystems	n/a	n/a				
Climate Change Risks						
Mitigation of GHG emissions						
Adaptation and resilience to natural disasters						

Table 5: Averaged benchmark flags for state indicators by source / topic for City of Bishkek


4.3 Green City environmental and sectoral challenges

The identified environmental challenges were discussed and ranked at the 2nd Stakeholders Workshop. The prioritisation of environmental challenges was performed by the stakeholders within the open discussion and voting at the workshop, and through individual communication. The main environmental challenges for Bishkek are ranked as follows:



Air

Air quality is one of the main concerns in Bishkek, which suffers high pollution from PM2.5, PM10, SO₂ and NO₂ values. The analysis shows that the quality of atmospheric air in Bishkek has deteriorated sharply over the past few years. According to the air pollution indicators, the air in Bishkek can be generally characterised as highly polluted and represents one of the most significant environmental challenges. Emissions of pollutants mainly come from the energy and heating (individual and district) sectors (i.e., use of coal), transport located in inner-city and peri-urban areas and the uncontrolled burning of waste.

Water (water use, surface water quality and drinking water quality)

The surface water is highly polluted by ammonium and its quality is affected in a negative way by anthropic activities. The wastewater is either not captured entirely or is treated in an inefficient way before discharge into the water body. Although the quality of the drinking water is at a satisfactory level, Bishkek is progressively facing water scarcity due to lower levels of water in the exploitation wells.

Soil, Greenspace, Biodiversity

There is a significant danger of heavy metal contamination of urban soils. The quantity and management of greenspaces are not at a satisfactory level. In particular, there is a low provision to residents of green areas for common use, low accessibility to landscaped areas for common use and a sparse number of green spaces. The low proportion of green space in the urban area and deteriorating trends from benchmarks is due to the increased population and new constructions. Biodiversity is not taken into consideration in Bishkek and there is no biodiversity monitoring and/or protection of species and their habitats.

Greenhouse gas emissions



Although there is no clear data and inventory of GHG emissions in Bishkek, a dependence on fossil fuels (i.e., coal, gas) for energy and energy-intensive buildings and transport indicate high greenhouse gas emissions.

Climate resilience

There is a water scarcity problem in the long term. Although the water use index indicates moderate water consumption, it tends to increase. The lack of a future scenario analysis of earthquake risks may lead to a lack of control over prevention of the allocation of land plots with construction risks (taking into account new areas).

Considering the available data and trends, indicators presented in the Indicators Database, direct discussion with stakeholders, combined with the local context and expertise provided, the most significant and prioritised environmental challenges for Bishkek are summarised in priority order in Table 6.

Rank	Environmental challenge	Area	Description
1 st	Air pollution and low level of air quality	Air	High levels of PM2.5, PM10, NOx and SOx that exceed international limits, mainly due to fossil fuel energy, transport, waste burning, low use of renewable energy and lack of energy efficiency measures.
2 nd	Surface water pollution and scarcity of drinking water	Water	Poor surface water quality upstream and downstream of Bishkek with high ammonium (NH4) levels, likely due to outdated sewer network, inappropriate treatment of wastewater, use of suburban pit latrines.
3 rd	Devastation of green space and need for reconstruction and preservation of green spaces in the city	Green space	Low proportion of green space in the urban area and deteriorating trends from benchmarks due to increased population and construction.
4 th	Pollution of urban soil	Soil	High levels of heavy metals in urban soil.
5 th	Lack of biodiversity protection	Biodiversity	Biodiversity in urban area is degraded. it is neither recognised as important, nor protected.

Table 6: Rank list of priority city challenges



6 th	High level of greenhouse gas emissions	Greenhouse gas emissions	There is no clear data on emissions for the city of Bishkek, dependence on fossil fuels for energy and energy- intensive buildings and transport indicates high greenhouse gas emissions.
7 th	Water scarcity	Climate resilience	Water scarcity problems in the long term (irrigation, drinking water). Although the water use index indicates moderate water consumption, it tends to increase.

Sectoral challenges

The environmental areas are under pressure, and this is causing sectoral challenges for Bishkek. The sectors' challenges have been identified and defined based on the collected GCAP indicators (Indicators Database), sectoral discussions with key stakeholders (at workshops and individually) and the technical expertise and analysis performed in this regard (presented in the Technical Assessment). These challenges, divided per sector, are as follows:

Urban transport The large number of fossil fuel vehicles in Bishkek cause significant air pollution, noise, and traffic jams. There is a limited alternative and sustainable transport with a low level of mobility for passengers and goods.

Water and wastewater The levels of surface and groundwater for water supply have declined in recent years and there is ongoing investigation to identify causes of water scarcity. The spring of 2023 was particularly dry and cold. According to hydrogeologists, dry weather led to deficit of the irrigation water for Bishkek and its surroundings during the spring and summer while cold weather caused late melting of glaciers that exacerbated the problem. This is seen as the main reason for water scarcity, is associated with climate change and there are forecasts of drinking water scarcity due to lack of water in exploitation wells. Drinking water is largely used for irrigation purposes, rationale water use technologies are not applied (e.g., jet irrigation, drip irrigation). An adequate precipitation water system and irrigation channels are missing. The water metering system is not fully developed. High losses in water supply and sewerage systems are associated with aging infrastructure (technical losses) and a substantial number of unauthorised water users. Due to the growing population, the water supply and sewerage facilities need further upgrading. In addition, the wastewater treatment plant needs modernising and upgrading.

Energy

The main fuel sources for heating are fossil fuels (i.e. coal, gas) in district heating systems and individual facilities. Low quality coal is one of the main causes of air pollution. There is low use of renewable energy or implementation of energy efficiency measures in Bishkek due to the ineffective application of the related laws and policies, a lack of political will, and inefficient



management. Particularly problematic is the need for more progress in implementing energy efficiency policies encompassing mandatory requirements for energy efficiency in industrial and residential sectors.

Buildings

Bishkek has an aging building stock, low levels of building maintenance, mainly fossil fuel-based energy infrastructure, low levels of energy metering and many households that are fuel poor. Moreover, high usage of inefficient and polluting solid fuel-fired heating systems causes problems such as respiratory issues and premature deaths from poor air quality. Data collected for the review of the indicators highlighted trends such as gradual increases in electricity consumption year-on-year as well as fluctuating heat demand. A significant opportunity exists to improve the energy efficiency of new and existing buildings in Bishkek. Investment in building energy retrofit projects, clean energy technologies (i.e. moving away from coal), as well as more effective building maintenance regimes are all key components.

Solid waste

Solid waste collection and treatment contribute to pollution in many areas including air, water, soil quality and this in turn has implications on the biodiversity, ecosystems, and green spaces. The solid waste management in Bishkek is based on waste collection and disposal through landfill. What is more, there is still illegal waste dumping, uncontrolled burning, and inappropriate collection of recyclable materials.

Land use

Urban growth and development has wide-ranging implications on all environmental areas, land use planning and land protection in Bishkek. Fragmented land use puts pressure on infrastructure provision and causes traffic congestion. There is a clear risk that the development of social and communal infrastructure will not keep pace with the development of buildings and housing constructions. In addition, there is a low ratio of green spaces per capita according to international indicators and a low level of green infrastructure in the city.



5 Green City Action Plan

5.1 GCAP Vision and Strategic goals

The Vision and Strategic Goals are based on identified and prioritised environmental and sectoral challenges. They were discussed and drafted at the 2nd and 3rd Stakeholder Workshops. The Vision is a combination of several important segments of Bishkek's ideal and realistic future and the Strategic Goals encompass clearly prioritised needs for improvements in the areas of air, water/wastewater, and green space.

"Bishkek strives to be an innovative, vibrant, people-centred and ecologically sound Green City, in which the well-being of all residents is promoted through clean air, green spaces, with an abundance of trees and fresh water, and well-developed municipal and digital infrastructure, communal services, and sustainable waste management."

VISION

In response to the identified Green City challenges and aspirations for sustainable city growth, a Green City vision has been developed for Bishkek. The Vision sets the broad direction for the green transformation of the city. It envisions the city as ecologically sound and incorporating the use of digital and smart technologies in its development. Furthermore, Bishkek's vision is to move towards social justice, health and well-being with well-developed communal services and infrastructure – particularly related to sustainable transport, waste management and with low emissions of pollutants. In



addition, the definition of the Vision Statement factored in the wider regulatory agenda and institutional jurisdictions, as well as the response from the city officials and stakeholders at the GCAP preparation process. This approach creates ownership and support for the GCAP from across the City's administration.

STRATEGIC GOALS

Strategic Goal 1 (SG1)

"Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while maintaining sustainable growth and improving infrastructure for transport, energy and waste management."



Bishkek is facing high air pollution with increased emissions of PM2.5, PM10, NOx and SOx and other harmful pollutants from the use of fossil fuel-based energy and transport, as well as waste burning, low use of renewable energy and a lack of energy efficiency measures. Therefore, improving air quality is a fundamental environmental and health challenge and a key strategic goal for the Green City. Significant reduction of air pollution levels in Bishkek will be achieved by implementing sustainable and comprehensive actions targeting the improvement of public transport, promoting cleaner technologies, raising awareness, and fostering collaborative efforts among relevant stakeholders. This approach aims to improve public health, quality of life, and the environmental sustainability of the city. The goal is to tackle the specific challenges related to air pollution in Bishkek and it outlines the vision and desired outcomes in terms of improved air quality and its associated benefits.

Strategic Goal 2 (SG2)

'Improve water supply and water use efficiency in Bishkek in order to avoid water scarcity, and to increase quality of the surface water, and to improve the sewer network and appropriate treatment of wastewater.'

Water scarcity has increased in recent years, highlighting the need for improving the water supply and ensuring the efficient use of centralised drinking water. Strategic Goal 2 aims to improve the water supply, water use efficiency, quality of surface water, sewer network and wastewater treatment in the city of Bishkek. It includes:

- Ensuring reliable and sustainable water supply to meet the current and future demands of the city's residents and businesses. This involves upgrading infrastructure, addressing non-revenue water, expanding water sources, implementing efficient water distribution systems, and promoting water conservation practices to adapt to climate change.
- Enhancing water use efficiency. This implies responsible water usage among the city's population, industries, and institutions through water metering, awareness campaigns, and the adoption of water-efficient technologies and practices, such as efficient irrigation and leak detection and repair initiatives.
- Improving surface water quality. This includes protection and enhancement of the quality of surface water bodies, such as rivers and reservoirs, within and around Bishkek.
- Upgrading the sewer network and wastewater treatment. This encompasses modernisation and expansion of the sewer network and wastewater treatment infrastructure to ensure proper collection, treatment, and disposal of sewage. It implies rehabilitating existing facilities, (re)constructing the treatment plant, implementing advanced wastewater treatment methods, and investing in sustainable sewage management. In addition, enhancement of the sewer network will contribute strongly to the improvement of the surface water quality in Bishkek.



Overall, the aim of this strategic goal is to ensure the availability of safe and clean water for the residents of Bishkek while also focusing on sustainability, efficiency, and environmental conservation in water management practices, in order to adapt to increasing demand and stresses on water supply due to climate change.

Strategic Objective 3 (SG3)

'Increase the area and quality of green spaces for city residents through the fostering of Bishkek's natural heritage and biodiversity and urban soil protection.'

The strategic goal for the improvement of quality of green spaces, green infrastructure, urban soil protection, biodiversity, and natural heritage in the city of Bishkek includes:

- Enhancing green space accessibility and green infrastructure integration. Improving access to green spaces by increasing their number, distribution, and connectivity. This includes the rehabilitation and establishment of parks, gardens, and green spaces, ensuring that all residents have easy access to natural areas. Green infrastructure helps manage stormwater runoff, reduce heat island effect, improve air quality, and provide shade and habitat for biodiversity. In addition, it implements guidelines for seedlings nurseries, planting, irrigation, and infrastructure to ensure the sustainability and longevity of green spaces.
- Maintain and enhance Bishkek's iconic water channel networks, not only for their important functional use for irrigation, but also to improve the quality, vitality, and attractiveness of green and public spaces for everyone, including children.
- Urban soil protection: Implement measures to protect urban soils, which are essential for healthy green spaces. This includes proper soil testing and analysis, promoting sustainable land management practices, and decreasing soil pollutants.
- Design and maintenance standards: Develop and enforce strict design and maintenance standards for green spaces, ensuring that they are well-maintained, aesthetically pleasing, and safe for public use.

It is important to note that the GCAP Strategic Goals align with the specific context and priorities of Bishkek, taking into account the city's particular characteristics and challenges.

5.2 GCAP Actions

5.2.1 Overview of the Green City Actions development

The GCAP Bishkek includes detailed descriptions of 28 actions that are developed in close collaboration with city officials and EBRD. The relevant stakeholders are engaged in identification



of the longlist of actions through stakeholder workshops, direct bilateral meetings, online meetings, and e-mail communication.

The longlist of actions contains 76 actions that were discussed with the stakeholders and experts. The scope of actions was based on the previously defined city strategies and action plans (i.e. the roadmap to combat smog, the plan of comprehensive measures to improve the environmental situation in the city of Bishkek and the Sokuluk, Alamudun districts of the Chui region for 2021-2023, Action Plan for the Implementation of the City Development Programme "Bishkek – 2026. Comfortable and Green Capital," Socio-economic development programmes for the city of Bishkek for 2023 and forecast for 2024-2025, Bishkek City Master Plan for 2010–2025). Furthermore, the multi-criteria assessment of the longlist of actions was conducted based on key environmental, economic, social, feasibility, and maturity aspects, and anticipated environmental, economic. and social benefits.

The actions are combined with the inclusion of hard (i.e. infrastructure) and soft (i.e. feasibility studies, policy) components. Furthermore, the actions consider the necessity for capacity building activities and the introduction of smart technologies.

Several rounds of technical reviews were conducted with city representatives, municipal companies, and institutions, and EBRD sectoral experts to finalise the shortlist of actions. This was further elaborated with detailed information related to identification of implementation steps, cost estimations and a mapping of benefits.

It is important to note that gender and social inclusiveness have been considered across all actions, and the highest potential has been found in actions that target improved quality of life, potential job creation, awareness raising and enabling broader community participation in implementation processes. Besides this, smart technologies were included in the description of the actions as a primary topic for selection of technologies and methodologies for the actions' implementation (e.g. smart metering, energy management, street lighting, waste and wastewater treatment, and resource management).

Although based on limited local data and good international practices, the reductions of GHG emissions are estimated at 534.9 ktCO2e per annum over the 10 - year period of the GCAP implementation. These estimations are connected to sectors with evident potential for GHG reductions (i.e. transport, energy, buildings, waste, and land use).

Beside evident environmental benefits, there are several co-benefits that are accounted for in the definition and selection of the Green City Actions. Most important are improving quality of life, job creation, increased transport, diminished vehicle maintenance costs, a decrease in energy operation and management costs, better health conditions, driving tourism, and enhancing building safety.



Sector	Action ID	Title of the Action	Action Type	CAPEX (EUR)	OPEX (EUR)
	UT01	Sustainable Urban Mobility Plan (SUMP)	Policy	600,000	98,000
	UT02	Construction of sidewalks and bicycle paths	Capital Investment – new	6,000,000	300,000
	UT03	The renewal of urban passenger transport, through the purchase of electric vehicles, the creation of preferential conditions for their purchase, the creation of a network of charging stations for electric vehicles and the creation of a municipal "Green Taxi".	Capital Investment – new	58,500,000	1,308,000
Urban Transport	UT04	Installation of a new progressive traffic light control system	Capital Investment – new	2,000,000	60,000
	UT05	Improvement of parking in Bishkek and the introduction of paid parking spaces	Capital Investment – new	3,700,000	111,000
	UT06	Reconstruction of a bypass road around the city of Bishkek, arrangement and landscaping of roadside infrastructure	Capital Investment – new	185,000,000	3,700,000
	UT07	Road dust prevention and cleaning	Capital Investment – existing	600,000	30,000
$(\mathcal{P}_{\mathcal{R}})$	EI01	Promotion of heat pumps to reduce coal and gas dependence	Capital Investment – new	10,960,000	n/a
Energy and Industry	E102	Heat loss reduction in distribution pipelines	Capital Investment – new	18,750,000	n/a

Table 7: Summary of Bishkek's Green City Actions



	EI03	Promotion of solar thermal in municipal buildings to reduce fossil fuel consumption	Capital Investment new	1,700,000	n/a
	E104	Central dispatch centre and installation of LEDs with smart control systems	Capital Investment new	3,200,000	n/a
	EI05*	Modernisation of operation of Bishkek CHP	Capital Investment - existing	17,500,000	n/a
	W01	Installation of drinking water meters with remote data transmission in multi- storey residential buildings and private households in Bishkek	Capital Investment – new	25,900,000	3,800,000
Water	W02	Reconstruction and modernisation of the Wastewater Treatment Plant in Bishkek. Construction and reconstruction of pressure and gravity sewer networks	Capital Investment – new and existing	35,000,000	1,100,000
	W03	Reconstruction of groundwater intake "HBO"	Capital Investment – existing	3,100,000	96,000
	W04	Reconstruction of water supply networks	Capital Investment – existing	1,330,000	6,000
	W05	Reconstruction and modernisation of the irrigation network for green areas	Capital Investment – new and existing	3,145,000	180,000
Solid Waste	SW02	Improvement of the municipal solid waste collection system and increase public awareness	Capital Investment – new	10,000,000	n/a
	SW03	Construction of a waste processing plant	Policy, Feasibility and Design, Capital investment – new	45,000,000	n/a



	SW04	Construction of a sanitary landfill and closure / remediation of the existing landfill	Capital Investment – new	15,000,000	n/a
Buildings	B01	Energy efficient retrofitting of public non-residential buildings – Pilot scheme	Capital Investment – existing	70,000,000	n/a
	B02	Improved technical capacity and training for undertaking building energy efficiency works	Awareness and Capacity Building	3,000,000	n/a
	LU01	Planting and maintenance of green spaces in the territory of Bishkek (in squares, parks, along roads and other green places) and development of vertical greening	Capital Investment – new and existing	13,550,000	1,000,000
S	LU02*	Reconstruction of scientific research Institute Botanical Garden	Capital Investment – existing	420,000	n/a
Land Use	LU03	Development of the base of ME "Bishkekzelenkhoz" for growing adapted large-sized planting material for the purpose of issuing it to the city through nursery and greenhouse optimisation and modernisation	Capital Investment – new	12,000,000	n/a
Cross- cutting	CC01	Development of a Roadmap of environmental safety, Environmental safety monitoring system and Information Campaign on Environmental situation	Policy, Awareness and Capacity Building	1,000,000	100,000



CC03	Purchase and install automatic air pollution monitoring stations	Monitoring and Reporting	500,000	40,000
CC04	Feasibility study on restoration of Ala- Archa and Alamudun rivers and BChK (Big Chui Channel)	Feasibility and Design	350,000	n/a
		Total:	547,805,000	





Figure 10: Map of Actions



5.2.2 Detailed description of the actions

Urban Transport

Sector & Reference: Urban Transport UT01												
Action Title	Suctainak						Action classification	High p	High priority			
Action The	Sustainable Orban Mobility Plan (SOMP)					-)	Environmental area	Air	Air			
Action's link to the strategic objectives SG1: Improve air quality maintaining sustainable g						e air quality sustainable gr	in Bishkek and reduce the rowth and improving infrasti	e negative ructure fo	e impact of a r transport.	air pollution	on citizens' health while	
Estimated costs: CAPEX EUR 600,000		600,000	K	(GS	57,240,000	Annual OPEX	EUR	98,000	KGS	9,408,000		
Financing mechanisms City budget, loan, grant.												

Description of the Action:

The growth of motorisation, poor road infrastructure, increased noise and harmful emissions, traffic jams and time challenges cause problems for citizens and the environment. The combination of these factors generates prerequisites for changing the situation through the transition to sustainable and reasonable mobility. This involves providing clean and safe energy, including the accelerated development of renewable energy sources and infrastructure for 'clean' transportation. The development of a Sustainable Urban Mobility Plan (SUMP) will serve as a strategic blueprint to address the mobility needs of individuals and businesses in cities and their surrounding areas, with the aim of enhancing quality of life. The SUMP will enable the creation of comprehensive solutions to transportation, urban planning, and environmental issues while considering the unique development characteristics of different areas. It will be founded on existing planning practices and will incorporate the principles of inclusiveness, participation, and evaluation.

The development and implementation of a SUMP is an opportunity to introduce the positive experience and best practices observed in other countries, to Bishkek, so that they can be adapted to the local conditions and financial capabilities of the city.

This process will help the city acquire expertise in harmonising its plans and programmes with the Sustainable Development Goals (SDGs) and national commitments to reduce greenhouse gas emissions. The formulation of a SUMP will guarantee the fulfilment of the following objectives:

- Providing opportunities for the social integration of all individuals and ensuring equality among users of various modes of transportation.
- Enhancing transportation safety.
- Encouraging and optimising alternative transportation modes throughout the city.
- Improving the integration of infrastructure and services for walking, cycling, and public transport across different districts of Bishkek and its suburbs.
- Elevating Bishkek's significance as an economic hub through the optimisation of commercial transportation.
- Mitigating the impact of transportation on human health and the environment.



Rationale:

The experience of foreign countries shows that the use of a Sustainable Urban Mobility Plan (SUMP) could foster the achievement of a harmonious balance between ease of movement and a pleasant urban environment characterised by clean air.

It offers the potential to reconcile the interests of all stakeholders and enhance the investment appeal of the region. In the development of a SUMP, primary efforts should be directed towards crafting integrated transportation systems and promoting eco-friendly modes of transportation.

Furthermore, there are compelling rationales underscoring the need for a sustainable urban mobility plan in Bishkek:

- Social considerations: Involving marginalised groups and individuals residing in distant areas, in the planning process, boosting efficiency through institutional collaboration and political alignment, achieving a well-rounded mix of transportation modes, and offering sustainable alternatives like public transit, cycling, and pedestrian traffic to personal vehicles.
- Environmental considerations: As the city continues its battle against climate change, curbing emissions from urban transportation assumes paramount significance. Priorities oriented towards noise reduction and air quality enhancement mitigate adverse effects on public health, fostering an appealing urban environment. Recognised investment necessities and related financing: The formulation of a SUMP could lead to funds acquisition via external sources, including international loans, grants, and internal funding. The preparation of a SUMP for Bishkek city could be executed as an autonomous project, engaging an ensemble of external experts alongside municipal specialists. To prepare the SUMP, representatives of subordinate organisations and enterprises of Bishkek municipality, dealing with issues of land use, transport, public transport, etc., will also be involved. Their work will be coordinated by the responsible representative of Bishkek municipality. Leveraging internal monitoring, analysis, and audits of the urban transport sector, these professionals would factor in the experiences from the creation of SUMPs in various European cities. Subsequently, tailored sets of measures for the Mayor's Office and the SUMP project could be devised. This endeavour promises enhancements in existing managerial methodologies and targeted investments, which, in turn, could curtail operational and maintenance expenditures. The establishment of a comprehensive public transport system further holds the potential to mitigate operating costs for all public transport entities operating within the city.

Steps in implementation:

Step 1: Initiation and diagnostics – assessment of current financial opportunities and resources, diagnosis of the state of urban mobility, analysis of household expenditures and accessibility, assessment of existing mobility costs and potential financing. (Timeline for implementation – 2024).

Step 2: Goal Setting and Scenario Development – assessment of the expenses associated with identified measures, performance of an economic evaluation of the proposed scenarios. (Timeline for implementation – 2024).

Step 3: Implementation and monitoring – formulation of an implementation plan with clearly defined financial responsibilities, elaboration of a feasibility study of priority measures. (Timeline for implementation --2025).

Step 4: Planning and evaluation – preparation of a comprehensive financial project with a detailed description of the cost estimates, financial sources, and cash flows. (Timeline for implementation – 2025).

Targets (indicators):

- Reduction of harmful emissions and greenhouse gases, based on the individual contributions of each citizen to addressing the issue of climate change.
- Promotion of ecological integrity and the "green" economy, widespread adoption of high-performance technologies, mitigation of climate change, and adaptation to a shifting climate.

-



Type of Action	Policy and regulatory framework related to the sectors and environment in Bishkek.							
Owner/Responsible body	City Hall of Bishkek, MP "Bishkekglavarchitectura", DUMI, Department of Transport and Road Infrastructure Development (DTRID).							
Stakeholders and their roles	The Ministry of Transport and Communications of the Kyrgyz Republic is a state executive authority responsible for shaping and implementing state policies, as well as managing the fields of automobile, railway, electric, water transport, and roads. The State Agency for Architecture, Construction and Housing and Communal Services is the administrative agency tasked with executing the functions of an executive authority in the realm of architectural and construction activities. Its principal role is to develop and implement a unified state policy within the architectural and construction sector.							
Implementation start/end year	2024-2025							
Notes on cost estimates	The cost estimations are based on experts' experiences in similar actions.							
	State:Average annual concentration of PM2.5Average annual concentration of PM10Average daily concentration of SO2Average daily concentration of NOx							
Action link to indicators	Press ure: Share of total passenger car fleet run by alternative energy. Transport modal share in commuting, cars, motorcycles, taxi, bus, metro, tram, bicycles, and pedestrians. Kilometres of road dedicated exclusively to public transit per 100,000 population. Kilometres of dedicated bicycle path per 100,000 population. Share of population having access to public transport within 15 min by foot.							
Benefits (environmental, socio- economic)	 Enhanced mobility, intermodal transport, and emissions reduction. Enhanced transportation access for vulnerable groups in Bishkek will positively influence their social, psychological, and economic well-being. An improved transport system, particularly focusing on non-motorised transportation modes, could also be appealing to tourists visiting Bishkek, thereby boosting the city's revenue. Reduction of greenhouse gas emissions and air pollution. Improved quality of life. 							



Sector & Reference: Urban Transport UT02

A stien Title	Construction of sidewally and binals with				Action classificatio	n Medi	Medium priority				
Action Title	Constructio	on of si	idewalks and	bicycie	patns	Environmental area	a Air, g	Air, green space			
Action's link to objectives	SG1: Impro	ove air q e growth	uality in Bishkek and improving in	and reduce the negat frastructure for transp	ive impact ort, energy	of air pollution , and waste mai	on citiz nageme	zens' health while maintaining nt.			
Estimated costs CAPEX EUR			6,000,000	KGS	576,000,000	Annual OPEX	EUR	300,000	KGS	28,800,000	
Financing mechanisms Loan, city budget											

Description of the Action:

The development of bicycle infrastructure serves as a crucial catalyst for promoting cycling as a viable transportation mode. It is an essential step towards alleviating traffic congestion and enhancing the well-being of citizens, as well as addressing environmental and air quality concerns.

A pivotal objective of this initiative is to enhance air quality, minimise contaminating emissions, promote the health and overall well-being of Bishkek residents, facilitate convenient mobility, enhance the quality and accessibility of contemporary transport infrastructure, and contribute to environmental preservation by curbing car trips. Key improvements in sidewalk and bike path construction and reconstruction will encompass:

- 1. Establishing a well-designed network of bicycle paths.
- 2. Implementing colour illumination to indicate the state of bicycle lanes.
- 3. Separating bicycle lanes from walkways through curbs or other secure barriers.
- 4. Increasing the availability of bicycle parking spaces equipped with security systems.
- 5. Expanding the length of bicycle paths/lanes.
- 6. Creating a ring infrastructure for bike paths.



The number of individual vehicles on Bishkek's roads remains a primary contributor to congestion and the emission of harmful exhaust gases. The measures mentioned above are geared towards enhancing the practicality and safety of sidewalks and bicycle paths for both pedestrians and cyclists.

Augmenting the number of contemporary sidewalks and bike paths will positively impact the rise of cyclists and electric scooter users while potentially decreasing reliance on public transportation. This shift could also lead to fewer drivers seeking alternative modes of individual transportation. Considering the potential usage of e-bikes and e-scooters is crucial to prevent

Figure 11: Bicycle paths in Bishkek

traffic incidents and conflicts. Implementing designated lanes or areas for these electric modes of transportation, along with proper regulations and awareness



campaigns, will help integrate them safely into the existing bicycle infrastructure. Additionally, educating both cyclists and electric scooter users about responsible riding practices and adherence to traffic rules is essential for harmonious coexistence on the roads. Regular monitoring and adjustments to infrastructure based on usage patterns can further enhance the safety and efficiency of incorporating e-bikes and e-scooters into the urban transportation system.

It is recommended to use the positive experience observed in foreign countries that successfully put into practice achievements in the field of bicycle and pedestrian infrastructure development. For example: the use of information signs, electronic placards for cyclists, a person should understand that he or she is approaching his or her destination, bicycle lights, it is necessary to create reliable conditions for storing bicycles for residents, start developing automated sharing, which is widely used in many developed countries and of which there are many such examples. It would also be key to adopt State-level regulations for the effective development of bicycle and pedestrian infrastructure.

Steps in implementation:

The process of road (re)construction in Bishkek adheres to the urban planning legislation of the Kyrgyz Republic, technical regulations, and building codes and rules. However, there is currently no specific regulatory framework governing the construction of sidewalks and bike paths. It appears essential to develop dedicated building codes and regulations for this purpose. The construction of bike paths is undertaken in conjunction with sidewalks and aligns with approved projects. The construction phases for sidewalks and bike paths are outlined below:

Step 1: Design and Preparatory Work (6 months):

Preparation of design and cost estimation documentation.

Step 2: Construction Phases (24 months).

Step 3: Commissioning (3 months).

In the broader context, the envisaged period from 2024 to 2025 aims to complete the construction of 50 km of sidewalks and 25 km of bike paths. This planning timeframe (2024-2025) is stipulated in the Bishkek Socio-Economic Development Program for 2023, along with projections for 2024-2025, which encompass the construction of 25 km of bicycle paths and 50 km of sidewalks.

Targets (indicators):

- Decreasing emissions of PM2.5, PM10, SO2, and NOx into the atmosphere by transitioning to cycling and walking.
- Providing clean air and enhanced comfort for residents.
- Reducing emissions of harmful and greenhouse gases through the individual contributions of each citizen towards addressing climate change.
- Promoting ecological integrity, fostering a "green" economy, disseminating high-performance technologies, mitigating climate change, and adapting to a shifting climate.
- Amplifying the prevalence of active non-motorised modes of transportation, bringing about qualitative improvements in mobility conditions for low-mobility population groups, augmenting the fleet of environmentally friendly vehicles, and enhancing urban spaces and air quality.

Type of Action	Capital investment: implementation - new actions that involve direct investment in new infrastructure, assets, and technologies.
Owner/Responsible body	City Hall of Bishkek, DTIRDTI, MP "Bishkekglavarchitectura", MP "Bishkekasfaltservis".



Stakeholders and their roles	One of the primary stakeholders in this project is the State Agency for Architecture, Construction and Housing (Gosstroy). Gosstroy is an administrative agency responsible for executing the roles of an executive authority within the realm of architectural and construction activities. Its objective is to establish a sustainable living environment for the citizens of the Kyrgyz Republic through the advancement of architectural and urban planning endeavours. A key mission of Gosstroy involves the formulation and execution of a cohesive state policy concerning architectural and construction activities.								
Implementation start/end year:	2024-2027	7							
Notes on cost estimates	The constr (1.5 m widt (25 km and cost amou the estima	The construction cost for 1 square metre of road is approximately 3000 KGS. Considering a combined area for bicycle paths (1.5 m width) and sidewalks (1 m width) totalling 2.5 metres, the minimum required construction area is 75,000 square metres (25 km and 50 km respectively). Thus, the calculation is $2.5 \text{ m} \times 75,000 \text{ m} = 187,500 \text{ sq}$. m. Consequently, the overall construction cost amounts to 187,500 sq. m. x 3,000 KGS = 562,500,000 KGS. When converting this to Euros at a rate of 94.67 (KGS/EUR), the estimated cost is approximately EUR5,941,692.							
Action link to indicators	State:	Average annual concentration of PM2.5 Average annual concentration of PM10 Average daily concentration of SO2 Average daily concentration of NOx							
Action link to indicators	Pressure:	Transport modal share in commuting, cars, motorcycles, taxi, bus, metro, tram, bicycles, and pedestrians. Kilometres of dedicated bicycle path per 100,000 population. Transport modals share i in commuting, cars, motorcycles, taxi, bus, metro, tram, bicycles, and pedestrians. Share of population having access to public transport within 15 min by foot.							
Benefits (environmental, socio- economic)	 The expansion of the bike path network resulting in an increased proportion of bike rides yields several benefincluding improved air quality, enhanced citizen health, and a reduction in road accidents. A decrease in the number of vehicles emitting exhaust gases into the atmosphere is anticipated. The decrease in the prevalence of cars is expected to result in fewer accidents with fatal outcomes. Citizens will experience improved mobility, and the parking issue in Bishkek will be alleviated. 								



Sector & Reference: Urban Transport UT03										
Action Title	The rer purchas conditio	newal o e of el ons for	of urban lectric ve their pur	passenger trans hicles, the creat chase, the creati	sport, through the ion of preferential on of a network of	Action class	ificatior	1	High priority	
	chargin municip	g statio al "Gre	ons for el en Taxi".	ectric vehicles an	d the creation of a	Environmental area			Air, green space	
Action's link to objectives	the strate	egic	SC	G1: Improve air qua Istainable growth ar	lity in Bishkek and redund improving infrastruct	ce the negative sure for transpo	impact rt, energ	of air pollution y, and waste r	n on citize nanageme	ns' health while maintaining ent.
Estimated costs: CAPEX		EUR	<i>IR</i> 58,500,000 <i>KGS</i> 5,616,000,000 Annual OPEX EUR 1,308,000 KGS 1					125,568,000		
Financing mechanisms International credit funds, city budget, republican budget, public-private partnership.										

Description of the Action:

Electrification of urban transportation is one of the effective measures to reduce environmental impact and improve air quality. By enhancing air quality through the reduction of transportation-related harmful exhaust gases and transitioning public and municipal transportation to environmentally friendly alternatives, emissions of pollutants and greenhouse gases will be minimised. This, in turn, will enhance the health and well-being of the residents of Bishkek.

 In the period from 2011 to 2018, two phases of the "Development of Public Transport" project were implemented, which was funded by the European Bank for Reconstruction and Development. The budget of the first phase of the project was US \$15.6 million, and the second phase – EUR 7.9 million. 79 trolleybuses were purchased as part of the first phase, 52 trolleybuses were purchased as part of the second phase. The route lines were also modified, and a maintenance centre was equipped.

In accordance with the third phase of the project "Improvement of trolleybus infrastructure in Bishkek", the trolleybus infrastructure will be updated: purchase of additional 100 trolleybus units.

- partial reconstruction of the existing 19 traction substations.
- replacement of cables of contact networks for trolleybuses (with a total length of 100 km);
- purchase of contact network supports (in the amount of 200 units);
- modernisation of the AC input system 7 pcs.;
- purchase of transformer distribution cells for own needs with transformers 2 pcs.;





- replacement of traction transformers 6 kV, 1330 kVA 2 pcs.;
- purchase of equipment for power supply of own needs of substations 3 pcs.;
- installation kit 1 pc., as well as other equipment.

The proposed measure aimed at modernising the public transport fleet through the "expansion of electric public transport" – the use of battery-powered trolleybuses and trolleybuses ("on the move" or "dynamic" charging), as well as parks of electric buses (buses and minibuses) and parks of environmentally friendly buses running on compressed natural gas to support the development of public transport. An integrated, safe, and accessible transport system will have a positive impact on the environment and lead to a reduction in air pollution. Along with measures to modernise the trolleybus infrastructure, an assessment of the electricity demand for the trolleybus contacts network/trolleybus substations and charging infrastructure will be carried out. This type of transport has further economic and environmental advantages, since the cost of electricity is lower compared to diesel fuel and gasoline per unit of energy. As part of the third phase of the project, entitled "Improvement of trolleybus infrastructure in Bishkek", the possibility of obtaining a loan from the European Bank for Reconstruction and Development (EBRD) is currently being studied. The total cost of the project is EUR 35 million.

2. The introduction of a "green passport" for motor transport is designed to be both profitable and attractive. Currently, a bill is being discussed in the Parliament of Kyrgyzstan, with the provision that green passport holders can enjoy benefits when paying property taxes. The Parliament is considering a proposal for a two-fold reduction in fines for owners of vehicles with green passports and electric vehicles. One of the incentives for the population to switch to electric vehicles is the availability of preferential leasing options for the purchase of electric vehicles. An increase in the number of electric passenger vehicles operated by Bishkek City Council will have a positive impact on reducing harmful emissions into the atmosphere, improving the overall ecological landscape of the city, and reducing fuel costs in the form of electricity.

In addition, a factor contributing to a sharp increase in the import of electric vehicles could be the introduction of preferential leasing conditions for the import of electric vehicles. Furthermore, "green passports" will provide owners with several benefits such as: to use paid parking lots for free and/or with a discounting; and there will also be discounts on payment of fines and movable property tax as a method to incentivize citizens. In order to get a green technical passport for residential premises, the citizen should completely abandon coal and heat with gas, insulate houses with alternative energy sources, then they will be issued a green technical passport of the house.

To implement the project "Introduction of preferential leasing for the purchase of an electric car", EUR12 million will be required, which is expected to be allocated from the city budget and preferential international lending (ideally grant funds).

The following measures will also spur the growth of imports:

- a. Creation of free parking spaces along the central roads of Bishkek exclusively for electric vehicles.
- b. Provision of specially designated places for electric vehicle charging stations.
- c. The creation of an extensive network of electric vehicle charging stations throughout Bishkek, including key highways, will serve as an additional incentive to promote the import of electric vehicles.
- 3. Establishing a municipal "green taxi" service is poised to yield positive outcomes for both passenger transportation safety and environmental sustainability. Several "green taxis" are operational in Bishkek, catering to passengers through electric vehicles, albeit primarily managed by private operators. However, these operators merely formalise themselves as legal entities without implementing routine measures such as daily medical examinations for blood alcohol levels or



regular technical assessments of their vehicles. The establishment of a municipal passenger transport company would help address this issue. Additionally, only 10% of taxi drivers are presently working with licenses, leaving the majority without proper authorisation.

- Revenues generated from the municipal taxi company will be entirely channelled into the budget. "Green taxis" offer an alternative avenue for drivers seeking to reduce their reliance on the escalating costs of fuel—an imperative consideration given the high price of gasoline. The affordability of electric cars is increasing, with prices starting from as low as EUR 9,500. Electric vehicles boast notably lower energy consumption at 15 kWh per 100 km, rendering them highly cost-effective.
- However, it is important to acknowledge that in the region, economic factors tend to outweigh environmental concerns. For the realisation of the municipal green taxi project, the requisite funding could reach EUR9.2 million. These funds are expected to be secured through advantageous international loans, although the investor responsible for such funding remains undetermined as of now.
 - Establishing a comprehensive network of electric vehicle charging stations in Bishkek, including strategic road locations, and harnessing the potential of renewable energy sources, can effectively leverage the existing infrastructure of the Municipal Enterprise "Bishksvet" under the aegis of the Bishkek City Council. This endeavour implies a revitalisation of the current infrastructure and the incorporation of advanced, forward-looking systems. Presently, these networks are grappling with overloads, with each outdoor lighting point drawing 20 kW of electricity.
- The activation of the charging station network project, which entails an estimated requirement of EUR2.3 million, could be financed through a public-private partnership arrangement.

Rationale:

The significant surge in air pollution, the degradation of roads impacting both safety and the environment, heightened noise levels, and the release of harmful emissions contributing to psychological stress within society have collectively established the prerequisites for expediting the shift toward sustainable and rational mobility. This necessitates the provision of clean and secure energy, alongside the accelerated advancement of "environmentally friendly" transportation options.

Steps in implementation:

Step 1; Renewal of the trolleybus fleet and infrastructure as part of the implementation of project activities of the 3rd phase of the project "Improvement of trolleybus infrastructure in Bishkek".

Step 2: introduction of the "green passport" of motor transport after the adoption of the draft law by the Parliament of the Kyrgyz Republic.

Step 3: adoption by Parliament and Bishkek City Council of a regulatory act on the creation of a municipal taxi, determination of the source of funding, organisational measures, and implementation of planned measures.

The third phase project activities are tentatively slated to begin in the first half of 2024, with potential extensions anticipated until mid-2025. The timelines for launching the "green passport" initiative can be set once the Kyrgyzstan Parliament reaches its final decision and resolution on the matter. Regarding the establishment and execution of the municipal taxi service, specific deadlines are still in the process of refinement. Nevertheless, Bishkek City Council is actively preparing to inaugurate an electric car-based urban taxi service. This initiative is being developed as part of an overarching strategy to combat smog.

City officials are simultaneously collaborating on a proposal for car catalysts, a venture undertaken in conjunction with the Ministry of Natural Resources, the Ministry of Transport, and the Ministry of Internal Affairs. Following its finalisation, this proposal will be presented to the Cabinet of Ministers for consideration. In parallel, the



City Administration is engaging in discussions with multiple investors regarding the potential launch of an electric car taxi service. This proposal envisions an initial deployment of up to 500 electric cars.

Targets (indicators):

Electrification of urban passenger and passenger transport will significantly reduce emissions of greenhouse gases and harmful exhaust gases, reducing their harmful impact on human health and the environment. The implementation of the project will also have a number of benefits – there will be an increase in the number of electric public transport vehicles, mechanisms and measures will be developed to promote environmental safety in the planning of public urban transport systems, promote the reduction of environmental pollution by all types of vehicles, improve the energy efficiency of road transport and urban transport, All this implies a change in the structure of used fuel and energy resources, significant improvement of energy and environmental characteristics of rolling stock, and the renewal of motor transport with ecologically sound transport.

Type of Action	apital investment – new (Action that involves direct investment in new infrastructure, assets, and technologies).							
Owner/Responsible body	City Hall of Bishkek, Department of Transport and Road Infrastructure Development.							
Stakeholders and their roles	arliament and Cabinet of Ministers of the Kyrgyz Republic.							
Implementation start/end year	2024–2028.							
	The comprehensive costs associated with the "Improvement of Trolleybus Infrastructure in Bishkek" project are estimated at approximately EUR35 million. For the endeavour of introducing the "green passport for a car," along with facilitating preferential leasing options for electric car acquisition, the municipal authorities might need investments amounting to approximately EUR12 million.							
Notes on cost estimates	Likewise, the establishment of the municipal "green taxi" service could potentially require an investment of around EUR9.2 million, the precise amount contingent upon the scale of new vehicle procurements. Meanwhile, establishing a network of charging stations is projected to require roughly EUR2.3 million.							
	The annual OPEX cost estimation are EUR1,308,000 as follows:							
	 Costs associated with the purchase of trolleybuses (EUR700,000). Costs associated with preferential leasing (EUR240,000) 							
	 Costs associated with urban green taxi (EUR276,000) Costs associated with the creation of a network of charging stations (EUR92,000) 							

Action link to indicators	State:	Average annual concentration of PM2.5 Average annual concentration of PM10 Average daily concentration of SO2 Average daily concentration of NOx				
	Pressure:	Energy efficiency and the type of energy used in transport. Choosing the type of transport.				
Benefits (environmental, socio-economic)	- Jok em - Enł ecc phy - Ad imp inc - Ele citi: - Din tim	 Creation: Anticipated investments associated with these initiatives are poised to yield the establishment of new ployment opportunities within the service and maintenance sector. nanced Transport Accessibility: These efforts could result in increased access to transportation for socially and pnomically vulnerable segments of Bishkek's population. This, in turn, could have positive ramifications for their social, ysiological, and economic well-being. vancement in Tourism and Revenue Generation: The electrification of the transportation system, coupled with proved air quality, has the potential to enhance Bishkek's appeal to visitors and tourists, potentially leading to reased revenue. vated Quality of Life: The collective impact encompasses an improved quality of life, bolstered overall mobility for zens, and a reduction in traffic congestion. ninished Vehicle Maintenance Costs: This transition has the potential to lower vehicle maintenance expenditures over e. 				

Sector & Reference: Urban Transport UT04											
						Action classificat	ion Me	Medium priority			
Action Title	installatio	on of a ne	w automat	ic traffic li	ght control system.	Environmental ar	ea Air	Air			
Action's link to the strategic objectives: SG1: Improve air quality in Bis maintaining sustainable growth					ove air quality in Bishke g sustainable growth an	ek and reduce the r d improving infrastru	negative i Icture for	mpact of air transport, ene	pollution or rgy, and w	on citizens' health while aste management.	
Estimated cos	ts CAPEX	EUR	2,000,000	KGS	192 000 000	Annual OPEX	EUR	60,000	KGS	5,760,000	

Financing mechanisms Loans (international financing institutions), city budget, republican budget, public-private partnership.

Description of the Action:

Improvement of air quality and reduction of harmful emissions in Bishkek, while contributing to sustainable growth and improvement of transport infrastructure, will be implemented through the introduction of a modern automatic traffic light system.

This innovative system is poised to bolster road safety while simultaneously curbing detrimental emissions into the atmosphere. By minimising waiting times at traffic signals for both vehicles and pedestrians, this initiative will not only streamline traffic flow, but also elevate overall efficiency.

The traffic management system is designed to facilitate fluid movement throughout the city, orchestrating the harmonious interaction of private and public transport along with pedestrians. Achieving these objective hinges on the utilisation of adaptive control mechanisms and, crucially, the regulation of speed parameters along roadways.

Dynamic microcontroller speed indicators, situated between intersections and linked to the local controller network, will enable the controlled propagation of traffic waves along main thoroughfares and at intersection junctions.

The deployment of a modernised traffic light management system and the renovation of the existing framework form a part of an ongoing endeavour to optimise traffic control. An automated outdoor lighting system was implemented on Gorky/Aitmatov streets as a pioneering initiative in partnership with the Uzbek company Toshentelektroapparat. Furthermore, Bishkek City Hall and the municipal enterprise "Bishkeksvet" are actively evaluating proposals from other foreign entities for comparable projects.



The anticipated reconstruction and implementation of the Smart Intersection system will yield several key benefits: a potential 25-35% augmentation in public transport capacity, a remarkable 60% reduction in pedestrian waiting times for green signals

during daytime hours, a consequential 18% reduction in transport delays during the day and 45% at night, and significant elimination of overhead cable installations through underground cable placement (Clear Sky). Furthermore, this endeavour will tangibly contribute to the reduction of harmful emissions into the atmosphere.

Rationale:

The introduction of a modern automatic traffic light control system will contribute to the following improvements:

- Reduction of the average crossing time
- Reduction of the waiting time for pedestrians
- Regulation of traffic flows
- Reduction of congestion (which will positively impact the speed of transport and the reduction in exhaust emissions)

The project is intended to be financed by international credit funds. The Bishkek Mayor's Office has already started the process of implementing a project for the introduction of smart traffic lights through a Japanese grant. However, the allocated funding is not enough for the full implementation of the smart traffic lights project. The city budget will cover the costs of installing supports for traffic light objects (complexes of several traffic lights regulating traffic at a separate intersection). Smart, state-of-the-art digital solutions will be taken into consideration during definition of technical design and use of equipment.

Steps in implementation:



The implementation of the action is foreseen in the following steps:

Step 1: Comprehensive Analysis and Design – This phase entails the compilation of an exhaustive list of project documentation and the calculation of associated expenses. (2024-2025)

Step 2: Equipment Selection, Preparation, and Installation – During this stage, the meticulous selection and adaptation of equipment is paramount, aligning seamlessly with the unique traffic patterns of each intersection. (2025-2026)

Step 3: System and Equipment Operation – Operating on the fundamental premise of signal control to amplify intersection throughput, the system functions by accurately predicting traffic scenarios 15-30 minutes in advance. (2026)

Step 4: Validation and Implementation of Effectiveness – Before the facilities are commissioned, an evaluation of the installed system's efficacy is conducted. If all parameters conform to established standards, the developed system is put into operation. (2026)

During the operational phase of the traffic lights, precedence at intersections will be given to cyclists and public transport. This approach encourages a conscious transition from personal vehicles to buses and bicycles, subsequently curbing overall traffic volumes and contributing to environmental enhancement. The cost of each smart traffic light installation can vary between EUR60,000 and EUR90,000. Expanding this initiative to cover approximately 30 additional key intersections throughout the city requires an investment of roughly EUR2.000,000.

Targets (Indicators):

- Development of comprehensive technical documentation and analyses.
- Deployment of an advanced and progressive traffic light control system.
- Mitigation of traffic congestion and enhancement of traffic flow velocity.
- Augmented safety for pedestrians.
- Optimisation of road network utilisation, facilitated through centralised traffic light management, automated monitoring of traffic flow metrics, and system component status assessment.

Type of Action	Capital investment: implementation - new: actions that involve direct investment in new infrastructure, assets, and technologies.
Owner/Responsible body	Department of City Economy (Housing and Communal Services), MP "Bishkek Asfalt Service", DUMI, DTIRDTI, SMEU Traffic Police (Specialised Installation and Maintenance Department of the Main Directorate of Road Safety), .
Stakeholders and their roles of	Traffic Police of the Ministry of Internal Affairs of Kyrgyzstan. Currently, the Traffic Police of the Ministry of Internal Affairs of the Kyrgyz Republic contributes to the Safe City project, a concerted effort aimed at diminishing road fatalities and accidents within the city. The Smart Traffic Light system is envisaged to seamlessly integrate with the Safe City initiative. Here, traffic police experts will fine-tune the traffic light operation based on the assimilated data. These two systems will harmoniously complement each other, fortifying the overall traffic management and road safety efforts.
Implementation start/end year	2024–2026



Notes on cost estimates	The designated funds will be directed towards procuring and updating a comprehensive system encompassing controlle cameras, and remote motion sensors. This integrated system will dynamically assess intersection conditions in real-tir evaluate their capacity load, and subsequently relay this data to the central management server. Transmission will be facilitat through radio communication or optical communication lines. The financial allocation for the automated system's implementation encompasses the complete overhaul of all traffic line equipment. The stated sum of EUR2,000,000 is earmarked for the period leading up to 2026.						
Action link to indicators	State:	Average annual concentration of PM2.5 Average annual concentration of PM10 Average daily concentration of SO2 Average daily concentration of NOx					
	Pressure:	Traffic congestion. Average travel speed on primary thoroughfares during peak hours. Travel speed of bus service on major thoroughfares – daily average.					
Benefits (environmental, socio- economic)	 Diminished incidence of road accidents and traffic injuries. Decreased travel duration. Elevated average speed of public transportation. Mitigated emissions of harmful substances. 						

Sector & Reference: Urban Transport UT05

	Improvem	ent of parking	hkek and the	Action classificatio	n High	High priority					
Action Title	introductio	on of paid parki	ing spac	es.	Environmental are	a Air, g	Air, green space, biodiversity,				
Action's link to the sobjectives	strategic	SG1: Improve sustainable gr	SG1: Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while r sustainable growth and improving infrastructure for transport, energy, and waste management.					rens' health while maintaining			
Estimated costs: CAPEX	EUR	EUR 3,700,000 KGS 355,200,000			Annual OPEX	EUR	111,000	KGS	10,656,000		
Financing mechanis	ms Loans	oans (international financing institutions), city budget, public-private partnership.									



Description of actions:

Increased use of vehicles in the city leads to a rising demand for parking spaces. To create conditions for restricting car access to the city centre, an intermediate parking infrastructure will be created for parking vehicles heading to the city centre. The municipality will create a condition under which driving a private car to the city centre will not only be difficult, but also costly, since it will be necessary to pay for entry to the central parts of cities. Of course, parking in the city will be paid, with the exception of ambulance transport, fire, police, etc. Parking fees will depend on the specific area (centre or outskirts), day of the week, and time of day. The parking system being created will work in close cooperation with the work of public transport (ecological buses and trolleybuses). This will require strengthening the operation to provide timely service to passengers who transfer to urban passenger eco-friendly transport. In addition, the creation of parking infrastructure at the borders of the city limits in the north-south and west-east directions, by creating intercepting parking lots at the entrance to the city, will create a kind of ring aimed at reducing traffic flows to the city of Bishkek, making it unprofitable and expensive for non-resident vehicles to enter, and park them on city territories. The city authorities are already planning projects for the creation of bicycle and pedestrian infrastructure looped both along the outer border areas of the city, and in the city centre.

The city authorities are actively working on dedicated lanes for public transport. These lanes prohibit traffic on them other than public transport and this is a barrier to illegal parking along the route of public transport. These projects to create parking and cycling and pedestrian looped infrastructure will need to be connected and mutually complement each other in a promising way. The created parking system will be more focused on improving efficiency and effectiveness public transport operations (buses and trolleybuses). However, the implementation of such plans requires an intermediate stage, which is planned to be implemented by this project. The city authorities are actively working on dedicated lanes for public transport. These lanes serve as a kind of limiter for illegal parking along the public transport route. In some cases, parked cars interfere with the organisation of more bike paths (electric scooters). The introduction of an automated paid parking system is strategically important and is designed to change the existing system flow of vehicles, by restricting entry not only to the central part of the city, but also to the city itself from the border and other regions, thereby optimising traffic flow, and reducing traffic congestion.

This will improve the quality and well-being of Bishkek residents, as well as facilitating automated payments that will feed the municipal budget. The main result of this project will be solving environmental problems, reducing harmful emissions into the atmosphere, improving the health of citizens by transferring to bicycles and electric scooters to move around the city centre, a improving health by walking along pedestrian paths, as well as improving passenger communication by eco-friendly types of transport (buses, trolleybuses) The parking system will be more focused on improving the efficiency and effectiveness public transport operations (buses and trolleybuses). The city authorities will also benefit from introducing new mechanisms for introducing fees for the use of road infrastructure (while rationalising the tax burden on carriers), as additional effective sources of financing will be created for the construction, repair and maintenance of road and street-road networks, which, in turn, will significantly improve the quality of transport services and at least solve congestion and maintain their operational qualities. At the same time, mechanisms and measures will be introduced to regulate transport demand, redistribute it in favour of eco-friendly public transport, and reduce the generation of additional demand for individual transport –by improving urban planning and land use policies.

A multifunctional paid parking management system will be supported by software for integration with users' mobile devices and third-party information services. The monitoring system will solve the tasks of digitizing the road network. It will be applied by cities and authorised state services. This smart system will be capable to record 25 types of traffic violations. Taking into account the technological capabilities of the camera (360-degree view with a monitoring radius of 200 meters), it will become an effective means of combating prohibited parking "second row" on lawns, sidewalks and public transport stops. The analytical system of the parking space



is capable of processing and transmitting in real time significant amounts of data concerning parked cars, their parking spots, the duration of stops, and information about parking congestion. The car owner, using a single mobile application for on-board computers and smartphones, will be able to find out where the nearest free parking space or street parking is located, indicating their cost. As a result, the user will be able to choose the most advantageous option in terms of price and distance and pay for parking in the mobile application without a cash register. The efficiency of the system is ensured by the complex structure of information collection and processing. Street monitoring and statistical data collection will be carried out through surveillance cameras. Municipalities or authorised organisations will receive information about the occupancy of the parking space, which is processed, including online, and visualized in several formats, including in the form of a digital parking map. High-quality management of the city's parking space will provide motorists with free spaces during the working day and helps reduce the number of parking violations. After creating a wide network of digitalized parking lots, municipality will receive a real tool for distributing the transport load on the urban road network. Based on similar experiences, it is assumed that in the first two months of the project, the workload of the parking space may decrease by 40%, and the number of parking violations may decrease by almost 50%.

Rationale:

The unregulated proliferation of parked vehicles disrupts the road network, contributing to deteriorating air quality, increased gas emissions, and adverse impacts on public health. On the other hand, unified automated paid parking systems are an effective solution to traffic congestion and parking problems in cities around the world. The installation of dedicated bus lanes and bike lanes in these areas should help to streamline and regulate parking. An automated parking system is a key mechanism for urban traffic management, which will be more effective if public transportation is improved.

Implementation Steps: Permit Preparation – 2024 Project Documentation Development and Approval – 2024 Equipment Selection – 2025 Complex Equipment Installation – 2025 Testing and Commissioning – 2026

Targets (Indicators):

- Reduction of Harmful and Greenhouse Gas Emissions Based on individual citizen contributions to address climate change concerns.
- Support for Ecological Integrity and "Green" Economy Propagation of high-performance technologies, climate change mitigation, adaptation to a shifting climate, and fostering a sustainable economy.
- Promotion of Active Non-Motorised Movement Increasing the share of non-motorised modes of transport, enhancing conditions for low-mobility population segments, augmenting the fleet of environmentally friendly vehicles, and enhancing urban spaces and air quality.

Type of Action	Cin – Capital investment: implementation – new: actions that involve direct investment in new infrastructure, assets, and technologies.
Owner/Responsible body	Department for Management of Municipal Property of the Bishkek City Hall, DTIRDTI, MP "Bishkekglavarchitectura".



Stakeholders and their roles	The Main governmer major city t	The Main Directorate of Road Safety within the Ministry of Internal Affairs of the Kyrgyz Republic serves as the designated governmental entity responsible for upholding road safety within urban settings. Unregulated and unsanctioned parking along major city thoroughfares presents a significant hazard to all road users, including pedestrians.									
Implementation start/end year	2024-2026	2024-2026									
Notes on cost estimates	The cost es dedicated estimated namely: - Ing - Ba - Pa - Au	The cost estimates are based on the opinion of experts who have been involved in similar projects, including measures to instal dedicated bus lanes and bike lanes. The requisite for parking spaces is projected to encompass 10,000 spots within the city. The estimated cost of a single parking space hovers around EUR370, encompassing both access control and restriction devices namely: Ingress and egress modules (racks) Barriers Payment mechanisms Automated cash registers 									
	State:	Average daily concentration of SO2 Average daily concentration of NOx									
Action link to indicators	Traffic congestionPressure:Average travel speed on primary thoroughfares during peak hourTravel speed of bus service on major thoroughfares daily average										
Benefits (environmental, socio-economic)	 The automated parking system will contribute to: improvement of the ecological landscape of the city decrease in harmful emissions released into the atmosphere strengthening public health accelerating the implementation of the Bishkek Smart City initiative reducing traffic jams and improving the overall quality of the environment in the city enhancing convenience for pedestrians and cyclists. 										



Sector & Reference: Urban Transport UT06											
	Reco	nstructio	n of a bypas	s road ar	ound the city of	Action classifica	High prio	High priority			
Action Title	Bishk infra	ek, arrai structure	ngement, and	l landsca	ping of roadside	Environmental	Air, gree	Air, green space			
Action's link to the strategic objectivesSG1: Improve air quality in Bishkek and sustainable growth and improving infras				ity in Bishkek and read improving infrastru	duce the negative cture for transport	impact o , energy,	of air pollution and waste m	n on citizens' anagement	health while maintaining		
Estimated costs: CA	PEX	EUR	EUR 185,000,000 KGS 17,760,000,000			Annual OPEX	EUR	3,700,000	KGS	355,200,000	
Financing mechanis	ms	Public-pr	Public-private partnership, international credit facilities.								

Description of the Action:

Although the implementation of the reconstruction project of the northern bypass road is under the jurisdiction of the Ministry of Transport and Communications of the Kyrgyz Republic, it will also be interesting for the city, because its routes follow part of the city territory, will feature a number of road interchanges and exits, will restrict access to a significant part of traffic flows to the city centre, and provide for the construction of bike paths, and resolve the issues of drainage systems and landscaping of the roadside lane, while increasing the number of bus and bicycle lanes. The redistribution of transit traffic flows of suburban and intercity directions to a detour from the city centre will create good prerequisites for reducing congestion on the roads. This will contribute to improving the service of citizens with ecofriendly passenger transport. Bishkek residents will strengthen their health through recreation, walking, ecology, improvement of the city's roadside areas and access to environmentally sustainable public transport. These efforts will bring double benefits: improving air quality by limiting emissions of pollutants and greenhouse gases, while improving the environment, health, and overall well-being of Bishkek residents. Detours (with the function of diverting transit traffic from the city centre) will be associated with the improvement of the original main streets/avenues that will be unloaded from transit traffic. This will provide an opportunity to reallocate road space for sustainable transport (active transportation, cycling, walking, etc.)), along with reducing general traffic lanes associated with the possible expansion of public spaces, parks, squares. Ring roads (city streets with the function of improving access to the city centre), ring boulevards, will embody the principles of sustainable mobility, i.e. safe pedestrian zones/crosswalks, cycling, public ecological transport facilities, dedicated lanes for public ecological transport, a modern drainage system along roads, as well as roadside landscaping. The implementation of this project will be closely linked to the implementation of the project for the construction of bike paths and paid parking lots, which will help reduce the number of vehicles entering the city. The construction of the ring road and bypass roads around the city will have the same focus as the above-mentioned projects, the main goal of which is to create favourable conditions for Bishkek residents to improve their health, recreation, hiking, ecology, the landscaping of urban roadside areas, and access to eco-friendly public transport.

Rationale:

The establishment of bypass roads serves as a potent means to curtail urban traffic volumes, alleviate congestion, enhance vehicular movement speed, and foster environmental betterment. The implementation of the action will reduce the traffic load on the city and will increase the convenience for citizens when entering and leaving the capital of the country. The road will bypass many bottlenecks of the city and settlements of the Chui region so that vehicles that transit of passengers and



fright in the north and east directions will pass the way in a short time, since the road is supposed to be high-speed. Another motivation for the construction of the bypass road is that the main route of suburban transport, both freight and passenger run from the western part of the entrance to the city in the direction of its eastern part, through the central streets of Bishkek. Along the way of this route there are large markets (Car market, auto parts markets Azamat, Dordoi and Osh Bazaar). As a rule, a huge number of vehicles and pedestrians accumulate around these markets, which leads to numerous congestion and traffic accidents. In addition, transit trucks traveling in the west-east, west-north, east-west directions create large congestions. The commuter transport is approximately 50,000 units that enters and leaves the city every day. This cause that 5 to 10 thousand vehicles follow the transit direction each day. The above factors are an additional motivation for the need to build a northern bypass road.

Steps in implementation:

Step 1: Investor Search and Investment Agreement Conception (2024)

Step 2: Formulation of Design and Technical Documentation and Site Selection for Road Construction (2024-2025)

Step 3: Road construction process (2025-2029)

Stage 4: Road commissioning and testing (2029-2030)

Targets (indicators):

- Diminished urban traffic volumes, congestion, and augmented mobility speed, all in aid of environmental enhancement.
- Mitigation of harmful and greenhouse gas emissions on a per-citizen basis to contribute to climate change mitigation.
- Endorsement of ecological wholeness and fostering a "green" economy, bolstered by the dissemination of high-performance technologies, climate change mitigation, and adaptation strategies.
- Promotion of active non-motorised transport participation, elevating the mobility conditions for low-mobility population segments, expanding the ecologically friendly vehicle fleet, and enhancing urban spaces and air quality

Type of Action	Capital investments: Implementation – new: actions that involve direct investment in new infrastructure, assets, and technologies.
Owner/Responsible body	City Hall of Bishkek, DTIRDTI, MP "Bishkekglavarchitectura", DUMI, MP "Bishkek Asfalt Servis", Capital Construction Department of Bishkek City Hall
Stakeholders and their roles	The Ministry of Transport and Communications of the Kyrgyz Republic assumes the pivotal role of the primary sponsor for the construction project. Consequently, the entire spectrum of organisational and financial facets pertaining to construction is channelled through this entity. In tandem, the State Agency for Architecture, Construction, and Housing plays a central role in addressing organisational requisites, encompassing the procurement of indispensable design authorisations, in addition to assuming oversight and quality control responsibilities throughout the construction phase. Simultaneously, the Ministry of Internal Affairs is tasked with overseeing and enforcing compliance with traffic regulations during the construction period.



Implementation start/end year	2024-2030							
Notes on cost estimates	The estimations were sourced from the Department of Transport Infrastructure and Road Transport Development Institut (DTIRDTI), as well as the Ministry of Transport and Communications of the Kyrgyz Republic. The expenditure for modern highway construction is estimated at approximately EUR2.8 million per kilometre. With a stret- encompassing 45 kilometres, which incorporates Trade Union Street, the aggregate cost solely for this 45-kilometre highw section is projected to stand at EUR126 million. When accounting for ancillary components such as interchanges, bridge and related infrastructure, the construction expenses could potentially escalate to around EUR185 million.							
	Average annual concentration of PM2.5State:Average daily concentration of SO2 Average daily concentration of NOx							
Action link to indicators	Pressure:Selection of transportation mode Distribution of transport modes in overall journeys Rate of motorisation Traffic congestion Average speed of travel on main arteries during peak hours Daily average bus service speed on major thoroughfares Transport system resilience Effectiveness of transport emergency systems in disaster scenarios							
Benefits (environmental, socio- economic)	 The modern road network built around the city of Bishkek will become one of its most valuable assets, and will bring social, economic, and environmental benefits, increase the well-being of residents, and promote business growth. The establishment of an expressway encircling the city of Bishkek is poised to yield substantial benefits for the city, including: Diminished influx of suburban and transit vehicles onto city roads Acceleration of vehicle and public transport movement Augmented capacity of the road network Mitigation of congestion Reduction in the frequency of accidents Lessened adverse impact of exhaust emissions on public health and the environment The implementation of the project will concurrently alleviate traffic loads while enhancing the ease of entry and exit for citizens visiting or departing the capital. 							



Sector & Reference: Urban Transport UT07

A stien Title	Deed duct moves the send close in a				Action classification	on	High priority				
Action Title	Road dus	t preventio	on and c	leaning	Environmental are	a	Air, soil, green space, biodiversity				
Action's link to the strategoigectives	gic	SG1: Impro sustainable	SG1: Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while maintaining sustainable growth and improving infrastructure for transport energy and waste management.								
Estimated costs: CAPEX	EUR	600,000	KGS	57,2600,000	Annual OPEX	EUR	30,000	KGS	2,880,000		
Financing mechanisms	Loans (inte	oans (international financing institutions), city and republic budget.									

Description of the Action:

In the pursuit of curtailing road dust emissions, the ensuing measures are to be undertaken:

- Fostering public awareness concerning road dust emissions and their mitigation through educational campaigns and information dissemination
- Identifying significant dust reformation sources, paving the way for effective emission control measures
- Procuring advanced road cleaning equipment through strategic investments, specifically in specialised sweepers, to amplify dust and debris eradication from roads, thereby minimising repetitive cleaning
- Implementation of roadside green lanes to abate dust emissions these natural filters capture and mitigate the dispersion of pollutants released by vehicles

This orchestrated implementation will engender reduced recurrent road dust emissions, consequently ushering in superior air quality and

a cleaner environment. The prudent execution of these measures directly translates to environmental amelioration, as it nearly always delivers efficacious dust suppression. To facilitate the execution of measures targeting road dust emission mitigation, a revamp of the special vehicle fleet is imperative, necessitating the acquisition of contemporary cleaning vehicles in the requisite quantity.

Initiated by the Bishkek City Hall and funded via the city budget, 77 units of specialised equipment were procured for municipal entities, amounting to 331 million KGS (EUR3.4 million), encompassing partial allocation to the MP "Tazalyk." Notwithstanding, MP "Tazalyk" necessitates additional funding for the procurement of road cleaning equipment.

Rationale:

This initiative is steered by the aspiration to preserve the city's aesthetic allure, foster road cleanliness, diminish the volume of fine dust particles, and curtail other pollutants that compromise air quality. The overarching intent is to safeguard the environment and the citizens' health and well-being in the long term. The endeavour hinges on attracting substantial investments into the city's municipal service domain, thereby facilitating systematic measures to uphold road cleanliness within Bishkek's thoroughfares.

Steps in implementation:

Step 1. Territorial analysis and traffic intensity evaluation - 2024



Step 2. Proposal formulation of technical and special equipment recommendations – 2024

Step 3. Financial allocation for equipment procurement – 2024-2025

Step 3. Training of specialist, driver, and technician workforce

Step 4. Procurement and incorporation of essential equipment – 2025

Step 5. Equipment integration and commissioning – 2025-2026.

Targets (indicators):

- Reduction of harmful gas emissions by leveraging each citizen's contribution to address climate change
- Advocacy for ecological soundness, a "green" economy, and the proliferation of high-performance technologies, driven by climate change mitigation and adaptation measures.
- Heightened promotion of active non-motorized travel, facilitating enhanced mobility conditions for low-mobility segments, amplifying the eco-friendly vehicle fleet, and elevating urban cleanliness and air purity
- Advancement of air quality through the curtailment of fine dust particles and additional airborne pollutants, manifesting in improved health for Bishkek's residents and a more favourable environment

Type of Action	Capital investment: implementation – improving existing: actions, which involve direct investment in existing infrastructure, assets, and technologies. This includes upgrading of infrastructure as applicable.						
Owner/Responsible body	Department of City Economy (housing and communal services), ME "Tazalyk", Municipal inspection on improvements of the mayor's office of Bishkek						
Stakeholders and their roles	Bishkek City Hall assumes comprehensive oversight and regulatory authority over its subordinate enterprises, furnishing a diverse array of support spanning financial backing to the procurement of indispensable specialised equipment for their operations.						
Implementation start/end year	2024-2026						
Notes on cost estimates	According to the Action Plan submitted by MP "Tazalyk", the required amount for the implementation of measures is EUR600,000, which will be used for the purchase of special equipment.						
Action link to indicators	State:	Average annual concentration of PM2.5 Average annual concentration of PM10					
	Pressure:	Transport modal share in total trips					
Benefits (environmental, socio- economic)	Mitigation of dust and detrimental solid particles on roads through consistent and high-quality roadway cleaning. This initiative is poised to elevate Bishkek's environmental condition. Decrease in the populace afflicted by chronic lung ailments, attributable to the reduction in road pollution stemming from dust particles. This transition is expected to yield economic gains stemming from the reintegration of convalescent citizens into the city's social and industrial fabric.						



Energy & Industry

Sector & Reference: Energy & Industries El01										
Action Title	Promotion o	f heat pumps	uce coal and	Action classificatio	n M	Medium priority				
Action Title	gas depende	jas dependence			Environmental area	a Ai	Air, climate change mitigation.			
Action's link to the str objectives	SG1: Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while maintaining sustainable growth and improving infrastructure for transport, energy, and waste management.									
Estimated costs: CAPE	EUR	10,960,000	KGS	956,160,000	Annual OPEX	EUR	n/a	KGS	n/a	
Financing mechanism	s Loan, city	Loan, city budget								

Description of the Action:

The primary objective of this project is to promote the use of renewable energy technologies while progressively phasing out fossil fuel-dependent technologies within both the public and residential sectors. Collaborative consultations with the City Administration have revealed numerous prospects to supplant current fossil fuel-oriented technologies with their renewable counterparts. The project encompasses two core components:

Component 1

Bishkekteploenergo, overseen by the City Administration, is a utility entity facilitating heating services for residential and commercial edifices within the Bishkek vicinity. Among their inventory of 74 boiler houses with capacities ranging from 900kW to 1000kW, 13 of these exclusively rely on electricity to generate heat, while the remainder deploy gas and coal. A strategic proposition has emerged post discussions with the City Administration — advocating for the replacement of these 13 electric boilers with ground source heat pumps (GSHP). This proposal garners full-fledged city support, resonating as a top-tier priority. The city is resolutely committed to relinquishing electric boilers in favour of greener energy sources, and notably, aims to curb electricity and coal consumption by maximising gas and renewable energy technology deployment. The proposed heat pump solution has a significant advantage in reducing electricity consumption, particularly during the winter months, as they lower the usage of green electricity sources, such as hydro-based electricity. This decreases the need to import electricity or utilise fossil fuel-based thermal generation.

The overarching plan entails the replacement of the existing 13 electric boiler houses with an equivalent number of ground source heat pumps, facilitating the generation of heat and hot water. This transition is envisaged to reduce electricity consumption by a minimum of 30%. The estimated budget allocation for this segment is approximately EUR9 million. It is important to consider that implementation of the downstream actions (outlined in El02), which target the reduction of heat loss in distribution pipelines, could provide extra advantages such as reduced heat demand and required capacity/capex for heat pumps. As a result, it is advised
to execute these measures in tandem. In addition, when installing ground source heat pumps, borehole placement requires more space. However, if space is limited, air-source heat pumps may be a more cost-effective alternative. Their reduced capex could offset their poorer wintertime performance.

Figure 1**1**: Heat pumps

Component 2

As part of its commitment to decarbonisation, the City Administration is embarking on a pioneering endeavour within a designated Bishkek neighbourhood. This initiative encompasses the substitution of coal boilers with heat pumps, functioning as a demonstrative exercise showcasing the viability and advantages of cleaner energy sources. The endeavour simultaneously advances the objectives of reducing coal and gas reliance for heating purposes, while also illuminating the operation, benefits, and cost-efficiency associated with heat pumps.

The City Administration aspires for this demonstration initiative to galvanise resident adoption of heat pumps, catalysing a favourable environmental impact. The anticipated expenditure for this component is approximately EUR 460,000.

Bishkekteploenergo is actively engaged in efforts to curtail coal and gas consumption within their boiler houses, underpinning their overarching decarbonisation ambition. The fundamental aim encompasses the mitigation of greenhouse gas emissions and

augmentation of air quality within the Bishkek milieu. The City Administration further recognises the major influence of the residential sector on air quality through coal combustion, thereby earnestly propelling energy-efficient and renewable energy technology proliferation.

Steps in implementation (optional):

Explanation of the phases and steps in implementation of the action.

Step 1: Energy audit of existing electric boiler houses. Timeframe: 02/2403/24; Cost: EUR 50,000

Step 2: Preparation of the implementation scheme and formalities required for the City Administration to move forward (Approvals, BoQ, investment cost, technical specs etc), Timeframe: 04/24-06/24; Cost: EUR 200,000²⁹

Step 3: Implementation: Procurement process (bidding documents and tendering) and actual implementation

Timeframe: procurement process from 07/24-09/24; Implementation start from 11/24; Cost: EUR5 million 1st year and EUR4,5 million second year Overall timeline:

It is proposed to execute the project in two distinct phases:

Phase 1: Installation of 7 Ground Source Heat Pumps (GSHPs) from January 2024 to February 2026.

Phase 2: Installation of 6 Ground Source Heat Pumps (GSHPs) from April 2024 to July 2026.

Targets (Indicators):

- Successfully install 13 ground source heat pump facilities.





²⁹ Mainly for consultancy to support in preparation of tech specs, validation of investment amount, implementation scheme etc.



- Execute a demonstration showcasing the replacement of coal-based boilers with heat pumps in a settlement.
- Achieve an enhanced penetration of Renewable Energy (RE) technologies.
- Effectively reduce the consumption of fossil fuels.

Type of Action	Capital Investment – new (Cin) (The action includes direct investment in new infrastructure, assets, and technologies.)							
Owner/Responsible body	Bishkekteploene	Jishkekteploenergo under coordination of the City Administration						
Stakeholders and their roles	Bishkekteploene Ministry of Energ initiatives. This m	rgo: Executing agency y: Provides project implementation support as part of their ongoing climate change mitigation and adaptation ay involve support for tax exemptions, awareness campaigns, etc.						
Implementation start/end year	2024 – 2026	2024 – 2026						
Notes on cost estimates	Component 1: Assumption: After conducting comprehensive desk research, it was discovered that the cost ranges between EUR 2,000 and EUR 7,000 per kWth. For the purpose of this estimate, a cost of USD 3000 is estimated that the heat demand for the 13 boilers amounts to approximately 3460 kWth, with each boiler cu heat demand of around 800 kWe. An assumed COP of 3 has been taken into account. The cost calculation is X USD 3000 = USD 10,380,000 or EUR 9.5 million. ³⁰ Proposed implementation: First year: EUR 5 million Second year: EUR 4,5 million Component 2: Assumption: On average, settlements/neighbourhoods in Bishkek consist of 50 to 100 households. This pilc							
Action link to indicators	State:	Average annual concentration of PM2.5 Average annual concentration of PM10 Average daily concentration of SO2 Average daily concentration of NOx						

³⁰ Exchange rate 0.92euro per USD



	Pressure:	Share of renewable in total energy consumption Share of population with access to quality heating / cooling
Benefits (environmental, socio- economic)	 Energy typicall consum Cost Sa up to f term. Reduct renewa reducti 	Efficiency: Enhanced efficiency compared to other energy sources. Ground Source Heat Pumps (GSHPs) y boast a high coefficient of performance (COP), signifying greater heat output for each unit of electricity ned. avings: Replacing an electric boiler with a GSHP is expected to yield substantial cost savings. GSHPs can provide our times more energy for every unit of electricity used, leading to reduced energy expenses over the long ble energy from the ground. This diminishes reliance on electricity derived from fossil fuels, aiding in the on of greenhouse gas emissions, mitigating air pollution, and contributing to climate change mitigation.

Sector & Reference: Energy & Industries El02										
Action Title	Heatler	c roduc	tion in dist	ibution n	inclines	Action classification	on	High priority		
Action Title	Heat IO:	ss reduc	tion in distr	ibution p	npennes	Environmental are	a	Air, climate change mitigation.		
Action's link to the objectives	gic	SG1: Im sustaina	orove air o ble growtł	quality in Bishkek a n and improving ir	and reduce the negat nfrastructure for transp	ive impa port, ene	act of air pollutior ergy, and waste ma	n on citiz anagem	zens' health while maintaining ent.	
Estimated costs: CAPEX EUR		18,750,000	8,750,000 KGS 1,800,000,000		Annual OPEX	EUR	N/A	KGS	N/A	
Financing mecha	nisms	Loan, c	Loan, city budget							

Bishkekteploenergo is the utility company responsible for providing heat to residential and public buildings in Bishkek. Their network covers 624 residential buildings, 12 healthcare facilities, 40 secondary schools, 14 kindergartens, eight universities, 26 other budgetary institutions, and 193 other consumers. Every summer, the company replaces and repairs hot water pipes and heating pipes when possible. Old and deteriorating water pipes are excavated and replaced with new ones. The company frequently encounters challenges such as high heat losses in their distribution lines. This primarily occurs due to outdated insulation and a lack of proper maintenance. The company owns a pipeline network spanning 149 km, of which approximately 60% requires





upgrading or urgent replacement. However, due to budget constraints, only 2.5 km of distribution lines can be upgraded annually, resulting in significant challenges for the company in terms of heat loss and maintenance expenses.

To address this issue, it is recommended that funds be allocated to upgrade a minimum of 15 km of pipelines annually (instead of the previous 2.5 km annually). Moreover, it is recommended to prioritise the complete upgrade of the entire heat distribution pipeline within a five-year timeframe. By securing the necessary funding, Bishkekteploenergo will be able to enhance the efficiency and reliability of their heat distribution system, reducing heat losses and ensuring better service for the residents and public buildings in Bishkek. The proposed action aims to be completed within five years. During this period, 15 km of pipeline will be replaced annually with new insulated pipes. The entire distribution network is expected to be upgraded by the end of the fifth year, resulting in a significant reduction of heat losses and an improvement in operational performance.

Rationale:

Heat Conservation: Insulation helps minimise heat loss from the distribution pipelines. Heat loss can occur through conduction, convection, and radiation. By insulating the pipelines, the heat energy intended for space heating or hot water delivery is retained within the pipes, reducing energy waste, and improving overall system efficiency. New pipes can significantly reduce heat loss and ensure that the heat reaches the desired destination more effectively.

Energy Efficiency: New pipelines contribute to energy efficiency. When heat loss is minimised, the heating system needs to compensate less frequently or operate for shorter periods to maintain the desired temperature. This results in reduced energy consumption, lower heating costs, and a smaller environmental footprint.

Improved Performance: New insulated pipelines help maintain consistent temperatures within the distribution system. By minimising heat loss, they ensure that the heat delivered to different zones remains at the desired levels. This helps prevent temperature variations, improves comfort, and enhances the overall performance of the heating system.

It should be also highlighted that many renewable heat sources, such as heat pumps and solar thermal systems, operate more efficiently at lower temperatures. By reducing the operating temperatures in the district heating network, it becomes easier to integrate these renewable heat sources into the system without the need for additional heat exchangers or complicated retrofitting.

Steps in implementation:

Explanation of the phases and steps in implementation of the action.

Step 1: Feasibility study for replacement of heat distribution pipelines (75 km in total)

Timeframe: 04/2024-07/2024; Cost: EUR 30,000

Step 2: Implementation: Procurement process (bidding documents and tendering) and actual implementation

Timeframe: 09/2024-12/2024 Contract award. Implementation start from May to August 2025 to 2029. May to August is the typical period of regular maintenance of distribution heat pipes in Bishkek.

Overall Timeline of the project: 04/2024-09/2029 (15 km per year)

- Prepared a feasibility study on the replacement of the heat distribution system.
- Procured and installed insulated pipelines.
- Increased penetration of renewable energy (RE) technologies.
- Reduced consumption of fossil fuels.



Type of Action	Capital Inves	Capital Investment – new (Cin) (The action includes direct investment in new infrastructure, assets, and technologies.)						
Owner/Responsible body	Bishkekteplc	energo under coordination of the City Administration						
Stakeholders and their roles	Bishkekteplo Bishkekteplo of heat distri Ministry of E	Bishkekteploenergo: Executing agency. Bishkekteploset – Heat distribution company owned by the Ministry of Energy: Coordination of activities and review extension of heat distribution areas. Ministry of Energy: Validation of the long-term initiatives of the City Administration.						
Implementation start/end year	2024 - 2029							
Notes on cost estimates	Market rese 500,000. For EUR 3.75 mil costs encom	Market research indicates that the cost of pipelines with appropriate insulation falls within the range of EUR 100,000 EUR 500,000. For this estimation, EUR250,000 is anticipated. The annual cost of the project to replace 15 km of pipeline amounts to EUR 3.75 million, or a total of EUR18.75 million for the entire project duration (5 years and 75 km of pipeline). The total estimated costs encompass the preparation of project implementation activities, planning, schedules, and technical justification.						
Action link to indicators	State:	Average annual concentration of PM2.5 Average annual concentration of PM10 Average daily concentration of SO2 Average daily concentration of NOx						
	Pressure:	Share of population with access to quality heating / cooling Share of households connected to district heating Heat consumption in industries, per unit of industrial GDP						
Benefits (environmental, socio- economic)	 Reduced Heat Loss: Existing heat distribution pipelines experience higher heat losses due to degraded insulation system inefficiencies. Through pipeline replacement, the utility can introduce modern, more efficient materials insulation, leading to diminished heat losses and improved energy efficiency. This could yield lower operating of and heightened system performance. Enhanced Reliability: Aging pipelines are susceptible to leaks, corrosion, and integrity concerns. Replacement with pipelines can elevate the reliability and integrity of the distribution system, minimising the risk of costly breakdor service interruptions, and safety issues linked to pipeline failures. Reduced Maintenance and Repair Costs: Older pipelines demand frequent maintenance and repairs. Replacement could significantly curtail ongoing maintenance and repair expenditures. New pipelines are less susceptible to leaks, or other issues that necessitate costly repairs, generating long-term cost savings for the utility company. 							



 Expansion and Capacity Upgrade: Replacing heat distribution pipelines opens avenues to expand the system's capacity or accommodate future growth in demand. This holds particular significance for Bishkekteploenergo, which experiences an expanding customer base and aims to serve new areas. Upgraded pipelines facilitate efficient and reliable heat delivery to meet mounting demands. Reduced Air Pollution: Replacing aging pipelines contributes to environmental sustainability by minimising energy
 wastage and curtailing greenhouse gas emissions associated with heat losses. Technological Advancements: Heat distribution pipeline replacement provides an opportunity to integrate the latest technological advancements in pipeline design, monitoring, and control systems. This could enhance overall system efficiency, enable improved monitoring and management of the distribution network, and support integration with smart grid technologies.

Sector & Reference: Energy & Industry El03										
Action Title	Promotion of solar thermal in municipal buildings to reduce fossil fuel consumption					Action classification Medium priority				
Action little						Environmental are	a A	Air, climate change mitigation.		
Action's link to the strate objectives:		SG1: Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while maintaining sustainable growth and improving infrastructure for transport, energy, and waste management.								
Estimated costs: CAPEX	EUR	1,700	0,000	KGS	163,200,000	Annual OPEX	EUR	n/a	KGS	n/a
Financing mechanisms	Loan, city budget									

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The City Administration is responsible for maintaining public buildings, including schools and kindergartens. These buildings have a consistent demand for hot water throughout the year, which is currently met using either fossil fuels or electricity. It is imperative for the City Administration to introduce solar thermal technologies in these public buildings to reduce fossil fuel consumption, promote the adoption of renewable energy sources, and decrease air pollution. To this end, the City Administration successfully conducted a pilot project by installing a solar thermal system in the Municipal bath. This system efficiently generates hot water and

significantly curtails gas consumption. The positive feedback received from the City Administration underscores the success of the project and its favourable impact on advancing the use of renewable energy (RE) within the city. Building on the success of this pilot initiative, the City Administration has identified at least eight public buildings that consistently require hot water throughout the year and are currently heavily reliant on gas for their hot water needs.

Furthermore, it is proposed to implement solar thermal systems in these buildings to achieve further reduction in gas consumption and promote the uptake of renewable energy in the city. The City Administration wholeheartedly supports this measure, recognising its potential to enhance sustainability and diminish dependence on fossil fuels. The potential sites for installing thermal solar systems are as follows:

- Boiler house "Torch": serves 1 state organisation, 5 private legal entities, multi-apartment, and private houses (total 641 end users).
- Boiler house "City hospital": serves 6 state organisations, 2 private legal entities, multi-apartment, and private houses (total 587 end users).
- Boiler house "KECH-1": serves apartment buildings (total 600 end users).
- Boiler house "KECh-2": serves 2 state organisations, 4 private legal entities, and multi-apartments (total 1189 end users).
- Boiler house "Ilbirs": serves kindergarten No. 53, multi-apartment, and private houses (total 953 end users).
- Boiler house "Boarding school No. 1": serves boarding school No.1, 3 apartment buildings (total 33 end users).
- Boiler house "Geodesy-1": serves 1 apartment building (total 87 end users).
- Boiler house "d / s No. 12": serves kindergarten No. 12.

Steps in Implementation (optional):

Step 1: Feasibility Assessment (design, sizing, and bidding documents)

Timeframe: 02/2024 - 06/2024; Cost: EUR40,000

Step 2: Procurement and Installation: Source the necessary equipment through a procurement process, including solar collectors, storage tanks, pumps, and controls, from reputable suppliers.

Timeframe: 06/2024 - 08/2024 (Contract Award), 08/2024 - 01/2025 (Project Implementation); Cost: EUR1.6 million.

Step 3: Training and Education: Provide training and education to building staff or maintenance personnel on the operation, maintenance, and troubleshooting of the solar hot water system.

Timeframe: 02/2024 - 03/2024; Cost: included in Step 2

Step 4: Public Awareness: Promote the installation of the solar hot water system in public buildings to raise awareness about sustainable practices and energy conservation. Share information about the system's benefits, energy savings, and environmental impact with building occupants and the wider community of the city.







Timeframe: 03/2024 - 06/2025; Cost: EUR 30,000 Overall Timeline: 2024 – 2025

- Feasibility study on the installation of thermal solar systems.
- Procurement and installation of equipment.
- Conducted training and increased capacities for system maintenance and energy management.
- Increase penetration of renewable energy technologies.
- Reduce consumption of fossil fuels.

Type of Action	Capital Investment – new (Cin) (The action includes direct investment in new infrastructure, assets, and technologies.)						
Owner/Responsible body	Bishkekteploenergo under coordination of the City Administration						
Stakeholders and their roles	Bishkekteploenergo: Executing agency Ministry of Energy: Implementation support. As part of its NDC initiative, the Ministry of Energy is also planning similar activities.						
Implementation start/end year:	2024 – 2025						
Notes on cost estimates	EUR1,728,044. According to estimates from Bishkek Teploenergo's technical team, the cost of implementing solar installations at the eight aforementioned sites is expected to be approximately EUR1.7 million. The estimation of the investment amount is provided by Bishkek Teploenergo.						
Action link to indicators	State:Average annual concentration of PM2.5Average annual concentration of PM10Average daily concentration of SO2Average daily concentration of NOx						
	Pressure: Share of district heating from carbon intensive sources Share of district heating from renewable sources						
Benefits (environmental, socio-economic)	 Cost Savings for Bishkekteploenergo Solar hot water systems utilise the sun's energy to heat water, which is a free and renewable resource. By harnessing power, public buildings can significantly reduce their reliance on natural gas and lower their energy bills. While the u cost of installing a solar system may be higher, the long-term savings on energy expenses could be substantial, lead cost-effective operation and maintenance of the hot water system. Reduced Air Pollution 						



Shifting to solar hot water systems aligns with environmental sustainability goals. Solar energy is clean and emits no
greenhouse gases or pollutants during operation. By reducing reliance on fossil fuels, such as natural gas, public buildings
can decrease their carbon footprint and contribute to mitigating climate change. This transition demonstrates a commitment
to renewable energy and environmental stewardship. The proposed system is specifically designed for heating hot water
only and will not affect the heating system. Additionally, the solar hot water system is typically installed at a 45-degree angle
which ensures that no snow accumulates on the surface of the thermal hot water system. During cloudy days, an automatic
electric heater located inside the tank is triggered to ensure that children always have access to hot water, regardless of the
weather conditions.
- Long-Term Stability and Reduced O&M Costs

Solar hot water systems are known for their durability and longevity. With proper maintenance, these systems can operate reliably for 20 to 30 years or more. This long lifespan ensures a stable and consistent hot water supply for public buildings, reducing the risk of system failures and the associated repair or replacement costs.

Promotion of Renewable Energy, Public Image, and Leadership
 Public buildings serve as significant examples to the community and can set a positive precedent for sustainable practices.
 By embracing solar energy and transitioning to solar hot water systems, public entities demonstrate environmental leadership, inspire others to adopt renewable energy solutions, and contribute to the overall sustainability goals of the city.

Sector & Reference: Energy & Industry El04										
Action Title	Central	dispatch cent	tre and	installation of	Action classification	on M	Medium priority			
Action little	LEDs wi	th smart cont	rol syste	ems	Environmental are	a A	Air, climate change mitigation.			
Action's link to the strate objectives	SG1: Impr sustainabl	SG1: Improve air quality in Bishkek and reduce the negative imp sustainable growth and improving infrastructure for transport, er				npact of air pollution on citizens' health while maintaining energy, and waste management.				
Estimated costs: CAPEX	EUR	<i>EUR</i> 3,200,000		307,200,000	Annual OPEX	EUR	N/A	KGS	N/A	
Financing mechanisms	Loan, city budget									



Bishkeksvet is a municipal organisation under the control of the City Administration responsible for street lighting. Currently, most city streets have streetlights. Dedicated officers manage the operation of streetlights, responsible for turning off and on various zones of Bishkek. However, there is no automatic central dispatch centre to control and monitor the entire system's operation. Interviews with the utility company confirmed that manual operation creates significant challenges, such as delayed turning off or on, resulting in increased or reduced operation time and a lack of control and monitoring.

To address this, a centralised dispatch centre could be established to monitor and control the operation of street lighting using modern automation equipment. Additionally, the utility company plans to install intelligent control devices with additional LED lighting at pedestrian crossings in Bishkek, linking them to the central dispatch centre. This approach would enhance safety and reduce energy consumption, with lights automatically dimming or turning off when no pedestrians are present and turning on when someone approaches the crossing. This strategy improves safety and reduces energy consumption compared to adding more lighting points. Implementing these measures will lead to efficient and effective street lighting management, enhancing safety at pedestrian crossings while optimising energy consumption in Bishkek. The proposed project is in line with the government's ongoing efforts towards decarbonisation. The project is expected to significantly reduce emissions and have a positive impact on the air quality of the city. The proposed project is a testament to the government's commitment to reducing carbon emissions and promoting sustainable development. The project's potential to mitigate the adverse effects of climate change is noteworthy, and it is expected to contribute significantly to the country's overall efforts to combat climate change.

Steps in implementation (optional):

Step 1: Feasibility study Timeframe: 01/2024-05/2024; Cost: EUR 100,000 Step 2: Procurement and Installation Timeframe: 06/2024-10/2024 Contract Award. 10/2024-06/2026 Project implementation. Cost: EUR 3.1 million Overall Timeline: 01/2024 – 06/2026

- Increased EE
- Increased safety
- Reduced O&M cost

Type of Action	Capital Investment – new (Cin) (The action includes direct investment in new infrastructure, assets, and technologies.)
Owner/Responsible body	Bishkeksvet under the coordination of the City Administration
Stakeholders and their roles	Bishkeksvet- –executing agency
Implementation start/end year	Timeline: 01/2024-06/2024



Notes on cost estimates	Accorc	According to estimates from Bishkeksvet, the cost of investment is around KGS 300 million.					
Action link to indicators	State:	Annual CO2 equivalent emissions per capita					
	Press ure:	Energy efficiency and type of energy used					
Benefits (environmental, socio- economic)	- -	Reduced O&M cost due to a better control and monitoring system. Increased safety due to an enhanced automation and control system. Reduced air pollution due to reduced electricity consumption of the street lighting, leading to increased efficiency.					

Sector & Reference: Energy & Industry El05*											Ø,	
							Action classification	Mediur	Medium priority			
Action Title	Modernis	sation o	f operation	ı of B	ishkek	СНР	Environmental area	Air, Clir	Air, Climate change mitigation,			
Action's link to the strategic objectives SG1: Improve air quality in Bi maintaining sustainable growth						re air quality in Bi sustainable growth	shkek and reduce the and improving infrastru	negative in acture for t	mpact of a transport, e	air pollu energy, a	tion on citizens' health while and waste management.	
Estimated costs: CAPEX		EUR	17,500,000		KGS	1,7 billion	Annual OPEX:	EUR	n/a	KGS	n/a	
Financing mech	nanisms	loan										



The Bishkek power station, originally constructed in 1961, is a significant source of heat, hot water, and electricity. As the largest electricity provider in the northern region of Kyrgyzstan and Bishkek, the plant is responsible for supply 100% of Bishkek's electricity demand and 15% of the country's total demand. Furthermore, it provides heating for over 120,000 customers and hot water to 2350 apartment complexes and at least 1840 private homes. The power plant utilizes coal as its primary fuel source.

The combined heat and power (CHP) plant faces several challenges that require urgent attention to ensure its continued operation, efficiency, and cleanliness. One of the crucial measures that need to be taken is gasification of the CHP (transition from coal to gas) and to replace and upgrade the old boilers, with a total of 11 boilers currently in use. While two of these boilers have already undergone renovation, the cost of modernizing the remaining units cannot be accurately estimated due to the large scale and complexity of the project. It is worth mentioning that two new units that were previously renovated along with additional electrical BOP cost USD 356 million. However, our desk research and interviews with sector experts have revealed that no plan is currently in place to upgrade old boilers of the CHP due to other priorities in the energy sector. Therefore, the focus of this action is the gasification. The government is currently exploring the possibility of converting the coal-fired CHP plant to a gas-fired system to improve efficiency and reduce emissions. The decision-making process hinges



on the gas price, and negotiations with gas suppliers. The technical details of the upgrade remain undisclosed at present. However, based on interviews with local experts, the primary components of the project may involve the modification of the burners in the boiler. This includes retrofitting or replacing the burners, as gas burners operate differently from coal burners. In addition, the combustion system and fuel preparation systems will also be modified. Furthermore, the gas supply and handling infrastructure must be adapted to accommodate the natural gas supply, including modifications to the fuel storage, handling, and delivery systems. The control systems and instrumentation of the plant will also require updating to monitor and control the new gas-fired operations effectively. This will entail integrating new sensors, control algorithms, and safety systems to ensure safe and reliable operation. The cost of such a transition is estimated to be around KGS 1.7 billion, as per government information. As Bishkek CHP is classified as a strategic object, access to information pertaining to its technical parameters, expansion planning or operation patterns requires adherence to official channels and internal protocols established by the Ministry of Energy. Consequently, certain technical details cannot be provided at this stage.

Costs:

Sub-project 1: EUR 17 500 000 Euro Overall Timeline: 01/2025 –12/2027 Targets (indicators): Increased EE Reduced impact to air pollution

Green City Action Plan for the City of Bishkek



Type of Action	Capital Inv	Capital Investment – new (Cin) (The action includes direct investment in new infrastructure, assets and technologies.)							
Owner/Responsible body	Ministry of	Ministry of Energy, OJSC Electric Power Plants							
Stakeholders and their roles	OJSC Elect	JJSC Electric Power Plants- executing agency; Ministry of Energy – Ministry of Finance – administration of Ioan and overall lecision-making body; Mayor's Office (city administration)							
Implementation start/end Year	Timeline: (Timeline: 01/2025-12/2027							
Notes on cost estimates	. This cost estimate is based on the cost provided by the city, which was also confirmed by the consultant during the assessmen of similar projects. The total projected cost includes the purchase of equipment and the necessary work.								
Action link to indicators	State:	Annual CO2 equivalent emissions per capita							
Action link to indicators	Pressure:	Energy efficiency and type of energy used							
Benefits (environmental, socio- economic)	 Reduced O&M cost due to a better and new technology Increased energy efficiency Reduced air pollution due to improved filtering system and gas fired system 								

Water

Sector & Re	eference: Water W01			.		
Action Title	Installation of drinking w transmission in multi-ste	vater meters with remote data	Action classification	High priority		
Action Title [private households in Bi	shkek	Environmental area	Water resources		
Action's link to the strategic objectives		SG2: Improve water supply and water use efficiency in Bishkek in order to avoid water scarcity, and to increase quality of the surface water, and to improve the sewer network and appropriate treatment of wastewater.				



Estimated costs: CAPEX	EUR	25,900,000	KGS	2,486,400,000	Annual OPEX	EUR	3,800,000	KGS	364,800,000	
Financing mechanisms	Loan (i	nternational finar	ncing inst	itutions), city bud	get.					

The proposed implementation of a project involving the purchase of water meters with remote reading, reading instruments, software, construction, and installation

works. It is estimated that around 80% of private sector subscribers do not have the chambers with shutoff valves at their connection points, which necessitates the installation of chambers, pipelines, and shutoff valves by the management. To facilitate this action, the "Bishkekvodokanal" water utility will take responsibility for carrying out the installation work at its own expense. This initiative aims to improve water management and monitoring by introducing remote reading capabilities through the use of water meters and associated software. By implementing this system, the management of the company will have more accurate and efficient means of monitoring water usage. The installation of pipelines with chambers and shutoff valves will contribute to better water control and distribution, particularly in the private sector. Overall, these measures will enhance water management practices and improve service delivery to subscribers in Bishkek.



Rationale:

To date, most of the subscribers in Bishkek do not have individual drinking water meters; payment for the provided water supply services is made in accordance with water consumption standards. In this connection, the population is not interested in saving potable water, which leads to uncontrolled water consumption. The main objective of this project is the transition to the payment of bills by the population from the consumption norms to the actual water consumption, as well as to encourage the population to save water and energy resources. These measures will entail a reduction in capital and operating costs for water production.

Steps in implementation:

There will be a continuous yearly procurement and installation of water meters and district units as follows:

- 2024 5000 meters, 10 district units
- 2025 15000 meters, 22 district units
- 2026 15000 meters, 22 district units
- 2027 15000 meters, 22 district units
- 2028 15000 meters, 22 district units
- 2029 15000 meters, 22 district units

- Increasing the revenue and sales of drinking water.
- Installation of drinking water meters that will result in:



- the population to pay for actually consumed drinking water;
- o optimisation of the water supply of the city of Bishkek to world norms and reduction of non-revenue water from 45% to 30%;
- o reduction of the volume of produced water, reduction of current and capital costs for servicing existing water intake facilities.

Type of Action	Cln (Capital Investment – new)								
Owner/Responsible body	City Hall of E	ity Hall of Bishkek, "Bishkekvodokanal"							
Stakeholders and their roles	Department "Bishkekvod	epartment of City Economy (Housing and Communal Services) of the Mayor's Office of Bishkek (contract managemer Bishkekvodokanal" (installation works, technical assistance and supervision).							
Implementation start/end year	2024–2029								
Notes on cost estimates	The cost est 1. Household - 99,657 - 99,657 2. District me 120 (number SCADA and 3. Excavatio approach of Costs are tak	imates are as follows: d metering 7 (number of private households to be measured) x EUR 70 (household meter unit price) = EUR 6,975,990 7 x EUR 60 (drive-by automated meter reading unit,) = EUR 5,979,420 7 x EUR 60 (manhole unit price, EUR) = EUR 5,979,420 etering r of districts to be measured) x EUR 8,000 (including electromagnetic meter, GSM automated meter reading unit + manhole) = EUR 960,000. n (special vehicles, excavators, cranes) and installation (fittings) works average EUR 6.000,000, depending on the implementation. keen as a result of the study of local and international markets, as well as from the estimates of water company experts.							
Action link to indicators	State: Pressure:	Water Exploitation Index Domestic water consumption per capita Non-revenue water Water consumption per unit of city GDP							
Benefits (environmental, socio-economic)	- Imp - Imp	 Improved integrated water resources management Improved efficient use of water 							



- Enhanced water consumption monitoring
- Easy and fast leak detection and repair
- Water and energy savings

Sector & Refe	Vater W	02							.	
	Action Title Construction of the Wastewater Treatment Plant in Bishkek. Construction and reconstruction of pressure and gravity sewer networks					Action classification High priority				
Action Title						Environmental area		Water resources, soils, green space, biodiversity		
Action's link to the strategic objectives			SG2: Impro the surface	ove wate e water, a	er supply and water use and to improve the sewe	efficiency in Bishke er network and app	ek in orde propriate	er to avoid wat treatment of w	er scarcity, astewater.	and to increase quality of
Estimated costs	CAPEX	EUR	35,000,000	KGS	3,360,000,000	Annual OPEX	EUR	1,100,000	KGS	105,600,000
Financing mecha	nisms	Loan (international financing institutions), city budget, grant.								

The Action consists of three components:

Component 1

Reconstruction and modernisation of the wastewater treatment plant in Bishkek (current capacity 380,000 m³/day), including feasibility study, design, and technical supervision. Currently, the equipment and facilities are physically obsolete. Additionally, the equipment has corroded due to contact with the wastewater environment

over time. Therefore, a comprehensive reconstruction and modernisation of the wastewater treatment plant (WWTP) in Bishkek is necessary. Exploring the reuse of treated water with the installation of pressure pumps is also recommended, which may require additional investment in a pumping station and piping. Moreover, the current reconstruction of the wastewater is aimed at modernisation of the primary and secondary wastewater treatment. However, it will take into consideration the analysis and introduction of tertiary wastewater treatment that includes additional filtering and/or disinfection. Tertiary wastewater treatment often works by using a combination of physical and chemical processes to remove harmful microbiological contaminants from wastewater. This will increase the quality of treated wastewater and open possibilities for discharging treated effluent that meets relevant standards and/or reuse of treated wastewater.



Component 2



The construction of a new sewer collector is proposed, spanning a length of 4,500 m, from the sewage pumping station "Krasny Stroitel" (the total population of the Sverdlovsk district where the station is located is 240,000 people) to the wastewater treatment plant. This new sewer collector will consist of two lines with a diameter of 500 mm, ensuring efficient transport of sewage from the pumping station to the WWTP. The infrastructure upgrade will enhance the capacity and reliability of the sewerage system, improving wastewater management in the area.

Component 3

Additionally, the reconstruction of the sewerage network is proposed, covering a distance of 4,200 m. This reconstruction project aims to upgrade the existing sewerage network, improving its functionality and reliability. By enhancing the infrastructure, the sewerage network will be better equipped to handle the wastewater flow and reduce the risk of system failures or blockages. This will contribute to improved sanitation services and the overall management of wastewater in the area. By implementing this action, the city will benefit from an upgraded sewerage system that can effectively transport wastewater from the pumping station to the WWTP, as well as a reconstructed sewerage network that can better manage and maintain the flow of wastewater.

Rationale:

The poor condition of the existing wastewater treatment plant has resulted in inadequate wastewater treatment, leading to the pollution of the natural water reservoir – the Chu River – where urban wastewater is discharged. The municipal sewerage networks are mostly outdated, contributing to a infiltration of wastewater into the ground, causing soil and groundwater pollution. Modernising the wastewater infrastructure will enhance the efficiency of the sewerage system and improve the quality of wastewater treatment.

Steps in implementation:

Component 1: Elaboration of the feasibility study and environmental and social impact assessment for wastewater treatment plant – during 2024 Detailed engineering design of the wastewater treatment plant – 2024-2025 Construction of the wastewater treatment plant with inclusion of a tertiary treatment stage for eventual wastewater reuse – 2026-2028 Component 2: Detailed engineering design of the sewer pressure pipeline – during 2024 Construction of the sewer pressure pipeline – 2025-2026 Component 3: Continued expansion and reconstruction of municipal sewerage network: 2024 – 670 m 2025 – 700 m 2026 – 900 m 2027 – 1,000 m 2028 – 1,930 m Targets (indicators):



- Enhancement of wastewater treatment efficiency.
- Improvement of the environmental and sanitary-epidemiological conditions within the city.
- Assurance of sanitary, hygienic, and environmental safety in the city of Bishkek and the village of Prigorodnoye.
- Mitigation of the adverse effects of urban wastewater on the Chu River.
- Adoption of a new technology for biological wastewater treatment centred on biogenic elements.

Type of Action	Cle (Capital investment – existing), Cln (Capital investment – new).							
Owner/Responsible body	City Hall of E	City Hall of Bishkek, "Bishkekvodokanal."						
Stakeholders and their roles	Department assistance ar	Department of Municipal Economy of the Mayor's Office of Bishkek (contract management), "Bishkekvodokanal" (technical assistance and supervision).						
Implementation start/end year	2024–2028	2024–2028						
Notes on cost estimates	The wastewater treatment plant's capacity of 380,000 m ³ /day was initially calculated during the Soviet era. An investmer EUR 35 million was discussed and approved in consultation with Bishkek's water utility and the City Hall, as part of the "Bish – 2026. A Comfortable and Green Capital" programme. However, precise costs for the rehabilitation or construction wil determined through the feasibility study and subsequent detailed technical design process. The cost of HDPE pressure p with a diameter of 500 mm is approximately EUR 400 – EUR 450 per linear metre, encompassing installation, backfilling, associated fittings (totalling 9,000 m). Similarly, pipes with a diameter of 200 mm or larger cost around EUR 300 per linearmetre, including installation and asphalt restoration (totalling 4,200 m). These cost estimates are derived from the "Bishke 2026. Comfortable and Green Capital" programme as well as current market price research.							
	State:	Biochemical Oxygen Demand (BOD) in rivers and lakes Ammonium (NH4) concentration in rivers and lakes						
Action link to indicators	Pressure:	Energy used for wastewater collection and treatment Sludge safely treated disposed of or safely used Sewer Network Integrity (Pipe break)						
Benefits (environmental, socio- economic)	 Reduced levels of pollutants Improved environmental protection Increased proportion of the population using wastewater services Destruction of pathogenic bacteria and harmful organisms Improved access to the wastewater collection system 							



Sector & Reference: Water W03

		- f			Action classification	h High	High priority				
Action Title Reconstruction			of groundwa	ter Intak	(e "HBO"	Environmental are	a Wate	Water resources, soils, green space, biodiversity			
Action's link to the strategic objectives			SG2: Impr the surface	SG2: Improve water supply and water use efficiency in Bishkek in order to avoid water scarcity, and to increase quality of the surface water, and to improve the sewer network and appropriate treatment of wastewater.							
Estimated costs: CAPEX		EUR	3,100,000	KGS	297,600,000	Annual OPEX	EUR	96,000	KGS	8,940,000	
Financing mecha	nisms	Loan (i	oan (international financing institutions), city budget, grant.								

Description of the Action:

The groundwater levels for water supply have declined in recent years, prompting an ongoing investigation to identify the causes of water scarcity. It is proposed to seek expert opinions from the Institute of Water Problems of the National Academy of Sciences of the Kyrgyz Republic and the Ministry of Natural Resources to investigate the reasons behind the declining groundwater levels and to forecast potential dry periods. This effort will involve consulting experts for insights and conducting analysis to gain a better understanding of the factors contributing to groundwater depletion and to develop effective strategies for sustainable water management.

It is recommended to undertake the modernisation and reconstruction of the groundwater intake "HBO" in Bishkek. The estimated cost of this project is approximately 200 million KGS. The proposed improvements include chlorination, drilling of two new wells, installation of water and electricity networks, reconstruction of the existing two reservoirs with a volume of 500 m³ each, replacement of the transformer at the existing transformer substation, and the establishment of a second-level pumping station. Additionally, there is a need for the reconstruction of a pressure pipeline spanning approximately 200 metres from the second-level pumping station to the water supply pipeline of the Kok-Zhar residential area.

Rationale:

The water supply plan for the Kok-Zhar residential area was initially designed in 1997 with a local water intake intended to be situated in the Dostoevsky St.-East Big Chui Canal area. However, due to land plots being seized and developed with individual residential buildings, the water supply for the district is currently managed through a temporary scheme from the Orto-Alysh water intake. Consequently, the "Kok-Zhar" residential area experiences interruptions in its drinking water provision, particularly during the summer. In recent years, developers have been acquiring individual land plots and constructing multi-storey buildings in their place.

This trend has led to the majority of the individual sector within the specified residential area being replaced with multi-storey housing.

To address the issue of a stable water supply to the specified area, the "Bishkekvodokanal" water utility proposes dividing the Kok-Jar water supply scheme into two zones:



- 1st zone: From South Big Chu Canal to Akhunbaev St.
- 2nd zone: From Akhunbaev St. to East Big Chu Canal.

In the first zone, the existing water supply scheme will be maintained, sourcing water from the Orto-Alysh water intake.

For the second zone, water supply to the Kok-Zhar area is proposed to come from the existing HBO water intake situated north of the East Big Chu Canal. Currently, the HBO water intake provides drinking water to the population, institutions, and enterprises within the area bounded by April 7th, Ankara, Dostoevsky streets, and the railway line. The groundwater reserves at this intake allow for an increase in water extraction without negatively impacting the water supply for existing consumers.

Steps in Implementation:

- Elaboration of detailed engineering design for deep wells and 2nd level pumping station, as well as the reconstruction of the water supply network for the water intake during 2024.
- Drilling of two additional deep wells with a depth of up to 200 metres, each with a flow rate of at least 45 l/s 2024-2025.
- Reconstruction of the existing two reservoirs, each with a volume of 500 m^3 2024-2025.
- Replacement of the transformer at the existing transformer substation 2024.
- Construction of the 2nd level pumping station 2024-2025.
- Construction of a chlorination plant for the disinfection of drinking water 2026.
- Rehabilitation of water supply and electricity networks 2026.
- Installation of a dispatching and automation system for the management of water production and supply technological processes at the water intake 2027.
- Reconstruction and modernisation of the water intake protection system 2027.
- Laying of two pressure lines, each with a diameter of 300 mm and a length of 2000 metres, from the 2nd level pumping station to the cold-water supply pipelines of the Kok-Jar area 2026-2027.

- Development of the water management system in Bishkek.
- Ensuring a stable and affordable drinking water supply for the population of the Kok-Zhar residential district, considering the planned sites for complex residential development in the area.
- Implementation of resource-saving technologies at water supply facilities and optimization of operating costs at all stages, from the extraction of drinking water to delivery to consumers.

Type of Action	Cle (Capital investment – existing)
Owner/Responsible body	City Hall of Bishkek, "Bishkekvodokanal"
Stakeholders and Roles of stakeholders:	Department of City Economy (Housing and Communal Services) of the Mayor's Office of Bishkek (contract management), "Bishkekvodokanal" (technical assistance and supervision)



Implementation start/end year	2024-202	2024–2027						
Notes on cost estimates	Bishkekvodokanal experts' estimates, and current market prices are as follows. Deep well – EUR 280/linear m, pressure pipeline – EUR 50/linear m, reservoir reconstruction (extra reservoir capacity) – cca. EUR 200,000 per reservoir including piping and controls, chlorination plant – cca. EUR 80,000 per prefabricated unit, design, and construction of pumping station – EUR 1,000 per kW, SCADA system installation – EUR 800,000.							
Action link to indicators	State:	Water Exploitation Index						
	Pressure:	Daily number of hours of continuous water supply per household Domestic water consumption per capita Energy used for urban water production and supply						
Benefits (environmental, socio- economic)	 Improvement of quantity and quality of drinking water supply to the population Increasing the proportion of the population using safe water supplies Clean drinking water prevents the spread of water-borne diseases Adaptation to water scarcity. 							

Sector & Reference: Water W04									.	
				Action classification			Medium priority			
Action The	Recor	Istructio	n of water su	рргу пет	works	Environmental are	a Wate	Water resources, soils.		
Action's link to the strategic objectives			SG2: Impr the surfac	SG2: Improve water supply and water use efficiency in Bishkek in order to avoid water scarcity, and to increase qu the surface water, and to improve the sewer network and appropriate treatment of wastewater					rcity, and to increase quality of ater	
Estimated costs: CAPEX		EUR	1,330,000	KGS	127,680,000	Annual OPEX	EUR	6,000	KGS	576,000
Financing mechani	isms	Loan (international financing institutions), city budget.								

A comprehensive plan has been proposed for the reconstruction of water supply networks to enhance the delivery of drinking water to the population and address the issue of deteriorating engineering networks. The total length of the water supply networks to be reconstructed is approximately 37.5 km.

This reconstruction project aims to improve the overall quality and reliability of the water supply system, ensuring that clean and safe drinking water reaches the residents. The plan, as a part of this GCAP, involves replacing or repairing the worn-out engineering networks to prevent leaks, reduce water loss, and enhance the efficiency of the water distribution system.

Rationale:

The water supply infrastructure is outdated and requires modernisation. The percentage of non-revenue water within the drinking water supply system is relatively high (approximately 45%) due to the poor technical condition of the system and a significant rate of unauthorised water consumption.

Investing in the reconstruction of water supply networks will enable the city to offer a more reliable and sustainable water supply to its residents and reduce the non-revenue rate to 30%. This initiative will contribute to the enhancement of public health and the overall well-being of the community by ensuring access to clean drinking water.

Steps in implementation:

Continued reconstruction of water supply system:

- 2024 6,500 m
- 2025 7,000 m
- 2026 7,500 m
- 2027 8,000 m

2028 – 8,500 m

- Ensuring a stable and affordable drinking water supply for the population of the city of Bishkek.
- Reduction of the water losses in the system.

Type of Action	Cle (Capital investment – existing)
Owner/Responsible body	City Hall of Bishkek, "Bishkekvodokanal"
Stakeholders and their roles	Department of Municipal Economy of the Mayor's Office of Bishkek (contract management), "Bishkekvodokanal" (technical assistance and supervision)
Implementation start/end year	2024–2028







Notes on cost estimates	Cost estimates for water supply pipes of 90-110 mm diameter including pipe installation, asphalt recovery and paving, fi and manholes are cca. EUR50 per 1 linear m.					
Action link to indicators	State:	Water Exploitation Index				
	Pressure:	Daily number of hours of continuous water supply per household Domestic water consumption per capita Non-revenue water				
Benefits (environmental, socio- economic)	- In - In - C - Er	nprovement of the quality of drinking water supply to the population. creased proportion of the population using safe water supplies. lean drinking water prevents the spread of water-borne diseases. nhanced quality of life.				

Sector & Reference: Water W05									Ť ,			
Action Title	Reconstrue	ction ar	nd moderni	dernisation of the irrigation		Action classification	on	High priority				
network for green a		areas			Environmental are	a '	Water resources, soils, green space, biodiversity.					
Action's link to the strategic objectives			SG2: of the SG3: and b	mprove v surface v ncrease t iodiversit	vater supply and v vater, and to impro he area and qualit y and urban soil p	water use efficiency in ove the sewer network ty of green spaces for rotection.	Bishke and a city res	k in order to avoid ppropriate treatme sidents through the	water s ent of wa e fosterin	carcity, and to increase quality stewater. g of Bishkek's natural heritage		
Estimated costs	timated costs: CAPEX EUR 3,14		3,145,000	000 KGS 301,920,000 Annu		Annual OPEX	EUR	180,000	KGS	17,280,000		
Financing mechanisms Loan (intern		international	ternational financing institutions), city budget.									
Description of the Action:												



The action includes the reconstruction and construction of the irrigation network, encompassing canals and trays. The irrigation network plays a crucial role in efficiently distributing water for agricultural purposes and maintaining the health of green spaces within the city. This action aims to address any issues related to outdated

infrastructure, such as leaks, blockages, or inadequate water flow. By implementing modern engineering techniques and utilising appropriate materials, the irrigation network will be upgraded to ensure optimal water supply to agricultural areas and green spaces. Additionally, a focus will be placed on promoting the rational use of water resources. This may involve implementing water-saving measures, raising awareness among the public, and adopting best practices for irrigation management. Through the reconstruction and construction of the irrigation network, the city will enhance its ability to sustainably manage and utilise water resources, leading to improved agricultural productivity, healthier green spaces, and the overall well-being of the community. The action is comprised of two components:



Component 1

The irrigation networks will be expanded and restored, covering a length of 6,400 m of main irrigation trays. This initiative aims

to provide citizens with reliable access to irrigation water and enhance the overall irrigation of green spaces. The estimated cost for this project is EUR540,000.

Component 2

Four new wells will be drilled to improve irrigation water supply. The total length of irrigation lines to be installed during the project implementation is 166,300 m. The participation of local communities in water and sanitation management will be encouraged through the establishment of rules and procedures. Based on previous experiences, the estimated cost for this endeavour is EUR 2.605,000.

Rationale:

Currently, drinking water is largely used in the city for irrigation purposes due to a weakly developed irrigation network. This leads to interruptions in drinking water supply, mostly in the southern parts of the city during the summer period. In previous years, water availability for irrigation purposes, as well as drinking water in the south of Bishkek, tended to become an issue in late July or early August. However, spring and summer 2023 clearly demonstrated the way in which the climate will most probably develop in the near future, as spring 2023 was relatively cold and dry. Due to a small number of precipitations, farmers started complaining about water availability in May. At the same time, normally, melting of glaciers takes place only when air temperature is higher than 20 degrees Celsius. In the mountains, the temperature reached such a level only in the third decade of June 2023 and only when the glaciers started to melt. Until then, the water level in the riverbeds of Alamudun and Ala-Archa was low, as well as in the underground water reservoirs of drinking water.

Steps in implementation:

Component 1: Continued expansion and reconstruction of open municipal irrigation system (main trays): 2024 – 1,600 m (EUR 135,000) 2025 – 1,600 m (EUR 135,000) 2026 – 1,600 m (EUR 135,000) 2027 – 1,600 m (EUR 135,000) Component 2:



2024-2025 – Drilling of 4 deep wells (EUR374,000)

2025 – Installation of 43,000 m of irrigation pipelines (EUR 683,000)

2026 – Installation of 45,300 m of irrigation pipelines (EUR 706,000)

2027 – Installation of 39,000 m of irrigation pipelines (EUR 607,500)

Targets (indicators):

- Enhancement of efficiency and effectiveness of water distribution and irrigation systems.

- Improvement of the well-being of citizens by providing access to irrigation water.

- Ensuring the efficient management and utilisation of water resources for the sustainable growth of green spaces.

Type of Action	Cle (Capital	nvestment – existing), Cln (Capital investment – new)			
Owner/Responsible body	Municipal Co	ompany "Bishkekvodkhoz"			
Stakeholders and their roles	Mayor's Offi "Bishkekzele	ce of Bishkek, Capital Construction Department of the Mayor's Office of Bishkek (contract management), ME nstroy" (technical assistance and supervision).			
Implementation start/end Year	2024–2027				
Notes on cost estimates	Cost estimat prices. The a installation. (depending c	es are based on the water utility's calculations, action plans for municipal development, as well as current market average cost of irrigation pipes/canals for main lines is EUR85/m, and for secondary lines is EUR16/m, including Cost estimates for one drilled well according to current prices and water utility's experience is cca. EUR 95,000, on the depth of the well.			
	State:	Water Exploitation Index			
Action link to indicators	Pressure:	Daily number of hours of continuous water supply per household Domestic water consumption per capita Non-revenue water Energy used for urban water production and supply			

 Improved irrigation water supply Enhanced management of greenspaces, ensuring their sustainability in the city Reduced drinking water usage for irrigation Enhanced plant growth Preserved soil structure
- Improved quality of life

Solid Waste

Sector & Reference: Solid Waste SW02										2 2	
Action Title	Improvement of the municipal solid waste collecti					Action classificatio	n hig	high priority			
system and increas			ase public av	wareness		Environmental are	a air,	air, climate change mitigation,			
Action's link to the strategic objectives:			SG1: Imp sustainal SG3: Incr biodiver:	SG1: Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while maintaining sustainable growth and improving infrastructure for transport, energy, and waste management SG3: Increase the area and quality of green spaces for city residents through the fostering of Bishkek's natural heritage an biodiversity and urban soil protection					zens' health while maintaining ent Bishkek's natural heritage and		
Estimated costs CAPEX	:	EUR	10,000,000	SOM	960,000,000	Annual OPEX	EUR	n/a	SOM	n/a	
Financing mech	anisms	loan, city	budget								

Description of the Action:

The project "Improvement of the Solid Household Waste Management System in the City of Bishkek" aims to enhance the city's solid waste management system by improvement of the waste collection efficiency and raising awareness of the population. The project is comprised of the following components:

1. Supply of New Trucks and Containers:

New trucks and containers will be procured to improve waste collection efficiency and capacity. This will facilitate proper handling and transportation of municipal solid waste (to be conducted within Integrated Waste Management Plan SW03).

GPS tracking and truck routing system: The existing waste management vehicles have a GPS tracking system to monitor and optimize their routes. This system will be extended to new vehicles, optimizing the overall routing system for enhanced operational efficiency and improved service delivery. The estimated cost for this component is EUR 6.0 million.

Additionally, the new equipment will be utilized to enhance waste separation at the source by providing recyclable and organic waste bins, along with an appropriate transport system. An estimated budget of EUR3 million has been allocated for this purpose. The segregated material can then be processed in the Waste Processing Plant foreseen under SW03.

2. Construction of Collection Points:

New collection points will be constructed strategically throughout the city, ensuring convenient and accessible locations



for residents to dispose of their waste. The placement of collection points will be based on the Waste Management Plan (WMP) in SW03. The estimated cost for this component is EUR 1.0 million. By implementing these additional measures, the project aims to reduce littering in the city and alleviate the strain on existing overloaded collection points. It seeks to enhance sustainable waste management practices, leading to an improved quality of life through pollution reduction. The city previously received support from EBRD/EU to modernize and extend the collection and transport system for MSW in Bishkek. Initial measures included the construction of collection points. However, the current number of collection points and the equipment comprising collection vehicles and containers are insufficient to cover the entire city adequately in terms of MSW storage and transport capacity. The project's goal is to comprehensively enhance the management of solid household waste in Bishkek, resulting in improved collection, transportation, and recycling processes.

3. Increase public awareness

As part of public awareness raising component, there is a focus waste refuse, reuse, reduction, separation at source and education on the importance of circular economy and its principles.

Steps in implementation:

- 1. Needs assessment: As part of SW03, a Solid Waste Master Plan will be developed for Bishkek City. One of the outcomes of this plan will be an additional needs assessment for collection points, collection/transport equipment, and equipment for separating valuable waste fractions at the source. This assessment will also include the preparation of technical specifications for the tender documents.
- Time Frame: 01/2024 06/2024
- Estimated cost: EUREUR100,000
- 2. Procurement of Equipment: Preparation of tender documents and procuring equipment and services for the establishment of collection points.
 - Time Frame: 07/2024 12/2024
 - Estimated cost: EUREUR100,000
- 3. Construction of Collection points:
 - Time Frame: 01/2025 12/2025
 - Estimated cost: EUR500,000
- 4. Supply of equipment



- Time Frame: 01/2025 12/2025
- Estimated cost: EUR800,000
- 5. Implementation of a public awareness raising programme with public relation and communication campaigns to prepare the population for the separation at source activities, and for the recycling activities which will educate the population on circular economy concept, thus promoting the separation at source activities more sustainably. In addition, it will be developed in a way to promote sustainable waste management hierarchy and circular economy principles.
 - Time Frame: 10/2024 06/2025
 - Estimated cost: EUR300,000

- Achieve 100% collection efficiency across the entire area of Bishkek.
- Eliminate illegal waste deposits within Bishkek city's boundaries.

Type of Action:	Capital Investment – new (Cin) (The action includes direct investment in new infrastructure, assets, and technologies.)					
Owner/Responsible body	City Hall of E	ishkek, Bishkek Tazalyk				
Stakeholders and Roles of stakeholders:	City Hall of E	ishkek, Bishkek Tazalyk				
Implementation Start/End Year	2024 - 2025					
Notes on cost estimates	Cost estimat Based on a p points is assu Cost estimat A collection have been a Cost estimat The estimate the purpose	es for collection points: revious tender, with an assumed cost increase of EUR10,000 per collection point. A total of 100 additional collection umed. es for vehicles: truck with a capacity of 20 m ³ is estimated to cost EUR150,000. For the purpose of this action 40 additional trucks ssumed. The cost would be EUR6,000,000. es for collection containers: ed cost for a 1,100-liter collection container is EUR500 per container. With a total of 5,600 pieces as assumed for of cost estimation for this action, the cost would amount to EUR2,800,000.				
Action link to indicators	State:	Average annual concentration of PM10 Number of contaminated sites				
	Pressure:	Total municipal solid waste generation per capita 2018: 189 kg/cap and year Share of the population with weekly municipal solid waste MSW collection 2021: 39,3 %				

	 Improved resource efficiency, increased waste separation, recycling, and waste recovery
Ponofite (onvironmental sesio	- Reduction of waste disposal at landfills
benefits (environmental, socio-	- Depollution of air, water, and soil
economic)	- Reduction of greenhouse gas (GHG) emissions
	- Improved quality of life

Sector & Reference: Solid Waste SW03											2 2
Action Title Construction of a			of a v	wasta processing plant			Action classificatio	on hi	high priority		
			orav	waste proc	essing p	nant	Environmental are	a ai	air, water resources, climate change mitigation,		
Action's link to the strategic objectives				SG1: Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while maintaining sustainable growth and improving infrastructure for transport, energy, and waste management SG3: Increase the area and quality of green spaces for city residents through the fostering of Bishkek's natural heritage and biodiversity and urban soil protection							
Estimated costs: CAPEX		EUR	45,0	000,000	SOM	4,320,000,000	Annual OPEX	EUR	n/a	SOM	n/a
Financing mecha	nisms	loan, g	ırant, ı	public-priva	te partne	ership, city budget	t				

The overall approach to sustainable waste management in Bishkek needs to include the proper organisation of waste collection and treatment. The waste management should be integrated to treat waste as a resource. Therefore, this action involves:

- The preparation of an Integrated Waste Management Plan and Technical Feasibility Study to define the future solid waste management system for Bishkek.
- The construction of a municipal solid waste processing plant with the objective of reducing waste for disposal and recovering as many recyclables and organic material as possible from the municipal waste flow.
- 1. The Waste Management Plan (WMP) is necessary to establish a comprehensive and sustainable approach to managing municipal solid waste and other waste streams. The plan will serve as a municipal policy document defining short-, medium-, and long-term targets for WMP development, prioritizing waste management practices in accordance with the waste management hierarchy and promoting material circularity. It will encompass policy measures like implementing source separation of waste and establishing suitable treatment facilities for each waste stream.



Additionally, it will outline specific strategies for managing municipal solid waste and other waste streams, aiming at all aspects of the solid waste management activity chain. This includes reducing waste generation, recovering valuable waste fractions, and minimizing landfill disposal. The WMP must clearly define the roles of key waste management stakeholders and their relationships within an integrated solid waste management system. Investment needs to achieve the plan's objectives will be identified through the waste management plan, including assessing and defining operational cost requirements and establishing a financing system based on user charges. The Technical Feasibility Study will analyse the current waste composition and quantities and provide a forecast, provide recommendations for waste collection, recycling, treatment, and disposal methods, propose locations, offer technological solutions, outline the need for environmental impact assessments, and clarify the roles of stakeholders and other relevant issues. Different scenarios both in terms of waste generation and composition changes shall be prepared and specific waste collection systems for different waste streams according to geographical patterns shall be compared. For source-separated recyclables and biowaste as well as for the mixed municipal (residual) waste, different technological treatment / recycling technologies shall be analysed in a multi-criteria assessment.

2. There is a proposal to construct a processing facility dedicated to handling organic and recyclable waste. Mixed from areas without proper separation at source will be treated as well to segregate recyclables and organic waste to be treated further for valorisation. Residual waste will be disposed at the new landfill cell. This proposal will be accompanied by a previously prepared Technical Feasibility Study by a private investment company to further clarify technical, financial (CAPEX/OPEX), and operational details of the proposed process flow and the technologies to be implemented for optimal treatment of the waste streams provided by municipal waste management services. These details will include separate collection, preparation for recycling, and waste-to-energy elements such as waste incineration if feasible, along with the use of RDF (refuse-derived fuel). This feasibility study will provide a better understanding of how the treatment facility will integrate with existing waste management practices and contribute to the overall waste management objectives of the city.

The purpose of this treatment facility is to effectively manage and process organic and recyclable waste, such as food waste and garden waste, as well as recyclable materials like paper, plastic, and glass. By implementing this facility, the city aims to reduce the amount of waste sent to landfills and explore alternative methods for waste treatment and resource recovery. The new waste processing facility should be part of an integrated waste management information system, incorporating smart solutions for digitalization of monitoring, management, and treatment of solid waste (e.g., tracking generated quantities, waste transport, treated quantities, and recovered waste).

The city has received investment support from EBRD/EU to finance a new sanitary landfill. Currently, municipal solid waste is dumped on a landfill site where the air is contaminated by landfill fires, landfill gas, and dust. Additionally, leachate from rainwater entering the waste is not captured and treated, potentially contaminating the underground site and groundwater. Landfill gas is also not captured, contributing to greenhouse gas emissions. To reduce waste going to the new landfill, optimize the recovery of recyclable and organic waste, and mitigate climate change impacts by eliminating greenhouse gases, a waste processing facility will be implemented. **Steps in implementation:**

- 1. Waste Management Plan and Technical Feasibility Study
- Time Frame: 2024 2025 (tendering of consultant, conduction of study)
- Estimated cost: EUR400,000
- 2. Implementation of Processing Plant (preparation of financing agreement, tendering of construction by investor and implementation of plant)
- Time Frame: 2024 2027
- Estimated cost: EUR45,000,000

- Prepared Waste Management Plan and Technical Feasibility Study.
- Constructed a waste processing facility.
- Achieved the delivery of 100% collected MSW in Bishkek City to the new processing plant.
- Reduced waste going to the landfill by 50%.
- Achieved a 50% recovery of recyclable waste from the total waste.
- Achieved a 70% recovery of organic waste from the total waste.

Type of Action	Policy (Development of policy document to define targets and future measures to improve SWM in Bishkek City Feasibility and Design (Preparation of an investment in new SWM activities.) Capital investment – new (Action includes direct investment in new infrastructure, assets, and technologies.)					
Owner/Responsible body	City Hall of Bishkek, Bishkek Sanitary Landfill Company					
Stakeholders and Roles of stakeholders	City Hall of Bishkek, Bishkek Sanitary Landfill Company (administration and possibly operation of new plant), Ministry of Ecology (permitting process), Tazalyk (waste collection and transport)					
Implementation Start/End Year	2024 - 2027					
Notes on cost estimates	 Cost for SWMP: The SWMP is approximately EUR500,000. 12-month duration: 15 months of consultancy work (team leader, SWM expert institutional expert, environmental expert, economist). International/local experts: 10 international x 30,000 + 10 local 20,00 = EUR500,000 Cost for Technical Feasibility Study and Waste Processing Plant: Estimation by Foreign Company: EUR45,000,000 					
	State: Average annual concentration of PM10 Number of contaminated sites					
Action link to indicators	Pressur e: Municipal solid waste treated in sorting, processing, and treatment plants 2021: 1-10%					



Benefits	(environmental,				
socio-economic)					

The development of policy documents like the Waste Management Plan (WMP), along with the preparation and implementation of a municipal solid waste treatment plant, contributes to sustainable waste management by reducing pollution, enhancing coordination between waste management and utility companies, decreasing the amount of waste sent to landfills, recovering valuable materials from the waste stream, improving the quality of life, and reducing emissions from landfills. Furthermore, the lifetime of the newly constructed Solid Waste Management (SWM) landfill cell will be maximized by only disposing of residual waste from the processing plant.

Action Title Construction of the existing landfill and closure / remediation of the existing landfill Action classification high priority Action's link to the strategic SG1: Improve air quality in Bishkek and reduce the negative improving infrastructure for transport, emergy, and waste management SG1: Improve air quality in Bishkek and reduce the negative improving infrastructure for transport, emergy, and waste management SG1: Improve air quality in Bishkek and reduce the negative improving infrastructure for transport, emergy, and waste management	Sector & Reference: Solid Waste SW04										â
Action 's link to the strategic Environmental area air, climate change mitigation Action's link to the strategic SG1: Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while maintaining sustainable growth and improving infrastructure for transport, energy, and waste management	Action Title Construction of a sanitary landfill and closure remediation of the existing landfill			and closure /	Action classificatio	h h	high priority				
Action's link to the strategicSG1: Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while maintaining sustainable growth and improving infrastructure for transport, energy, and waste management				ion of the existing landfill			Environmental are	a a	air, climate change mitigation		
objectives SG3: Increase the area and quality of green spaces for city residents through the fostering of Bishkek's natural heritage and biodiversity and urban soil protection	Action's link to the strategic objectives			SG1: Improve sustainable g SG3: Increas biodiversity a	e air qua growth a e the are and urba	ality in Bishkek ar nd improving infra ea and quality of g an soil protection	nd reduce the negativ astructure for transpor green spaces for city r	re impac t, energ esidents	ct of air pollution ly, and waste man through the foste	on citiz agemen ering of	ens' health while maintaining t Bishkek's natural heritage and
Estimated costs: CAPEX EUR 15,000,000 SOM 1,440,000,000 Annual OPEX EUR n/a SOM n/a	Estimated costs: CAPEX		EUR	15,000,000	SOM	1,440,000,000	Annual OPEX	EUR	n/a	SOM	n/a
Financing mechanisms loan	Financing mecha	nisms	loan								

Description of the Action:

The action aims to enhance the solid waste management system in Bishkek City. The project includes the following components:

- 1. Closure and remediation of Existing Landfill: The existing Bishkek landfill will be closed, remediated and shall undergo recultivation to restore and rehabilitate the site.
- 2. Construction of a New Sanitary Landfill: A new sanitary landfill cell will be constructed, including a waste reception area and administration facilities. This new landfill will provide improved waste disposal practices and comply with modern environmental standards.
- 3. Utilization of Available Funds: The funds initially allocated for the waste sorting and composting plant (MBT) will now be redirected to cover the costs of recultivating the existing landfill site. Additionally, these funds will be used to upgrade the new sanitary landfill with a landfill gas-to-energy management system and a leachate treatment plant.

These improvements to the waste disposal infrastructure will be implemented with the support of international financing institutions, particularly the European Bank for Reconstruction and Development (EBRD). The goal is to ensure more sustainable and environmentally friendly waste management practices in Bishkek.

Currently, municipal solid waste is dumped on a landfill site where the air is contaminated by landfill fires, landfill gas, and dust. Moreover, leachate from rainwater entering the waste is not captured and treated, potentially contaminating the underground site and eventually the groundwater. Additionally, landfill gas is not



captured, contributing to greenhouse gas emissions. With the construction of the new landfill cell, all environmental emissions will be mitigated, and landfill gas will be captured as much as possible to reduce greenhouse gas emissions. Capturing and treating leachate will minimize the potential risk of groundwater resource damage.

By implementing these additional measures, the project aims to enhance the overall management of solid household waste in Bishkek, leading to improved waste disposal practices.

Steps in implementation:

- 1. A design and build contract have been concluded with a contractor according to the FIDIC Yellow Book to construct the new landfill cell and close the existing dump site.
- Time Frame: 2024 2026
- Estimated Cost: EUR15,000,000
- 2. A contract has been concluded to include the closure of additional parts of the dump site and implement additional measures to enhance the environmental sustainability of the new landfill.
- Time Frame: 2024 2026

Estimated Cost: EUR3,100,000

- 100% of municipal waste goes to the new landfill cell after treatment in waste processing facility
- Greenhouse gas emissions from uncontrolled waste disposal are reduced
- Leachate generated in the landfill is captured and treated

Type of Action	Capital investment – new (Action includes direct investment in new infrastructure, assets, and technologies.)
Owner/Responsible body	City Hall of Bishkek, Bishkek Sanitary Landfill Company
Stakeholders and their roles	City Hall of Bishkek, Bishkek Sanitary Landfill Company (administration and possibly operation of new plant), Ministry of Ecology (permitting process), Tazalyk (waste collection and transport)
Implementation Start/End Year	2024 – 2026
Notes on cost estimates	 Cost estimation: Cost for initial Design-Build Contract for new landfill and closure of existing dump site: Based on feasibility study and tender for works contract. Estimated cost: EUR11,900,000 Cost for new contract for closure of additional parts of dump site and additional landfill measures: Based on cost proposal from current contractor. Estimated cost: EUR3,100,000



Action link to indicators	State:	Average annual concentration of PM10 Number of contaminated sites					
	Pressure:	Junicipal solid waste disposed in EU-compliant/equivalent sanitary landfills 2021: 0%					
Benefits (environmental, socio- economic)	The closure of the old dump site and the disposal of municipal solid waste in a new landfill cell will result in environmental friendly waste disposal. Greenhouse gas emissions will be reduced, and nuisances caused by constant landfill fires, dust, an odours will be minimized. Through sustainable waste management, the quality of life for nearby residents will be improved and pollution will be reduced.						

Buildings

Sector & Reference: Buildings B01												
Action Title	Energy	rgy efficient retrofitting of public non-					Action classificatio	n F	High priority			
Action Title:	residential buildings - Pilot scheme						Environmental area	a /	Air, Climate Change Mitigation			
Action's link to the strategic objectives SG1: Improve air quality in Bis sustainable growth and impr						air quality in Bishk owth and improvi	kek and reduce the negative impact of air pollution on citizens' health while maintaining ving infrastructure for transport, energy, and waste management					
Estimated costs: CAPEX EUR 70,00		70,000,0	. 000	SOM	6,720,000,000	Annual OPEX	EUR	n/a	SOM	n/a		
Financing mechanisms Credit, city's budget												

Description of the Action:

The public sector is a major energy consumer in Bishkek, with public buildings constituting the largest segment. Many of these public buildings were constructed decades ago and lack proper energy efficiency measures, such as insulation. Additionally, their energy management practices are not up to satisfactory standards. A pilot programme has been initiated to enhance the energy efficiency of municipally owned public buildings in Bishkek. The programme encompasses various steps, including conducting an energy audit, implementing priority improvements (such as insulation enhancements for building envelopes and windows, HVAC efficiency improvements, and controls), tracking energy consumption before and after the improvements, and creating a lesson learned report for each building. This pilot initiative will be conducted on 25 buildings, each with a budget of EUR2 million, which will be funded through a 'PPP' (public-private partnership) arrangement. The insights gained from these pilot studies will be utilized to formulate an overarching report on pilot study findings, as well as a strategy for the potential 'Phase 2 rollout programme' that would encompass all relevant municipally owned public buildings in Bishkek. **Rationale:**



Many public buildings in Bishkek lack proper insulation and exhibit low levels of energy efficiency. These buildings rely on aging systems that are powered by fossil fuels, and there is a noticeable absence of on-site renewable energy generation. Given the extensive nature of this challenge throughout the city, a pilot study programme is being proposed to determine the best possible solution.

Steps in implementation:

Step 1: Energy audits, set-up of building typology, preparation of technical documentation with energy efficiency measures, set up of PPP relationship Step 2: Energy rehabilitation of 25 buildings

Step 3: Develop an energy management guide for energy mangers and all occupants of public buildings, Include energy monitoring and smart energy management A two-year lead-in period is set for establishing the approach to scheme administration, selecting sites, and conducting building audits (2024-2025), followed by a three-year retrofit programme for the 25 public buildings (2026-2028). An additional year is allocated for post-occupancy monitoring upon completion (2028-2029). The buildings prioritized in the programme are those with the highest overall energy consumption, energy intensity, and maintenance requirements.

- A minimum reduction of 35% in energy consumption in the retrofitted buildings.
- Changes in energy management and improved energy-efficient behaviours among occupants.

Type of Action	Cle (Capital investment – existing)						
Owner/Responsible body	City of Bishkek, Department for individual housing construction and urban planning						
Stakeholders and Roles of stakeholders	State Agency for Architecture, Construction and Housing						
Implementation Start/End Year	2024-2029						
Notes on cost estimates	Costs estimations of energy audits and technical documentation based on expert's experience: EUR250,000. Energy rehabilitation: Assumes EUR2,000,000 for 25 public buildings, with 20% contingency in place. EUR5,000,000 for establishing creation of 'PPP'. EUR5,000,000 for scheme administration included. Energy management guide.						
Action link to indicators	Average annual concentration of PM2.5Average annual concentration of PM10State:Average daily concentration of SO2Average daily concentration of NOxAnnual CO2 equivalent emissions per capita						
	PressElectricity consumption in non-residential buildingsure:Heating consumption in non-residential buildings fossil fuels						
Benefits (environmental, socio- economic)	 Reduction of energy use and carbon emissions Improved air quality in the city Enhanced indoor thermal comfort, including temperature and humidity in work and living spaces 						



 Extended expected building lifetime, leading to increased asset values and improved public health Enhanced quality of life and comfort for citizens Implementation of measures targeting vulnerable individuals, enhancing their access to public buildings
 Job creation Lower energy costs Enhanced building safety

Sector & Reference: Buildings B02										
Action Title	ing technical capacity and training for				Action classification	Bu	Buildings (medium priority)			
Action Title	underta	undertaking building energy efficiency works				Environmental are	a Ai	Air, Climate Change Mitigation		
Action's link to to objectives	he strate	gic	SG1: susta	SG1: Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while maintaining sustainable growth and improving infrastructure for transport, energy, and waste management						
Estimated costs: CAPEX EU		EUR	3,000,00	00 SOM	288,000,000	Annual OPEX	EUR	-	SOM	-
Financing mecha	nisms	City budget, credit, grant								

A construction skills and energy efficiency training programme will be developed in Bishkek to enhance the technical capacity necessary for implementing the planned building stock upgrades. The programme will encompass various aspects related to new construction, retrofitting, design, construction techniques, energy auditing, inspections, energy efficiency measures, renewable energy technologies (e.g., photovoltaics), and building maintenance. The training content will be designed to provide participants with comprehensive knowledge and skills, enabling them to effectively execute energy-efficient building projects. It will cover both theoretical concepts and practical applications, focusing on the latest industry standards and best practices in energy-efficient construction.

Additionally, the scope of the programme will include establishing a stronger capacity for enforcement to ensure that all relevant buildings comply with energy efficiency requirements. This will involve implementing measures to ensure that green energy certificates are obtained for qualifying buildings and that the information is uploaded to a centralized reporting web-platform. This platform will serve as a repository for tracking and monitoring the energy performance of buildings in Bishkek.

By developing this construction skills and energy efficiency training programme, Bishkek aims to enhance the expertise of construction professionals, promote the adoption of energy-efficient practices in both new and existing buildings, and facilitate the certification and monitoring of green energy performance. This comprehensive approach will contribute to the city's overall sustainability goals and the reduction of energy consumption in its building stock.

Rationale:


Skills and training levels are currently low regarding building energy efficiency and renewable energy. Similarly, the uptake levels of green certifications are limited, as are the number of inspections that occur once works are completed. Investment in these areas would enable greater capacity and quality, enhancing the city's ability to deliver more effective results.

Steps in implementation:

- 1. Establishment of training scheme, administration, and initial start-up from 2024-2026 with on-going investment to support long term implementation from 2026-2029.
- 2. Parallel activities to include support to central government on ensuring more routine inspections relating to compliance with minimum standards take place (e.g. energy efficiency, boiler inspections, metering, safety, green certificates etc).

Targets (indicators):

- Number of industry professionals trained
- % of applicable buildings with green energy certificates on the web-platform

Type of Action	ACB (Awareness and Capacity Building)							
Owner/Responsible body	City of Bishkek, Department for individual housing construction and urban planning							
Stakeholders and Roles of stakeholders	State Agency for Architecture, Construction and Housing							
Implementation Start/End Year	2024-2029							
Notes on cost estimates	Assumes EUR1,000,000 for initial establishment of training programme and EUR2,000,000 for on-going implementation							
Action link to indicators	Average annual concentration of PM2.5Average annual concentration of PM10State:Average daily concentration of SO2Average daily concentration of NOxAnnual CO2 equivalent emissions per capita							
	Electricity consumption in buildings Pressure: Heating consumption in buildings fossil fuels Total value of projects with green building certification							

 Reduction of energy use and carbon emissions Improved air quality in the city Improvement of indoor thermal comfort, including temperature and humidity in work and living spaces Extension of the expected building lifetime, leading to increased asset values and improved public health Increased quality of life and comfort for citizens Implementation of measures targeting vulnerable individuals, enhancing their accessibility to public build Creation of job opportunities Decreased energy costs Enhanced building safety Higher quality of work 	ngs
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Land Use

Sector & Reference: Land Use – LU1													
	Planting and	and caring for green spaces in the territory of					Action classification	on hig	high priority				
Action Litle	ction Title Bishkek (in squares, parks, green places) and developme				ong roa of vertio	ds and other cal greening	Environmental are	a gr	green space, air, climate change adaptation				
Action's link to	Action's link to the strategic objectives				SG3: Increase the area and quality of green spaces for city residents through the fostering of Bishkek's natural heritage and biodiversity and urban soil protection.						ng of Bishkek's natural heritage		
Estimated cos	ts: CAPEX	EUR	13,550,00	00	SOM	1,300,800,000	Annual OPEX	EUR	1,000,000	SOM	96,000,000		
Financing mechanisms loan, city's budg				get									

Description of the Action:

The recovery, improvement, and new construction of green spaces in Bishkek are considered highly important for the city's functioning and the enhancement of its quality of life. This action comprises several components:

Component 1: The expansion of green spaces in Bishkek will involve planting various seedlings, including 33,000 mature trees, 13,500 shrubs, and 570,000 hedges. This initiative is based on the "Jashyl Muras" program, which focuses on landscaping boulevards, parks, public gardens, school grounds, and intra-quarter territories.



The program emphasizes the use of royal walnut (walnut) due to its longevity of 250-300 years compared to other broad-leaved species that typically require replacement every 35-50 years. This component is planned to take place from 2024 to 2030 and it was included in the previous action plan³¹.

Component 2: The park "Karagachevaya Grove" will undergo landscaping, with an estimated cost of EUR 2,000,000. This estimation is based on the surface area and the cost of rehabilitating the green space within the park. This sub-action may be carried out independently and is scheduled for the period 2025-2027.

Component 3: The scope of this component is to rehabilitate parks in Bishkek and increase green spaces to mitigate hotspots. An annual investment of EUR 1,000,000 over a 10-year period is required. This component will be implemented on a yearly basis from 2024 to 2033.

Component 4: Vertical greening, also known as vertical gardens or living walls, involves growing plants and vegetation vertically on building surfaces. This approach maximizes greenery in urban areas with limited horizontal space, improving aesthetics and offering environmental benefits such as enhanced air quality, insulation,

reduced urban heat island effect, noise reduction, and habitat creation for birds and insects. Additionally,

vertical greening can lead to energy savings by shading buildings and reducing the need for air conditioning.

This component is planned to take place from 2024 to 2035. Plants that will be used for vertical greening can be epiphytic, lithophytes and bromeliads. Moreover, there will be taken in consideration the ferns, succulent, herbaceous, small shrubs, and climbing plants.

The LU01 action includes several components related to the protection of natural heritage, including existing green spaces and indigenous plants. To ensure an adequate planting material supply, the program involves establishing nurseries for landscaping in Bishkek under the control of the National Academy of Sciences of the Kyrgyz Republic. The program will also incorporate scientific recommendations from the Research Institute "Botanical Garden" for planting greenery in settlements. Moreover, efforts will be made to align Bishkek's urban irrigation network with the Master Plan. These initiatives aim to enhance the availability and quality of green spaces in Bishkek, contributing to the well-being and liveability of the city.

Main parks (existing and recently opened) \mathbf{Q}

Targets (indicators):

- Number of reconstructed green spaces,
- Number of planted trees,
- Number of newly constructed park and green infrastructures,



³¹ Plan of comprehensive measures to improve the environmental situation in the city of Bishkek and Sokuluk, Alamudun districts of Chui region for 2021-2023, Task/Measure 3.



- Number of buildings with vertical greening.

Type of Action	Cle & Cln (Capital investment – existing and Capital investment – new)							
Owner/Responsible body	Departme Housing a	nt of City Economy of the Mayor's Office of Bishkek, Municipal Administrations of the Mayor's Office of Bishkek, nd Communal Services Unit of the Central Office of the Mayor's Office of Bishkek, MP "Bishkekzelenkhoz"						
Stakeholders and Roles of stakeholders	Scientific R Kyrgyzstan Public Fun Other civil	esearch Institute Bishkek Botanic Garden to recommend the most relevant species of planation that are adapted to climate; among them the species that can improve air quality in wintertime will be considered. d Archa Initiative – advisory roles as well as provides overseeing from the civil society organisations side. society organisations.						
Implementation Start/End Year	2024 - 203	2024 - 2035						
Notes on cost estimates	Costs are estimated on the scope and quantity of investments. In addition, the estimated costs took into account estimated costs and plan on the implementation of the Bishkek City Development Program "Bishkek - 2026 A comfor green capital" and Plan of comprehensive measures to improve the environmental situation in the city of Bishkek and Alamudun districts of Chui region for 2021-2023. Component 1: The estimated cost for this project, based on seedling and mature tree prices, is EUR 1,250,000. Estimated on the prices of seedlings, trees planting. Component 2: The estimated cost is EUR 2,000,000 estimation is based on the surface area and the cost of rehabilit green space within the park. Component 3: To rehabilitate parks in Bishkek and increase green spaces to mitigate hotspots, an annual investme 1,000,000 (total of EUR 10 million over the 10 years). Component 4: The estimated cost for the pilot vertical greening effort on five buildings is EUR 300,000.							
Action link to indicators	State:	Average annual concentration of PM2.5 Average annual concentration of PM10 Annual CO2 equivalent emissions per capita Annual CO2 emissions per unit of GDP Open green space area per capita Share of green space areas within urban limits						



	Pressure:	N/A
Benefits (environmental, socio- economic)	- Impi - Incre - Effic - Enha - Ada	ovement of greenspace management, ensuring the sustainability of greenspaces in Bishkek, eased sequestration of CO2 in the urban area, ent irrigation, ancement of quality of life and health with additional park and forestry areas, otation to increased temperatures in the urban area and reduction of hotspots in the city.

Sector & Re	eference: La	nd Use	e – LU	12*							
Action Title	Reconstruction of scientific research Institute						Action classificatio				
Action The	Botanical Ga	rden					Environmental are	a	green space, bioc	air	
Action's link to the strategic objectives SG3: Increase the area and biodiversity and u					the area and qual ty and urban soil	ity of green spaces for protection.	city res	idents through the	e fosterir	ng of Bishkek's natural heritage	
Estimated cos	ts: CAPEX	EUR	UR 420,000		SOM	40,320,000	Annual OPEX	EUR	n/a	SOM	n/a
Financing mechanisms loan											

Description of the Action:

The Gareev Botanical Garden of the National Academy of Sciences of the Kyrgyz Republic is located in Bishkek with a total area of 174,32 hectares. On the grounds of the Botanical Garden there is a large arboretum, a greenhouse for exotic plants, a luxurious flower garden, a rose garden with an area of three hectares, where flowers bloom from April to August. In addition, an orchard has been planted here, where different types of fruit trees are harvested. Local scientists take pride in their extensive collection of hybrid plants. Three hectares is occupied by a pharmaceutical garden with medicinal herbs that grow here for purely practical purposes. The employees of the Botanical Garden pay great attention to the study of their medicinal properties and the production of tinctures, solutions, and ointments from herbs, which help with certain diseases and conditions. There is also a nursery at the Botanical Park where plants are grown for sale.

The Botanical Garden needs to be rehabilitated using new sustainable landscape design methods combined with local knowledge in gardening, horticulture, and fauna protection. Botanical education and citizen engagement with nature and ecology will take a central role, raising awareness of the regional ecosystem.



Conditions for the work of scientists will be created on the territory of the Botanical Garden: modern laboratories, greenhouses, a greenhouse, a reservoir, experimental sites, and territories equipped with drip irrigation for the introduction and selection of plants, scientific conferences of both national and international importance are held. The restored and reconstructed Botanical Garden will become the main attraction and unique natural area of Bishkek and Kyrgyzstan, the tourist, educational and cultural centre of Bishkek, a place of attraction for citizens and communication with nature.

The Botanical Garden plays major roles in plant conservation globally. Its involvement in integrating ex-situ and in-situ plant conservation has increased significantly, with a growing focus on understanding, documenting, and capturing genetic diversity in its living collection– an important factor for conservation.

Type of Action	Cle & Cln (Capital investment – existing and Capital investment – new)								
Owner/Responsible body	Academy o	Academy of Sciences of KR, Scientific Research Institute "Botanical Garden"							
Stakeholders and their roles	Mayor's Of	Mayor's Office of Bishkek							
Implementation Start/End Year	2024-2030								
Notes on cost estimates	Costs are e	Costs are estimated on the scope and quantity of investments.							
Action link to indicators	State:	Average annual concentration of PM2.5 Average annual concentration of PM10 Annual CO2 equivalent emissions per capita Annual CO2 emissions per unit of GDP Open green space area per capita Share of green space areas within urban limits							
	Pressure:								
Benefits (environmental, socio- economic)	Conditions for the work of scientists will be created on the territory of the Botanical Garden: modern laboratories greenhouses, a reservoir, experimental sites and territories equipped with drip irrigation for the introduction and selection plants, so that scientific conferences of both national and international importance can be held. The restored are reconstructed Botanical Garden will become the main attraction and unique natural area of Bishkek and Kyrgyzstan, to tourist, educational and cultural centre of Bishkek, a place for communication with nature.								



The second s	
Development of the base of ME "Bishkekzelenkhoz" Action classification High priority	
Action Title for growing adapted large-sized planting material for the purpose of issuing it to the city through nursery and greenhouse optimization and modernisation Environmental area Air, Climate change mitigation	
Action's link to the strategic objectives Increase the area and quality of green spaces for city residents through the fostering of Bishkek's natural biodiversity and urban soil protection.	ral heritage
Estimated costs: CAPEX EUR 12,000,000 KGS 1,152,000,000 Annual OPEX EUR n/a KGS n/a	
Financing mechanisms credit, budgetary financing	

Description of the Action:

Developing green spaces to meet the needs of the growing population is a priority task for the "Bishkekzelenkhoz" Municipal Enterprise. To achieve this goal, "Bishkekzelenkhoz" needs to establish seedling nurseries and increase the production of seedlings for distribution and recultivation in the greenspaces of Bishkek. "Bishkekzelenkhoz" currently owns KGSe nurseries and greenhouse fields, which are used for seedling cultivation. However, a significant proportion of these areas remains unused for two main reasons: a lack of labour force and the vulnerability of the nurseries to adverse weather conditions such as rain and snow.

The objective is to develop the foundation of "Bishkekzelenkhoz" for cultivating well-adapted large-sized planting materials that can be distributed throughout the city. The project's goal is to enable year-round operation of the existing and additional nurseries. To achieve this, equipping the nurseries with environmentally friendly and reliable heating pumps is essential. These heating pumps utilize the heat stored in the environment, drawing warmth from sources such as groundwater, soil, air, lakes, seas, and oceans. Compressors and heat circulation are powered by electricity, with the heating pump generating two to five times more heat than the power consumed. Importantly, the heat production process does not involve combustion and does not produce harmful by-products like smoke, gases, or ash. Many heating pump models also offer a reverse mode, allowing them to function as air conditioners during the summer months.

"Bishkekzelenkhoz" will collaborate with the Botanical Garden under the Academy of Sciences to achieve these goals.

Rationale:

It is widely recognized by all stakeholders that air pollution is a significant concern in Bishkek, particularly during the winter months. Simultaneously, the overall green space area in the city of Bishkek is decreasing, while the city's population continues to grow. This shortage of green spaces also contributes to an increase in temperatures during the summer. The project aims to enhance both air quality and the climate in Bishkek.



By optimizing and modernizing nurseries and greenhouses, all parties involved can benefit. City residents will enjoy fresher air, while unemployed individuals will have the opportunity to secure employment. They will participate in setting up nurseries and contributing to the city's green initiatives. Over time, the greenhouses may become competitive compared to private ones, offering the possibility of planting diverse tree species suited to various purposes and locations.

Steps in implementation (optional):

Step 1: Preparation of the technical documentation and set up of location conditions for construction of greenhouses (2024). Step 2: Purchase of equipment's and construction of greenhouses with introduction of energy efficient management (2025 – 2028) Step 3: Distribution of planting materials for recultivation of greenspaces in Bishkek (2026 – 2029). Targets (indicators):

- Modern, efficient, and energy-saving greenhouses, along with hardening sites and container-based seedling cultivation areas, have been constructed:
- These facilities are equipped with the necessary equipment and automated lines to ensure optimal operations.
- Number of greenhouses in function.
- Increased the replanting in Bishkek

Type of Action	Cln (Capital i	Cln (Capital investment – new)						
Owner/Responsible body	MP "Bishkek:	zelenstroy"						
Stakeholders and their roles	This project produce the can improve	is project is a collaboration between MP "Bishkekzelenstroy" and the Scientific Research Institute "Botanical Garden" to oduce the most recommended species of seedlings that are adapted to Kyrgyzstan climate; among them the species tha n improve air quality in wintertime will be considered.						
Implementation Start/End Year	2024-2029	2024-2029						
Notes on cost estimates	The estimation equipment. due to signif service life of higher. OPE2 reduction in	ons are provided by the Bishkekzelenstroy based on the prices for construction of greenhouses and purchase of The calculations show that even though heat pumps are slightly more expensive equipment that the gas ones, icant savings of operational costs, this difference in capital costs is paid off very quickly - during one season. The f the heat pump is several times longer than that of gas or other equipment and the reliability of these units is K costs should be reduced for approximately 28% based on estimations of energy and maintenance costs similar cases.						
Action's link to indicators	State:	Average annual concentration of PM2.5 Average annual concentration of PM10 Annual CO2 equivalent emissions per capita						



		Annual CO2 emissions per unit of GDP Open green space area per capita Share of green space areas within urban limits
	Pressure:	Share of renewable energy in total energy consumption Electricity consumption in industries Fossil fuel combustion in industrial processes
Benefits (environmental, socio- economic)	 Increa biodiv Seque Using The op of fuel Reduct Impro that ai Reduct High et Job cr Impro Green 	sed capacities for nursery of plants (trees) necessary for development of greenspaces and reforestation, improved ersity, and preservation of natural heritage stration of CO ₂ with planting of trees heat pumps significantly reduces CO ₂ emissions into the atmosphere peration of heat pumps occurs without burning fuel, therefore, without harmful emissions into the atmosphere combustion products tion of the operational costs and maintenance of the energy supply system ved exploitation al safety (due to the fuel absence the possibility of fire, explosions, and leakage of substances re hazardous to health is excluded) tion of dependence on fuel and gas economic efficiency of heat pumps eation ved knowledge and capacities in modern horticulture practice and maintenance of green spaces spaces in park areas and squares create conditions for social interaction, improved mood, and well-being.

Cross-Cutting

Sector 8	Sector & Reference: Cross Cutting – CC01												
Action	Development o safety monitori	f a Roadn ng systen	nap of e n and In	nvironme formation	ntal safety, Envir Campaign on Ei	onmental nvironmental	Actio	n classifi	cation	med	lium prio	ority	
Title:	situation	5,5	-,						l area	air, water, soil, climate change			
Action's link to the strategic objectives SO1, SO2, SO3													
Estimated	costs: CAPEX	EUR	1,000,00	0 SOM	96,900,000	Annual OI	PEX	EUR	100,000		SOM	9,603,900	
Financing	ancing mechanisms city budget, grant, loan												

Description of the Action:

The public awareness and adequate transfer of knowledge and information is key to the implementation of the Green City Action Plan. The awareness raising is related to ensuring dissemination of information on environmental safety and informational campaign on the situation and environmental protection measures. The action is divided into two components as follows:

- Component 1; This action focuses on the development of a comprehensive roadmap to ensure a sufficient level of environmental safety. The roadmap will outline key policies, strategies, and plans aimed at improving countries' ability to adapt to the adverse effects of climate change. It will address various aspects of environmental safety, including mitigation, adaptation, and resilience measures. The objective is to encourage development and implementation of robust policies that safeguard the environment and enhance their capacity to respond effectively to climate change challenges. Regular reporting by countries on their progress in implementing the roadmap will be a key component of this action.
- Component 2: Development of a monitoring system and measures of responsibility on environmental safety issues. This component aims to develop a comprehensive monitoring system that effectively tracks environmental indicators and ensures compliance with safety standards. It includes the establishment of monitoring protocols, data collection methods, and analysis techniques to assess the state of the environment. Additionally, measures of responsibility will be implemented to hold individuals and organisations accountable for their actions that may impact the environment. The ultimate goal is to maintain a healthy and sustainable ecosystem by proactively addressing environmental safety issues.
- Component 3: This action aims to organize and implement an extensive information campaign targeting the public, non-governmental organisations, and media outlets. The campaign will focus on raising awareness about the current environmental situation in the city and promoting measures to improve it. Various communication channels, such as public meetings, workshops, social media, and traditional media platforms, will be utilized to disseminate information effectively. The campaign will provide accurate and accessible information about environmental issues, their causes, and the potential solutions. It will emphasize the importance of individual and collective actions in safeguarding the environment and encourage active participation in environmental conservation efforts. By engaging the public, non-governmental organisations, and media outlets, the campaign aims to create a widespread understanding of environmental



Steps in implementation (optional):

Step 1: Development of roadmap (2023 – 2024)

Step 2: Development of environmental safety monitoring system (2024 - 2026)

Step 3: Development and conducting of Campaign on Environmental Situation and Improvement Measures (2024 – 2030).

Targets (indicators):

- Roadmap on environmental safety.
- Environmental safety monitoring system
- Increased awareness of citizens on the environmental situation in Bishkek. Verification should be performed through the public surveys.

Type of Action	Policy & Awa	Policy & Awareness and Capacity Building						
Owner/Responsible body	Department	epartment of City Economy (Housing and Public Utilities) of the Mayors' Office of Bishkek						
Stakeholders and Roles of stakeholders:	 NGOs w Kyrgyzhy safety rc 	NGOs will have a key role in dissemination and advocacy for implementation of greening actions. Kyrgyzhydromet will provide important data and information that should be used in the development of the environmental safety roadmap and awareness raising campaign.						
Implementation start/end year	2023–2030	023–2030						
Notes on cost estimates	The CAPEX a	he CAPEX and OPEX is based on expert judgement and benchmarking of similar actions.						
Action link to indicators	State:							
	Response	Public and non-motorised transport is promoted through Information and awareness campaigns Renewable energy facilities are incentivised through awareness campaigns Water saving reuse is encouraged through awareness campaigns Reduction of material consumption solid waste generation is promoted through awareness campaigns Solid waste reuse sorting and recycling is promoted through information and awareness campaigns						
Benefits (environmental, socio- economic)	 Improvement of environmental management and protection. Improved environmental safety. Improved quality of life. Increased awareness on environmental issues. Increased public support for implementation of environmental protection measures. 							



Sector & Reference: Cross Cutting – CC03 **Action classification** High priority Purchase and install automatic air pollution monitoring **Action Title** stations **Environmental area** Air Improve air quality in Bishkek and reduce the negative impact of air pollution on citizens' health while Action's link to the strategic objectives: maintaining sustainable growth and improving infrastructure for transport, energy, and waste management Estimated costs: CAPEX EUR **Annual OPEX** EUR 40,000 500,000 *SOM* 48,000,000 SOM 3,840,000 **Financing mechanisms** City budget, grant

Description of the Action:

Pollution of the air is at a prominent level, and it is one of the most critical environmental challenges for Bishkek. A proper and collaborative air monitoring model is necessary to identify locational and periodic air pollution. This model is primarily oriented towards the identification and measurement of key air pollutants: SO2, NOx, PM2.5, PM10, and other pollutants originating from the use of fossil fuel energy, transportation, and waste burning.

This action centres on the procurement and installation of automatic air pollution monitoring stations in urban areas and the settlements around the city. These stations will be equipped with advanced sensors and monitoring equipment to measure and monitor various air pollutants in real-time. The objective is to establish a comprehensive air quality monitoring system that provides accurate and up-to-date information on pollutant levels in the air. This data will enable authorities to assess air quality, identify pollution sources, and take necessary measures to mitigate pollution and improve overall air quality in urban areas.

Regular monitoring and reporting of air pollution levels will be conducted to ensure the effectiveness of pollution control measures and to raise public awareness about the importance of clean air. Modern, digitized equipment will be purchased to ensure real-time air quality monitoring. The collaborative air monitoring system will enhance citizen awareness, improve City Administration, identify pollution hotspots, and increase the city's ability to respond adequately.

This action is crucial for the city and falls under the joint jurisdiction of both city and governmental institutions. Kyrgyzhydromet has constructed a new, large automatic air monitoring station. Additionally, the World Bank has committed to purchasing and installing six new stations. However, these efforts will not fully cover the city's total needs.

Steps in implementation:

Step 1: Review of the existing air pollution methods and equipment (2024).

Step 2: Preparation of the joint model for the air monitoring, including use of existing and newly installed monitoring equipment, involvement of governmental bodies (i.e. Kyrgyzhydromet) (2024).

Step 3: Purchase and installation of air pollution monitoring stations (2024).

Step 4: Monitoring of air pollution and analysis of the data with information dissemination and possibility for quick response to extreme situation (i.e. high levels of pollutants) (2024-2026).

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The action should be implemented in the period 2024 – 2026 with clear air quality management and control. Targets (indicators):

- Report on exiting air pollution monitoring methods
- Number of purchased and installed stations
- Functional air quality monitoring system

Type of Action	Monitoring and Reporting			
Owner/Responsible body	Mayor's office of Bishkek, Department of City Economy (Housing and Public Utilities).			
Stakeholders and their roles	Kyrgyzhydromet: Responsible for ongoing air quality monitoring. NGOs: Responsible for monitoring air quality using simple measurement equipment and facilitating citizen responses in extreme situations.			
Implementation start/end year	2024-2026			
Notes on cost estimates	The CAPEX and OPEX is based on expert judgement and benchmarking of similar actions.			
Action link to indicators	State:	Average annual concentration of PM2.5 Average annual concentration of PM10 Average daily concentration of SO2 Average daily concentration of NOx		
	Pressure:	Pressure: n/a		
Benefits (environmental, socio- economic)	 Reduction of air pollution and improvement of air quality. Increased public awareness of air quality. Improved functioning of City Administration. Health protection enhancement. Improved quality of life. 			



Sector & Reference: CC04

Action Title Feasibility study or Alamudun rivers an		on restoratio	restoration of Ala- Archa and		Action classificatio	m Me	Medium priority			
		rivers and BChK (Big Chui Channel)				Environmental are	a Wa	Water resources, soils, green space, biodiversity.		
Action's link to the strategic objectives			SG2: Imp of the su SG3: Incr and biod	SG2: Improve water supply and water use efficiency in Bishkek in order to avoid water scarcity, and to increase the quality of the surface water, and to improve the sewer network and appropriate treatment of wastewater. SG3: Increase the area and quality of green spaces for city residents through the fostering of Bishkek's natural heritage and biodiversity and urban soil protection.						
Estimated costs	: CAPEX	EUR	350,000	KGS	33,600,000	Annual OPEX	EUR	n/a	KGS	n/a
Financing mech	anisms	Loan (international financing institutions), grant (international financing institutions), city budget								

Description of the Action:

The Master Plan of Bishkek to 2025 provides for the organisation and improvement of the water protection lanes of the Ala-Archa and Alamudun rivers, the Western Big Chui Channel, the Eastern Big Chui Channel, the Southern Big Chui Channel, and the implementation of measures to restore floodplain areas as elements of the ecological framework of the city. The Master Plan provides for bank protection works along the riverbeds of the Alamudun and Ala-Archa rivers, caused by the need to protect urban areas from the flood waters of these rivers, with the aim of their further improvement:

- along the Alamudun River from the railway to the bypass road, 8.7 km long, and continuation of regulatory work to the south of the 12th micro district. to the settling basin with a length of 2.1 km;
- along the bed of the Ala-Archa River --- from Chui Avenue to the northern border of the city with a length of 4.0 km.

To improve the environmental situation in the city, it is planned to preserve and restore watercourses (natural and artificial) of the city as the basis of the urban natural complex.

The goal of this project is to develop a feasibility study for a project of environmental rehabilitation (restoration) of urban rivers using various nature – based solutions with the possibility of creating a blue-green corridor along the city rivers.

Rationale:

Previously applied practices of a bank protection work, accompanied by the construction of heavy concrete embarkments and strengthening the riverbanks with construction waste, created a seemingly lifeless ecosystem of the city's rivers. Primary measures to bring the river morphology closer to the natural state, such as riverbank slope <30%, rough riverbed, meandering channel, will have an impact on biological processes and contribute to the restoration of biodiversity. Rehabilitation of the riverbed by creating a rough surface with natural cobblestones, boulders, and tree deposits, as well as river meandering, will reduce flow speed and create a habitat for invertebrates, fish, and algae growth. Reducing the transverse slope of the banks to <30% will create conditions for the growth of vegetation, reduce bank erosion and ensure the ability to regulate the risks of leashes. Renaturation of watercourses will deliver the effects of air cooling, shade creation, evapotranspiration, soil stabilisation, biodiversity protection, soil and water cleaning, creation of a water buffer and prevention of infiltration of pollutants to groundwater.



The concept of a blue green corridor implies not only the improvement of embankment areas of water bodies, but also the widespread use of rainwater runoff generated in the city for watering green spaces with the creation of appropriate infrastructure.

The project will consider lessons learned from the implementation of similar projects (e.g. river Bic, Chisinau's (Moldova)) with the purpose of regenerating riverbeds and transforming them into attractive assets for its residents and the region.

Targets (indicators):

- Enhancement of efficiency and effectiveness of water distribution and irrigation systems.
- Improvement of the well-being of citizens by providing access to irrigation water.
- Ensuring the efficient management and utilization of water resources for the sustainable growth of green spaces.

Type of Action	Feasibility Study			
Owner/Responsible body	ME "Bishkekzelenstroy" Ministry of Agriculture of the Kyrgyz Republic Department of Water Resources under the Ministry of Agriculture of the Kyrgyz Republic			
Stakeholders and their roles	layor's Office of Bishkek, ME "Bishkekzelenstroy" (technical assistance and supervision)			
Implementation start/end Year	2024 –2025			
Notes on cost estimates	The estimation cost is based on the price of similar studies.			
Action link to indicators	Water Exploitation IndexShare of green space areas within urban limitsBiodiversity and ecosystems: Abundance of other speciesAnnual CO2 equivalentPercentage of public infrastructure at riskPercentage of households at risk			
	ressure: Resilience to floods			
Benefits (environmental, socio- economic)	 Improved irrigation water supply. Protection of the banks of the river from erosion of the dams and its destruction. Air cooling, shade creation, evapotranspiration, soil stabilization, biodiversity protection, soil and water clean creation of water buffer and prevention of infiltration of pollutants to ground water. Favourable more environment for city inhabitants through air cooling and shade creation. Improved open spaces. 			



6 GCAP monitoring, evaluation and reporting

Monitoring of the GCAP implementation is foreseen to comprehend and assess the process, results, and outcomes of the actions' implementation. Its purpose is to identify the most efficient and effective actions and to report to the city authorities and responsible stakeholders on the need for further adjustments to actions with lower results. In addition, the monitoring is needed to measure the outcomes and impacts of the GCAP's actions on the environmental situation in Bishkek. This chapter outlines the key roles and responsibilities in monitoring and reporting the implementation of the sectoral actions.

The overall monitoring process is supported with the appropriate tools to track implementation progress:

- GCAP Actions Progress Monitoring Plan (PMP), and
- Impact Monitoring Plan (IMP).

The goals of the GCAP implementation monitoring are to identify relevant achievements of each of action per sector, link of the actions with desired positive environmental changes in line with the State and Pressure Indicators, to enable the City Administration and city's bodies to learn about implementation deviations that needs to be corrected, and to determine necessary adjustments of the actions to maximize potential achievements. The result of the GCAP's monitoring may correspond with other city's plans, policies, activities and/or development programmes.

6.1 Scope and purpose of monitoring

Successful monitoring requires adequate Progress Monitoring and Impact Monitoring Plans to track the status and progress of the GCAP actions' implementation and to measure the impacts of the GCAP actions on the city's environmental and resilience performance.

The monitoring of the implementation and impacts of the GCAP's actions needs to be based on the data and information collected regarding:

- The implementation status of each action per sector (i.e., It should be recorded as 'No Action,' 'In Preparation,' 'Implementation Underway,' or 'Completed,')
- Identification of any changes in the Implementation Plan for each of the actions,
- Identification and use of selected indicators to be monitored per sector and action, and
- Verification of data and determination of factors for likelihood of the achievement of the Vision and Strategic goals, cost effectiveness of the actions, needs for corrective actions



and changes, effectiveness of the monitoring process and use of lessons learnt for further improvements.

6.2 Reporting

The reporting format, established by EBRD, applies to all GCAPs and require the submission of two reports in the forms of:

- Progress Monitoring Plan (PMP) that summarises the implementation status of the GCAP that should be adopted annually, and
- Impact Monitoring Plan (IMP) that summarises status and likelihood of achieving GCAP vision, strategic goals and targets. The IMP will be completed at the end of the GCAP development process and will be updated after three and five years to report on the environmental, social, and economic impacts of the GCAP.

In addition to these two reports, the Indicators Database will be used to compare and present data collected alongside benchmark values. The City Administration will submit these reports to the EBRD, circulate them internally to inform internal decision-making, and communicate them with other stakeholders, as appropriate.

6.3 Governance structure and roles of stakeholders

The basic monitoring and evaluation roles for the GCAP Bishkek are presented in Table 8.

Institution	Role	Role details		
First Mayor's Deputy	Supervision	Overall supervision of the GCAP implementation		
GCAP Coordination Board / Environmental Experts Committee	Supervision and Advice	The GCAP Coordination Board will be responsible for implementation and monitoring actions as well as decision making during the implementation period. The Coordination Board will/may be established bz the members of the Environmental Experts Committee (Mayor's Resolution #145, 30 December 2022). The GCAP coordination Board will: - Meet at least twice a year to make decisions regarding the actions,		

Table 8: GCAP Bishkek Monitoring Roles



		 Provide technical advice to the City Development and Investment Attraction Agency, and Provide insights into departmental priorities and opportunities for new green city actions.
Policy Development Department of the Mayor's Office of Bishkek	Green City Office	 Oversee overall implementation Liaising with the Mayor's Office and relevant city's departments Coordinate the monitoring and reporting of the GCAP across departments, ensuring that the Progress Monitoring Plan (PMP) and Impact Monitoring Plan (IMP) are updated accordingly Collaborate with bodies responsible for the actions implementation to ensure the proper progress monitoring of actions Set standards for proper data collection and storage Prepare an Annual GCAP Progress Report
Sectoral Project Managers	Management of selected GCAP actions within their organisations	 Each municipal company or department that has taken responsibility for the GCAP actions included in this document will appoint a sectoral project manager who will be responsible for: Monitoring of the relevant GCAP actions implementation within their organisations. Liaise with appropriate stakeholders for data collection and action implementation. Collaboration with other GCAP actors. Reporting to the City Development and Investment Attraction Agency on the implementation of relevant GCAP actions. Each municipal company or department in charge of GCAP will determine the budget and timetable for the implementation of the activities assigned to it. Assigned department staff will provide regular progress and environmental impact reports to the City Development and Investment Attraction Agency. The results will form the basis for planning the subsequent stages of each action, including changes in schedules, resources, and budget, if required. Sectoral Project Managers should also strive to align GCAP monitoring with other planned city activities and initiatives in order to avoid duplication and improve efficiency.



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9 Appendixes

9.1 Appendix 1. List of stakeholders' events

Date	Event	General topic	Participants
May 20, 2022	Kick off meeting	 Task and project schedule Role distribution Types of indicators to be collected End product, why is it useful Next steps 	Senior officials from Bishkek Mayor's Office, EBRD and Consultant Total: 18 Male: 8 Female: 10
June 17, 2022	Presentation of the project to CDA	Presentation of the project and expected results of the main project counterpart Bishkek City Development and Investment Attraction Agency, discussion of main environmental challenges	Key CDA staff, Consultant Total: 12 people Male: 5 Female: 7
June 28, 2022	Presentation of the project to civil society and NGO representatives	Presentation of the project and expected results to key NGOs working in the environmental sector; discussion of main environmental challenges of Bishkek City	RepresentativesofCDA,Consultant,CivilSocietyandNGOs, namely:Total: 8 people4Male: 6Female: 2
June 10- 25, 2022	Introductory field visit of Team Leader	More than 20 Individual meetings with key stakeholders with the purpose of identification of main environmental challenges of Bishkek City	EBRD Country Representative Office, Senior officials from Bishkek Mayor's Office, various departments of the Mayor's Office and municipal companies, relevant country level ministries, IFIs and donor organisations: Total: 54 people Male: 29 Female: 25
September 22, 2022	1st Introduction Workshop	Identification of main environmental challenges of Bishkek City. To initiate a dialogue with the main stakeholders of Bishkek on pollutant emissions caused by transport, buildings and, in general, energy sources (including fossil fuels) used for urban activities; To give a quick assessment of the indicators collected to date that directly affect the air quality in the city	Various departments of the Mayor's Office, municipal companies, relevant country level ministries, civil society and NGO representatives, EBRD and Consultant Total: 24 Male: 12 Female: 12
September 23, 2022	Launch Event	EBRD Green Cities - programme overview: presentation of Green Cities video by EBRD	Relevant country level ministries, IFIs and donor organisations, Senior officials from Bishkek



		Introduction to city challenges by City authorities Bishkek GCAP – findings of assessment to date, and next steps (key activities and deliverables) by Consultant	Mayor's Office, various departments of the Mayor's Office and municipal companies, EBRD Country Representative Office, civil society and NGOs, Consultant Total: 64 Male: 31 Female: 33
March 3, 2023	2nd Stakeholders workshop	Related to interactive work on environmental assessment; presentation and discussion of the Policy and Urban Framework Report, Technical Assessment and PSR Indicators database; Prioritisation of Identified Environmental Challenges in Bishkek; Discussion and Definition of GCAP Vision.	Relevant country level ministries, Senior officials from Bishkek Mayor's Office, various departments of the Mayor's Office and municipal companies, NGOs and civil society, EBRD, Consultant Total: 55 Male: 31 Female: 24
June 8, 2023	3rd Stakeholders workshop	Related to discussion and drafting of GCAP Vision, Strategic Goals and the Long List of Actions	Relevant country level ministries, Senior officials from Bishkek Mayor's Office, various departments of the Mayor's Office and municipal companies, NGOs and civil society, EBRD, Consultant Total: 48 Male: 27 Female: 21
October 30, 2023	Online workshop with City officials	 On presentation of the GCAP development process: Introduction on GCAP development process Environmental challenges – priorities Sectoral challenges Green City Actions – per sector And validation of GCAP actions with City Authorities 	Senior officials from Bishkek Mayor's Office, its departments and municipal companies, EBRD, Consultant Total: 24 Male: 17 Female: 7
In the course of the project	Individual sectoral meetings with various stakeholders	Sectoral meetings with national and municipal authorities and municipal utility companies on specific sector issues; meetings with international projects working on similar agenda	Individual meetings with above mentioned national and municipal authorities and international organisations on various topics Total: no data Male: no data Female: no data
			Total: 307 Male: 166 Female: 141

Table 9. Lists of stakeholders' events



9.2 Appendix 2. City Emissions Trajectories Tool

Bishkek key results	
Assigned Paris aligned trajectory typology	Late peak
City emissions in 2019	2.9 tCO2e/capita
Business-as-usual emissions in 2050	8.8 tCO2e/capita
Annual emissions reduction against BAU in 2030 required according to assigned Paris-aligned trajectory	31%
Proportion of assigned Paris-aligned cumulative emissions reductions delivered by GCAP	#V
GCAP actions savings against BAU in 2050	#V
Impact on results from testing alternative decarbonisation trajectory	
Annual emissions reduction against BAU in 2030 required according to assigned Late peak trajectory	#V
Proportion of assigned Paris-aligned cumulative emissions reductions	31%
Proportion of Late peak trajectory cumulative emissions reductions delivered by GCAP	#VA

Table 10. City Emissions Trajectories Tool



Figure 12. Summary trajectories



Figure 13: GCAP action savings by sector







