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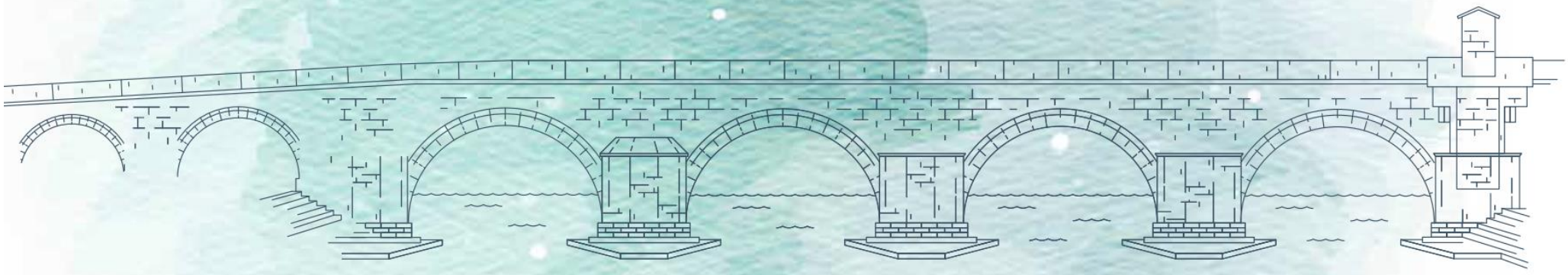


Green City Action Plan

CITY OF SKOPJE

2020

European Bank
or Reconstruction and Development

LDK CONSULTANTS

hcl Consultants

Vision and key strategic and operational objectives

A leading, sustainable City

The City of Skopje will be a leading sustainable city in the region, offering its citizens a high quality of life through the provision of clean air and water, healthy green spaces and accessibility for all, while contributing to national and international efforts to address climate change.

Contents

Tables

Figures

Guide to acronyms used in this document

EBRD	European Bank for Reconstruction and Development
GCAP	Green City Action Plan
ICLEI	International Council for Local Environmental Initiatives
LSGU	Local Self-Government Unit
OECD	Organisation for Economic Co-operation and Development
ID	Indicator's database
IFI	International financial institutions
DFI	Development Finance institution
PPP	Public Private Partnership
EC	European Council
EC	European Council
NMT	Non motorised transport
MRV	Monitoring Reporting & Verification

Message from the Mayor

The GCAP will strategically address the city's needs for sustainable and green growth. With financing from the EBRD and international donors, the plan will address the most pressing climate change and environmental challenges, including public building energy efficiency, urban transport, water and wastewater, and, in order to reduce local pollution, improve energy and resource efficiency and promote climate change adaptation.

In March 2019, the City of Skopje and the EBRD launched the Green City Action Plan (GCAP), following the EBRD methodology as part of the city's involvement in the EBRD Green Cities programme.

Skopje is the first city in North Macedonia to join the EBRD Green Cities and begin development of the action plan. The GCAP will help Skopje to identify, prioritise and address its most pressing environmental challenges.

The project has the full support and backing of myself and the Skopje city administration.

The GCAP aims to tackle the most acute climate change and environmental challenges, including solid waste management, water and wastewater, urban roads and lighting, urban transport and public building energy efficiency, in order to reduce local pollution, improve energy and resource efficiency and promote climate change adaptation.

The GCAP will strategically address the city's needs for sustainable and green growth. With financing from the EBRD and international donors, the plan will address the most pressing climate change and environmental challenges, including public building energy efficiency, urban transport, water and wastewater, and, in order to reduce local pollution, improve energy and resource efficiency and promote climate change adaptation.

EBRD Green Cities strives to build a better and more sustainable future for cities and their residents. The programme achieves this by identifying, prioritising and connecting cities' environmental challenges with sustainable infrastructure investments and policy measures.

I believe that the measures proposed by the GCAP will improve the lives of City of Skopje's residents. The Skopje GCAP will therefore represent a model countrywide.

Executive summary

Skopje is the capital of North Macedonia. The city is located on the upper course of the Vardar River, and is located on a major north-south Balkan route between Belgrade and Athens.

Skopje is the country's political, cultural, economic and academic centre. It is a centre for metal-processing, chemical, timber, textile, leather, and printing industries. Industrial development of the city has been accompanied by development of the trade, logistics, and banking sectors, as well as an emphasis on the fields of transportation, culture and sport.

According to the data, Skopje is the largest and fastest growing city in Macedonia. Based on the last official count from 2002, Skopje had a population of 506,926 inhabitants1 but according to official estimates, the city had a population of 544,086 inhabitants, as of June 30, 2015. The city of Skopje belongs to the Skopje region, which covers the Skopje valley basin with a total area of 1,812 km^2, and is the smallest of the 8 regions in the Republic of North Macedonia. The population density is four times the average of the country. 88% of the population in the region is concentrated in the city of Skopje, or 25.1% of the total population in the country. Skopje, and its 10 municipalities, encompasses many villages and other settlements.

In 1963 a magnitude 6.1 earthquake hit Skopje. It is estimated that it destroyed circa 80% of the City. After the catastrophe, the the city has been renovated with international help, renamed the "City of Solidarity" and based on a project by Japanese urban planner Kenzo Tange, whose design won an international competition involving architects from around the world.

Since the rebuilding of the catastrophic earthquake, the city has been growing rapidly, and the main reason is the uneven economic development of the republic, that is, the state. The trend of development is characterized by a large migration of people from other regions and cities to Skopje and the creation of large conglomerates of people in a narrow area, thereby increasing the processing industry, increased consumption of goods, water, energy and other resources, and in particular the problem, especially in traffic, is daily business migration.

Skopje is strategically located near three other capital cities, Prishtina (87 kilometres away), Tirana (291 km) and Sofia (245 km). Thessaloniki is 233 kilometres south and Belgrade is 433 kilometres north. It is also at the crossroad of two Pan-European corridors: Corridor X, which runs between Austria and Greece, and Corridor VIII, which runs from the Adriatic in Albania to the Black sea in Bulgaria. Corridor X links Skopje to Thessaloniki, Belgrade and Western Europe, while Corridor VIII links it with Tirana and Sofia.

Being the capital and largest city in North Macedonia, Skopje concentrates a large share of the national economy. The Skopje Statistical Region, which encompasses the City of Skopje and some neighbouring municipalities, produces 45.5% of the Macedonian GDP. Skopje, which accounts for about 25 percent of the population and contributes around 45.6percent of the country's GDP2.

The development of Skopje as a Green City will look to address these historic factors, however there are also a range of ongoing and recently implemented large investment projects that could significantly influence Green City development.

Over the past decade there have been efforts to develop Skopje in a more sustainable way. However, these efforts have been considered in isolation from one another and have been implemented in an ad hoc manner. Today, acute problems remain in several areas.

Skopje is considered one of the most polluted cities in Europe. Air pollution continues to take its toll on the health of residents of Skopje, particularly affecting the most vulnerable populations.

For these reasons, the Institute for Public Health for the needs of the City of Skopje has prepared a Research Study on the Impact of Air on Human Health, with a special focus on preschool and school children, using demographic, socioeconomic, environmental and health data.

The average number of examinations by a specialist doctor at the level of the city of Skopje, does not exceed the national average, however individually, per municipality, the national average is exceeded in the municipalities of Gazi Baba, Chair and Centar.

This can be attributed to heating of properties not connected to the district heating network, urban transport, soil and dust from the streets and industry within the City.

Other problems include the lack of comprehensive solid waste management, energy inefficiencies, poor development of the river banks, and vulnerability to climate change.

A Green City approach offers an integrated, multi-sector process whereby a city's environmental challenges are periodically identified, prioritised and addressed. This is achieved through targeted investments, 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, whilst seeking to maximise the economic and social co-benefits.

With this approach, Skopje has a lot of potential to develop towards a Green City, on the path to sustainable and green growth.

Skopje & neighbouring principaities produce

45.5%

of the Macedonian

GDP

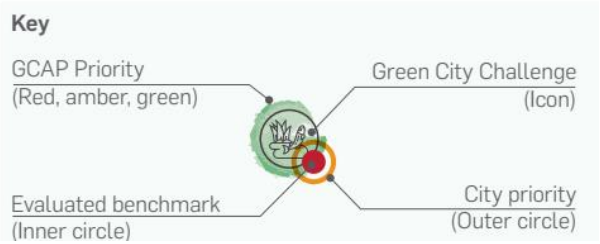
Green City baseline

A Green City Baseline has been prepared, focussed on evaluating the City's current environmental conditions. The challenges were categorised based on the traffic light screening (red,amber and green). Skopje's baseline assessment of indicators facilitated identifying the main challenge areas.The evaluated benchmark is the final, technical assessment of each challenge area based on the indicators database and stakeholder input. The City Priority level is the assessment of both the actual impact, and ability to improve, the challenge area within Skopje compared to other challenge areas.This is specifically assessed based on Skopje and local context. A final GCAP Priority can be deduced for each of the environmental challenges based on these two assessments. The three GCAP Priority levels are:

Urgent efforts needed, which can immediately and comprehensively address challenge.

Efforts needed to address challenges in mid-term, supporting urgent efforts.

Actions within other more urgent challenge areas will lead to benefits and can be supported by longer-term efforts.



Air quality

Air quality is a clear and immediate challenge for Skopje as air pollution is widely accepted to be a major problem. Suspended particles (PM10 and PM2.5) are the most critical pollutants affecting human health and well-being. The concentrations of suspended particles are high, especially during the winter months, when they significantly exceed the limit values defined in the legislation. Air pollution comes from numerous sectors including transport, energy, industry, solid waste within the boundary of the city, and targetted measures implemented previously show Skopje's ability to positively address this challenge, and thus it is assessed as a high priority challenge.

Air quality challenges are predominantly led by:

- Heating consumption in the residential sector due to the "energy poverty" leading people to use PM- and carbon- intensive materials covering heating demands.
- Very intensive construction works influencing the concentration of particulate matter.
- Obsolete industrial machinery contributing to poor air quality in Skopje.
- Inadequate policy for motorized vehicles with diesel vehicles comprising 46% (last data: 2016) of total vehicle fleet.
- Low use of alternative transport.

Affected by: Transport, Buildings, Industries, Solid Waste, Energy

Quality of water bodies

The city baseline shows high pollutant concentration in rivers and watercourses are negatively affecting the quality of water bodies in Skopje.

The River Vardar and others are highly polluted as a direct result of unsatisfactory wastewater treatment in the City. The City does not have a municipal wastewater treatment plant, an as such there is incomplete coverage of the population to wastewater sewage, insufficient separation wastewaters and storm sewers, and presence of illegal outflows into the rivers. This challenge is exasperated by:

- Around 10% of residential buildings are not connected to the main sewage collector allowing significant quantities of wastewater to be directly discharged to surface water bodies without treatment.
- Inadequate solid waste management leading to inappropriate waste disposal practices and the increase in number of illegal landfills contributing to uncontrolled leakage of untreated waste.

Affected by: Water, Solid Waste, Industry

Adaptation and resilience

The last two decades show significant human, economic and environmental losses due to natural disasters. The national and municipal authorities still heavily rely on the response-based approach rather than establishing a comprehensive prevention-oriented system.

Based on historic events, resilience to earthquakes, fires and floods is most crucial and vulnerability to such climate hazards presents serious risks for the health of the population and the environment. Previous flooding has led to investments in flood protection infrastructure and regulation of the rivers, however based on recent modelling by the City of Skopje, vulnerabilities still exist.

Skopje has limited resilience to natural disasters in many sectors. There is significant lack of information related to adaptation and resilience to natural disaster. Challenges and pressures relating to climate resilience include:

- Insufficient involvement of disaster risk reduction in sector strategies, programs, and priorities for action of the institutions involved at national and local level.
- Insufficient coordination and communication between the involved institutions at national and local level.
- Accelerated urbanization and built environment.
- Insufficient financial support for implemented activities and measures.

Affected by: Water, Buildings

Water use and availability

The water supply system of the city of Skopje is supplied with water from the Rasce spring and the Nerezi-Lepenec well. The citizens of Skopje drink exceptionally high-quality water.

In addition to large scale losses in the water supply network, a particular problem is that drinking water of excellent quality in the city is also used by commercial buildings for watering the greenery and washing the streets.

This inefficient use has the potential to limit water supply in the City, which will be exacerbated in the face of climate change, and has a high potential impact on this challenge, not just for Skopje but on a national level also. The main problems in this sector are:

- Threats to the quality of the waters supplying the Rasce spring and the Nerezi-Lepenec well, particularly from Jugohrom landfill in Jegunovce, which is within the MoEPP's jurisdiction.
- Incomplete coverage of the water supply system in all settlements,
- Increasing the water supply needs in parallel with the growth of the city,
- Drinking water consumption for commercial and sanitary purposes,
- Very high water losses from the water supply system.

Affected by: Water, Industry sectors

Soil quality

Several industrial hot spots have been identified on the territory of the City of Skopje. They originate from the operation of state-owned industrial complexes and after their closure, during the years of transition to the market economy, landfills of larger quantities of industrial waste remained to be repaired to prevent migration of pollutants into the soil, surface and ground water, and in exceptional cases, air emissions.

Periodic dumps also affect soils. For the former Vardarishte landfill, located in an urban area by the river Vardar, a Feasibility Study for the revitalization of this landfill site has been made.

The main pressures are:

- Urbanization and conversion of arable land into construction;
- Unstructured sewage network in rural areas;
- Occupying unurbanized areas with illegal dumps;
- Lack of good agricultural practice including a database of agro-chemical measures,
- Heavy metal soil pollution

The City of Skopje has recognised this challenge and has begun to address the issue within its remit. Wider efforts are needed at national and regional level.

Affected by: Water, Solid Waste, Industry sectors

GHG emissions

The City of Skopje implemented the GHG Inventory on two occasions, and the third inventory (2016-2018) is ongoing. Estimated GHG emissions within the inventory show that the total emissions of the City of Skopje decreased by 21.6% in the period 2008-2015.

Emissions reductions are mainly due to reduced emissions from industrial processes and reduced energy consumption in residential and institutional buildings. However, the rising number of vehicles in the transport sector results in increased emissions. Another sector with an increase in emissions, albeit smaller, is the waste sector.

The City of Skopje is an important contributor to the national emissions. It is responsible for 48.2% of all Industrial Processes emissions and contributes to 40.7% of the national transport emissions,

The main sources of greenhouse gases are the Static Energy sectors (including the Buildings subsector), Transport and Waste.

- Intensive application of high GHG fuels,
- Greater use of individual instead of public transport,
- Obsolete and diesel vehicles involved in traffic,
- Lack of organized waste management system including waste selection and reuse.

Affected by: Transport, Buildings, Solid Waste, Industry sectors

Green spaces

The rapid expansion of the residential buildings during the last two decades has seriously influenced the share of green spaces in the city. While individual green areas are interconnected with trees and central greenery along boulevards, is that this greenery is only perceived in terms of providing a decorative function. Despite the lack of data on biodiversity and ecosystems, the environmental practitioners are confident that there is a heavy anthropogenic impact to the species and habitats.

The city has acknowledged the need for improvement and has developed several studies to guide greening and green corridors. Based on its activities, the City of Skopje has been accepted as a member of Cities4Forests.

The key challenges and pressures for green spaces include:

- Easy process of revision of the detailed urban plans in favour of the construction works.
- Land conversion and intensive expansion of residential buildings.
- Larger green space areas not well- managed and not easily accessible.
- Degradation of the protected areas.
- Lack of monitoring of built-up area growth and illegal constructions.

Affected by: Water, Solid Waste, Land use sectors

Biodiversity and ecosystems

Analysis show a very large biogeographical diversity, as well as a variety of species and habitats in the Skopje Basin, which is confirmed by large areas protected or recorded as natural heritage. There are 12 areas or structures registered in the Skopje region that are protected as natural heritage.

All sites are protected on the basis of expert studies for their valorisation, and the legal obligation to adopt protected site management plans has commenced.The City of Skopje has provided the necessary funds for their protection and arrangement on a yearly basis for many years.

The main pressures for protected natural sites are:

- Loss, modification and fragmentation of habitats.
- Overuse of biological resources.
- Environmental pollution.
- Introducing invasive species.
- Climate changes.
- Natural disasters (forest fires, landslides, floods, etc.).
- Lack of biodiversity monitoring within protected areas.
- Insufficient cooperation with institutions at national level.
- Lack of developed awareness of the importance of protected areas and understanding them only as good places for recreation.

Affected by: Water, Solid Waste, Land use sectors

Strategic & operational objectives

Biodiversity & ecosystems

Heavy, negative anthropogenic impact to species and habitats, leading to species decline.

Strategic Objectives

Improve safeguarding of natural habitats for wildlife by halting unplanned urban development and increasing the enforcement and number of protected sites against 2020 benchmarks.

Air Quality

High PM10 and PM2.5 concentrations.

Strategic Objectives

Regularly monitoring and incrementally reduce atmospheric concentration of pollutants to achieve AMBER status for allindicators within the lifetime of the GCAP.

Quality of water bodies

High pollutant concentrations in rivers.

Strategic Objectives

Incrementally reduce Biochemical Oxygen Demand and ammonium concentrations in the River Vardar to AMBER indicator status within the lifetime of the GCAP.

Green Spaces

Expansion of the City has significantly reduced the provision of Green Space for residents.

Strategic Objectives

Increase the proportion of accessible public green spaces for residents by 100% against current benchmark.

Vision

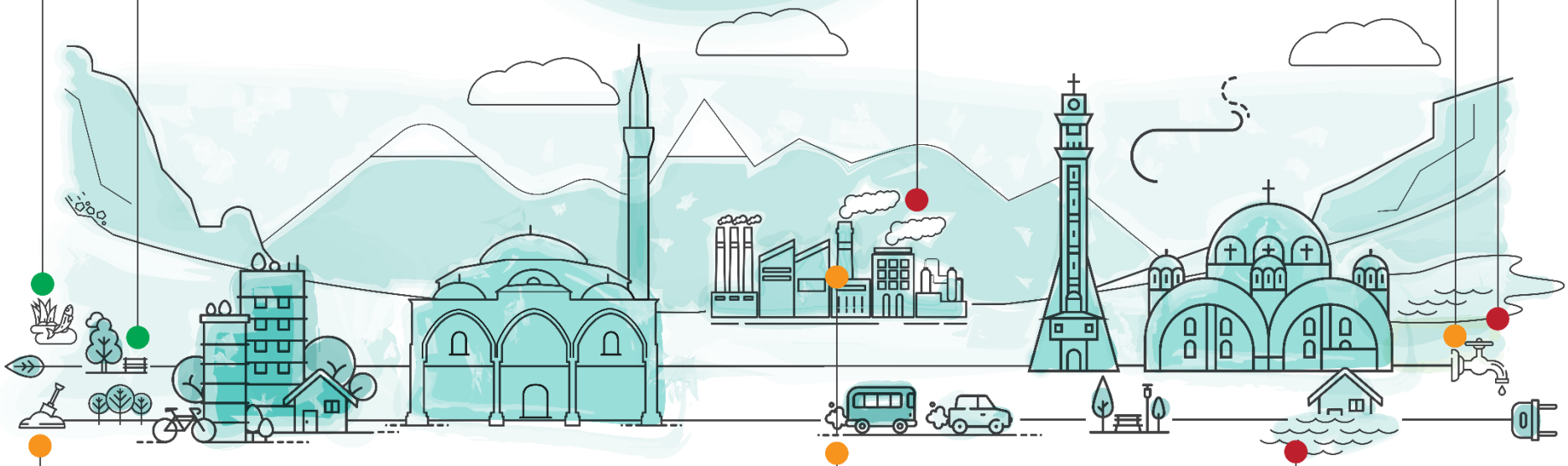
The City of Skopje will be a leading sustainable city in the region, offering its citizens a high quality of life through the provision of clean air and water, healthy green spaces and accessibility for all, while contributing to national and international efforts to address climate change.

Water use & availability

Inefficient use of existing water sources.

Strategic Objectives

Improve the efficiency of water supply networks indicator by 50% within lifetime of the GCAP, against current benchmark.



Soil Quality

Large number of industrial contaminated sites affecting soil quality.

Strategic Objectives

Clearly identify, categorise and reduce the number of contaminated sites within the city, by 50% within the lifetime of the GCAP.

GHG Emissions

Steadily increasing GHG emissions in the energy, transport and waste sectors

Strategic Objectives

Halt the increase of GHG in all sectors and reduce to achieve GREEN indicator status within lifetime of the GCAP.

Adaption & resilience

Historic flood risk and limited planning.

Strategic Objectives

Improve resilience to the impacts of weather events to reduce the number and severity of public assets and households at risk to AMBER status.

Key

GCAP Priority levels:
Red – High;
Yellow – Medium;
Green - Low

Challenge priority level

Environmental Challenge	GCAP Priority Level	Specifics of challenge	Strategic Objective	Operational Objective	
Air Quality	High	High PM_{10} & $PM_{2.5}$ concentrations	Regularly monitoring and incrementally reduce atmospheric concentration of pollutants to achieve AMBER status for all indicators within the lifetime of the GCAP.	AQ1	Reduce the volume and impact of local air pollution from fossil fuelled transport
				AQ2	Increase modal share of less polluting, alternative sustainable transport
				AQ3	Reduce overall energy consumption of building stock city-wide
				AQ4	Reduce proportion of energy generated from higher air polluting sources
				AQ5	Reduce the dependence on fossil fuels for domestic heating needs
Quality of water bodies	High	High pollutant concentrations in rivers	Incrementally reduce pollutant concentrations in the River Vardar to AMBER indicator status within the lifetime of the GCAP.	WQ1	Improve sewerage collection coverage for buildings city-wide
				WQ2	Increase wastewater collection and treatment city-wide
				WQ3	Improve solid waste management and treatment processes
Adaptation and resilience	High	Historic flood risk and limited planning	Improve resilience to the impacts of weather events to reduce the number and severity of public assets and households at risk to AMBER status.	AR1	Promote safe and resilient infrastructure, housing and urban development
				AR2	Raise awareness of vulnerabilities to climate change impacts
Water availability and use	Medium	Inefficient use of existing water sources	Improve the efficiency of water supply networks indicator by 50% within lifetime of the GCAP, against current benchmark.	WA1	Reduce overall wastage of potable water
				WA2	Reduce proportion of potable usage in industrial processes
				WA3	Improve the protection of freshwater sources
Soil	Medium	Urbanization, industrial hot spots, and periodic dumps affecting soil quality	Clearly identify, categorise and reduce the number of contaminated sites within the city, by 50% within the lifetime of the GCAP.	SL1	Encourage development of remediation plans for contaminated sites
				SL2	Reduce discharge of untreated wastewater and generation of solid waste from industrial processes
				SL3	Reduce proportion of solid waste dumped, disposed onsite or to landfill
				SL4	Reduce the volume of local air pollution from fossil fuel use
GHG mitigation	Medium	Steadily increasing GHG emissions in the energy, transport and waste sectors	Halt the increase of GHG in all sectors and reduce to achieve GREEN indicator status within lifetime of the GCAP.	GH1	Encourage uptake of low carbon energy generation
				GH2	Improve energy efficiency of building stock
				GH3	Reduce the volume and impact of GHG emissions from transport
				GH4	Reduce overall emissions from landfill and solid waste treatment processes
Biodiversity	Low	Heavy, negative anthropogenic impact to species and habitats, leading to species decline	Improve safeguarding of natural habitats for wildlife by halting unplanned urban development and increasing the enforcement and number of protected sites against 2020 benchmarks.	BE1	Encourage development of green infrastructure across the city
				BE2	Improve data collection and monitoring systems for measuring biodiversity within the City
				BE3	Improve awareness of impact on biodiversity within the City
Green Space	Low	Expansion of the city has significantly reduced the provision of Green Space for residents.	Increase the proportion of accessible public green spaces for residents by 100% against current benchmark.	GS1	Enhance extent, quality and diversity of green spaces and other green infrastructure
				GS2	Promote a sequential approach (brownfield, infill, greenfield) to urban development to avoid further urban sprawl
				GS3	Improve proposed law on urban planning to safeguard green spaces

Summary of GCAP

		Measures	Total Cost (€)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Transport	**TR-1** Improve transport planning, decision making and data collection and monitoring	Improving cooperation with stakeholders for coordination of initiatives	100k															
		Awareness raising and data management campaigns	200k															
		Increase the capacities of the core stakeholders to improve the quality of the city's transport related documents	100k															
	TR-2 Implementation of urban traffic management schemes	Conduct legal gap assessment, identify the challenges and develop plan for in-practice implementation of improved city transport regulation	250k															
		Conduct technical analysis on increased traffic management to limit motorised transport and promote improved mobility for citizens	250k															
	TR-3 Improve the quality of public transport and infrastructure including a BRT system	Development of public transport development strategy	100k															
		Introduce BRT system	90m															
		Improve infrastructure and fleet	15.75m															
		Creating a database for monitoring and mobility improvements	1.05m															
	TR-4 Increased use of the alternative transport	Improve the city's capacities for planning in the area of alternative transport	210k															
		Continuous improvement of pedestrian facilities and infrastructure	15.75m															
		Continuous improvement of the cycling infrastructure	21m															
	TR-5 Improve private motorized transport towards a cleaner fleet	Stimulate the interest for moving towards low carbon transport	11m															
		Discourage citizens and private companies to invest in carbon intensive vehicles	1.05m															
Solid Waste	**SW-1** Assess legislation and gaps to promote strengthened waste management in city of Skopje	Improve the national law on waste management to enable strengthened waste management in Skopje	50k															
		Assessing the waste management gaps	100k															
		Awareness raising and enforcement to reduce waste disposal	170k															
	SW-2 Improve the internal processes of planning and implementation	Development of the main city waste management framework	200k															
		Development of residential sector waste management framework	300k															
		Implementation of measures to ensure technical background information is included in strategic documents and plans	500k															
	SW-3 Capacity building and public-private collaboration to improve waste management operations	Strengthening the city's planning and implementing capacities	50k															
		Improving the data collection system	100k															
		Improving the partnership with the public and private sector companies	25k															
		Application of alternative measures for improved waste management	200k															
	SW-4 Implement new infrastructure and processes to improve city-wide waste collection, management and disposal	Improving waste collection by improving the waste collection vehicles and containers	5.25m															
		Improve Drisla by strengthening the waste management system	10.5m															
		Introduce RDF and WtE schemes, extending the life of the landfills	21m															

		Measures	Total Cost (€)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Energy	**EN-1** Plan and strengthen administrative capacities for implementation of the national law on Energy Efficiency	Conduct assessment, identify the challenges and develop plan for implementation for building renovation	200k															
		Capacity building for City and Municipalities to develop and implement EE programs and action plans	500k															
		Improve certification program, proper auditing requirements and monitoring	500k															
	EN-2 Develop City level strategy and strengthen collaborative working practices	Develop the Skopje city energy and energy efficiency strategy	250k															
		Mainstream industrial energy efficiency planning into city planning processes	250k															
		Strengthen collaborative working practices amongst key stakeholders	250k															
	EN-3 Retrofitting of energy efficiency and renewable energy measures in residential buildings	Mapping of citizens and households facing energy poverty and raise awareness on issues	250k															
		Implement energy efficiency and renewable energy measures in residential buildings	10.5m															
		Link households to the District Heating network	26m															
	EN-4 Installation of energy efficiency (EE), renewable energy (RE) technologies in city/ public building stock	Capacity building to plan and coordinate energy saving initiatives	750k															
		Retrofitting of EE and RE measures in public buildings	11m															
		Connection of public buildings to the district heating network	26m															
	EN-5 Install energy reduction technologies and processes into industrial sector	Capacity building and data collection	250k															
		Installation of energy saving technologies to improve efficiency of industrial processes	11m															
		Expand and improve the district heating systems to the industrial sector	21m															
Resilience	**CR-1** Develop the strategic planning and collaborative resilience capability of Skopje	Develop and mainstream disaster risk profiles and strategies to provide clear understanding of climate risk in Skopje	250k															
		Improve city/national level coordination on development and implementation of climate risk mitigation measures	200k															
		Implement disaster risk preparedness exercises for key local institutions	50k															
	CR-2 Improve the city's resilience to forest fires	Develop a wildfire risk assessment for Skopje to assess vulnerable areas and plan for integrated forest fire prevention	200k															
		Implement awareness raising and mitigation measures to reduce the prevalence, extent and impact of wildfires on the city.	1m															
	CR-3 Improve city's resilience to other natural disasters	Conducting analysis for each of the risks	100k															
		Strengthening the response coordination mechanism	250k															
		Link up with other sectoral measures in terms of prevention	150k															
	CR-4 Rehabilitate and improve flood protection infrastructure in Skopje	Understanding flood risk profiles and development of targeted measures to reduce exposure to flooding	150k															
		Ongoing rehabilitation and strengthening of existing natural and built flood protection infrastructure	21m															

		Measures	Total Cost (€)	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Water	**WT-1** Promote private sector investment to reduce potable water use	Mandating companies to invest in installing systems that will allow the reuse of technical water	250k															
		Identify and decrease the illegal use of potable water for irrigation	250k															
	WT-2 Capacity building to enforce measures to limit pollution of rivers and groundwaters	Improve stakeholder partnerships for enforcement and reduction of pollution	250k															
		Policies and awareness raising to improved water management and sustainable agricultural practices	250k															
	WT 3 Wastewater treatment plant	Build a modern waste water treatment plant to reduce with water pollution in the River Vardar and provide options for reclaimed water use to limit drinking water demand	126m															
	WT-4 Update and protect the water distribution network to improve supply and guarantee quality	Achieving protection zones at Rasce spring and Nerezi-Lepenec well and respecting protection measures	1.1m															
		Improved data management and awareness raising on water use and demand	250k															
		Repair of the urban water supply network to reduce losses and improve efficiency	10.25m															
		Expansion of the water supply network to ensure all residents have access to potable water	10.25m															
	WT-5 Urban water infrastructural measures for improved treatment of waste and atmospheric waters	Improvement and expansion of the sewerage network to improve urban wastewater management	21m															
		Implementation of sustainable urban drainage systems (SUDS) to improve resilience to flooding and enable public rainwater harvesting	10.5m															
Land Use	**LU – 1** Improve data collection and collaboration to inform future urban planning	Development of baseline and justification for undertaking strong restriction on raising the number of residential buildings on greenfield sites	500k															
		Technical implementation of the plan for restriction on construction works	300k															
	LU – 2 Contaminated sites remediation	Enabling the technical environment for remediation of the contaminated sites	500k															
		Strengthening the partnership in addressing the contamination challenges	500k															
	LU – 3 Increase the quality and accessibility of green spaces and parks	Strengthening the planning processes for improved pocket parks management	150k															
		Strengthening the planning and decision-making processes	100k															
		Implementation of technical measures that should enable improved substantiality of the large green areas	1m															
		Enable larger green areas to improve their accessibility	300k															
	LU – 4 Establish green city spaces and corridors	Development of plan for establishment of the city's green corridors and pocket parks	300k															
		Implementation of practice proven measures for increased number of pocket parks in city of Skopje	2m															
		Implementation of the plan for establishment of the city's green corridor	8m															
			521.3m															

1. About the plan

1.1. Background of the plan

1.1.1. Introduction to Skopje

The City of Skopje is a local self-government unit (LSGU) with special legal status, responsible for the overall quality of life of its citizens, which requires a systematic approach in addressing a myriad of urban environmental challenges. In order to address these challenges, the city administration has committed to develop and consequently implement a Green City Action Plan (GCAP).

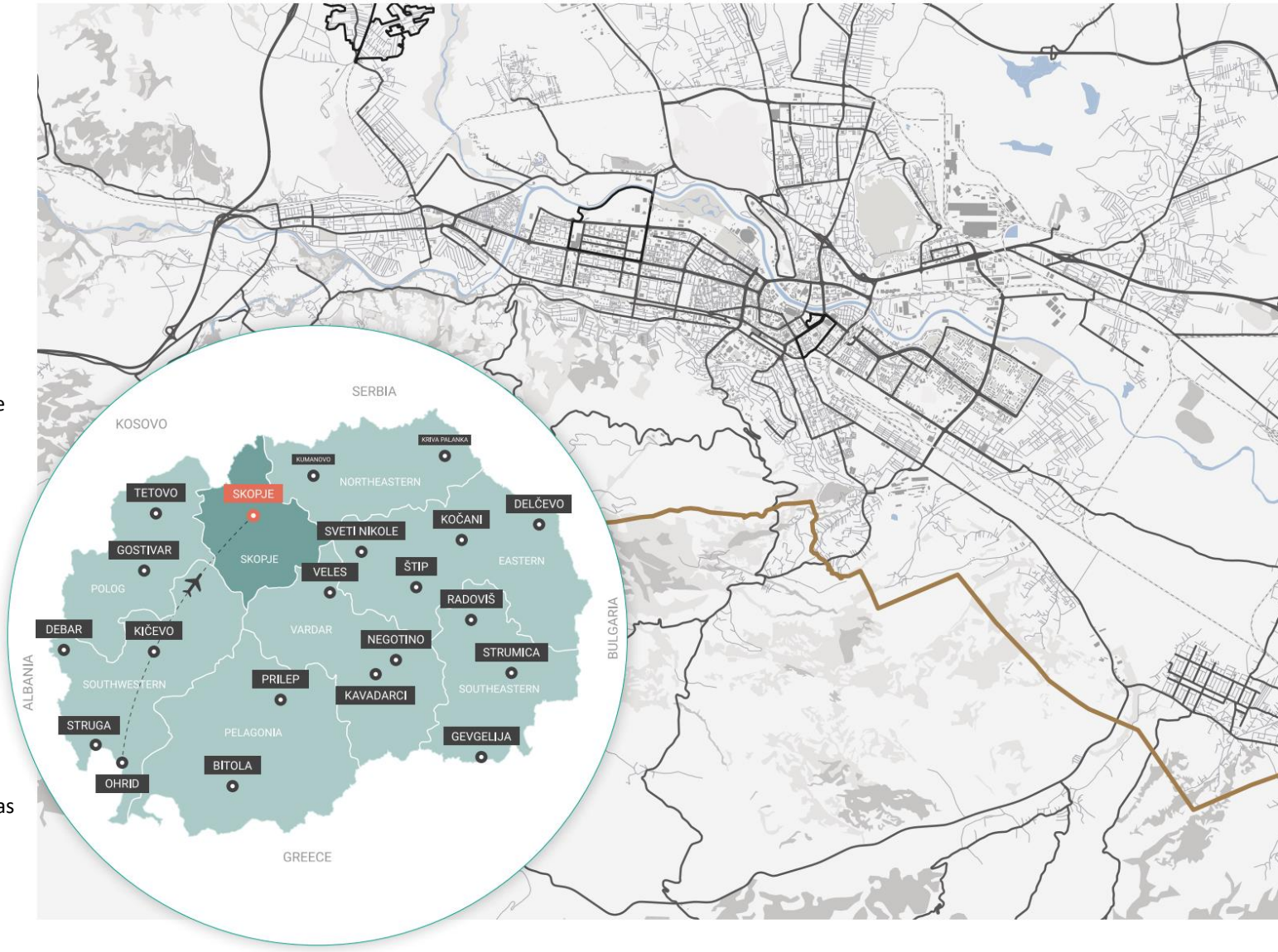
North Macedonia is a land-locked country situated in the central part of the Balkan Peninsula covering an area of 25,713 km3, which is inhabited by 2,075,3011 people (2017). The City of Skopje is the country's capital and is located in the central north part. It is the largest

administrative, political, economic, cultural, academic and scientific centre (see Figure 1.1) in North Macedonia.

The most important economic sectors in the city are the food and beverage industry, textile, printing, steel making, metal processing, construction, chemical and pharmaceutical, catering, trade, transportation and logistics, and services.

The City of Skopje, with its 10 municipalities (Aerodrom, Butel, Centar, Cair, Gazi Baba, Gjorce Petrov, Karpos, Kisela Voda, Saraj, and Suto Orizari) has an estimated 550,6002 inhabitants (2017), with an average population density of 5,989 inhabitants/km4.

Figure 1-1: Map of the City of Skopje



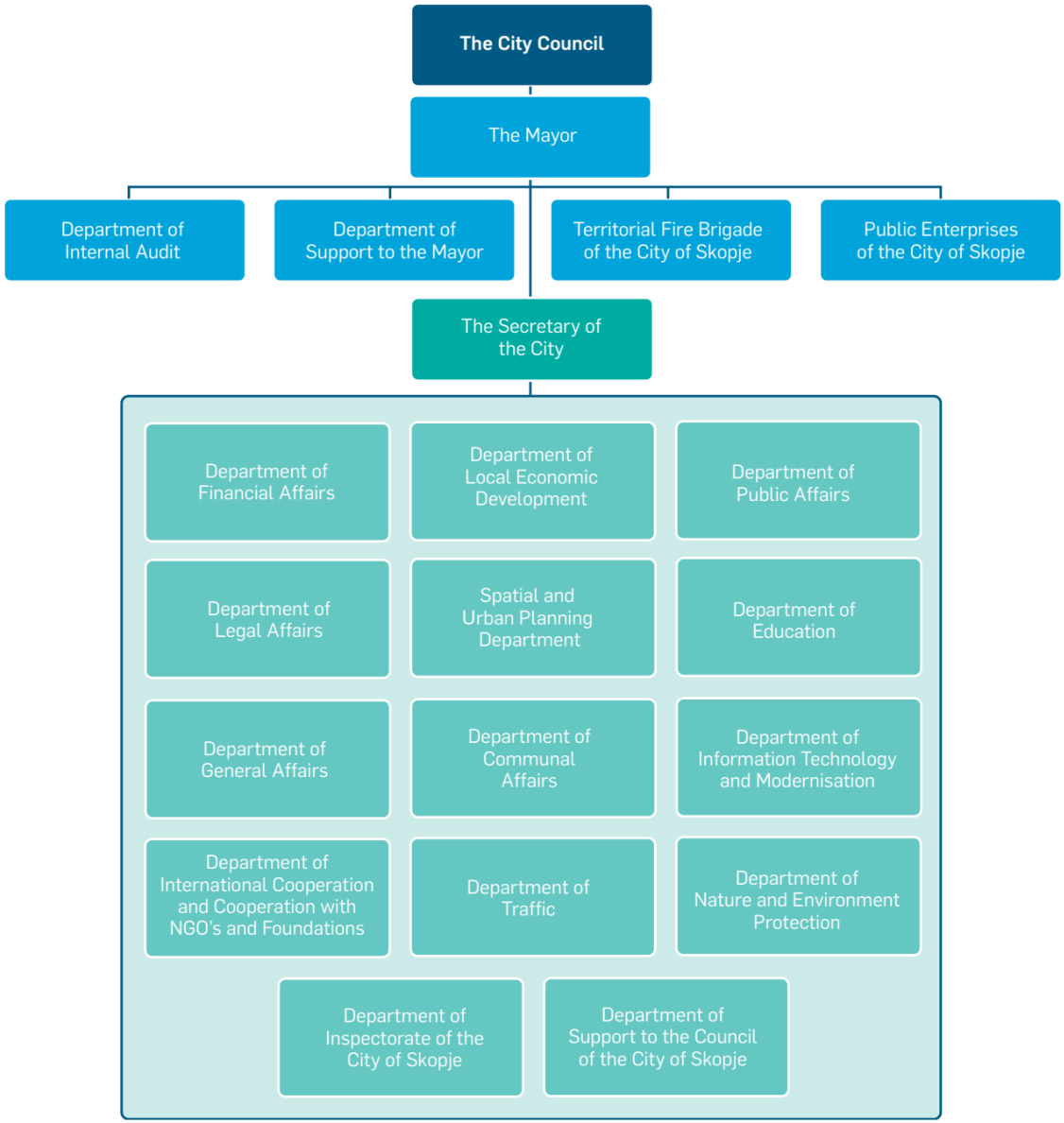
1.1.2. City administration

The City has its own administration that is responsible for organising and performing the necessary tasks to comply with the competences and responsibilities of the City, where the core administrative departments are presented in Figure 1.2, while the various communal services are delivered by the City's eight Public Enterprises (shown in Figure 1.3).

In general, people in cities are highly dependent on urban infrastructure, including transport systems, communication systems, water and energy distribution, wastewater drainage systems and waste collection. The concentration of people and goods and their dependence on these infrastructural systems make cities highly vulnerable to climate change.

Almost one third of the total population of North Macedonia lives in the City, and there is also significant daily migration into the capital from the region and beyond. This certainly causes problems for the City's sustainability as a system, since the new needs of the residents are difficult to satisfy, and the City is faced with other challenges in its day-to-day functioning. Although the City has been making great efforts to deal with the numerous problems, it is limited in its resources, and its ecological footprint is unfavourable. A lot of investments and additional efforts need to be done not just by the City administration, but by many other stakeholders to improve the whole range of environmental issues that concern the citizens, using available local, national and international experience, best practices, and expert and technical capacities.

Figure 1-2: Organisational chart of the City of Skopje



1.1.3. Political structure and operations in the City

For the provision of different communal services, the City owns eight Public Enterprises (PEs) (Figure 1.3 Political Enterprises of the City of Skopje), as an extension of the executive branch that are important for the implementation of the annually planned programmes and activities. The latest additions to these are the Joint Stocks Company that will operate the district heating network and natural gas network of the city and the Public enterprise for wellbeing of the stray animals Lajka.

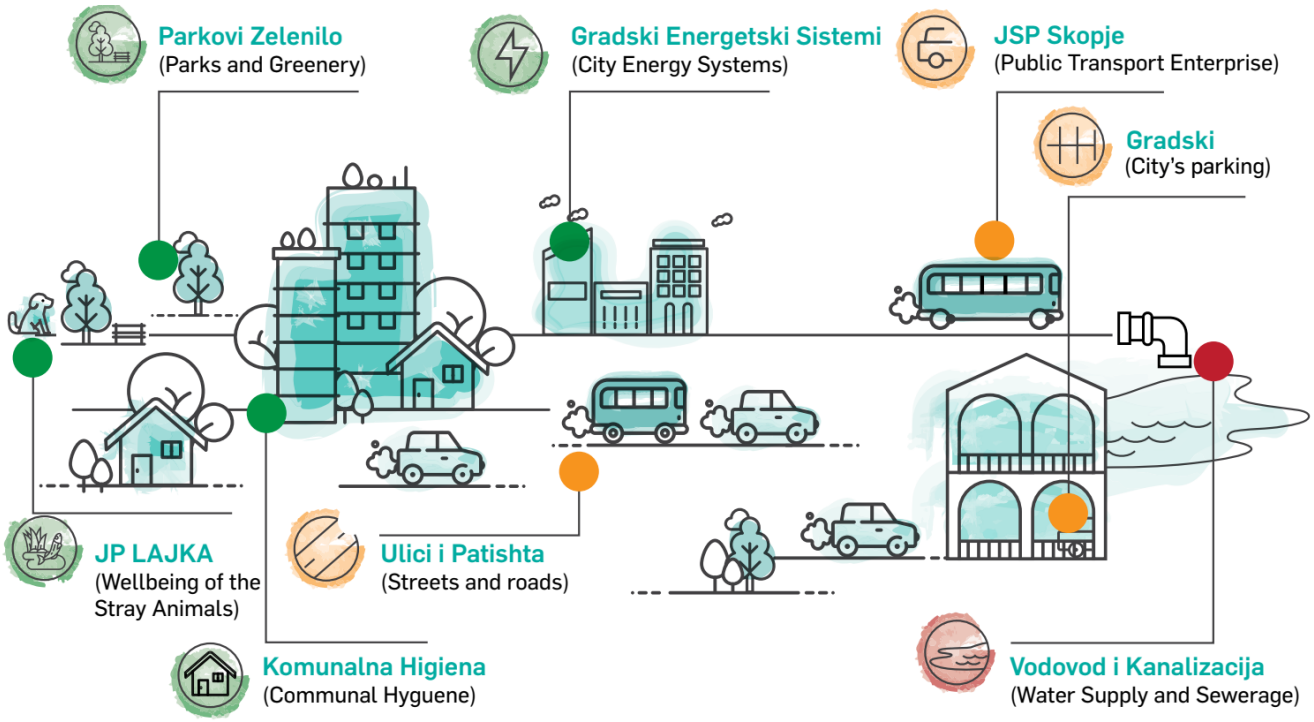
1.2. Purpose of the GCAP

The City of Skopje (herein after: "the City"), pursuant to the Constitution and the Law on the City of Skopje, is a local self-government unit (LSGU) with special legal status, responsible for the overall quality of life of its citizens, which requires a systematic approach in addressing a myriad of urban environmental challenges, including water, air and soil issues.

In order to address these challenges, the City has assumed to develop and consequently implement a Green City Action Plan (herein after: the "GCAP"). The GCAP forms part of European Bank for Reconstruction and Development (EBRD) Green Cities Framework and covers a wide range of urban environmental challenges.

The GCAP methodology has been developed by EBRD together with the Organisation for Economic Co-operation and Development (OECD) and International Council for Local Environmental Initiatives (ICLEI). It represents a systematic process of identifying,

Figure 1-3: Public enterprises of the City of Skopje



benchmarking, prioritising and guiding Green City Actions that involves four steps:

1. Establishing a Green City Baseline and priority setting, which includes measuring the current status of environmental challenges in the City based on ca. 70 core indicators and identifying the priority environmental challenges that need to be addressed;
2. Developing a Green City Action Plan, which includes preparing a document that articulates the City's vision, strategic objectives and priority actions and investments to address priority environmental challenges and meet the objectives;
3. Implementation i.e. execution of the GCAP; and
4. Monitoring and Evaluation of the GCAP results and updating the GCAP as necessary.

1.3. Green City Action Plan Methodology

Table 1-1: GCAP methodology outline

Phase	Main activities	Key steps	Stakeholder engagement
Phase 1 - Baselining	» Understand Political Framework » Evaluation of Green City Challenges	» Collection of contextual information » Collection of all State-Pressure- Response indicators and application of benchmarking and trend analysis	**Workshop #1** - Kick off meeting and information collection
Phase 2 – Technical analysis	» Prioritise green city challenges » Set vision and objectives	» Identification of priority green city challenges based on the assessment of indicators carried out in the previous step » Political assessment	**Workshop #2 -** Stakeholder based prioritisation of challenges, development vision & objectives
Phase 3 - Develop options	» Identify policy options and actions » Create investment plan	» Develop long-list of policy options and actions » Select and prioritise options through the application of scoring filters » Political assessment	**Workshop #3 -** Stakeholder based assessment of Policy Options and Actions
Phase 4 - Produce GCAP	» Produce GCAP presenting all previous stages	» Consolidation of all of the above steps into a costed, scheduled investment plan for the City of Skopje	Presentation of Draft GCAP

1.4. How to read this document

The document is structured as follows:

- Chapter 1 sets out the GCAP methodology
- Chapter 2 outlines the City Baseline
- Chapter 3 describes the vision and objectives guiding the development of the GCAP
- Chapter 4 presents the GCAP
- Chapter 5 presents the action plan for each such sector
- Chapter 6 describes the planned process of monitoring, report and verification

The document is also supported by a series of technical addendum documents which provide more detail on the actual process of data collection and analysis undertaken as part of the development of the baseline.

2. City baseline

2.1. City profile overview

Almost one third of the total population of North Macedonia lives in the City, and there is also significant daily migration into the capital from the region and beyond. The daily presence of people in the City, exceeds the official estimated number of 550,000 residents (2017). This certainly causes problems for the City's sustainability as a system, since the new needs of the residents are difficult to satisfy, and the City is faced with other challenges in its day-to-day functioning. Although the City has been making great efforts to deal with the numerous problems, it is limited in its resources, and its ecological footprint is unfavourable. A lot of investments and additional efforts need to be done not just by the City administration, but by many other stakeholders to improve the whole range of environmental issues that concern the citizens, using available local, national and international experience, best practices, and expert and technical capacities.

The Skopje region is by far the most economically developed in the country contributing 43.1% in the national GDP (2017), with an average GDP per capita of €6,291 (2015), almost one third higher than the national figure.

This is the result of the high concentration of industries, services and administrative institutions as well as the impact of the employees that commute daily into the city from other regions in the country.

The City's budget revenues in 2019 are programmed at ca. 5.5 billion MKD (ca. €90 million) with 557.5 million MKD (ca. €9 million) or almost 9% of the total 2019 revenues to be spent for environment protection. Most of these funds are managed by the city's Environment Department, which is the administration's champion, responsible for creation and implementation of the environmental policy of the city.

2.2. City baseline

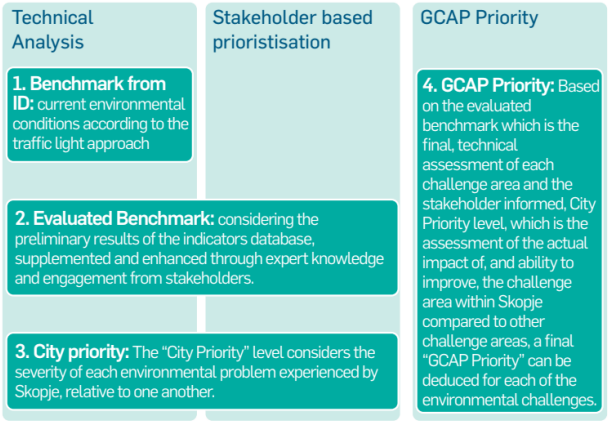
The City baseline was developed following four stages:

1. Benchmarking from indicators database: current environmental conditions according to the traffic light approach.
2. Evaluated Benchmarking: considering the preliminary results of the indicators database, supplemented and enhanced through expert knowledge and engagement from stakeholders.
3. Political Assessment: The "City Priority" level is identified considering the severity of each environmental problem experienced by Skopje, relative to one another.
4. GCAP Priority: Based on the evaluated benchmark which is the final, technical assessment of each challenge area and the stakeholder informed, City Priority level, which is the assessment of the actual impact of, and ability to improve, the challenge area within Skopje compared to other challenge areas, a final "GCAP Priority" can be deduced for each of the environmental challenges.

2.2.1. Benchmarking from indicators database

According to the EBRD's GCAP methodology, indicator data was collected to create a city baseline profile. Collection of indicators followed the traffic light benchmarking process of State- Pressure-Response indicators. The Indicators Database is comprised of the following indicators:

Figure 2-1: Development of GCAP priority



State and pressure indicators have been populated using available data. Indicator values have been benchmarked using standardised benchmarking definitions specific to each indicator. Response indicators have been benchmarked using one of three standardised categories, common to all response indicators. For some indicators there was no data found.

2.2.2. Evaluated benchmarking

The indicators database allowed for a preliminary evaluation of the City's current environmental conditions according to the traffic light approach.

However, the indicators do not provide a comprehensive, consistent and thorough reflection of the current status of environmental conditions.

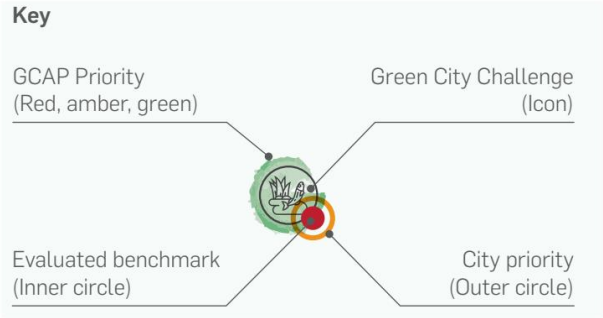
As such, the preliminary results of the indicators database were supplemented and enhanced through expert knowledge and engagement from stakeholders, to arrive at a evaluated benchmark, which was deemed more accurate and reflective of the true environmental challenges in Skopje.

2.2.3. Political assessment

Assessment of the actual impact of, and ability to improve, the challenge area within Skopje compared to other challenge areas. This provided a "City Priority" level which considers the severity of each environmental problem experienced by Skopje, relative to one another.

Table 2.2 presents the evaluated benchmark and City Priority justification, showing how the preliminary benchmark from the indicators database is supplemented and augmented with wider considerations.

Figure 2-2: Key for Green City Challenge prioritisation



2.2.4. Evaluated benchmark and city priority justification

2.2.4.1. Air Quality

Key Contributing Sectors: Transport; Energy; Buildings; Industry

Evaluated benchmark: Air quality is a clear and immediate challenge for Skopje as air pollution is widely accepted to be a major problem. Suspended particles (PM_{10} and $PM_{2.5}$) are the most critical pollutants affecting human health and well-being. The concentrations of suspended particles are high, especially during the winter months, when they significantly exceed the limit values defined in the legislation. Air quality challenges are predominantly led by:

- Heating consumption in the residential sector due to the "energy poverty" leading people to use PM- and carbon- intensive materials covering heating demands.
- Very intensive construction works influencing the concentration of particulate matter.
- Obsolete industrial machinery contributing to poor air quality in Skopje.
- Inadequate policy for motorized vehicles with diesel vehicles comprising 46% (last data: 2016) of total vehicle fleet.
- Low use of alternative sustainable transport.

City priority: Insufficient data collection means the full extent of challenge and its impact on the City is not known. Pollution hotspots exist and must be tackled to improve health of residents.

Measures implemented previously show Skopje's ability to positively address this challenge, and thus it is assessed as a high priority challenge.

2.2.4.2. Quality of water bodies

Key Contributing Sectors: Water management; Solid waste

Evaluated benchmark: The city baseline shows high pollutant concentration in rivers and watercourses are negatively affecting the quality of water bodies in Skopje. The River Vardar and others are highly polluted as a direct result of unsatisfactory wastewater treatment in the City. The City does not have a municipal wastewater treatment plant, and as such there is incomplete coverage of the population to wastewater sewage, insufficient separation wastewaters and storm sewers, and presence of illegal outflows into the rivers.

This challenge is exasperated by:

- Around 10% of residential buildings not connected to the main sewage collector allowing significant quantities of wastewater to be directly discharged to surface water bodies without treatment.
- Inadequate solid waste management leading to inappropriate waste disposal practices and the increase in number of illegal landfills contributing to uncontrolled leakage of untreated waste.

City priority: River Vardar and others are highly polluted as a direct result of unsatisfactory wastewater treatment in the City. This has the potential to negatively affect health, biodiversity, soil quality and water availability.

Within the city's boundaries, there is additional pressure due to the industrial, residential and solid waste sectors. Directly addressing this challenge has the potential to result in positive change in this sector and as such it is assessed as a high priority for the City.

2.2.4.3. Adaptation & resilience

Key Contributing Sectors: Water management; Buildings

Evaluated benchmark: Based on historic events, resilience to earthquakes, fires and floods is most crucial and vulnerability to such climate hazards presents serious risks for the health of the population and the environment. Previous flooding has led to investments in flood protection infrastructure and regulation of the rivers, however based on recent modelling by the City of Skopje, vulnerabilities still exist.

Challenges and pressures relating to climate resilience include:

- Insufficient involvement of disaster risk reduction in sector strategies, programs, and priorities for action of the institutions involved at national and local level.
- Insufficient coordination and communication between the involved institutions at national and local level.
- Accelerated urbanization and built environment.
- Insufficient financial support for implemented activities and measures.

City priority: There is lack of data for resilience to natural disasters.

The last two decades show significant human, economic and environmental losses due to natural disasters.

Floods, earthquakes, heat waves and biohazards (forest fires) are quite regular events that the City of Skopje faces. The national and municipal authorities still heavily rely on the response-based approach rather than establishing a comprehensive prevention-oriented system.

Due to the limited resilience to natural disasters and the significant lack of information in this area, this environmental challenge presents a high potential impact on the City and must be addressed as a matter of urgency. This is within the remit of the City to embed resilience throughout its operations and plans and should be viewed as a high priority.

2.2.4.4. Water use & availability

Key Contributing Sectors: Water management; Industry

Evaluated benchmark: Indicators, showing a green baseline, are not a fair representation of current state of water use and availability due to the lack of data. There are large scale losses within the network and use of drinking water for industrial purposes is inefficient. This challenge is exasperated by:

- Increased number of Skopje citizens requiring amplified quantity of water supplied.
- The amount of non-revenue water is extremely high.
- Historic use of drinking water for the industry needs.

City priority: The inefficient use of potable water has the potential to limit water supply in the City, which will be exacerbated in the face of climate change, and has a high potential impact on this challenge, not just for Skopje but on a national level also.

2.2.4.5. GHG emissions

Key Contributing Sectors: Transport; Buildings; Energy Industry

Evaluated benchmark: CO_2 emissions are high in Skopje and it is acknowledged that this trend is worsening and needs to be reversed and thus has been benchmarked as red in the evaluation rather than amber according to the database. The challenges and pressures contributing to GHG emissions include:

- Very limited use of alternative transport modes, with the predominant mode being private car.
- High level of diesel cars, and further negative dynamics.
- Intensive use of GHG emission- driven fuels for heating.
- Limited share of population with access to district heating/cooling.
- Emissions from industries and factories.
- Absence of methane- capture systems.
- Limited provision on reuse and sorting of MSW and very limited provision on recycling.
- There is no composting or waste-to-energy facilities in place.

City priority: This challenge must be viewed on a national level. The everyday consequences of high CO_2 emissions are not a high impact on Skopje but are part of a wider system in which Skopje must play its part, however it is reliant on national and international cooperation to address. By reducing its GHG emissions, Skopje will not reduce its short- term climate exposure if concerted efforts on a larger scale are not implemented in parallel. Linkages with many pressure sectors, and in particular air pollution and adaptation mean that GHG emissions can be addressed as a co-benefit of many interventions.

GHG emissions should not be a primary focus of Skopje viewed in isolation and as such this should be considered a medium priority level.

2.2.4.6. Soil quality

Key Contributing Sectors: Solid waste; Water management

Evaluated benchmark: Several industrial hot spots have been identified on the territory of the City of Skopje. They originate from the operation of state-owned industrial complexes and after their closure, during the years of transition to the market economy, landfills of larger quantities of industrial waste remained to be repaired to prevent migration of pollutants into the soil, surface and ground water, and in exceptional cases, air emissions.

Periodic dumps also affect soils. For the former Vardarishte landfill, located in an urban area by the river Vardar, a Feasibility Study for the revitalization of this landfill site has been made.

The main pressures are:

- Urbanization and conversion of arable land into construction;
- Unstructured sewage network in rural areas;
- Occupying unurbanized areas with illegal dumps;
- Lack of good agricultural practice including a database of agro-chemical measures,
- Heavy metal soil pollution

City priority: The City of Skopje has recognised this challenge and has begun to address the issue within its remit. Wider efforts are needed at national and regional level to implement soil protection policies, as for example, existing, historic industrial sites are the responsibility of the national government to address Air pollution, solid waste management and wastewater are considerable contributors to soil quality, which if addressed will have a positive influence. Considering this as a standalone environmental challenge has thus been considered as a medium priority for the city.

2.2.4.7. Green Spaces

Key Contributing Sectors: Land use; Solid waste; Water management

Evaluated benchmark: The rapid expansion of the residential buildings during the last two decades has seriously influenced the share of green spaces in the city. Despite the lack of data on biodiversity and ecosystems, the environmental practitioners are confident that there is a heavy anthropogenic impact to the species and habitats. The key challenges and pressures for green spaces include:

- Easy process of revision of the detailed urban plans in favour of the construction works.
- Land conversion and intensive expansion of residential buildings.
- Larger green space areas not well-managed and not easily accessible.
- Degradation of the protected areas.

- Lack of monitoring of built-up area growth and illegal constructions.

City priority: The city has acknowledged the need for improvement and has developed several studies to guide greening and green corridors. This will be supported by improved land-use planning, and implementation of targeted measures where appropriate, which could realistically achieve small gains in the short-medium term.

Based on its activities, the City of Skopje has been accepted as a member of Cities4Forests. This considered, based on green space per capita and all other contributory metrics, the green space challenges is marked as a medium priority

2.2.4.8. Biodiversity

Key Contributing Sectors: Land use; Solid waste

Evaluated benchmark: The continuous degradation of the environment, intensive construction works in urban areas, and especially the data on the decreasing number of "flagship species" are clear

indicators that there is a negative trend in abundance of species that are of national and global interest. The key challenges and pressures for biodiversity include:

- Limited interest of the decision makers for addressing the biodiversity and ecosystem challenges.
- Absence of funds for full size investments in biodiversity ecosystem management.
- Absence of city inventory of habitat types, flora, fauna and fungi.
- Valorisation studies are not adequately taken into consideration.
- Increased influence by transport and residential buildings sectors.
- Limited monitoring and response to the industrial impact.
- Illegal hunting.
- Lack of awareness

City priority: The city has budgeted for nature conservation activities but support at the national level is needed.

Factors of urbanisation are clearly and undeniably linked to biodiversity and ecosystem loss, and improvements in other sectors such as construction, industries, waste, water quality, transport, energy will have a positive impact here.

This topic requires further analysis with strong recommendation for increased investment in result-oriented actions for strengthened monitoring, planning and management capacity for biodiversity and ecosystem management and is thus prioritised as medium priority.

2.2.5. Final prioritisation of environmental challenges

Based on the evaluated benchmark and the City Priority level, a final "GCAP Priority" can be deduced for each

of the environmental challenges. This classification is based on two elements, the benchmarked result of the most underperforming environmental challenges, and in the context of Skopje, the environmental challenges that have the most impact, are within the responsibility of the City, can be easily influenced by the City, and can be mostly improved by efforts by the City. This helps identify in terms of prioritising efforts, the urgency of each of the environmental challenges and helps focus efforts.

Urgent efforts needed, which can immediately and comprehensively address challenge

Efforts needed to address challenges in mid-term, supporting urgent efforts

Benefits accrued as a result of improvement to more urgent challenges may be supported by longer term efforts.

It should be noted that 'low' priority challenges still require due attention but in relation to the 'high' level ones are less pressing.

Air pollution, quality of water bodies, and adaptation and resilience are deemed the High priorities, where the most urgent efforts on addressing current status is needed, which is in line with the analysis of them being the most pressing challenge areas. Water use and availability, soil quality and GHG emissions are ranked as Medium priority, while green spaces and biodiversity and ecosystems are within the lowest priority, requiring the least focus in relation to other challenges.

Figure 2-3: GCAP priority

Green city challenges		Comments, including key pressures
Air quality		Air quality is classed as 'high' GCAP priority as a clear and immediate challenge for Skopje. Transport and domestic energy use and fossil fuel power generation are key contributors to air pollution. Moreover, better solid waste management could reduce supply of poor-quality materials for heating. Ad hoc measures implemented previously show Skopje's ability to positively address this challenge, and thus it is assessed as a city high priority and subsequently a GCAP high priority.
Quality of water bodies		While the standard of drinking water is good, the quality of water bodies, such as the rivers and lakes, is low, as observed in River Vardar. This is due to the lack of wastewater treatment from residential, commercial and industrial sectors. This challenge has the potential to negatively affect health, biodiversity, soil quality and water availability. Directly addressing this challenge has the potential to result in positive change in this sector and as such it is assessed as a high priority for the City and within the GCAP.
Adaptation and resilience		There is limited resilience to natural disasters across many sectors. There is significant lack of information related to adaptation and resilience to natural disasters. The data available from the assessment of impacts of 2016 floods backs up the risk and thus this should be considered as a high GCAP priority.
Water use and availability		Further evaluation of the benchmark demotes the assessment of water use and availability from green to yellow. This is due to the large-scale losses within the network and the inefficient use of drinking water for industrial purposes. As climate change is seen to put more pressure on this finite resource, this is seen as a high priority challenge for the city. As a WWTP could reduce demand on freshwater for industrial use, and a WWTP is being implemented, this makes the GCAP priority 'medium'.
Soil quality		Due to the lack of research, misclassification of contaminated sites and the evidence of presence of highly hazardous waste within the boundaries of the city, soil quality has been assessed as a red benchmark. However, the City has recognised this challenge and has begun to address the issue within its remit. Air pollution, solid waste management and wastewater are considerable contributors to soil quality, which if addressed will have a positive influence. Considering this as a standalone environmental challenge has thus been considered as a 'medium' priority for the city.
GHG emissions		Highly related to air pollution issues from energy use in transport, industries, residential buildings, and inappropriate solid waste management and treatment. GHG emissions should not be a primary focus of Skopje viewed in isolation and as such this should be considered a medium priority level in terms of city priority and GCAP priority.
Green spaces		Impacts from many sectors are negatively affecting green space and biodiversity. This challenge has been categorised as a 'low' GCAP priority as it can be enhanced by efforts targeting other challenge areas.
Biodiversity and ecosystems		Impacts from many sectors are affecting negatively green space and biodiversity.

Figure 2-4: Summary of Green City Challenge priorities

IMPORTANT NOTE: The classification of 'low', 'medium' and 'high' has been used in accordance with the Green City Action Plan methodology. This has allowed to classify the environmental challenge areas based on the level of most pressing issues that would need to be addressed. This classification is based on two elements, the benchmarked result of the most underperforming environmental challenges and, in the context of Skopje,

the environmental challenges that have the most impact, are within the responsibility of the City, can be easily influenced by the City, and can be mostly improved by efforts by the City. It should be noted that 'low' priority challenges still require due attention but in relation to the 'high' level ones are less pressing.

In addition, any positive action within the other challenge areas will result in improvements in the 'low' priority areas, as for example, good air and water quality are prerequisites for improved green spaces and biodiversity in the City. Without focusing on improvements in these High priority areas, efforts to improve lower priority areas will be less wasteful.

2.3. Pressures contributing to green city challenges

Following the linking of state and pressure indicators, providing clear understanding of which sectors contribute to the environmental challenges prioritised earlier, the key pressures have been amalgamated by overarching themes and mapped against challenges.

Table 2-4 (Overleaf) displays the mapping of pressure themes against challenges.

This allows for clear identification of common themes of pressures which act across and between challenge areas, rather than affecting each challenge in isolation.

In turn this will help to address the challenges through development of objectives that may lead to improvement in several problem areas.

2.4. Green City Challenges by theme

2.4.1. Sectoral pressure areas

Based on the above, a range of common themes are appreciable across the sectors and challenges, Skopje. The specific thematic areas are as follows:

- Urban transport - Fossil fuel vehicles; Quality of alternative sustainable transport.
- Energy supply and efficiency - Provision of energy; Energy consumption and efficiency.
- Solid waste management - Solid waste collection; Solid waste treatment.
- Water supply and treatment - Potable water consumption; Wastewater treatment.

The above demonstrates that, through identifying common issues across sectors, key priority areas can be summarised concisely, while still articulating the specificity of challenges facing a particular sector.

2.4.2. Cross cutting themes

The Pressure Areas are supported by cross-cutting themes, which run across sectors and must be addressed in a wholistic way, rather than by each sector or priority area in isolation. These were identified as:

- Climate resilience;
- Land use and protection;
- Data management and monitoring; and
- Public and institutional awareness/knowledge.

In the following stage of the GCAP, objectives related to each sector are presented which help guide improved performance of the environmental challenges. Crucially however, the above outlined process of Technical Assessment and development of thematic Priority Areas mean that targeted interventions within these areas can be generated, which by addressing the objective will, through a clearly visible bottom-up approach, guarantee this improved performance.

Table 2-1: Mapping of pressure themes

Challenge area	Transport	Buildings	Energy	Industry	Solid waste	Water management	Land use
Air pollution 	**Fossil fuel polluting vehicles Limited quality of alternative sustainable transport**	**Poor domestic energy efficiency** Limited extent of district heating/cooling **Intensive construction works**	**Poor quality energy consumption** Limited extent of district heating/ cooling **Fossil fuel derived grid electricity**	**High energy consumption Low energy efficiency** Obsolete machinery	Burning of solid waste material in domestic sector		**Intensive construction works** Agricultural waste burning in places
Quality of water bodies 		**Lack of wastewater treatment** Limited connection to main sewage collector		**Non-adherence to** national standards for wastewater treatment	Inappropriate waste disposal Illegal waste dumping Untreated leachate	**Increase in demand leading to pressure on springs and wells**	**High urban potable water consumption** Losses within water supply system
Adaptation and resilience 	**Resilience to climate change** and extreme weather conditions	**Resilience to climate change** and extreme weather conditions	**Resilience to climate change** and extreme weather conditions	**Resilience to climate change** and extreme weather conditions		**Resilience to climate change** and extreme weather conditions	
Water use and availability 		**High potable water consumption** Losses within water supply system		**Potable water consumption** to fulfil industry needs		**Increase in demand leading to pressure on springs and wells**	**High urban potable water consumption** Losses within water supply system
GHG emissions 	**Fossil fuel vehicles Quality of alternative transport**	**Poor domestic energy efficiency Limited extent of district heating/ Cooling**	**Poor quality energy consumption Fossil fuel derived grid electricity**	**High energy consumption Low energy efficiency Obsolete machinery**	**Landfill emissions as** no methane capture system **Solid waste treatment**		
Soil quality 				**Air pollution from energy consumption Limited wastewater treatment** Heavy metals in the soil	**Limited recycling and composting facilities Inappropriate waste disposal Illegal waste dumping Limited remediation** of contaminated areas	**Lack of wastewater treatment**	
Green spaces 		**Intrusive urban development Limited data / monitoring on** built-up area and illegal constructions			**Inappropriate waste disposal** Illegal waste dumping		**Intensive construction works** Poor management of larger green spaces **Limited data / monitoring Lack of awareness**
Biodiversity 				**Air pollution from energy consumption** Heavy metals in the soil **Limited data / monitoring** on industrial impact			

3. Vision and Objectives

3.1. Introduction

The Vision and Objectives of the GCAP assesses the existing policy initiatives and gaps and outlines the:

- Guiding Vision for the GCAP;
- Key Strategic Objectives for each challenge for a period of 10-15 years; and
- Operational Objectives which build towards the strategic objectives.

3.1.1. Hierarchy of principles

This forms the basis for the development of specific short-term actions for the City to undertake for each sector - as illustrated in Figure 3-1. This hierarchy of principles provides a clear framework for the development of measures which will have an appreciable benefit on the City's environmental performance.

Throughout this process, environmental and socio-economic dimensions will be considered in the development of the vision, objectives and in the appraisal of actions.

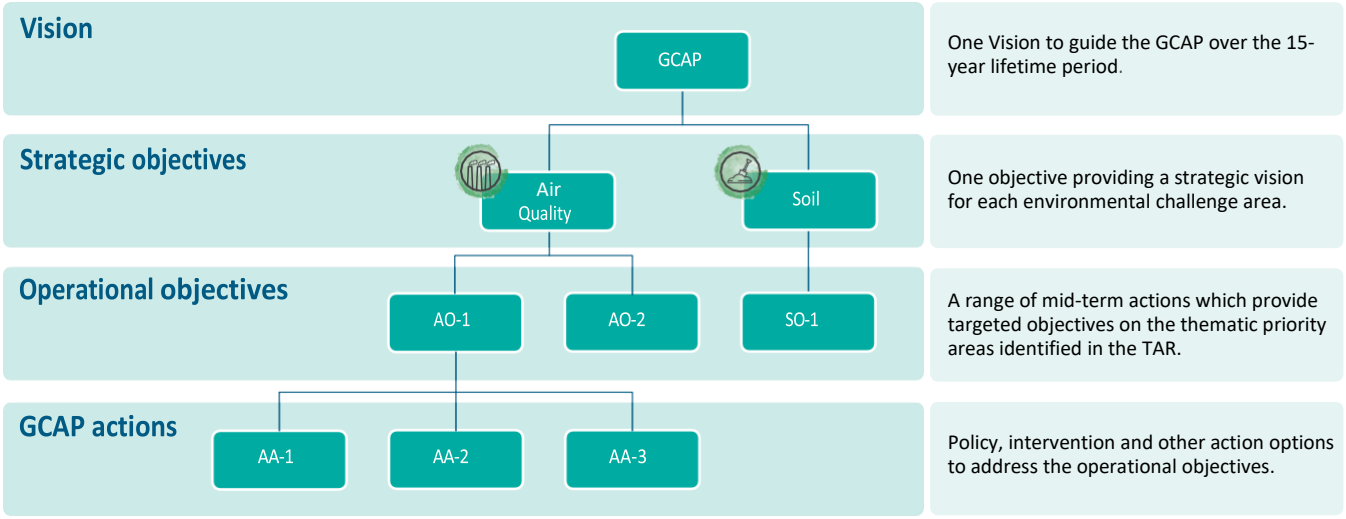
3.2. Summary of policy initiatives and gaps

The policies and regulations are weakly implemented and even less monitored and reported. In addition, most strategies have already expired.

The lack of an efficient monitoring and evaluation system poses a great challenge to the development of the GCAP for the City of Skopje. It is therefore fundamental that the City or other relevant authorities, ensure that monitoring and evaluation systems are put in place and the progress assessed. The latter is essential in order to update the policy documents, and more importantly to make available comprehensive reports to the citizens and stakeholders.

Moreover, improved understanding and awareness of environmental conditions and their factors will allow for shared ownership amongst all City stakeholder groups, encourage further knowledge sharing and promote monitoring and evaluation of targets – all ultimately improving performance over time.

Figure 3-1: Hierarchy of principles



3.2.1. Air quality

Air quality is the biggest problem facing the City of Skopje. Suspended particles (PM10 and PM2.5) are the most critical pollutants affecting human health and well-being. The concentrations of suspended particles are high, especially during the winter months, when they significantly exceed the limit values defined in the legislation.

The main source of suspended particles is household heating, and industry and traffic are also important sources.

High concentrations of suspended particles in winter are associated with higher direct emissions (household heating, especially wood use), but also due to meteorological conditions that limit emission dispersion and facilitate the chemical reactions that produce secondary particles, for example from vehicle exhausts.

The Integrated Cadastre of Environmental Pollutants of the City of Skopje, based on the annual emitted quantities of air pollutants from the various emission

sources in the City of Skopje (stationary, residential, mobile sources and fugitive emissions), is the following:

- Emissions from stationary sources have the largest share (83.33%) in the total annual emission of CO_2. The emission from residential sources accounts for 15.80% of the total CO_2 emissions, while the mobile sources account for 0.86%,
- CO emission mostly comes from residential sources (66.52%), while mobile and stationary sources account for 30.57% or 2.90% of total CO emission, respectively,
- The amount of NOx emission annually comes mostly from mobile sources (60.18%). The share of stationary sources in the total NOx emission is 31.44% and in the residential sources 8.38%,
- The annual amount of TSPs emitted is primarily the result of fuel combustion in domestic fireboxes (91.74%), while mobile and stationary sources contribute slightly to total TSP emission (4.72% and 3.55% respectively),
- Emissions of NMVOC originate primarily from residential sources (58.85%). In the total annual emission of NMVOC mobile sources participate with 23.18%, fugitive emission with 14.60% and stationary sources with 3.37%.

Air pollution is a problem that citizens need to resolve as soon as possible. The City of Skopje, the Municipalities of the City, the Ministry of Environment and Physical Planning and the Government of the Republic of Northern Macedonia, in cooperation with expert institutions and the civil sector, are trying to implement relevant projects and solutions to overcome the air pollution through the implementation of the measures from the Plan for reducing air pollution in

Skopje agglomeration. The largest funds were spent on subsidizing citizens in the form of heating (purchase of pellet stoves and inverters), chimney cleaning and procurement of bicycles and electric trolleys, a measure foreseen in the plan, as well as in the "City Heating Study". Skopje: Policy and Measures Analysis Based on Research Project Skopje Warming Up ".

3.2.2. GHG mitigation

The City of Skopje implemented the GHG Inventory on two occasions, the first for 2008 and 2012 and the second for 2013, 2014 and 2015. The third inventory for 2016, 2017 and 2018 is ongoing.

Estimated GHG emissions within the inventory show that the total emissions of the City of Skopje decreased by 21.6% in the period 2008-2015.

Emissions reductions are mainly due to reduced emissions from industrial processes and from combustion of fuels used in the processing industry and construction (within the stationary energy sector) due to lower output than industrial branches in the city of Skopje over the years. Reduced energy consumption in residential and institutional buildings also contributes to reducing overall greenhouse gas emissions. On the other hand, the increased number of vehicles in the transport sector results in increased emissions from this sector. Another sector with an increase in emissions, albeit smaller, is the waste sector.

Key categories and trends:

- Manufacturing industries and construction (-25.3%)
- Residential buildings (-25.2%)
- Road transport (+ 14.8%)
- Commercial buildings / buildings (+ 10.7%)
- Emissions from industrial processes within the city limits (+ 8.5%)
- Institutional buildings / facilities (-5.2%),
- Solid waste disposal (+ 4.3%)
- Energy industries (-3.1%).

Emissions of the City of Skopje in National Context:

- The City of Skopje is an important contributor to the national emissions of the Industrial Processes sector and is responsible for 48.2% of the national emissions of the sector in 2014,
- The transport sector of the City of Skopje contributes to 40.7% of the national transport emissions,
- Category Wastewater Treatment and Discharge of the City of Skopje contributes by 21.1% of national emissions in the category,
- The energy industries of the City of Skopje contribute very little to national emissions in this category, or 2.7% of emissions in this category.

Comparison between national greenhouse gas emissions and local emissions of the City of Skopje

The main sources of greenhouse gases are the Static Energy sectors (including the Buildings subsector), Transport and Waste.

- Intensive application of high GHG fuels,
- Greater use of individual instead of public transport,
- Obsolete and diesel vehicles involved in traffic,
- Lack of organized waste management system including waste selection and reuse.

3.2.3. Water

The water supply system of the city of Skopje is supplied with water from the Rasce spring and the Nerezi - Lepenec well. The citizens of Skopje drink exceptionally high quality water.

The Rasce spring is located 10 kilometers west of Skopje, and the established protection zones extend into Skopje and across the Polog valley. The Nerezi - Lepenec well is located in the urban area of Skopje.

Due to the fact that the protection zones of the Rasce spring are very large, which means that the source of the feed is from a larger territory, which is full of economic and agricultural activities, numerous settlements, roads, etc., but the biggest threat to the Rasce spring is the historical landfill of production process of Jugohrom plant in Jegunovce and the possibility of groundwater contamination with hexavalent rum (Cr + 6). The very location of the Nerezi - Lepenec well area makes this water supply facility extremely vulnerable to the overall urban life.

The city built extensive piezometric grids 10 years ago in the Polog valley (for the Rasce source) and the Skopje valley (for the Rasce spring, the Nerezi-Lepenec well area and in the wider groundwater in the Skopje valley), with which the contours were continually established. leads.

Updated expertise on the establishment of protective zones at the Rasce spring and Nerezi - Lepenec well area, developed in the last year (the previous ones were developed more than 25 years ago), based on many research projects funded by the City of Skopje, the borders have been updated. on the protection zones of both water supply facilities and a new and precise protection regime has been established. The process of adopting new legal acts to protect both sources is ongoing. The main problem, as in the past, is the observance of the established protection measures, since they are not only within the competence of the City of Skopje.

A particular problem is that drinking water of excellent quality in the city is also used by commercial buildings for watering the greenery and washing the streets. Therefore, a detailed study of the feasibility of using wells for irrigation has been made and the municipalities in the city are gradually implementing it. Commercial buildings are increasingly opting to use their own wells for water supply, which is approved by the MoEPP based on the opinion of the City of Skopje. Due to the increasing number of legal entities using groundwater, the City of Skopje has made a Register of wells for commercial purposes and is in progress. is developing a comprehensive Groundwater Study of the Skopje region. All this in 2021 will be the basis for preparation of the Water Management Strategy of the City of Skopje.

Due to the threats from the effects of climate change, the City of Skopje has been continuously implementing a project for four years to find alternative water sources, Kadina Reka and the cave spring Vrelo of Matka, whose water quality is similar to that of the Rasce spring.

The main problems in this sector are:

- Threats to the quality of the waters supplying the Rasce spring and the Nerezi-Lepenec well, with the largest recorded and proven risk being the Jugohrom landfill in Jegunovce, which is within the MoEPP's jurisdiction.
- Incomplete coverage of the water supply system in all settlements,
- Increasing the water supply needs in parallel with the growth of the city,
- Drinking water consumption for commercial and sanitary purposes,
- Very high water losses from the water supply system.

3.2.4. Soil

The big urban expansion is an important mechanism for soil degradation in Skopje, primarily through its conversion and 'sealing' by the construction of residential buildings, industrial plants, streets, roads and the like. The reason for the degradation of the soil in the territory of Skopje is the local pollution from industrial facilities and landfills and diffuse pollution due to atmospheric deposition of emissions of gases from industry and traffic. Agricultural soil is degraded due to inadequate use of fertilizers and plant protection products, as well as irrigation with leachate from inadequately treated waste.

Based on the monitoring of heavy metal soils carried out in 4 phases at 300 km^2 in the Skopje valley, the presence of 22 elements was investigated, and most of them were found to be below the maximum permissible concentrations, some of which were of natural origin, and some with a more intense presence are found in certain micro-sites and are due to traffic and industry and other activities. Significant concentrations of arsenic are found in a wider area with relatively lower to more intense contamination. As a truly expressed "black spot" from the eco-

geochemical point of view in the treated area, only the very extensive and intensely present As-contaminations are present, especially in the alluvium of the spaces between OHIS, v. Gorno Lisice, v. Dolno Lisice, v. Ognjanci, v. Dracevo. Examination of the distribution of heavy metals in vegetable crops for human consumption, carried out on all micro-sites of the recorded elements, showed no disturbing results.

Erosion as a process of deterioration of soil quality and threat to the environment and human health, as well as torrents, has been covered by the Erosion Study, and parts of the Action Plan of this study are already being implemented (Skopje Fortress and Skopje Montenegro, as on Vodno Mountain).

Several industrial hot spots have been identified on the territory of the City of Skopje. They originate from the operation of state-owned industrial complexes and after their closure, during the years of transition to the market economy, landfills of larger quantities of industrial waste remained to be repaired to prevent migration of pollutants into the soil, surface and ground water, and in exceptional cases, air emissions. The biggest problem is the industrial landfill of OHIS AD Skopje and the GODEL (tannery) factory, which is not under the jurisdiction of the City.

Periodic dumps also affect soils. For the former Vardarishte landfill, located in an urban area by the river Vardar, a Feasibility Study for the revitalization of this landfill site has been made.

The main pressures are:

- Urbanization and conversion of arable land into construction;
- Unstructured sewage network in rural areas;
- Occupying unurbanized areas with illegal dumps;
- Lack of good agricultural practice including a database of agro-chemical measures,
- Heavy metal soil pollution.

3.2.5. Adaptation and resilience

The City of Skopje has its own recognizable risk profile, based on the number, frequency and characteristics of past disasters and disasters, as well as on the existing hazard profile determined by the specifics of the natural and environmental environment, and more the impacts associated with dispersion and the way the environment is built (space management), exposure and vulnerability of the population and other risk elements.

Taking into account the expected magnitude of the effect and the consequences, which may be expressed in loss of life and injury, direct damage and long-term effects on natural, material and cultural goods, as well as the negative effect on the national gross social product, having Given the historical facts and vulnerability of the wider metropolitan area, the danger of an earthquake is paramount. On the other hand, if frequency analysis is done, according to the frequency, intensity and damage caused, in recent years, fires and floods are second and third.

Also, the city of Skopje is characterized by the occurrence of other hazards related to climate and meteorological impacts, which are manifested by very high values of air pollution, extreme weather events such as heat waves in summer and cold waves in winter, landslides, torrential rains followed by storms and thunderstorms, snowstorms, as well as long-lasting fog in the Skopje valley.

The City of Skopje area can be flooded from several sources: from the Vardar River, stormwater (floods), torrential watercourses originating from Vodno Mountain, elevated groundwater levels and as a result of overflows of reservoirs / reservoirs Matka, Sveta Petka and Kozjak. Since the beginning of hydrological monitoring in 1923, four major floods have occurred in the City of Skopje: December 1935, December 1937, November 1962 and November 1979. The maximum measured flow in 1962 was 1,310 m3 / sec, the highest recorded flow; the area flooded by this event amounted to 6,752 ha. The measured flow in 1979 was 980 m3 / sec and the flooded area 7,550 ha.

Following the extreme flood in 1962 and the damage caused, a large-scale project was designed and built to manage flood risk in the urban area. The main project for regulation of the river Vardar was worked in the period from 1968 to 1974, in parallel with the construction works of the regulation itself.

In the past, flood protection activities have also been undertaken due to the torrents of Vodno Mountain. The afforestation of the northern slopes of Mount Vodno after World War I has a major contribution to protecting the city from potential erosion processes and torrential flows.

The current situation in terms of flood protection against the torrential downpours of Skopska Crna Gora is even more critical. Flood protection in this area is limited to the drainage system, which consists mainly of open channels, primarily intended for the evacuation of high groundwater and surface water from arable land. To some extent the drainage system is also used for flood protection in rural areas.

In the framework of the implementation of the Climate Change Action Plan Resistant Skopje, the City of Skopje has in the last three years conducted a Flood Study modeling all types of floods in the city, Operational plan for flood protection and Plan for protection against technological disasters, as well as technical documentation for flood protection of Skopska Crna Gora.

The following challenges must be taken into account when implementing risk reduction and resilience activities:

- Insufficient involvement of disaster risk reduction in sector strategies, programs, and priorities for action of the institutions involved at national and local level;
- Insufficient coordination and communication between the involved institutions at national and local level;
- Accelerated urbanization and built environment;
- Insufficient financial support for implemented activities and measures;
- Low level of involvement of gender practices in risk reduction management;
- Insufficient level of building a culture of prevention and cooperation with the business sector.

3.2.6. Biodiversity

The Law on Environment is a national policy demanding municipalities in North Macedonia to conceive a Local Environment Action Plan (LEAP). Consequently, the City of Skopje developed LEAP-1 (2004-2010) and LEAP-2 (2011-2017). The new LEAP-3 (covering 2020-2026) document is therefore being updated at the present time. The purpose of LEAP-2 was to identify all the environmental changes since the endorsement of LEAP-1 in 2004.

The fundamental objectives of LEAP-2 include:

- Identifying and strengthening that the administration's needs to efficiently manage the environment locally;
- Ensuring that the environmental is protected as required,
- Raising the public's awareness on its responsibility regarding the environment and

- Providing funds for implementing the priority actions of the City.

The policy gaps associated to biodiversity are linked to the lack of biodiversity inventory of flora, fauna, fungi and types of habitat in the city. The gaps in greenery policy are predominantly focussed on the lack in monitoring the built-up area growth and illegal construction.

The analyzes show a very large biogeographical diversity, as well as a variety of species and habitats in the Skopje Basin, which is confirmed by large areas protected or recorded as natural heritage. There are 12 areas or structures registered in the Skopje region that are protected as natural heritage.

All sites are protected on the basis of expert studies for their valorization, and the legal obligation to adopt protected site management plans has commenced.

The City of Skopje has provided the necessary funds for their protection and arrangement on a yearly basis for many years.

The main pressures for protected natural sites are:

- Loss, modification and fragmentation of habitats,
- Overuse of biological resources,
- Environmental pollution,
- Introducing invasive species,
- Climate changes,
- Natural disasters (forest fires, landslides, floods, etc.),
- Lack of biodiversity monitoring within protected areas,
- Insufficient cooperation with institutions at national level,
- Lack of developed awareness of the importance of protected areas and understanding them only as good places for recreation.

3.2.7. Green space

The steep expansion of construction activities in the last two decades has seriously affected the greenery situation in the city. The polyvalent importance of green spaces, as major environmental quality actors (insulation protection, jacuzzi protection, air quality improvement, stormwater acceptance, etc.) and as a space for social integration, is not given serious attention.

Green areas (parks and block greenery) are interconnected with trees and green areas along boulevards (central greenery). The problem is that this greenery is only perceived in terms of providing a decorative function. Little attention has been paid to its potential to participate in air purification and to gain an ecological function.

Urban vegetation in the city of Skopje has not been thoroughly explored, but is known to be representative of several types of communities: rudder communities, lawns, parks and cultivated communities (particularly

rich in diverse flora - in parks there are about 200 species and 500 species and varieties of trees and shrubs). From the fauna of the city, only birds have been explored (there are over 100 bird species in Skopje City Park) and some invertebrates. Despite the lack of biodiversity data in the city, it is clear that the anthropogenic impact on species and their habitats is large.

There are no larger green corridors on the territory of the City of Skopje, except partly along the Vardar River. The city recognized the need for improvement and started the following activities:

- The Green Cadastre of the City of Skopje recorded those public green areas and their contents, which are under the jurisdiction of the City of Skopje, with about 100,000 trees and shrubs. The creation of this cadastre provided systematic information and data on trees, their number, quality and economic assessment, which includes cartographic representation and statistical information and is the basis for the use of natural resources, planning and control of their protection.
- To improve the planning and maintenance of greenery in the city, a research Greening and afforestation study of the City of Skopje has been developed, which is an excellent basis for developing expert plans in accordance with the new Law on Greenery.
- The new study on riparian habitats (coastal habitats) has recorded such habitats of flora and fauna in the Skopje region, with all the adverse anthropological impacts and activities needed for their conservation, and the Action Plan activities are being implemented.
- The preparation of a Biotope Map for the City of Skopje is in the initial phase, which will for the first time detect the diversity and complexity of biotopes in the area of the city, in the direction of sustainable land use.
- The study of green corridors has created conditions for the manner of forming green corridors along the rivers Serava and Lepenec, tributaries of the river Vardar within the city limits, for which technical documentation is currently being prepared.
- Pioneering steps have been taken in the development of Green Roofs in public buildings. Preparatory activities are underway to develop a second Green Roof.
- The first public urban garden (farm) in the city, of the type permaculture activities, is under construction.
- Based on its activities, the City of Skopje has been accepted as a member of Cities4Forests - a movement to catalyze political, social and economic support between governments and city dwellers to integrate indoor (urban), near and far forests in development plans and programs. Participants work together to reduce deforestation, reforestation (and more trees in cities) and more sustainable forest management.

3.3. Green City Vision

"The City of Skopje will be a leading sustainable city in the region, offering its citizens a high quality of life through the provision of clean air and water, healthy green spaces and accessibility for all, while contributing to national and international efforts to address climate change."

3.4. Strategic and operational objectives

Environmental Challenge	GCAP Priority Level	Specifics of challenge	Strategic Objective	Operational Objective	
Air Quality	High	High PM_{10} & $PM_{2.5}$ concentrations	Regularly monitoring and incrementally reduce atmospheric concentration of pollutants to achieve AMBER status for all indicators within the lifetime of the GCAP.	AQ1	Reduce the volume and impact of local air pollution from fossil fuelled transport
				AQ2	Increase modal share of less polluting, alternative sustainable transport
				AQ3	Reduce overall energy consumption of building stock city-wide
				AQ4	Reduce proportion of energy generated from higher air polluting sources
				AQ5	Reduce the dependence on fossil fuels for domestic heating needs
Quality of water bodies	High	High pollutant concentrations in rivers	Incrementally reduce pollutant concentrations in the River Vardar to AMBER indicator status within the lifetime of the GCAP.	WQ1	Improve sewerage collection coverage for buildings city-wide
				WQ2	Increase wastewater collection and treatment city-wide
				WQ3	Improve solid waste management and treatment processes
Adaptation and resilience	High	Historic flood risk and limited planning	Improve resilience to the impacts of weather events to reduce the number and severity of public assets and households at risk to AMBER status.	AR1	Promote safe and resilient infrastructure, housing and urban development
				AR2	Raise awareness of vulnerabilities to climate change impacts
Water availability and use	Medium	Inefficient use of existing water sources	Improve the efficiency of water supply networks indicator by 50% within lifetime of the GCAP, against current benchmark.	WA1	Reduce overall wastage of potable water
				WA2	Reduce proportion of potable usage in industrial processes
				WA3	Improve the protection of freshwater sources
Soil	Medium	Urbanization, industrial hot spots, and periodic dumps affecting soil quality	Clearly identify, categorise and reduce the number of contaminated sites within the city, by 50% within the lifetime of the GCAP.	SL1	Encourage development of remediation plans for contaminated sites
				SL2	Reduce discharge of untreated wastewater and generation of solid waste from industrial processes
				SL3	Reduce proportion of solid waste dumped, disposed onsite or to landfill
				SL4	Reduce the volume of local air pollution from fossil fuel use
GHG mitigation	Medium	Steadily increasing GHG emissions in the energy, transport and waste sectors	Halt the increase of GHG in all sectors and reduce to achieve GREEN indicator status within lifetime of the GCAP.	GH1	Encourage uptake of low carbon energy generation
				GH2	Improve energy efficiency of building stock
				GH3	Reduce the volume and impact of GHG emissions from transport
				GH4	Reduce overall emissions from landfill and solid waste treatment processes
Biodiversity	Low	Heavy, negative anthropogenic impact to species and habitats, leading to species decline	Improve safeguarding of natural habitats for wildlife by halting unplanned urban development and increasing the enforcement and number of protected sites against 2020 benchmarks.	BE1	Encourage development of green infrastructure across the city
				BE2	Improve data collection and monitoring systems for measuring biodiversity within the City
				BE3	Improve awareness of impact on biodiversity within the City
Green Space	Low	Expansion of the city has significantly reduced the provision of Green Space for residents.	Increase the proportion of accessible public green spaces for residents by 100% against current benchmark.	GS1	Enhance extent, quality and diversity of green spaces and other green infrastructure
				GS2	Promote a sequential approach (brownfield, infill, greenfield) to urban development to avoid further urban sprawl
				GS3	Improve proposed law on urban planning to safeguard green spaces

4. Green City Action Plan

4.1. Key considerations and commentary on the action plan

When developing the action plan there were a number of considerations needed to ensure it was robust, realistic and achievable. The following sections outlines considerations in the design, detail, packaging and wider cross cutting benefits of the measures presented in the action plan.

4.1.1. Policy options and action interventions

In line with the GCAP methodology we have grouped action plan measures into two categories – policy options and action interventions

Policy options include City lead softer schemes of capacity building; institutional strengthening; internal processes; studies and plans to enable the realisation of infrastructural investments; data collection and management; awareness raising and enforcement.

Without these soft measures, the environment for implementation, management and full realisation of the potential benefits of larger, more expensive schemes, would not exist. Policy options will tackle the root causes of green city challenges in Skopje, but on their own will have limited ability to make material changes to practices.

Action interventions cover the larger scale, high cost, infrastructural investments which will result in the appreciable positive change to green city challenges in Skopje.

The action interventions will follow through on the groundwork laid by policy options, installing newer, more efficient, and greener solutions to many of the major (and necessary) functions of a capital city. As a result they will replace outdated, inefficient and unsustainable

practices and technologies with cleaner, greener and more inclusive solutions for the citizens of Skopje. The action interventions are targeted at the lowest performing areas of the city's processes and will lead to clear, measurable benefits for the city, it's citizens and the environment.

4.1.2. Level of detail

We have put so much detail to allow the City to communicate the level of detail required with funding options. Without this detail, the City would then have to design up these options and identify relevant supporting sub-actions to put together robust funding applications. With this level of detail provided, and phasing of the options clear, the City can now be more proactive, raising their capacity to deal closely with potential funding agencies

4.1.3. Packaging to establish a mechanism for planning, investment and sustainability

We have undertaken packaging of measures to establish a mechanism for planning, investment and sustainability. A package of 2-5 measures if most optimal, it allows efficient management of implementation of the project by the city project team. Also, they can be an affordable package which each sub-action complements and allows for greater realisation in a shorter timeframe.

4.1.4. Cross cutting themes

4.1.4.1. Data management and monitoring

The specifics of a number of challenge and pressure areas are not fully understood.

It is essential that better data is gathered and shared so as to improve the knowledge and understanding of both public and private companies, and residents of the City of Skopje. This should be mainstreamed into each sector/ pressure area in line with the GCAP. Examples of lack of monitoring and data include:

- Lack of monitoring of built-up area growth and illegal construction;
- Unidentified number and area of the contaminated sites and lack of data;
- Absence of city inventory of habitat types, flora, fauna and fungi; and
- Limited monitoring and response to the industrial impact.

'Resilient Skopje' proposes general mitigation measures for air pollution and GHG emissions including implementing and mainstreaming measures from action plans in documents for the protection of ambient air and updating the GHG inventory for the City of Skopje. These are examples of data management and monitoring measures that will be crucial across various sectors.

4.1.4.2. Awareness raising

Improved understanding and awareness of environmental conditions and their factors will allow for shared ownership amongst all City stakeholder groups, encourage further knowledge sharing and promoted monitoring

and evaluation of targets – all ultimately improving performance over time. It was found that there is limited knowledge and experience in recycling and composting facilities and low levels of public awareness on benefits of decreasing solid waste. This may lead to

institutional hindrances and blockages such as limited interest for investing in recycling and composting facilities.

Other institutional hindrances include limited investment in residential energy efficiency and renewable energy measures, lack of coordinated water management protection measures, absence of a law on soil and soil quality and limited interest of the decision makers and funds for addressing the biodiversity and ecosystem challenges. 'Resilient Skopje' also advises on establishing and implementing activities for changing the behaviour of citizens and institutions as they are the instigators of positive change in terms of climate change actions.

4.1.4.3. Capacity development framework

The framework has been developed and used to influence the strategic documents they have, and incorporated into the policy options and actions for each sector.

4.1.5. Social considerations

During development of the strategies which are subject of the GCAP the City will secure equal representation of men and women, representatives of socially vulnerable groups and social actors.

This is crucial since later the plans, strategies, documents developed will include immediate the actions and budgets that would be gender and socially sensitive. This is since this kind of documents production and revision is part of this Action Plan. That is the most important in relation to gender and social issues.

ue to this involvement many new actions will take place as result of revision of the strategic documents plans etc. This will reflect the budget of the city in the following years.

Second the city must commit that they will make sure that during the training sessions for their administration and staff from PCs they will secure also equal representation of men and women where applicable. This will bring gender perspective in the future work of the city in implementation of the GCAP.

4.1.6. GHG mitigation considerations

Estimated emissions within the 2016-2018 GHG inventory (currently being prepared by the City) indicate that the total emissions of the City of Skopje decreased by 21.6% in the period 2008-2015.

As demonstrated in Table 4-1, the stationary energy sector contributes three quarters of emissions, with emissions from the residential sub-sector being the biggest contributor. Within stationary energy manufacturing industries and construction are the second highest contributor.

Both are considerably higher than other sectors. Transport, predominantly road-based transport, is third highest single contributing sector. "There is significant potential for reducing CO_2 emissions in the sectors of energy supply, buildings and transportation. These sectors are crucial sectors for mitigation" (Resilient Skopje). Measures in the GCAP focus on these areas strongly.

However, Resilient Skopje proposed no measures to be undertaken in the industry sector, as it claimed the city cannot influence the consumption of fuels resulting in greenhouse gas emissions from this sector. Our belief is that some opportunities do exist for reducing emissions from the industrial sector – in particular action "EN-5 Install energy reduction technologies and processes into industrial sector". Some mitigation measures in Resilient Skopje have similarities with measures in the GCAP, and as such have been used for reference to estimate GHG savings potential where appropriate.

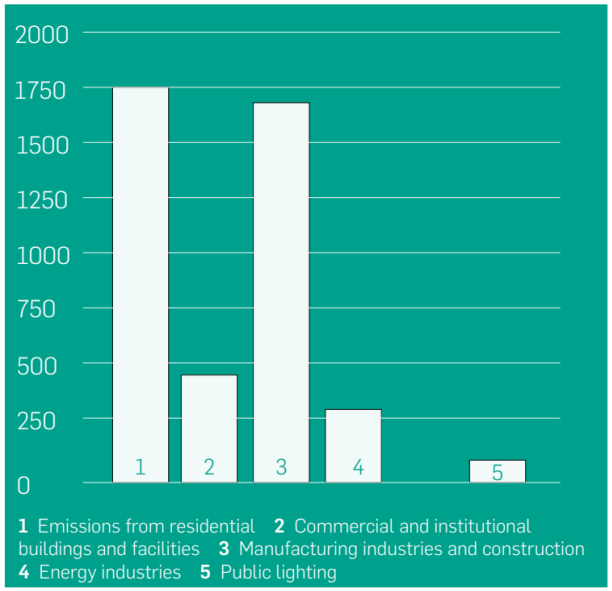
Table 4-1: GHG emissions profile by sector

Department	2008	2012	2013	2014	2015
Stationary Energy	4,242	4,023	3,220	3,230	3,139
Transport	545	505	603	664	675
Waste	202	207	199	212	216
Industrial Process	500	412	363	355	386
Agriculture, forestry and others	172	14	308	-55	22
Total greenhouse gas emissions	**5,660**	**5,162**	**4,692**	**4,407**	**4,438**

The energy sector, particularly focused on energy supply offers the potential for over 500 $ktCO_2$ mitigated. Resilient Skopje measures closely mirror those in the GCAP, for example, the installation of heat pumps in households were calculated to offer over 400 $ktCO_2$ of savings alone, and other renewable energy measures presented in the GCAP will have similar potential. The gasification of the households and commercial sector, to avoid the use of high polluting fossil fuels created at source was estimated to have the

potential to save over 100ktCO_2. This however can lock the sector into fossil fuel use for decades. As an alternative, the extension of the district heating network could provide savings of a similar magnitude. In addition, district heating systems offer the potential

Figure 4-1: Stationary energy emissions 2012 (ktCO_2e)



such this GCAP advocates for this over gasification.

In addition solar thermal collectors for the Municipalities and City of Skopje buildings, as well as residential buildings offer a further 8ktCO_2.

Buildings measures mainly focus on the retrofitting of energy efficiency measures to existing building stock and were estimate to offer over 130 ktCO2 savings per year. This included measures such as construction of passive buildings for dwelling – 93, improve the thermal insulation of buildings – 26 and renovation of residential and public buildings offering a further 11 ktCO_2.

Transport mitigation measures in Resilient Skopje were also estimated at over 100 ktCO_2. The main area of opportunity was the use of alternative fuels, mainly biofuels, in the transport sector. To enhance current expansion of the CNG (as bio-fuel compatible) bus fleet within the city, this GCAP supports wider adoption of electric vehicles as the zero tailpipe emissions of electric vehicles will offer significant additional benefits to the City and must not be overlooked.

However, Reporting suggests that while electric cars offer large potential for reduced emissions compared to traditional internal combustion engines, this potential is limited if its ultimate energy source is an oil, or lignite-fired power plant. An EU study based on expected performance in 2020 found that an electric car using electricity generated solely by an oil-fired power station would use only two-thirds of the energy of a petrol car travelling the same distance.

Additional measures however focused on renewal of the car fleet (45 ktCO_2), Increased use of bicycles, walking and car free days (1 ktCO_2) and the Purchase of vehicles for the City of Skopje in accordance with the criteria for Green Public procurement (1 ktCO_2).

Additional assessment on GHG emissions has been done to identify other measures which offer savings potential in sectors not covered by Resilient Skopje. For instance, in the land use sector the installation of pocket parks and green corridors offer mitigation potential through reforestation.

The UN FAO, report that typical sequestration rates for afforestation/reforestation, in tonnes of carbon per hectare per year, are: 0.8 to 2.4 tonnes in boreal forests, 0.7 to 7.5 tonnes in temperate regions. Reforestation of 1,000 hectares (roughly 3% of surface area of urban Skopje) would thus absorb up to 7.5 ktCO_2, whilst also offering additional green space, air quality, resilience and biodiversity benefits.

4.2. Summary of investment needs: Define pre-investment and long-term financing

4.2.1. Intervention costs

Investment costs of the prioritised interventions are shown in Table 4-2, which includes the additional operating costs of capital projects.

All pre-investment, capital and operational costs of interventions are indicative, using conservative estimates of best available information at the time of writing, and should not be seen as final costs. The sectoral breakdown is presented in table 4-3.

Total investment costs over the period 2021-2035 are estimated to be €496m, comprising of €13.5m in pre-investment studies, €482m in capex investments. In addition there are €25.5m of operational costs needed to realise the actions.

Within the base strategy, €289 million is accounted for by the proposed by three high value interventions, namely the wastewater treatment plan (WT3), mass rapid transit system (TR3) and expansion of the district heating network (EN3, EN4 and EN5). It needs to be recognised that the realisation of such large projects is highly susceptible to funding, and in particular,

borrowing limitations at national level. In addition, the scale of the project requires a relatively long timescale for construction of at least ten years.

4.2.2. Phasing of interventions

Each intervention is presented in a chronological investment programme. As per the methodology, pre-investment such as the policy options developed for research, feasibility and impact studies amongst others, are essential pre-requisites for the ultimate realisation of the final investment option. As such, these can be described as essential, short-term interventions, without which the longer-term goal will not be achieved.

The overall programming of these costs is showing in Figure 4-2 while the phasing of short-term (2021-2025) and mid-term 2026-2030 and long-term 2031+ are shown in Figure 4-3. This considers all costs including pre-investment, capex and opex.

Table 4-2: Sectoral breakdown of GCAP

		Number of option /actions	Policy options cost	Actions cost	Total cost	Pre-investment	Capex	Opex
1	Transport	5	0.9	155.9	156.8	1.2	147	8.61
2	Energy	5	1.95	106.75	108.7	2.45	100.25	6
3	Solid Waste	4	1.7	36.75	38.45	1.695	35	1.75
4	Water	5	1	179.35	180.35	2.2	170	8.15
5	Climate resilience	4	2.2	21.15	23.35	2.35	20	1
6	Land Use	4	3.35	10.3	13.65	3.65	10	0.65
	TOTAL	**27**	**11.1**	**510.2**	**521.3**	**13.5**	**482.25**	**25.5**

** Values in EUR millions*

Table 4-3: Sectoral breakdown on GCAP costs

4.2.3. Funding options and sources

For each policy option/action, an assessment was made on how the city share of the investment could be financed, using the grant, debt finance and the budget. This is presented in Table 4-3.

4.2.3.1. City budget

Following the financial assessment of the proposed options, it was determined that the City of Skopje could add approximately EUR 9.29m of new annual repayments to the city Budget. However, this figure is subject to revision depending on receipt of data related to annual obligations toward long-term borrowing from the Central Budget of North Macedonia.

In terms of spending, in 2018, the surplus of revenue was EUR 3.25m, while in 2017, it was EUR 0.55m. According to these numbers, we estimate that there is potential for approximately EUR 1.79m of additional spending related to the GCAP per year. Given the limited annual surplus annually, only a small number of projects can be fully financed from the budget.

4.2.3.2. IFIs

In cases of projects without revenues, it assumed that the city share of the investment would be financed from the budget and through grants, with a higher share of grants in case the policy option or action would appear more attractive to donors.

In case of projects with revenues, generally, it was assumed that the city's share in the investment would be financed through the budget and with debt-funded by Development Finance Institutions (in the future text as DFIs) and International Financial Institutions (IFIs).

Figure 4-3: GCAP investment cost - 5 year period

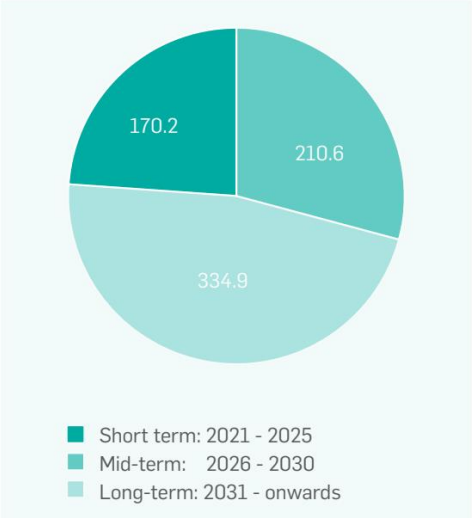


Figure 4-2: Total GCAP investment cost

	City	City related company funding	Private sector Funding	Relevant Ministries / GOV.	Grant	Budget	Debt
TR-1 Improve transport planning, decision making and data collection and monitoring							
TR-2 Improve the city's demand management regulation							
TR-3 Improve the quality of public transport and infrastructure including a BRT system							
TR-4 Increased use of the alternative sustainable transport							
TR-5 Improve private motorized transport towards a cleaner fleet							
SW-1 Assess legislation and gaps to promote strengthened waste management in city of Skopje							
SW-2 Improve the internal processes of planning and implementation							
SW-3 Capacity building and public-private collaboration to improve waste management operations							
SW-4 Implement new infrastructure and processes to improve city-wide waste collection, management and disposal							
EN-1 Plan and strengthen administrative capacities for implementation of the national law on Energy Efficiency							
EN-2 Develop City level strategy and strengthen collaborative working practices							
EN-3 Retrofitting of energy efficiency and renewable energy measures in residential buildings							
EN-4 Installation of energy efficiency (EE), renewable energy (RE) technologies in city/public building stock							
EN-5 Install energy reduction technologies and processes into industrial sector							
CR-1 Develop the strategic planning and collaborative resilience capability of Skopje							
CR-2 Improve the city's resilience to forest fires							
CR-3 Improve city's resilience to other natural disasters							
CR-4 Rehabilitate and improve flood protection infrastructure in Skopje							
WT-1 Promote private sector investment to reduce potable water use							
WT-2 Capacity building to enforce measures to limit pollution of rivers and groundwaters							
WT-4 Update and protect the water distribution network to improve supply and guarantee quality							
WT-5 Urban water infrastructural measures for improved treatment of waste and atmospheric waters							
LU – 1 Improve data collection and collaboration to inform future urban planning							
LU – 2 Contaminated sites remediation							
LU – 3 Increase the quality and accessibility of green spaces and parks							
LU – 4 Establish green city spaces and corridors							

4.2.3.3. Private sector potential

Public Private Partnerships (PPP)

For the delegated GCAP projects, particularly interesting, but the underutilised potential is a model of financing through a public-private partnership, which is very applicable in other countries.

A public-private partnership is a long-term partnership between a public and a private partner, which involves the provision of public services or the satisfaction of the public interest, that is, the public need, through PPP projects.

In North Macedonia, there is state-level law on concession and PPP to regulate public-private partnership issues, as the competencies for the provision of public services and the construction of

public infrastructure are largely the responsibility of the Government.

Energy Service Company (ESCO)

The total CAPEX for delegated projects in the energy sector is over EUR 100m. As can be seen, saving on energy efficiency measures is a major driver of investment. Apart from individual loans and housing association loans, energy efficiency measures could also be financed by loans targeted at district heating companies (DHC) or ESCO companies.

According to the definition provided by the European Commission (EC), ESCO is a company that offers energy services which may include implementing energy-efficiency projects (and also renewable energy projects) and in many cases on a turn-key basis.

The three main characteristics of an ESCO are:

1. ESCOs guarantee energy savings and / or provision of the same level of energy service at a lower cost. A performance guarantee can take several forms. It can revolve around the actual The flow of energy savings from a project can stipulate that the energy savings will be sufficient to repay monthly debt service costs or that same level of energy service is provided for less money.

2. The remuneration of ESCOs is directly tied to the energy savings achieved.
3. ESCOs can finance, or assist in arranging to finance for the operation of an energy system by providing a savings guarantee.

Local banks

As a possible financing option, local banks are emerging, which mostly finance from their sources but on the principle of the syndicated loan (financing offered by a group of lenders who work together to provide funds for a single borrower. The loan can involve a fixed amount of funds, a credit line, or a combination of the two.

Syndicated loans arise when a project requires too large a loan for a single lender or when a project needs a specialised lender with expertise in a specific asset class.

Syndicating the loan allows lenders to spread the risk and take part in financial opportunities that may be too large for their capital base.

4.2.3.4. City bonds

As an alternative source of financing for the projects, the issuance of municipality bonds of the City of Skopje (all within legal limits) may be considered.

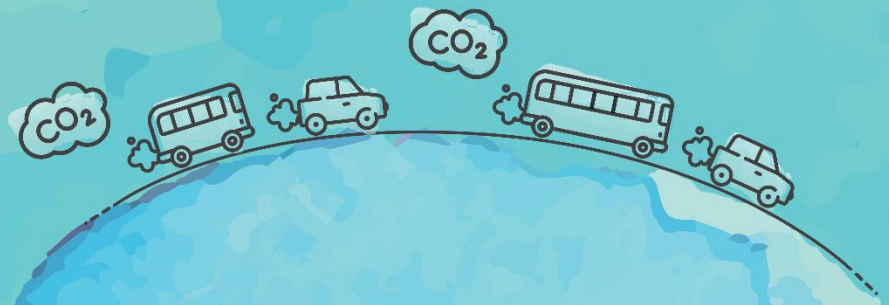
City bonds are debt securities issued by cities to fund day- to-day obligations and to finance capital projects such as building schools, highways or sewer systems. City bonds are commonly tax-free but can be taxable at state or local income tax levels or under certain circumstances. Cities issue two common types of municipal bonds:

a. General obligation bonds. These bonds are unsecured by any assets, instead of relying on the “full faith and credit” of the issuing city. The city has the authority to tax its residents to pay the bondholders.

b. Revenue bonds. These bonds are backed by the revenues that a specific project generates, such as a highway toll, instead of by taxes imposed by a city’s government.

5. Sectoral overview

5.1. Urban transport



Air pollution and GHG emissions are heavily driven by the dominance of fossil fuelled private vehicles as well as the quality and availability of alternative sustainable transport.

The main issue is not only the large proportion of vehicles that are diesel powered private cars, but also the quality and availability of sustainable modes, that are insufficiently attractive for citizens

5.1.1. Potential for Skopje

The public transport system needs improvement to serve as a viable mode that competes with private vehicles and results in reduced car use. The story is similar with non- motorised modes, namely bicycle infrastructure provision, as there is low quality and provision of infrastructure that doesn't sufficiently encourage the uptake of non-motorised transport (NMT).

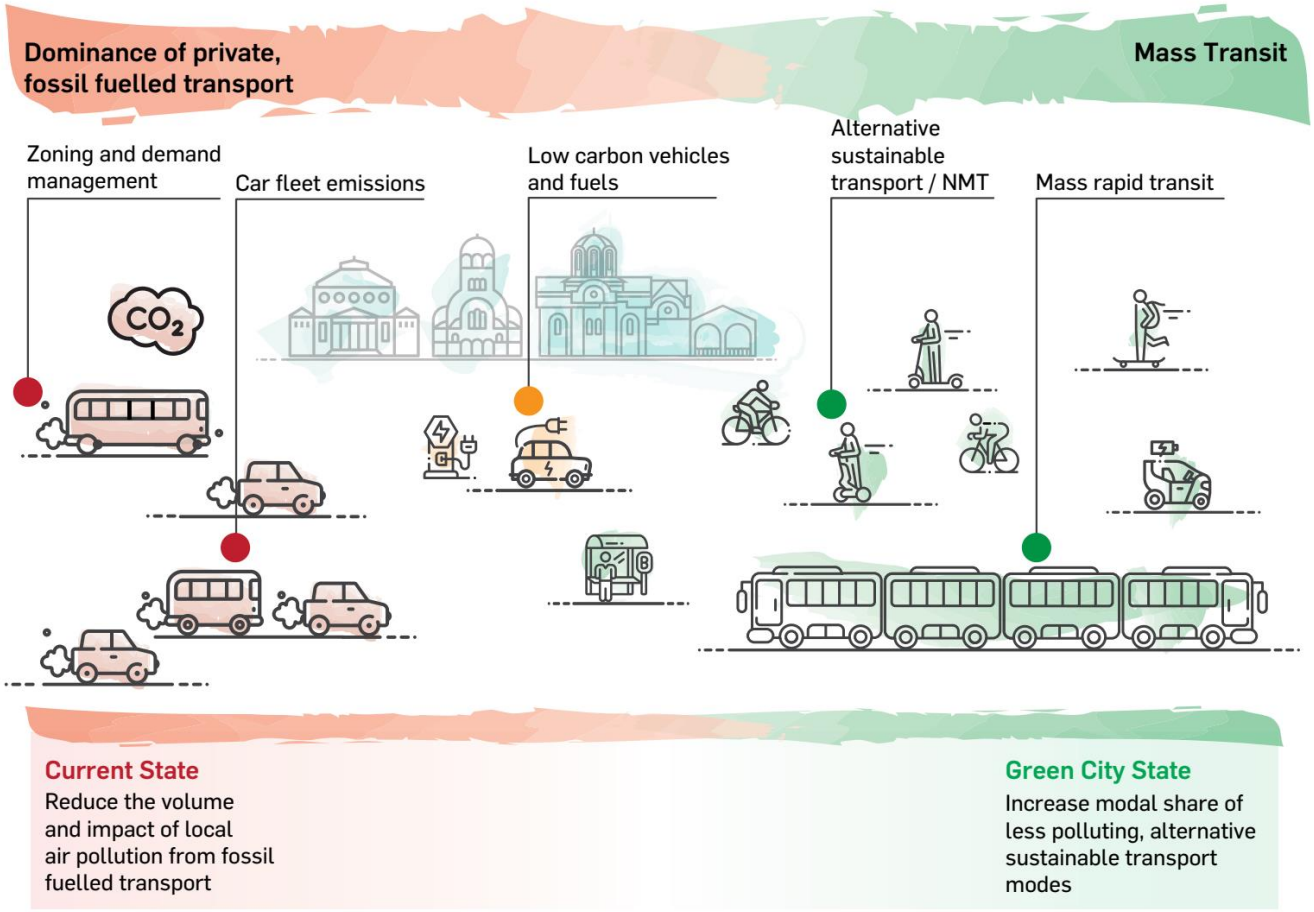
5.1.2. Environmental challenges of urban transport

The environmental challenges that will be addressed by improved urban transport are:

- Air Quality;
- Resilience and Adaptation;
- Soil;
- GHG emissions;
- Biodiversity and ecosystems;
- Green Spaces.

5.1.3. Preliminary option areas

- Demand management
- Low carbon vehicles and fuels
- Alternative / non-motorised transport
- Facilitate inter-modality
- Mass transportation



5.1.4. Objectives addressed by the urban transport options

By implementing all of the actions, it will be possible to achieve the following:

- AQ1 - Reduce the volume and impact of local air pollution from fossil fuelled transport
- AQ2 - Increase modal share of less polluting, alternative sustainable transport modes
- AR1 - Promote safe and resilient infrastructure, housing and urban development
- AR2 - Raise awareness of vulnerabilities to climate change impacts
- SL4 - Reduce the volume of local air pollution from fossil fuel use
- GH3 - Reduce the volume and impact of GHG
- emissions from transport
- BE1 - Encourage development of green infrastructure across the city
- GS1 - Enhance extent, quality and diversity of green spaces and other green infrastructure
- GS3 - Improve proposed law on urban planning to safeguard green spaces

The following pages present short information sheets for each action, with more detailed versions provided in Appendix A.1.

5.1.5. Stage investment plan

	Measures	Total Cost	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
TR-1 Improve transport planning, decision making and data collection and monitoring	Improving cooperation with stakeholders for coordination of initiatives	€100k																
	Awareness raising and data management campaigns	€200k																
	Increase the capacities of the core stakeholders to improve the quality of the city's transport related documents	€100k																
TR-2 Implementation of urban traffic management schemes	Conduct legal gap assessment, identify the challenges and develop plan for in-practice implementation of improved city transport regulation	€250k																
	Conduct technical analysis on increased traffic management to limit motorised transport and promote improved mobility for citizens	€250k																
TR-3 Improve the quality of public transport and infrastructure including a BRT system	Strengthen the public transport development plans	€100k																
	Introduce BRT system	€90m																
	Improve infrastructure and fleet	€15,75m																
	Creating a database for monitoring and mobility improvements	€1.05m																
TR-4 Increased use of the alternative sustainable transport	Improve the city's capacities for planning in the area of alternative sustainable transport	€210k																
	Continuous improvement of pedestrian facilities and infrastructure	€15.75m																
	Continuous improvement of the cycling infrastructure	€21m																
TR-5 Improve private motorized transport towards a cleaner fleet	Stimulate the interest for moving towards low carbon transport	€11m																
	Discourage citizens and private companies to invest in carbon intensive vehicles	€1.05m																

TR-1 Improve transport planning, decision making and data collection and monitoring		
Description Strengthening the capacities and cross-sector collaboration through awareness raising to encourage sustainable travel and implementing data management campaigns to support such initiatives, through: » Improving cooperation with stakeholders for coordination of initiatives » Awareness raising and data management campaigns » Increasing the capacities of the core stakeholders to improve the quality of the city's transport related documents		
Benefits » Components can be incorporated into the planned Bus Restructuring and SUMP commissions currently under tender » Improved city transport regulation to encourage cross-sector collaboration and data collection and monitoring. » The policy aims to cater for improved public transport system through raising awareness on alterative transport modes and increase use of the alternative transport infrastructure. » Improving the quality of the city's transport plans will help decrease greenhouse gas emissions and improve air quality.		
Objectives covered AQ1 AQ2 GH3		Timescale 2021 - 2027
Pre-investment EUR 400,000	Capex cost -	Opex cost -
Notes on costs Costs incurred to cover capacity building and awareness raising campaigns		
Implementing and supporting agents » City of Skopje » Municipalities » Ministry of Interior » Ministry of Transport » Parking management authorities » Ministry of Environment and Physical Planning » Public Transport Company "Skopje" » Private operators		Funding options » City » City related company funding » Grant » Debt

TR-2 Implementation of urban traffic management schemes		
Description Evaluate performance and embed policies for improved city transport regulation through introduction and enforcement of low emission zones and parking regulations through: » Conducting a legal gap assessment, identifying the challenges and developing plan for in-practice implementation of improved city transport regulation » Conduct technical analysis on increased traffic management to limit motorised transport and promote improved mobility for citizens		
Benefits » Improved city transport regulation after a thorough gap analysis and assessment have been conducted. » The policy aims to cater for improved public transport system through discouraging the use of private vehicles. » Increase use of the alternative transport infrastructure by restricting the use of private vehicles in certain areas. » Demand management will help decrease greenhouse gas emissions and improve air quality, especially in the areas implemented.		
Objectives covered AQ1 AQ2 GH3		Timescale 2021 - 2023
Pre-investment EUR 500,000	Capex cost -	Opex cost -
Notes on costs Costs incurred to cover assessment and analysis study costs		
Implementing and supporting agents » City of Skopje » Municipalities » Ministry of Interior » Ministry of Transport » Parking management authorities » Ministry of Environment and Physical Planning » Public Transport Company "Skopje" » Private operators » PE Streets and Roads Skopje		Funding options » City » City related company funding » Grant » Debt

TR-3 Improve the quality of public transport and infrastructure , including a BRT system		
Description Introduce a BRT system with improved bus infrastructure and creation of a database to monitor and support mobility improvements, through: » Strengthening the public transport development plans » Introducing a BRT system » Improving the infrastructure and fleet » Creating a database for monitoring and mobility improvements		
Benefits » Improved quality of the public transport through development strategy and the introduction of a BRT system » Increased use of the public transport and alternative transport through the provision of good quality BRT system, infrastructure and fleet and subsequently decreased use of private cars » Improving the quality of the city's public transport system will help decrease greenhouse gas emissions and improve air quality. This will also result in Improved social development perspectives » Components can be incorporated into the planned Bus Restructuring and SUMP commissions currently under tender		
Objectives covered AQ1 AQ2	Timescale 2021 - 2035	
Pre-investment EUR 100,000	Capex cost EUR 100 Million	Opex cost EUR 5.8 Million
Notes on costs € 90 Mil to build BRT system (assuming $25-60m = $2-5m per km, including cost of buses) € 500,000 for renewed bus operator modernisation 500 bus stops at € 5,000, totalling to € 2,500,000 Low-emission buses €250k (CNG buses) - €450k (zero emission buses)		
Implementing and supporting agents » City of Skopje » Central Government » Development Banks » Public Transport Entity (JSP) » Parking management authorities » Ministry of Environment and Physical Planning	Funding options » City » City related company funding » Private sector funding (PPP) » Grant » Debt	
» Private operators » Ministry of Labour and Social Policy		

TR-4 Increased use of the alternative sustainable transport		
Description Improvement in cycling and pedestrian infrastructure and increasing the use of alternative sustainable transport through marketing and other campaigns, through: » Improving the city's capacities for planning in the area of alternative transport » Improving and expanding pedestrian facilities and infrastructure » Improving and expanding cycling infrastructure		
Benefits » Increased use of the public transport and alternative transport through good quality provision for alternative sustainable transport and subsequently decreased use of private cars » Increased traffic safety » Improving the quality of the city's public transport system as well as cyclist and pedestrian infrastructure will encourage these modes and help decrease greenhouse gas emissions and improve air quality. This will also result in Improved social development perspectives		
Objectives covered AQ1 AQ2	Timescale 2021 - 2030	
Pre-investment EUR 200,000	Capex cost EUR 35 Million	Opex cost EUR 1.8 Million
Notes on costs CAPEX is calculated at € 50-150 per metre of cycle lane, which is non-segregated. CAPEX for cycle parking is 2,500 Sheffield stands at € 100 per stand		

Implementing and supporting agents	Funding options
» City of Skopje » Municipalities » Ministry of Interior » Ministry of Transport » Parking management authorities » Ministry of Environment and Physical Planning » Public Transport Company "Skopje" » Private operators » PE Streets and Roads Skopje	» City » Relevant ministries/gov » Grant » Budget » Debt

Notes on costs Costs incurred to introduce EV charging points and low emission zones	
Implementing and supporting agents » Central Government » City of Skopje » Private companies » Citizens	Funding options » City » City related company funding » Private sector funding (PPP) » Grant » Debt

TR-5 Improve private motorized transport towards a cleaner fleet		
Description Improving the quality of the private car fleet and discouraging extensive use of the private vehicles, through: » Stimulating the interest for moving towards low carbon transport » Discouraging citizens and private companies to invest in carbon intensive vehicles		
Benefits » Improved quality of private vehicles through moving towards low carbon transport » Increased use of the public transport and alternative sustainable transport and decreased use of private cars through discouraging citizens and private companies to invest in carbon intensive vehicles. » Improving the quality of the fleet would decrease greenhouse gas emissions and improve air quality		
Objectives covered AQ1	Timescale 2025 - 2035	
Pre-investment -	Capex cost EUR 11 Million	Opex cost EUR 1 Million

5.2. Energy supply and efficiency

The energy supply and efficiency for residential, commercial and industrial buildings and processes also contribute to the air pollution and GHG emissions. This relates to the provision of energy where a proportion of the population remains with no access to district heating/cooling

5.2.1. Influence on Skopje

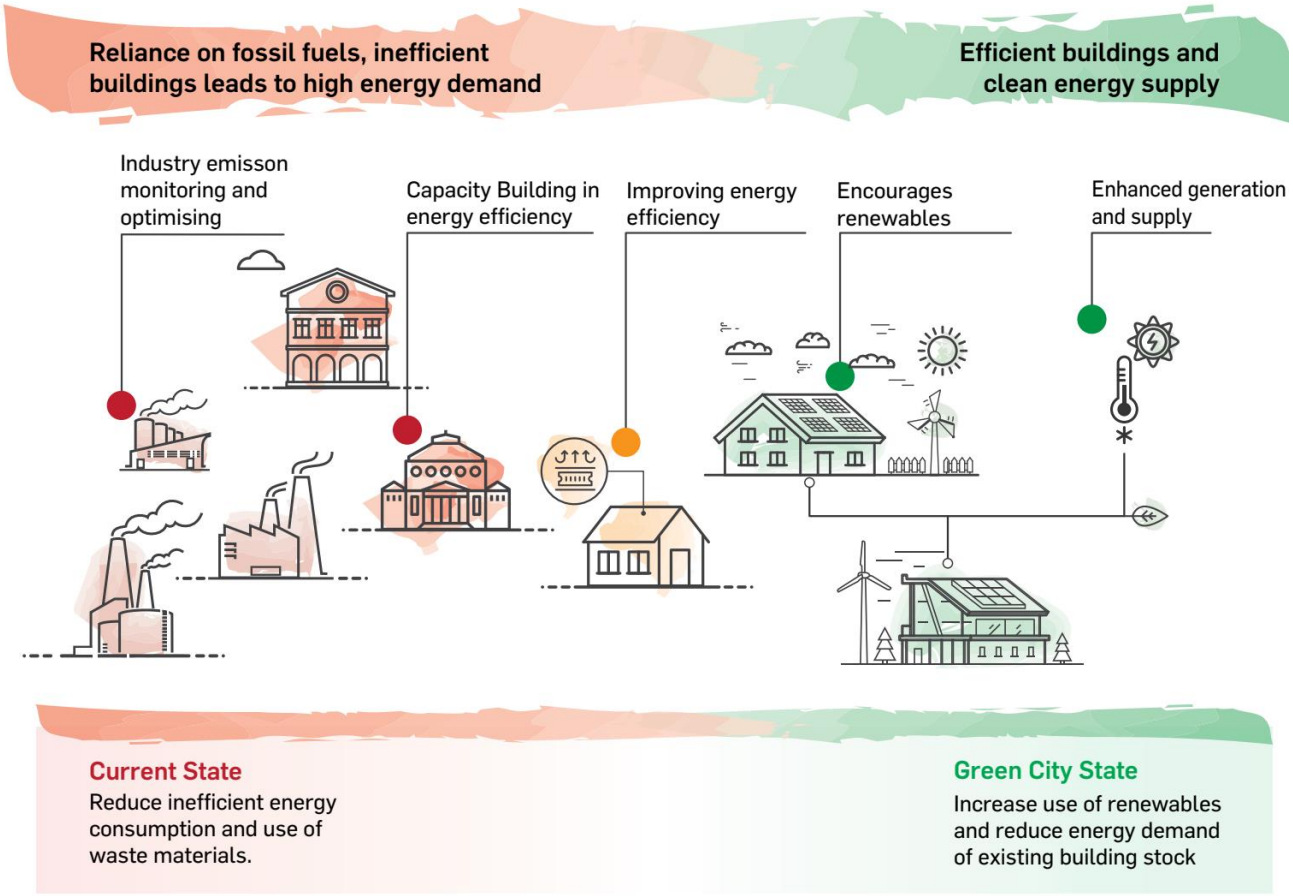
This results in the inefficient energy consumption, using fossil fuel and waste material heating and electricity sources. In the industrial sector specifically, the problem is exasperated by the obsolete machinery used. The intensive construction work going on in the city also contributes to the air pollution. Stationary energy (i.e. emissions from residential, commercial and institutional buildings and facilities, manufacturing industries and construction, energy industries and public lighting) remains the dominant sector in the total share of the greenhouse gas emissions

5.2.2. Preliminary option areas

- Capacity Building in energy efficiency
- Industry emission monitoring and optimising
- Improving energy efficiency
- Encourages renewables
- Generation and supply

5.2.3. Environmental challenges of energy

- Air Quality;
- Resilience and Adaptation;
- Water availability;
- Water quality;
- Soil;
- GHG emissions;
- Biodiversity and ecosystems;
- Green Spaces.



5.2.4. Objectives addressed by the energy supply and efficiency options

By implementing all of the actions, it will be possible to achieve the following:

- AQ3 - Reduce overall energy consumption of building stock city-wide
- AQ4 - Reduce proportion of energy generated from higher air polluting sources
- AQ5 - Reduce the dependence on fossil fuels for domestic heating needs
- WQ2 - Increase wastewater collection and treatment city-wide
- AR1 - Promote safe and resilient infrastructure, housing and urban development
- AR2 - Raise awareness of vulnerabilities to climate change impacts
- WA2 - Reduce proportion of potable usage in industrial processes
- SL4 - Reduce the volume of local air pollution from fossil fuel use
- GH1 - Encourage uptake of low carbon energy generation
- GH2 - Improve energy efficiency of building stock
- BE1 - Encourage development of green infrastructure across the city
- GS1 - Enhance extent, quality and diversity of green spaces and other green infrastructure
- GS3 - Improve proposed law on urban planning to safeguard green spaces

The following pages present short information sheets for each action, with more detailed versions provided in Appendix A.2.

5.2.5. Stage investment plan

	Measures	Total Cost	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
EN-1 Plan and strengthen administrative capacities for implementation of the national law on Energy Efficiency	Conduct assessment, identify the challenges and develop plan for implementation for building renovation	€200k																
	Capacity building for City and Municipalities to develop and implement EE programs and action plans	€500k																
	Improve certification program, proper auditing requirements and monitoring	€500k																
EN-2 Develop City level strategy and strengthen collaborative working practices	Develop the Skopje city energy and energy efficiency strategy	€250k																
	Mainstream industrial energy efficiency planning into city planning processes	€250k																
	Strengthen collaborative working practices amongst key stakeholders	€250k																
EN-3 Retrofitting of energy efficiency and renewable energy measures in residential buildings	Mapping of citizens and households facing energy poverty and raise awareness on issues	€250k																
	Implement energy efficiency and renewable energy measures in residential buildings	€10.5k																
	Link households to the District Heating network	€26m																
EN-4 Installation of energy efficiency (EE), renewable energy (RE) technologies in city/ public building stock	Capacity building to plan and coordinate energy saving initiatives	€750k																
	Retrofitting of EE and RE measures in public buildings	€11k																
	Connection of public buildings to the district heating network	€26m																
EN-5 Install energy reduction technologies and processes into industrial sector	Capacity building and data collection	€250k																
	Installation of energy saving technologies to improve efficiency of industrial processes	€11k																
	Expand and improve the district heating systems to the industrial sector	€21m																

EN-1 Plan and strengthen administrative capacities for implementation of the national law on Energy Efficiency		
Description Build administrative capacities for implementation of the national law on Energy Efficiency through: » Conduct assessment, identify the challenges and develop plan for implementation for building renovation » Capacity building for City and Municipalities to develop and implement EE programs and action plans » Improve certification program, proper auditing requirements and monitoring		
Benefits » Align with the national and local obligations in training of energy auditors » Decreased energy consumption and increased use of renewables in the public buildings through application of Rulebooks on energy performance, efficiency and auditing » Strengthened internal city's capacities through use of certified energy auditors » Improved energy management systems in public and residential buildings.		
Objectives covered AQ3 AQ4 GH2		
Timescale 2021 - 2024		
Pre-investment EUR 1,200,000	Capex cost -	Opex cost EUR 100k
Notes on costs €1.2m for development of plan and initial set up of auditors €100,000 per annum for ongoing implementation of energy audits and training for capacity building.		
Implementing and supporting agents » City of Skopje » Ministry of Economy » Energy Agency » Energy Community » National experts » Donor community	Funding options » Relevant ministries /gov » Grant	

EN-2 Develop City level strategy and strengthen of collaborative working practices		
Description Development of the local strategic documents and integrating them in practice to improve energy efficiency of building stock within Skopje, encourage best practice, increase uptake of renewable energy technologies. Key measures are to: » Develop the Skopje city energy and energy efficiency strategy – including an energy and climate plan, with program to increase adoption of energy efficiency, renewable energy, reduce GHGs, and develop a green economy for the city » Mainstream industrial energy efficiency planning into city planning processes » Support this through strengthen collaborative working practices amongst national ministries, local government, energy working groups, public entities, and key CSOs		
Benefits » Improved quality of the strategic planning and aligned framework with the national vision will increase implementability of the city's plans, strengthen funds mobilization processes and improve partnership development. » The increased application of EE and RE measures will decrease energy consumption, decrease GHG emissions and increase employment opportunities.		
Objectives covered AQ3 AQ4 AQ5 SL4 GH1 GH2		
Timescale 2022 - 2025		
Pre-investment EUR 750,000	Capex cost -	Opex cost -
Notes on costs » €500,000 for comprehensive city wide energy efficiency strategy » €250,000 for industrial energy planning » €50,000 for management of plans and maintenance of collaborative working groups		
Implementing and supporting agents » City of Skopje » Ministry of Economy » Energy Agency » Civil Society Organizations » National experts » Donor community	Funding Options » City » Grant » Budget	

EN- 3 Retrofitting of energy efficiency and renewable energy measures in residential buildings		
Description Implementation of energy efficiency and renewable energy measures by targeting the citizens that face significant energy poverty through: » Mapping of citizens and households facing energy poverty and using emission intensive heating materials » Development of awareness raising programmes to promote more suitable heating sources and promote new EE scheme » Implement energy efficiency and renewable energy in residential buildings to offer savings and improved energy usage to key households » Where possible, link households to the District Heating network		
Benefits » Measures will target those most in need of support ensuring cost savings, supporting poverty reduction for citizens. » Significantly improved air quality will improve health of citizens and support decreased greenhouse gas emissions.		
Objectives covered AQ3 AQ4 AQ5 SL4 GH1 GH2		
Timescale 2022 - 2032		
Pre-investment EUR 150,000	Capex cost EUR 35,000,000	Opex cost EUR 1,500,000
Notes on costs Main measure - Implementation of EE and RE measures: €10m revolving fund Supporting measures - District heating: €20m; Mapping and awareness raising: €500,000 Opex costs estimated 5% for maintenance of measures and management of fund		
Implementing and supporting agents » City of Skopje » Ministry of Economy » Ministry of Labour and Social Policy » Civil Society Organizations » National Energy Efficiency Fund » Donor community	Funding Options » City » Private sector funding » Relevant ministries/ gov » Grant » Budget » Debt	

EN-4 Installation of energy efficiency (EE), renewable energy (RE) technologies in city/public building stock		
Description Implementation of energy efficiency (EE), renewable energy (RE) and greenhouse gas (GHG) emission reduction measures. Measures will focus on: » Capacity building to plan and coordinate energy saving initiatives » Retrofitting of EE and RE measures in public buildings » Connection of public buildings to the district heating network		
Benefits » Improved capacity and preparatory work will improve access to and absorption of funding » Improving the energy demand of city buildings will decrease GHG emissions and improve air quality; » Lower air pollution will improve citizens health and promote biodiversity in the city		
Objectives covered AQ3 AQ4 AQ5 SL4 GH1 GH2		
Timescale 2022 – 2032		
Pre-investment -	Capex cost EUR 32,000,000	Opex cost EUR 2,500,000
Notes on costs Main measure - Retrofitting of EE and RE measures: €10m Supporting measures - District heating: €20m; Capacity building : €1m Opex costs estimated 5% for maintenance of measures and management of funds		
Implementing and supporting agents » City of Skopje » Ministry of Economy » Energy Agency » Civil Society Organizations » National experts » Donor community	Funding Options » City » City related company funding » Private sector funding (PPP) » Grant » Budget » Debt	

EN-5 Install energy reduction technologies and processes into industrial sector		
Description Implementation of energy efficiency (EE), renewable energy (RE) and greenhouse gas (GHG) emission reduction measures including by: » Capacity building and data collection to implement energy management systems, best practice energy saving behaviours and application of energy audits » Installation of energy saving technologies to improve efficiency of industrial processes such as Establish a gas-main system in City of Skopje and application of utilization systems from exhaust gases » Expand and improve the district heating systems to the industrial sector;		
Benefits » Improved technological processes will offer cost savings » Decreased energy consumption will come from onsite generation from alternate sources » Improved industrial efficiency will result in decreased GHG emissions and improved air quality.		
Objectives covered AQ3 AQ4 SL4 GH1 GH2		
Timescale 2024 - 2034		
Pre-investment EUR 250,000	Capex cost EUR 30,000,000	Opex cost EUR 2,000,000
Notes on costs Main measure - Installation of energy saving technologies: €10m Supporting measures - District heating: €20m; Capacity building: €500,000 Opex costs estimated 5% for maintenance of measures and management of funds.		
Implementing and supporting agents » City of Skopje » B installations » A installations » State Energy Efficiency Fund » Reliable national and international banks » Ministry of Economy » Energy Agency » Donor community	Funding Options » City » Private sector funding » Relevant ministries/ gov » Grant » Budget » Debt	

5.3. Waste

Solid waste collection and treatment contribute to many areas including air, water, soil quality and this in turn has implications on the biodiversity, ecosystems and green spaces.

The waste collection system is not only poor, leading to illegal waste dumping sites, but also has inappropriate disposal methods

5.3.1. Influence on Skopje

It has widely acknowledged in the city and has been reported by our local team, through interaction with stakeholders that burning poor-quality material which has been discarded as waste for heating is a major air quality issue. Better solid waste management could reduce the supply of this poor-quality material used for heating and in turn improve air quality. There are limited facilities

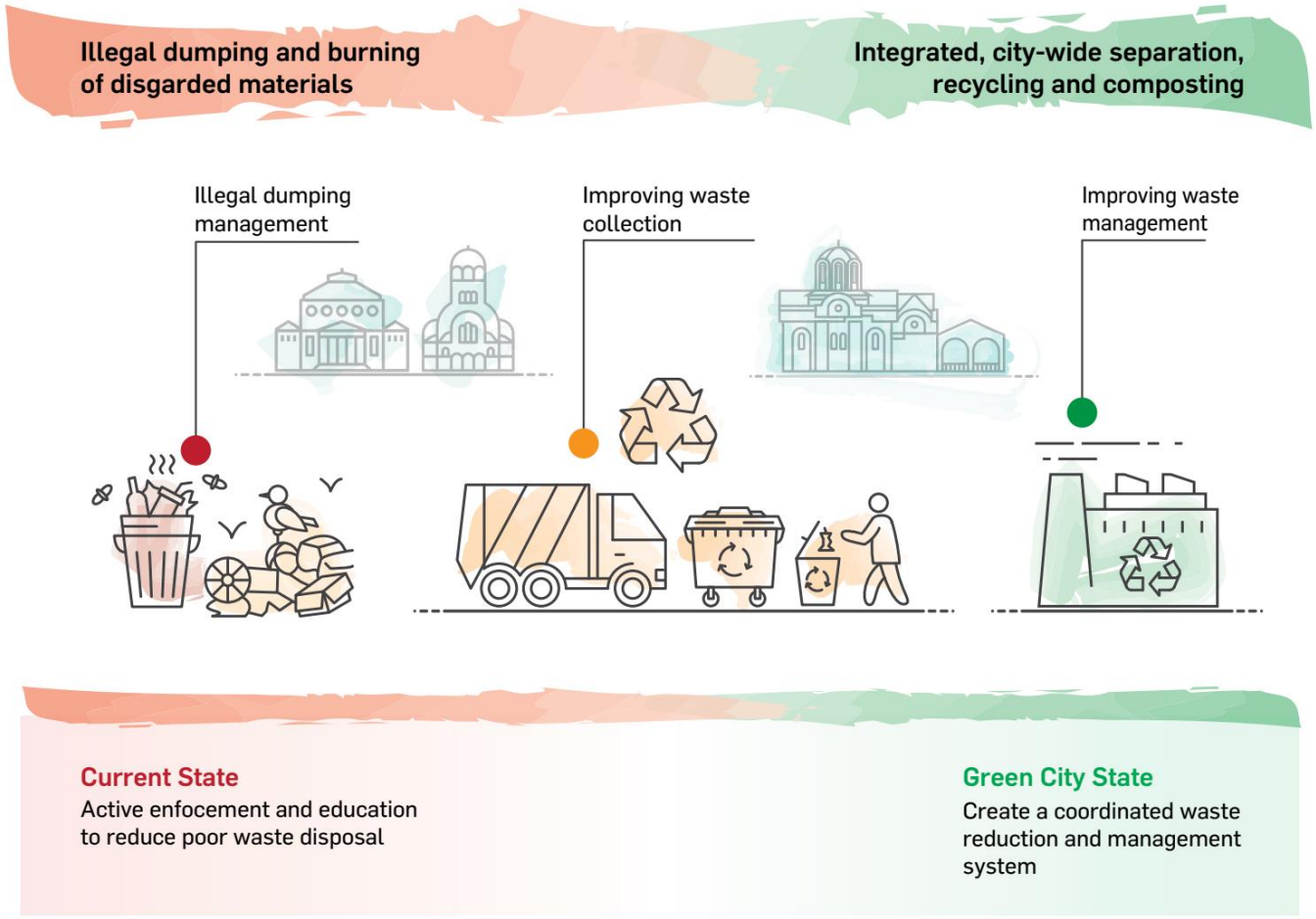
for separation, recycling and composting. Moreover, the landfill is not equipped with a methane capture system and biowaste management is an ongoing issue. This results in air pollution, GHG emissions, and water and soil pollution due to untreated leachate.

5.3.2. Preliminary option areas

- Illegal dumping management
- Improving waste collection
- Improving waste management

5.3.3. Environmental challenges of solid waste

- Resilience and Adaptation;
- Soil;
- GHG emissions;
- Biodiversity and ecosystems;
- Green spaces.



5.3.4. Objectives addressed by the solid waste management options

By implementing all of the actions, it will be possible to achieve the following:

- WQ3 - Improve solid waste management and treatment processes
- AR1 - Promote safe and resilient infrastructure, housing and urban development
- AR2 - Raise awareness of vulnerabilities to climate change impacts
- SL2 - Reduce discharge of untreated wastewater and generation of solid waste from industrial processes
- SL3 - Reduce proportion of solid waste dumped, disposed onsite or to landfill
- GH4 - Reduce overall emissions from landfill and solid waste treatment processes
- BE1 - Encourage development of green infrastructure across the city
- GS1 - Enhance extent, quality and diversity of green spaces and other green infrastructure
- GS3 - Improve proposed law on urban planning to safeguard green spaces

The following pages present short information sheets for each action, with more detailed versions provided in Appendix A.3.

5.3.5. Stage investment plan

	Measures	Total Cost	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
SW-1 Assess legislation and gaps to promote strengthened waste management in city of Skopje	Improve the national law on waste management to enable strengthened waste management in Skopje	€50k																
	Assessing the waste management gaps	€100k																
	Awareness raising and enforcement to reduce waste disposal	€170k																
SW-2 Improve the internal processes of planning and implementation	Development of the main city waste management framework	€200k																
	Development of residential sector waste management framework	€300k																
	Implementation of measures to ensure technical background information is included in strategic documents and plans	€500k																
SW-3 Capacity building and public-private collaboration to improve waste management operations	Strengthening the city's planning and implementing capacities	€50k																
	Improving the data collection system	€100k																
	Improving the partnership with the public and private sector companies	€25k																
	Application of alternative measures for improved waste management	€200k																
SW-4 Implement new infrastructure and processes to improve city-wide waste collection, management and disposal	Improving waste collection by improving the waste collection vehicles and containers	€5.25k																
	Improve Drisla by strengthening the waste management system	€10.5k																
	Introduce RDF and WtE schemes, extending the life of the landfills	€21k																

SW – 1 Assess legislation and gaps to promote strengthened waste management in city of Skopje		
Description Support the law improvement on illegal dumping and waste management processes and assess the gaps, through: » Support improving the national law on waste management, and propose bylaws, to enable strengthened waste management in Skopje » Assessing the waste management gaps » Awareness raising and enforcement to reduce waste disposal		
Benefits » Increased law enforcement leading to decreased illegal dumping sites and combating grey economy » Improved waste management mechanism through the support of a law on improving waste management. This will hopefully lead to improved air quality, increased energy production (waste to energy system), improved soil and groundwater quality, decreased impact to environment, increased primary waste sorting and introduce full recycling cycles. » Strengthened implementing capacities » Reduced quantity of disposed waste due to awareness raising efforts		
Objectives covered SL1 SL3 GH4		
Timescale 2021 - 2025		
Pre-investment EUR 320,000	Capex cost EUR 320,000	Opex cost EUR 50,000
Notes on costing » Estimate for increased enforcement (patrols support police), remediation (cost for clean ups) and litigation (administration of fines, prosecuting offenders)		
Implementing and supporting agents » Ministry of Environment and Physical Planning » City of Skopje; » “Komunalna Higiena” » “Drisla” » Non-for-profit companies involved in waste management	Funding Options » City » Budget	

SW-2 Improve the internal processes of planning and implementation		
Description Development of the local waste management strategy documents and implementation of measures, through: » Development of the main city waste management framework » Development of residential sector waste management framework » Implementation of measures to ensure technical background information is included in strategic documents and plans		
Benefits » Integrated waste management framework established		
Objectives covered SL1 SL2		
Timescale 2023 - 2025		
Pre-investment EUR 1 Million	Capex cost -	Opex cost -
Notes on costing » Cost estimate for development of city-wide strategic planning framework and action planning documents		
Implementing and supporting agents » City of Skopje; » 10 recipient municipalities; » “Komunalna Higiena” » “Drisla” » Ministry of Environment and Physical Planning » Spatial Planning Agency » Non-for-profit companies involved in waste management	Funding Options » City » Grant » Budget	

SW- 3 Capacity building and public-private collaboration to improve waste management operations		
Description Strengthening the planning, implementing and reporting capacities on waste management to improve processes, through: » Improving the data collection system » Improving the partnership with the public and private sector companies » Develop and strengthen waste reduction measures for improved waste management		
Benefits » Improved planning, implementing and reporting processes.		
Objectives covered SL1		
Timescale 2021 - 2027		
Pre-investment EUR 375,000	Capex cost -	Opex cost -
Notes on costing » Cost estimate for data management system and capacity strengthening		
Implementing and supporting agents » City of Skopje; » Private sector companies » Public and non-profit companies » Citizens » 10 recipient municipalities; » “Komunalna Higiena” » “Drisla” » Waste management experts » Spatial Planning Agency » Non-for-profit companies involved in waste management » Informal waste collectors	Funding Options » City » City related company funding » Grant » Budget	

SW- 4 Implement new infrastructure and processes to improve city-wide waste collection, management and disposal		
Description Invest in vehicles, containers and logistical infrastructure to improve separation, strengthen recycling and sorting, introduce a composting system, and facilitate the process of remediation, through: » Improving waste collection by improving the waste collection vehicles and containers » Improve Drisla by strengthening the waste management system » Introduce RDF and WtE schemes, extending the life of the landfills		
Benefits » **Improved law enforcement** » **Improved waste management mechanism** » **Strengthened implementing capacities** which will allow more effective waste sorting » **Reduced quantity of disposed waste** due to improved waste management processes » **Increased energy production** (waste to energy system) within the current landfill » **Increased primary waste sorting and introduce full recycling cycles** including enlargement of the number of waste separation bins		
Objectives covered WQ3 SL4 GH1 GH4		
Timescale 2023 - 2035		
Pre-investment -	**Capex cost** EUR 35 Million	**Opex cost** EUR 1.8 Million
Notes on costing Estimate cost of purchasing of household bins (€50 per bin x100,000) and street containers (€500 per bin x1,000); improvement of MRF facility (EUR 5m); and development of WtE facility (EUR 20m)		
Implementing and supporting agents » City of Skopje » Private sector companies » Public and non-profit companies » Citizens » 10 recipient municipalities » “Komunalna Higiena” » “Drisla” » Waste management experts » Non-for-profit companies involved in waste management » Informal waste collectors		**Funding Options** » City » Private sector funding » Grant » Debt

5.4. Water

Wastewater treatment contributes to water and soil quality issues and this in turn has implications on the biodiversity and ecosystems

5.4.1. Influence on Skopje

The main problem is the connections of some residential buildings to the main sewage network and the absence of a wastewater treatment plant. This is reflected by

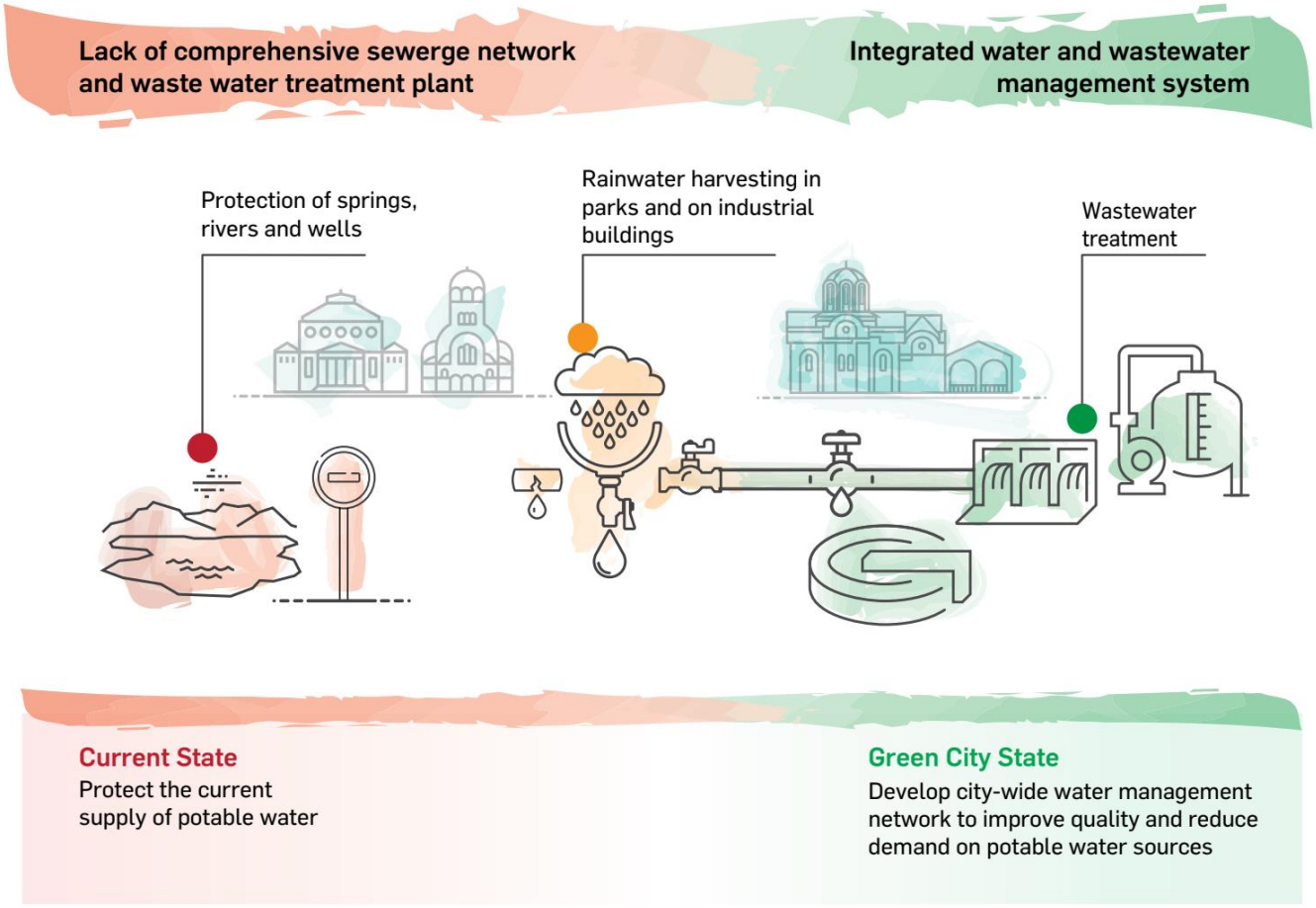
River Vardar's poor water quality. Moreover, there are high pressures on water use and demand as the population is increasing leading to increased demand and due to the fact that potable water is used for industrial processes this leads to inefficient use of potable water. A wastewater treatment plant can contribute positively to alleviating the pressure on potable water. On the other hand, There are threats to the water quality of the water supplied by the Rasce spring and the Nerezi-Lepenec well area.

5.4.2. Preliminary option areas

- Protection of springs, rivers and wells
- Minimise water inefficient use
- Wastewater treatment

5.4.3. Environmental challenges of the water sector

- Water quality;
- Resilience and Adaptation;
- Water availability;
- Soil;
- GHG emissions;
- Biodiversity and ecosystems



5.4.4. Objectives addressed by the water supply and treatment

By implementing all of the actions, it will be possible to achieve the following:

- WQ1 - Improve sewerage collection coverage for buildings city-wide
- WQ2 - Increase wastewater collection and treatment city-wide
- AR1 - Promote safe and resilient infrastructure, housing and urban development
- AR2 - Raise awareness of vulnerabilities to climate change impacts
- WA1 - Reduce overall wastage of potable water
- WA2 - Reduce proportion of potable usage in industrial processes
- WA3 - Improve the protection of freshwater sources
- SL2 - Reduce discharge of untreated wastewater and generation of solid waste from industrial processes
- BE1 - Encourage development of green infrastructure across the city

The following pages present short information sheets for each action, with more detailed versions provided in Appendix A.4.

5.4.5. Stage investment plan

	Measures	Total Cost	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
WT-1 Promote private sector in- vestment to reduce potable water use	Mandating companies to invest in installing systems that will allow the reuse of technical water	€250k																
	Identify and decrease the illegal use of potable water for irrigation	€250k																
WT-2 Capacity building to enforce measures to limit pollution of rivers and groundwaters	Improve stakeholder partner- ships for enforcement and reduction of pollution	€250k																
	Policies and awareness raising to improved water manage- ment and sustainable agricul- tural practices	€250k																
WT 3 - Wastewater treatment plant	Build a modern wastewater treatment plant to reduce with water pollution in the River Vardar and provide options for reclaimed water use to limit drinking water demand	€126k																
WT-4 Update and protect the water distribution network to improve supply and guarantee quality	Expansion and enforcement of the protection zones around Rasche to secure the long- term quality of the potable water supply	€1.1k																
	Improved data management and awareness raising on water use and demand	€250k																
	Repair of the urban water sup- ply network to reduce losses and improve efficiency	€10.25k																
	Expansion of the water supply network to ensure all residents have access to potable water	€10.25k																
WT-5 Urban water infrastructural measures for im- proved treatment of waste and atmos- pheric waters	Improvement and expansion of the sewerage network to improve urban waste water management	€21k																
	Implementation of sustaina- ble urban drainage systems (SUDS) to improve resilience to flooding and enable public rainwater harvesting	€10.5k																

WT-1 Promote private sector investment to reduce potable water use		
Description Encourage private sector investment into water management systems to reduce the use of potable water for industrial and agricultural purposes. It will create an enabling environment for decreased use of potable water by stimulating the private sector to improve water management and more sustainable usage through » Analysing the quantity of drinking water used for industrial processes and mandating companies to invest in installing systems that will allow the reuse of technical water » Assess the quantity of potable water used for irrigation and industrial purposes, decrease the illegal access to potable water and monitor improved industrial water management systems on a yearly basis.		
Benefits » Increased availability of the potable water by reducing demand from private sector in Skopje » Increased use of technical water by forcing investment in reuse technologies » Improved efficiency of the industrial and agricultural sector		
Objectives covered SL2 WA1 WA2 WA3		
Timescale 2022-2024		
Pre-investment EUR 500,000	Capex cost -	Opex cost -
Note on costs » Cost needed to maintain enforcement of illegal access to potable water		
Implementing and supporting agents » City of Skopje » Industry » Agriculture practitioners » PU “Vodovod I Kanalizacija” » PE “Parks and Greeneries” » Municipalities » Ministry of environment and physical planning	Funding Options » City » City related company funded » Private sector funding » Grant	

WT-2 Capacity building to enforce measures to limit pollution of rivers and groundwaters		
Description Strengthen collaboration of local government, city departments, rural and agricultural populations. » Improve waste management, the discharge of communal and industrial waste waters, wastewater treatment, and the decreased use of pesticides. » Implementation and development of policies and awareness raising activities that will promote the move towards improved water management and sustainable agricultural practices.		
Benefits » Improved downstream surface and groundwater quality through improved agricultural practices that will decrease the use of pesticides » Improved biodiversity status of the rivers through minimising illegal communal and industrial waste waters		
Objectives covered SL2 AR2 WA3		
Timescale 2022-2024		
Pre-Investment EUR 500,000	Capex cost -	Opex cost -
Notes on cost » EUR 200,000 first phase » EUR 300,000 for policy measure implementation » Cost used to maintain collaborative partner working		
Implementing and supporting agents » City of Skopje; » Municipalities; » Ministry of Environment and Physical Planning; » Industries » Investment banks » Agriculture practitioners » PE Komunalna Higiena	Funding Options » City » Relevant ministries/gov » Budget	

WT-3 Wastewater treatment plant		
Description Build a modern waste water treatment plant to; » Reduce with water pollution in the River Vardar » Provide options for reclaimed water use to limit drinking water demand		
Benefits » Increased availability of the potable water for drinking will promote resilience to climate change		
Objectives covered WQ1 WQ2 SL2		
Timescale 2022 - 2026		
Pre-investment -	Capex cost EUR 120,000,000	Opex cost EUR 6,000,000
Notes on cost This project is currently in preparation		
Implementing and supporting agents » JP Vodovod i Kanalizacija Skopje » City of Skopje » The owner of Vodovod » The Ministry of Environment and Physical Planning » Ministry of Finance	Funding Options » EBRD loan to finance wastewater treatment plant for Skopje as well as an investment package from EIB	

WT-4 Urban water infrastructural measures for improved treatment of waste and atmospheric waters		
Description Enforce protection of freshwater sources, and improve the supply network to decrease losses in the water supply system and expand access to all citizens though: » Achieving protection zones at Rasce spring and Nerezi-Lepenec well and respecting protection measures » Improved data management and awareness raising on water use and demand » Repair of the urban water supply network to reduce losses and improve efficiency » Expansion of the water supply network to ensure all residents have access to potable water		
Benefits » Secured quality of the potable water supply by extending protection areas around freshwater supply and intensifying inspection controls » Minimized water losses and decreased energy consumption » Ensuring access to all residents through expansion of the network		
Objectives covered WQ2 SL2 WA2 WA2 WA3		
Timescale 2023-2032		
Pre-investment EUR 1,200,000	Capex cost EUR 10,000,000	Opex cost EUR 400,000
Notes on cost » EUR 1 Mil for the first phase » EUR 12 Mil for improving the quality and efficiency of the water supply system » EU 2 Mil for addressing the needs of the people facing challenges » Opex of 5% to maintain infrastructure		
Implementing and supporting agents » City of Skopje » PU Vodovod I Kanalizacija » Municipalities » Ministry of environment and physical planning » Ministry of economy	Funding Options » City » City related company funded » Private sector funding » Grant » Budget » Debt	

WT-5 Urban water infrastructural measures for improved treatment of waste and atmospheric waters		
Description Invest in integrated, city-wide rainwater and sewerage management infrastructure to improve management and treatment of waste and atmospheric waters to decrease the use of potable water for industrial services. This will include: » Improvement and expansion of the sewerage network to improve urban waste water management » Implementation of sustainable urban drainage systems (SUDS) to improve resilience to flooding and enable public rainwater harvesting		
Benefits » Increased resilience to floods through improved management of rainwater » SUDS will promote the increased use of technical water and thereby » Increased availability of the potable water for drinking will promote resilience to climate change » Improved management of rainwaters will support operation of the planned waste water treatment plant		
Objectives covered WQ1 WQ2 SL2 AR1 BE1 WA1 WA3		
Timescale 2024 - 2035		
Pre-investment -	Capex cost EUR 30,000,000	Opex cost EUR 1,500,000
Notes on cost » EUR 20 Mil for the construction of separated sewerage system » EUR 10 Mil for developing SUDs and rainwater harvesting system » 5% opex for maintenance of infrastrcture		
Implementing and supporting agents » City of Skopje » Municipalities » Ministry of Environment and Physical Planning » Industries » Investment banks » Agriculture practitioners » PE Komunalna Higiena	Funding Options » City » City related company funded » Private sector funding » Grant » Budget	

5.5. Climate resilience

Resilience to flooding, forest fires and other natural disasters is a theme which is common to all priority pressure areas. The need for all assets, processes and operations to be resilient to the impacts of climate change is not restricted to any one sector

5.5.1. Influence on Skopje

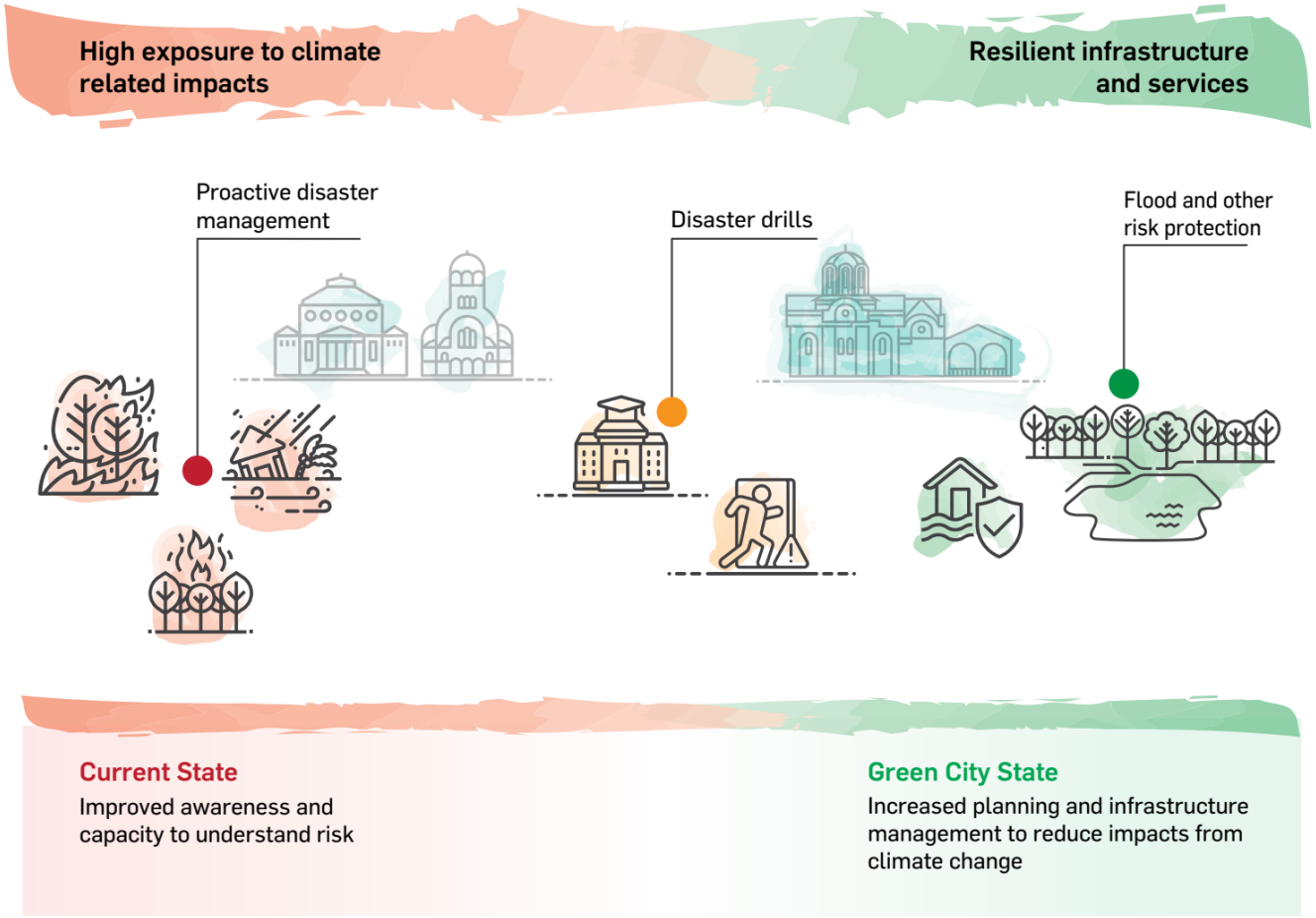
For instance, the flooding experienced in 2016 was not felt or caused by any one sector alone, but impacted transport and solid waste management operations, water management and energy supply networks. Investments in each sector will all contribute to shared benefits and improvement in resilience as a whole for the City of Skopje. The issue of adaptation and resilience should be mainstreamed into policies and planning for all sectors. 'Resilient Skopje' presents action measures that could be implemented in this area including incorporating the issue of climate change into urban planning.

5.5.2. Preliminary option areas

- Proactive disaster management
- Disaster drills
- Flood and other risk protection

5.5.3. Environmental challenges of resilience

- Adaptation and resilience;
- Water availability and use;
- Biodiversity;
- Green space.



5.5.4. Objectives addressed by the resilience options

By implementing all of the actions, it will be possible to achieve the following:

- AR1 - Promote safe and resilient infrastructure, housing and urban development
- AR2 - Raise awareness of vulnerabilities to climate change impacts
- WA3 - Improve the protection of freshwater sources
- BE3 - Improve awareness of impact on biodiversity within the City
- GS1 - Enhance extent, quality and diversity of green spaces and other green infrastructure

The following pages present short information sheets for each action, with more detailed versions provided in Appendix A.5.

5.5.5. Stage investment plan

	Measures	Total Cost	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
CR-1 Develop the strategic planning and collaborative resilience capability of Skopje	Develop and mainstream disaster risk profiles and strategies to provide clear understanding of climate risk in Skopje	€250k																
	Improve city/national level co- ordination on development and implementation of climate risk mitigation measures	€200k																
	Implement disaster risk preparedness exercises for key local institutions	€50k																
CR-2 Improve the city's resilience to forest fires	Develop a wildfire risk assessment for Skopje to assess vulnerable areas and plan for integrated forest fire prevention	€200k																
	Implement awareness raising and mitigation measures to reduce the prevalence, extent and impact of wildfires on the city.	€1k																
CR-3 Improve city's resilience to other natural disasters	Conducting analysis for each of the risks	€100k																
	Strengthening the response coordination mechanism	€250k																
	Link up with other sectoral measures in terms of prevention	€150k																
CR-4 Rehabilitate and improve flood protection infrastruc- ture in Skopje	Understanding flood risk profiles and development of targeted measures to reduce exposure to flooding	€150k																
	Ongoing rehabilitation and strengthening of existing natural and built flood protection infra- structure	€21k																

CR-1 Develop the strategic planning and collaborative resilience capability of Skopje		
Description Strengthening the quality of planning documents, improving the coordination and implementation capacities of City of Skopje in the area of climate resilience » Develop and mainstream disaster risk profiles and strategies to provide clear understanding of climate risk in Skopje » Improve city/national level coordination on development and implementation of climate risk mitigation measures » Implement disaster risk preparedness exercises for key local institutions		
Benefits » Improved planning capacities through development of urban resilience action plan » Increased resilience to floods; decreased economic losses and decreased environmental damage by increasing the capacity of the City of Skopje and the municipal administrations to strengthen urban resilience to climate change by introducing innovative measures » Improved early response mechanisms through improved institutional capacity and coordination		
Objectives covered AR1 AR2		
Timescale 2021 - 2024		
Pre-investment EUR 500,000	Capex cost -	Opex cost -
Note on costs » €500,000 for development of disaster risk profiles » €50,000 for ongoing coordination and undertaking of risk preparedness drills		
Implementing and supporting agents » City of Skopje; » Hydro-Meteorological Institute; » Joint Stock Company (JSC) "Vodostopanstvo" (Water Economy of North Macedonia); » Ministry of Environment and Physical Planning;	Funding options » Cities » Relevant ministries/gov	

CR-2 Improve the city's resilience to forest fires		
Description Implementation of measures that will increase the city's resilience to forest fires including improving infrastructure to enable vehicles to reach affected forest areas, improving equipment, and raising awareness for prevention. Specific measures include: » Develop a wildfire risk assessment for Skopje to assess vulnerable areas and plan for integrated forest fire prevention » Implement awareness raising and mitigation measures to reduce the prevalence, extent and impact of wildfires on the city.		
Benefits » Improved planning, awareness raising reduce risk of forest fires » Implementation of preventative measures will increase resilience, thus decreasing economic losses and environmental damage; » Strengthened forest management will improve biodiversity and long-term green space management for the City		
Objectives covered AR1 AR2 BE3 GS1		
Timescale 2021 - 2030		
Pre-investment EUR 1,200,000	Capex cost -	Opex cost -
Notes on cost » €2,000,000 for strengthened planning and initial set up » €1,000,000 per annum for ongoing maintenance of measures		
Implementing and supporting agents » City of Skopje; Municipal authorities; » PE National Forests; » Directorate for Protection and Rescue; » Army of North Macedonia; » Crisis Management Centre; » Hydro-Meteorological Institute; » Ministry of Environment and Physical Planning; » Ministry of agriculture, forestry and water economy;	Funding options » Cities » Relevant ministries/gov » Grant » Budget	

CR-3 Improve city's resilience to other natural disasters		
Description Implementation of measures to address the risks of droughts, landslides, earthquakes, cold waves, heat waves etc. through prevention planning and strengthening the response system. Measures include: » Conducting analysis for each of the risks; » Strengthening the response coordination mechanism » Increase the investment in prevention measures		
Benefits » Improved planning, awareness raising reduce risk of natural disasters; » Implementation of preventative measures will increase resilience, thus decreasing economic losses and environmental damage; » Strengthened nature and urban areas' management will improve biodiversity and long-term green space management for the City.		
Objectives covered AR1 AR2		
Timescale 2021-2024		
Capex cost EUR 500,000	Capex cost -	Opex cost -
Notes on cost » €1,000,000 for strengthened planning and initial set up » €500,000 per annum for ongoing maintenance of measures		
Implementing and supporting agents » City of Skopje; Municipal authorities; » Directorate for Protection and Rescue; » Crisis Management Centre; » Hydro-Meteorological Institute; » Public health institute; » Institute of Earthquake Engineering and Engineering Seismology; » Ministry of Environment and Physical Planning; » Ministry of health; Ministry of transport and communications; » Ministry of agriculture, forestry and water economy;	Funding options » Cities » Relevant ministries/gov » Grant » Budget	

CR-4 Rehabilitate and improve flood protection infrastructure in Skopje		
Description Increase the city's resilience to floods through improved spatial planning, risk management of dams and reservoirs and building or maintaining existing flood control structures. Measures will include » Understanding flood risk profiles and development of targeted measures to reduce exposure to flooding » Ongoing rehabilitation and strengthening of existing natural and built flood protection infrastructure		
Benefits » Development of measures to target the areas vulnerable to flooding will limit flood risk » Suitable investment in existing flood risk infrastructure will ensure that defences are climate-proofed and able to withstand forecast changes in rainfall, ensuring long-term resilience for Skopje » This will result in Increased resilience to floods and decreased economic losses and environmental damage;		
Objectives covered AR1 AR2 WA3		
Timescale 2023 - 2035		
Pre-investment EUR 150,000	Capex cost EUR 20,000,000	Opex cost EUR 1,000,000
Notes on cost » €2,000,000 for strengthened planning and initial set up » €1,000,000 per annum for ongoing cleaning and maintenance of flood defences		
Implementing and supporting agents » City of Skopje; Municipalities; » Hydro-Meteorological Institute; » Joint Stock Company (JSC) "Vodostopanstvo" (Water Economy of North Macedonia); » Hydro Power Stations; » Crisis Management Centre; » Directorate for Protection and Rescue; » Ministry of agriculture, forestry and water economy;	Funding options » Cities » Private sector funding » Relevant ministries/gov » Budget » Debt	

5.6. Land use

Urban growth and development has wide ranging implications on all pressure areas. As such, improving land use planning and protection is a cross cutting issue

5.6.1. Influence on Skopje

Examples include increasing urbanisation leads to increased energy demand; transport demand; solid waste and wastewater outputs from residents and business; higher demand on potable water supply; encroachment on protected areas threatening degradation of water supply; and encroachment of green space leading to negative

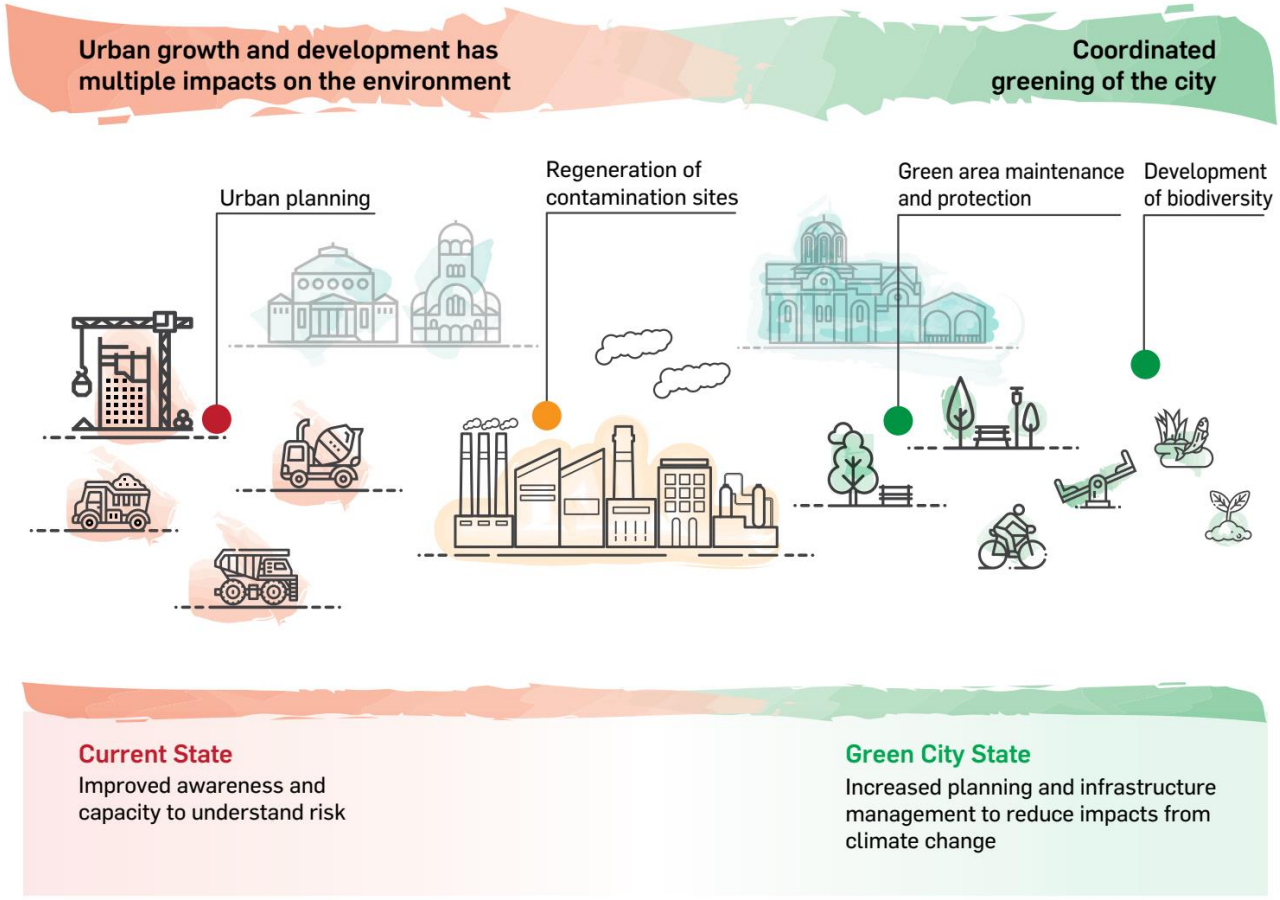
impacts on biodiversity. 'Resilient Skopje' notes that green spaces have a positive impact on natural values such as air, water, soil, flora and fauna, and thus represent a "climate infrastructure" of the city. This further validates the importance of 'land use and protection' as a cross cutting issue, which if preserved, will positively impact other sectors.

5.6.2. Preliminary option areas

- Urban planning
- Regeneration of contaminated sites
- Green area maintenance and protection
- Development of biodiversity

5.6.3. Environmental challenges of land use and protection

- Soil quality;
- Biodiversity;
- Green space.



5.6.4. Objectives addressed by the land use options

By implementing all of the actions, it will be possible to achieve the following:

- SL1 - Encourage development of remediation plans for contaminated sites
- BE1 - Encourage development of green infrastructure across the city
- BE2 - Improve data collection and monitoring systems for measuring biodiversity within the City
- BE3 - Improve awareness of impact on biodiversity within the City
- GS1 - Enhance extent, quality and diversity of green spaces and other green infrastructure
- GS2 - Promote a sequential approach (brownfield, infill, greenfield) to urban development to avoid further urban sprawl
- GS3 - Improve proposed law on urban planning to safeguard green spaces

The following pages present short information sheets for each action, with more detailed versions provided in Appendix A.6.

5.6.5. Stage investment plan

	Measures	Total Cost	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
LU – 1 Improve data collection and collaboration to inform future urban planning	Development of baseline and justification for undertaking strong restriction on raising the number of residential buildings on greenfield sites	€500k																
	Technical implementation of the plan for restriction on construction works	€300k																
LU – 2 Contaminated sites remediation	Enabling the technical environment for remediation of the contaminated sites	€500k																
	Strengthening the partnership in addressing the contamination challenges	€500k																
LU – 3 Increase the quality and accessibility of green spaces and parks	Strengthening the planning processes for improved pocket parks management	€150k																
	Strengthening the planning and decision-making processes	€100k																
	Implementation of technical measures that should enable improved substantiality of the large green areas	€1k																
	Enable larger green areas to improve their accessibility	€300k																
LU – 4 Establish green city spaces and corridors	Development of plan for establishment of the city's green corridors and pocket parks	€300k																
	Implementation of practice proven measures for increased number of pocket parks in city of Skopje	€2k																
	Implementation of the plan for establishment of the city's green corridor	€8k																

LU – 1 Improve data collection and collaboration to inform future urban planning		
Description Develop city-wide impact studies of urban development on Green City challenges to inform the process of urban planning and limit the extent and impact of future development through: » Development of baseline and justification for undertaking strong restriction on raising the number of residential buildings on greenfield sites » Technical implementation of the plan for restriction on construction works		
Benefits » Reduced pressure to environment and improved environmental conditions in City of Skopje » Reduced pollution and reduced number of cases of citizens facing health challenges due to air pollution » Enabling municipal authorities to improve their planning process based on the fix data on number of inhabitants » Strengthened inter-municipal cooperation through joined planning, decision making and implementation processes		
Objectives covered GS1 GS2 GS3		
Timescale 2021-2024		
Pre-investment EUR 800,000	Capex cost -	Opex cost -
Notes on costs » Pre-investment urban impact studies, and awareness raising and enforcement to restrict encroachment on the environment		
Implementing and supporting agents » City of Skopje, 10 local self-governments administration, International organization » 10 local self-governments administration, local civil society organizations » Relevant Ministries and Agencies	Funding Options » City » Relevant ministries/gov » Grant	

LU – 2 Contaminated sites remediation		
Description Strengthening the process of remediation of the contaminated sites and addressing the contamination challenges, through: » Enabling the technical environment for remediation of the contaminated sites » Strengthening the partnership in addressing the contamination challenges		
Benefits » Remediated contaminated sites » Reduced pressure to environment and improved environmental conditions in City of Skopje » Improved quality of the soil and groundwaters due to the policy supporting remediation as well as reduced contamination of the agricultural products and improved health of the citizens. This will lead to increased competitiveness of the products (fruits and vegetables) produces in Skopje, and improved economy » Increased environmental, social and economic conditions, hence increased quality of life of Skopje citizens		
Objectives covered SL1		
Timescale 2021-2031		
Pre-investment EUR 1,000,000	Capex cost -	Opex cost -
Notes on cost Pre-investment for establishment of knowledge sharing across stakeholder groups and facilitation of process to remediate		
Implementing and supporting agents » City of Skopje » Ministry of Environment and Physical Planning » 10 local-self governments administration, International organization » 10 municipal authorities, local civil society organizations » Universities.	Funding Options » City » Grant » Budget	

LU – 3 Increase the quality and accessibility of green spaces and parks		
Description Implement innovative and good practice measures for pocket parks and larger green areas to promote greening of the city, through: » Strengthening the planning processes for improved pocket parks management » Implementation of practice proven measures for increased number of pocket parks in city of Skopje » Strengthening the planning and decision-making processes » Implementation of technical measures that should enable improved substantiality of the large green areas » Enable larger green areas to improve their accessibility		
Benefits » Number of pocket parks and their total area increased as well as increased number of children's playgrounds » Improved air quality in the city » Increased urban mobility of the citizens, as well as increased options for social integration of elderly people and people with disabilities. Overall, strengthened social conditions of the citizens » Improved conditions of the larger green area and nature conservation conditions » Raised awareness on nature conservation		
Objectives covered BE1 GS1		
Timescale 2024-2030		
Pre-investment EUR 1,500,000	Capex cost -	Opex cost -
Notes on costs Cost estimate for range of pre-investment studies, internal capacity building and cross sector working for three years		
Implementing and supporting agents » City of Skopje, 10 Municipal authorities » Ministry of Environment and Physical Planning » Public Entity "Parks and Greeneries" » International organizations, European "sister cities"; » Local civil society organizations » Private companies	Funding Options » City » Grant » Budget	

LU – 4 Establish green city spaces and corridors		
Description Develop a connected network of green areas across the city to improve urban biodiversity, enhance resilience to flooding, reduce the city's 'heat island' effect, and reduce air pollution, through: » Development of plan for establishment of the city's green corridors » Implementation of the plan for establishment of the city's green corridor » Implementation of plan for increased number of pocket parks		
Benefits » Improved mobility conditions of the citizens » Improved environmental conditions and nature conservation conditions » Improved air quality in the city and subsequently reduced health related risks of the citizens » Strengthened social conditions of the citizens		
Objectives covered BE3 GS1		
Timescale 2024-2035		
Pre-investment -	Capex cost -	Opex cost EUR 10,000,000
Notes on cost Cost estimate to reforest 1,000 hectares (3% of surface area of urban Skopje), with native vegetation		
Implementing and supporting agents » Local civil society organizations » Private companies » Universities » City of Skopje, 10 Municipal authorities » Ministry of Environment and Physical Planning	Funding Options » City	

6. Green City monitoring, reporting, and verification

6.1. Scope and purpose of monitoring

In order to monitor the implementation and impact of GCAP actions and the GCAP as a whole data will need to be collected regarding:

» The implementation status of each GCAP action: This should be recorded as 'No Action,' 'In Preparation,' 'Implementation Underway,' or 'Completed,' with an explanatory note provided. Where there has been 'No Action' the note should include a justification, and actions 'In Preparation' and where 'Implementation [is] Underway' should be accompanied by a short summary of progress. 'Implementation Underway' and 'Completed' actions should also be accompanied by a note summarising any social, economic and environmental impacts;

- Any changes to the Implementation Plan for each GCAP action: Details regarding the budget, scope and implementation programme of each action should be collected; and
- GCAP indicators that will be used to determine the impact of each GCAP action: The GCAP methodology introduces a number of indicators that can be monitored to determine the impact of each GCAP action. It is anticipated these will largely comprise indicators used to assess Skopje's Green City Baseline additionally the stakeholders pointed out to the usefulness of other ones. The data, once verified, will be analysed to determine factors including:
  - The likelihood of the GCAP vision, objectives and targets being achieved;
  - Lessons learnt (what has gone well and where there is room for improvement);
  - The need to take any corrective action, for example the revision of an element(s) of the GCAP Implementation Plan;
  - Cost-effectiveness of investments;
  - The effectiveness of the monitoring process; and
  - Whether there should be a refresh of the GCAP.

Table 6-2: Progress Monitoring Plan (PMP) template

City	County	Sector	Code	Vision	Target	Actions	Investment/	Implementing body	Source of funding	Potential Support	Status Implementation	Note	Date	Verifiable target	Status meeting	CAPEX €	OPEX €	Development & advisor costs	Funding need

Table 6-1: Impact Monitoring Plan (IMP) template

Indicator Code	Topic/ Sector	Pressure – State - Response	Trend	Colour code (red, amber, green)	Figure (in indicator database)	Data source	Relation actions (major impact)	Relation actions (medium impact)	Relation actions (minor impact)	Data Source Contact/ Note	Figure (3 years after GCAP finalisation)	Colour code	Figure (5 years after GCAP finalisation)	Colour code
1	Air	State												
1.1	Air	State												

6.2. Reporting format and frequency

The EBRD has established reporting requirements that apply to all GCAPs. These require the submission of two reports:

1. A report summarising the implementation status of actions included in GCAPs, which should adopt the format of the template in Table 6-1 ('Progress Monitoring Plan' (PMP)). This table should be populated at the end of the GCAP development process and will be updated within a year of the GCAP being adopted, and then at least annually thereafter;

2. A report summarising the status and likelihood of achieving GCAP visions, objectives and targets. This will take the form of an 'Impact Monitoring Plan' (IMP) (see Table 6-2) which, like the PMP, was completed at the end of the GCAP development process and will be updated after three years and five years to report on the environmental, social and economic impacts of the GCAP. It will be populated by drawing on the relevant indicator data in the Indicator Database.

In addition to these two reports, the Indicator Database will continue to be used to collate and present data

collected alongside global benchmark values. Any additional reporting requirements will be set by the GCAP Co-ordinator in Step 3 of the GCAP process ('Green City Implementation'). 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. MRV process and governance

It is anticipated that a designated City Administration official will be responsible for ensuring the timely monitoring of the GCAP and submission of related reports. They will be tasked with delegating the data collection, analysis and reporting tasks to senior-level officials from across the City Administration.

This 'MRV Co-ordinator' role will involve the delivery of the following activities:

1. Liaise with the GCAP Co-ordinator, the Chief Advisor to the Mayor, to confirm the data collection requirements (including frequency and quality) for assessing the implementation and impact of GCAP actions, as well as associated timescales and budget, and ultimately of the GCAP as a whole. This should include a review of the targets and constituent indicators that each GCAP action will contribute towards achieving, as well as the objectives that each action and policy addresses, which are presented in Chapter 5. This step will also be used to support the identification of synergies with other city, and wider domestic, processes and protocols as well as of the specific stakeholders responsible for each (see also Section 6.5);

2. Identify and assign an official ('MRV Sector Expert') within each of the departments responsible for the implementation of a GCAP action(s) (see Table 6-3) to monitor and report on the action(s) – it is likely that this would be a head of department and in most instances, if not all, be the same official responsible for the implementation of the relevant GCAP action ('GCAP Action Owner') from the relevant department within the City Administration. The selected officials will be responsible for Monitoring, Reporting and Verifying data relating to a) the implementation progress of each action, b) the budget, scope and implementation programme of each action, and c) the impact of each action in relation to the relevant targets;

Table 6-3: Potential departments responsible for MRV

GCAP Sector	Department responsible for MRV
Transport	Ministry of Transport
Building, Industries and Energy	Ministry of Environment and Physical Planning
Water	Ministry of Environment and Physical Planning
Solid Waste	Ministry of Environment and Physical Planning
Land use	Ministry of Environment and Physical Planning
Resilience	Ministry of Interior

3. Identify and designate an official ('Data Collection Officer') with responsibility for the collection and review of data to inform each GCAP indicator;

4. Establish formal communication channels between the MRV Sectoral Experts and the relevant Data Collection Officers;

5. Communicate regularly with officials designated MRV responsibilities to ensure that they are suitably informed, trained and otherwise supported to conduct their role effectively, efficiently and in a transparent and consistent manner. This will include the development and dissemination of guidance to facilitate appropriate and consistent Monitoring, Reporting and Verification that meets the requirements of the GCAP methodology. This communication should also be conducted to ensure that the tasks of the MRV Sector Experts and Data Collection Officers are being executed to the specified quality, time and budget, as set by the MRV Co-ordinator;

6. Set and enforce deadlines for regular reports relating to each GCAP action and indicator;

7. Assimilate inputs from MRV Sector Experts to report on each GCAP action, as well as on the progress and impact of the GCAP as a whole, and cascade the findings to the GCAP Co-ordinator, the Chief Advisor to the Mayor. The Chief Advisor to the Mayor will in turn share findings with other stakeholders, notably internal and external actors who are responsible for making decisions based on the findings. The MRV Sector Experts, as appointed by the MRV Co-ordinator to take responsibility for the Monitoring, Reporting and Verification of actions in specific GCAP sectors, will be required to:

1. Acquire an in-depth understanding of the targets and indicators relevant to their GCAP action(s) and about how the data to inform each is derived and

validated. This will require consultation with the MRV Co-ordinator and relevant Data Collection Officers;

2. Communicate regularly with the official responsible for the implementation of each GCAP action ('GCAP Action Owner'), and if different, also the official responsible for reviewing, and if necessary, revise the budget, scope and planning of each action;

3. Familiarise themselves with the required method and frequency of data collection for each data item. In terms of the monitoring of the implementation of GCAP actions, data collection will in all instances be continuous throughout the implementation period. But there will be more variation in the frequency of the data collection for each indicator. Examples are provided in Table 6-4 in the context of a specific GCAP action;

4. Liaise with Data Collection Officers to ensure that any factors that might compromise the quality or availability of data to meet deadlines set by the MRV Co-ordinator are identified in time to identify an alternative approach;

5. Adopt responsibility for the validation of all data in relation to each GCAP action, reviewing data received to ensure that it is complete, consistent and otherwise robust;

6. Analyse and assimilate the inputs of Data Collection Officers and GCAP Action Owners to report on the progress and impact of each GCAP action, and report on the findings; and

7. Cascade the results to the MRV Co-ordinator.

Table 6-4: Indicative monitoring scheme for GCAP action TR3 (Improve quality of public transport and infra through BRT system)

Indicator	Data collection frequency	Data collection method	Responsible department
Average annual concentration of $PM_{2.5}$	Continuous	Stationary (active sampling) automated hydrometeorological monitoring stations that monitor $PM_{2.5}$ concentrations daily	» City of Skopje » Ministry of Environment and Physical Planning
Average annual concentration of SO_2	Continuous	Stationary (active sampling) automated hydrometeorological monitoring stations that monitor SO_2 concentrations daily	» City of Skopje » Ministry of Environment and Physical Planning
Share of commuting trips by private motorised transport	Annual	Surveys of a city-wide data collection programme and multi-modal transport model	» City of Skopje » JSP Skopje » Ministry of Interior
Share of trips by private motorised transport	Annual	Surveys of a city-wide data collection programme and multi-modal transport model	» City of Skopje » JSP Skopje » Ministry of Interior
Frequency of bus service	Monthly	As part of TR3 - Creating a database for monitoring and mobility improvements	» City of Skopje » JSP Skopje » Ministry of Interior
Travel speed of bus service on major thoroughfares daily average	Continuous	As part of TR3 - Creating a database for monitoring and mobility improvements	» City of Skopje » JSP Skopje » Ministry of Interior

6.4. Data availability and collection

The technical assessment that was conducted to establish Skopje's environmental baseline revealed a number of challenges that will need to be addressed in order to effectively monitor the impact of the GCAP. These include:

- Gaps in data collection and reporting;
- Limited capacity within the City Administration to collect the required data;
- Lack of data collection equipment
- and other physical infrastructure necessary for the required Monitoring, Reporting and Verification within the City Administration; and
- Lack of a tradition of Monitoring, Reporting and Verifying related data within the
- City Administration departments that will be assigned GCAP MRV responsibilities.

Gaps in data collection and reporting have been referred to throughout this report along with the impact that they have had on the City Administration's ability to understand the state of the environment in Skopke, the impact of different sectors on the environment and the likely effectiveness of different

responses. The data sources listed in the Indicator Database reveal that data for many indicators was only collected on an ad hoc basis.

Gaps in data reporting can constrain analysis as much as gaps in data collection. It is not always possible to ascertain the impact of different pressures and responses on the state of the environment even when data do exist, but related complexities make investment in establishing a robust MRV process even more prudent.

The current status of MRV in Skopje will limit the quality of MRV in the shortterm. But by adopting an immediate focus on enhancing data collection and institutionalising related protocols the city can establish a credible MRV regime that can play an integral role in decision-making within a couple of years. The next steps should be as follows:

1. Identify data collection requirements: This will involve reviewing the gaps in data availability and quality as highlighted by the GCAP, Indicator Database and problem trees;

2. Create a data collection plan: This should describe exactly what data need to be collected, how, where from, how often and by whom. It should also detail how the data need to be recorded as well as the purpose of collecting each data item. The plan should take into account the GCAP actions that will enhance data collection, monitoring and collaboration. These are intended to be implemented in the short term. These include:

- TR2 – Improve transport planning, decision making and data collection and monitoring
- EN-2 Develop City level strategy and strengthen of collaborative working practices
- SW-2 Improve the internal processes of planning and implementation
- WT-2 Capacity building to enforce measures to limit pollution of rivers and groundwaters
- CR-1 Develop the strategic planning and collaborative resilience capability of Skopje

3. Develop an MRV implementation plan: The large number of data collection and reporting limitations identified by this GCAP, and the diversity of the associated requirements, makes it likely that the implementation of the data collection plan and establishment of an enabling framework will need to be phased with improvements made in increments. This Implementation Plan should therefore contain a prioritisation of data collection requirements and information about associated costs, potential funding sources and mechanisms and implementation programme;

4. Secure funding for the proposed MRV: Additional funding will be needed to cover the cost of items including surveys, City Administration staff time, the purchase of monitoring equipment, and related capacity building activities. This funding is likely to be secured from a combination of sources including from the city, for example by integrating MRV measures into municipal budgets, subnational government via ministries, various city linked utilities and enterprises and wider public and private sector domestic sources, as well as IFIs and donors;

5. Build related capacities: Investment needs to be made in capacity building of officials within the City Administration to support Skopje's ability to conduct MRV to an adequate level of rigour, and to embed MRV into institutions with related responsibilities. The capabilities needed for MRV include a range of managerial and technical skills, including in relation to: the design, implementation and operation of MRV systems; data collection and management (encompassing factors including technical and technological monitoring infrastructure and documentation procedures), and; relevant methodologies (for example to calculate GHG emissions). They also extend to institutional capacity, as outlined below;

6. Institutionalise MRV procedures: Institutional arrangements (for example in relation to MRV leadership, co-ordination and information sharing mechanisms), processes, mandates and data sharing protocols need to be established to ensure that MRV is efficient and achieves its objectives. There must be clarity around MRV requirements and responsibilities with roles clearly designated, defined and communicated – including regarding leadership and co-ordination functions, and potentially along the lines of the process outlined in Section 6.3. These could be enshrined in formalised agreements. Most of the required changes can be realised by making relatively small adjustments to existing roles and processes, but some new systems are likely to need to be set up, such as a centralised system for storing data.

6.5. Role of stakeholders

The City Administration will own the MRV process, but internal and external stakeholders will also need to contribute. The stakeholders who are either responsible or accountable for elements of the GCAP

MRV process, or have or will be consulted, are listed in Table 6-5.

Table 6-5 Definitions:

Accountable – Answerable for the Monitoring, Reporting and Verification of GCAP action(s), the accountable stakeholder must approve and explicitly sign off on the activities of any responsible stakeholder(s)

Responsible – These stakeholders will conduct and lead elements of MRV by following rules and regulations defined by another higher (often 'accountable') stakeholder

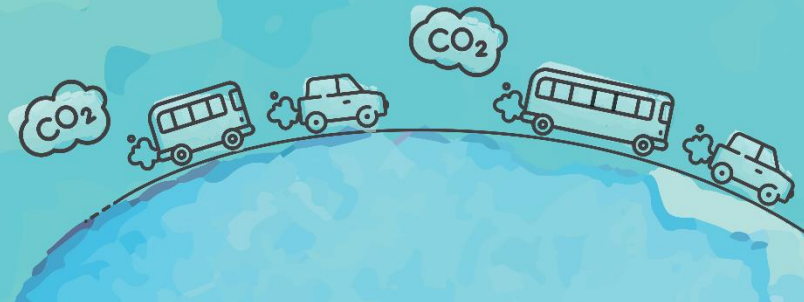
Consulted – Opinion or contributions are sought on the MRV through two-way communication

Table 6-5: Stakeholders in the GCAP MRV process

Sector	Mayor's office/ City of Skopje	Ministry of Environment and Physical Planning	Ministry of interior	Ministry of Transport	Ministry of Labour and Social Policy	Municipalities	Parking management authorities	Drisla	Spatial Planning Agency	Private sector companies	Experts	NGOSs and community groups
Transport	Consulted	Responsible	Consulted	Accountable	Responsible	Consulted	Responsible	-	Consulted	-	Consulted	Consulted
Building, Industries and energy	Consulted	Accountable	Consulted	-	Consulted	Consulted	-	-	-	Consulted	Consulted	Consulted
Water	Consulted	Accountable	-	-	-	Consulted	-	-	-	Consulted	Consulted	Consulted
Solid Waste	Consulted	Accountable	-	-		Consulted	-	Responsible	Consulted	Consulted	Consulted	Consulted
Land use	Consulted	Accountable	Consulted	-	-	Consulted	Consulted	-	Consulted	-	Consulted	Consulted
Resilience	Consulted	Consulted	Accountable	Consulted	-	Consulted	-		Consulted	-	Consulted	Consulted

Appendix A – Policy option and actions - detailed proformas

Appendix A.1. Urban transport



<table>
<tr><th colspan="5">TR-1: Improve transport planning, decision making and data collection and monitoring</th></tr>
<tr><td>Timescale
2021 - 2027</td><td>Strategic objectives
AQ1; AQ2; GH3</td><td>Pre-investment
EUR 400,000</td><td>Capex
-</td><td>Opex
-</td></tr>
<tr><td colspan="2">Description
Strengthening the capacities and cross-sector collaboration through awareness raising to encourage sustainable travel and implementing data management campaigns to support such initiatives.</td><td colspan="3">Notes on estimate
Costs incurred to cover capacity building and awareness raising campaigns</td></tr>
<tr><td colspan="2" rowspan="4">Details
1.1. Improving cooperation with stakeholders for coordination of initiatives:
» Establishment of comprehensive transport working group building upon the concept and experience of the existing Bicycle Policy Audit (BYPAD) working group;
» Establishment of regular consultation process with the transport working group (including social development practitioners), especially giving the floor to the CSOs and citizens initiatives;
» Strengthen the regular process of public hearing (public consultation) for each planning and reporting document that is produced by the city;
» Enabling CSOs to be frontlines when communicating the strategic documents developed in a highly participatory mode, hence gaining their ownership and indirectly achieving citizens' trust and willingness to participate in implementation.

1.2. Awareness raising and data management campaigns
» Organize campaign for targeting parents who could cycle to kindergarten with their children, hence building the cycling habits from the very early stage of their development;
» Increase the use of the European Mobility Week for promotion of the alternative transport and improved sustainability of the urban mobility;
» Work with the municipalities, schools and parents' representatives on development of program and implementation of promotional activities for safe and pleasant cycling to school by targeting first the schools with existing safe infrastructure and parking;

1.3. Increase the capacities of the core stakeholders to improve the quality of the city's transport related documents
» Organizing regular topic specific trainings to the working group delivered by the internationally recognized experts in the area/s of interest;
» Aligning the municipal transport related strategic and operational documents with the one developed by the city;
» Improve the quality of the city's strategic transport related documents in order to serve as a main resource for other municipalities but also to the Ministry of Transport and communications;
» Implement planned Sustainable Urban Mobility Plan (IPA funded) and ensure follow on implementation support to go beyond expectations in strengthening the mobility of the citizens by applying progressive mobility measures stimulating the alternative transport and discouraging the use of motorized vehicles.</td><td colspan="2">Funding options
» City
» City related company funding
» Grant
» Debt</td><td>Carbon saving potential
Yes, the policy aims to build the ground work for regulation that supports effective transport planning, data collection and monitoring which will lead to informed decision making. The effects of the policy measures will result in carbon savings in the transport sector.</td></tr>
<tr><td colspan="2">Revenue generating
No</td><td>Climate resilience building
No</td></tr>
<tr><td>Implementing and supporting agents
» City of Skopje
» Municipalities
» Ministry of Transport
» Ministry of Interior
» Ministry of Environment and Physical Planning
» Ministry of Labour and Social Policy
» Parking management authorities
» Civil Society Organizations
» Citizens' initiatives
» Public Transport Company "Skopje"
» Private companies</td><td>Benefits
» Components can be incorporated into the planned Bus Restructuring and SUMP commissions currently under tender
» Improved processes of city transport planning and implementation
» Increased quality of the transport related documents
» Increased implementability of the strategic documents;
» Decreased traffic congestion
» Decreased air pollution</td></tr>
<tr><td colspan="2">Social considerations
» The working group should integrate representatives from the city administration, central government, municipalities, civil society organizations and initiatives, private companies, and public entities;
» The transport focused representation should be enlarged by inclusion of social, environmental and economic development institutions, organizations and/ or practitioners;
» The working group should tend to have equal representation of men and women and ensure addressing the needs of different vulnerable groups;
» The working group should follow the recommendations provided by the EU vision for zero carbon development.</td></tr>
</table>

TR-2: Implementation of urban traffic management schemes				
Timescale 2021 - 2023	**Strategic objectives** AQ1; AQ2; GH3	**Pre-investment** EUR 500,000	**Capex** -	**Opex** -
Description Evaluate performance and embed policies for improved city transport regulation through introduction and enforcement of low emission zones and parking regulations.		**Notes on estimate** Costs incurred to cover assessment and analysis study costs		
Details 2.1. Conduct legal gap assessment, identify the challenges and develop plan for in-practice implementation of improved city transport regulation » Review the current law on road transport and propose changes that will significantly improve the mobility; » Initiate strengthening the bylaws on transport planning and modelling, hence introducing the bicycle lanes, but also decreasing the space for cars (for example from 3,5m to 3m in boulevards) according to the speed limitations (max 50km/h in city of Skopje); » Evaluate the enforcement of the (yellow marked) bus lines and develop joined plan with the Ministry of Interior and JSP for in-practice implementation; » Evaluate the current parking regulation in the city and work with the municipal authorities, Ministry of Interior and parking management entities on development and implementation of joined plan for parking regulation with focus on minimizing the illegal parking, increasing the parking fees, and limitation on the parking time in certain areas; » Evaluate the impact of the vehicles heavier than 3.5t in the inner-city area and analyse the options for applying their travel limitation in rush hours, hence improving the mobility and decreasing the air pollution; » Use the capacities of the mayors, socially influential persons recognized in the society, civil society organizations and civil initiatives to raise awareness on use of the bus lines and combating illegal parking; » Develop indicators, baseline and system for monitoring the enforcement of the yellow marked bus lines and illegal parking cases. Compare the data before and after implementation of the law improvement and in-practice development measures. Ensure continuity of data collection. 2.2. Conduct technical analysis on increased traffic management to limit motorised transport and promote improved mobility for citizens » Assess the possibilities and options of extension of adaptive regulated traffic regime for all streets that should be subject to different regime during the day; » Analyse the options for introducing streets that are released from cars, hence meeting the significant needs for use by pedestrians (“Rekord”) and minimizing the environmental impact and enabling easy access to alternative sustainable transport; » Analyse the potentials for introducing a Low Emission Zones (excluding hybrids and e-vehicles) in densely populated urban areas, and the areas with biological significance (Matka, Gazi Baba, Skopska Crna Gora, Vodno); » Assess the gaps and needs for increased mobility of people with disabilities; » Assess the options for increased access to pedestrians and cyclists by releasing the currently interrupted space through allowed parking for vehicles; » Assess the needs for increased parking network for bicycles; » Assess the gaps for hassle free use of the bicycle infrastructure; » Assess the options for integration of the inner-city railway stations in the city transport for increased connectivity and urban mobility.		**Funding options** » City » City related company funding » Grant » Debt	**Carbon saving potential** Yes, the policy aims to build the ground work for regulation that supports demand management to decrease usage of private vehicles and promote alternative modes. The effects of the policy measures will result in carbon savings in the transport sector.
		Revenue generating No	**Climate resilience building** No	
		Implementing and supporting agents » City of Skopje » Municipalities » Ministry of Interior » Ministry of Transport » Parking management authorities » Ministry of Environment and Physical Planning » Public Transport Company "Skopje" » Private operators » PE Streets and Roads Skopje	**Benefits** » Improved city transport regulation » Improved public transport system » Increase use of the alternative sustainable transport » Decreased greenhouse gas emissions » Improved air quality	
		Social considerations » Gender and different vulnerable groups should be analysed from the demand and contribution perspectives; » Vulnerable groups should include people with disabilities, children living in the areas of extremely extensive traffic (closing streets), citizens using the large green areas affected by high emission vehicles (cars restrictions and law emission zones), cyclists, pedestrians etc.; » Awareness raising activities must reach all ethnic groups (use NGOs that can reach different ethnic groups), different type of vulnerable groups (use NGOs and associations on people with disabilities, minorities etc.), different mode of transport users (cycling CSOs, environmental NGOs, social development CSOs), etc.; » Ensure city budget with technical and financial contribution delivered by international organization/s present in the country with environment and climate change portfolio.		

<table>
<tr><th colspan="5">TR-3: Improve the quality of public transport and infrastructure including a BRT system</th></tr>
<tr><td>Timescale
2021 - 2035</td><td>Strategic objectives
AQ1; AQ2; GH3</td><td>Pre-investment
EUR 100,000</td><td>Capex
EUR 100 Million</td><td>Opex
EUR 5.8 Million</td></tr>
<tr><td colspan="2">Description
Introduce a BRT system with improved bus infrastructure and creation of a database to monitor and support mobility improvements.</td><td colspan="3">Notes on estimate
» € 90 Mil to build BRT system (assuming $25-60m = $2-5m per km, including cost of buses)
» € 500,000 for renewed bus operator model
» 500 bus stops at € 5,000, totalling to € 2,500,000
» Low-emission buses €250k (CNG buses) - €450k (zero emission buses)</td></tr>
<tr><td colspan="2" rowspan="4">Details
3.1. Development of public transport development strategy
» Implementation of the planned Bus Network Restructuring Study to assess the current bus lines, identify the gaps and propose changes that will improve the connectivity, accessibility and frequency;
» Developing a plan for introduction of mass transport system without affecting the already existing bicycles infrastructure;
» Significantly improve the taxi traffic regulation to encourage improvement of fleet and integration with public and alternative sustainable transport.

3.2. Applying capital investments and implementation of support measures for significant improvement of public transport
» Introducing a bus rapid transit transportation (BRT) system along the alignment of the planned LRT, by prioritizing the introduction of zero-carbon vehicles such as a hydrogen-based bus fleet;
» Enabling minimized overlap with the bus lines, decreased charging challenges, regular implementation of the time schedule, and meeting the demand, access, and safety requirements;
» Increased investment in securing low pollution buses and introduction of e-buses;
» Ensure availability and sustainability of the EV chargers for e-buses;
» Increasing investment in improving the state of the bus stops, improving the access, real time displays, and journey planners but also apply printed maps of bus lines and their timetables;
» Improve the safety and visibility of the bus stops;
» Incorporating the inner-city railway stations in the active city transport system;
» Introduce multimodal public transport in Skopje by application of single ticket for traveling within Skopje with different means of transport including bus, tram, and train;
» Develop and implement strong awareness raising campaign for available public transport options;
» Use the capacities of the environmental CSOs to justify and promote (raise the awareness on) the increased use of public transport as modality for fastest transport mode, increased safety, decreased greenhouse gas emissions, and improved air quality;
» Develop a database with comprehensive parameters focused on public transport and enable close monitoring of data strongly focused on mobility improvements.</td><td colspan="3">Funding options
» City
» City related company funding
» Private sector funding (PPP)
» Grant
» Debt</td><td>Carbon saving potential
Yes, an improved public transport system, specifically a BRT and upgraded infrastructure, would result in public transport being more attractive. Modal shift towards public transport will lead to carbon saving. In addition, a if less polluting buses are used, there is higher potential for carbon saving potential.</td></tr>
<tr><td colspan="3">Revenue generating
Yes, ticket revenue</td><td>Climate resilience building
No</td></tr>
<tr><td colspan="3">Implementing and supporting agents
» City of Skopje
» Central Government
» Development Banks
» Public Transport Entity (JSP)
» Parking management authorities
» Ministry of Environment and Physical Planning
» Ministry of Labour and Social Policy
» Private operators</td><td>Benefits
» Components can be incorporated into the planned Bus Restructuring and SUMP commissions currently under tender
» Improved quality of the public transport
» Increased use of the public transport
» Decreased use of private cars
» Increase use of the alternative sustainable transport
» Decreased greenhouse gas emissions
» Improved air quality
» Improved social development perspectives</td></tr>
<tr><td colspan="4">Social considerations
» The assessments/plans should integrate the social perspectives. Gender and different vulnerable groups should be analysed from the specific needs and job creation perspectives;
» When identifying the vulnerable groups in selected assessments focus on people with disabilities, children, people in rural areas, marginalized community, cyclists, pedestrians etc.;
» When undertaking awareness raising activities make sure you reach all ethnic groups, different type of vulnerable groups, and different group of people using different mode of transport (public, alternative, pedestrian);
» Ensure increased city and state fund contribution in order to mobilize increased/ sufficient budget by the investment banks.</td></tr>
</table>

TR-4: Increased use of the alternative non-motorised transport

Timescale	Strategic objectives	Pre-investment	Capex	Opex
2021 - 2030	AQ1; AQ2; GH3	EUR 200,000	EUR 35 Million	EUR 1.8 Million

Description
Improvement in cycling and pedestrian infrastructure and increasing the use of alternative non- motorised transport through marketing and other campaigns.

Notes on estimate
» CAPEX is calculated at € 50-150 per metre of cycle lane, which is non-segregated.
» CAPEX for cycle parking is 2,500 Sheffield stands at € 100 per stand

Details

4.1. Improve the city's capacities for planning in the area of alternative transport
» Strengthening the administrative capacities for improved planning, decision making and implementation in the area of alternative transport;
» Building a strong Civil Society Organisation (CSO) support by investing in strengthening their capacities and strongly involving them in the processes of planning and implementation;
» Regular update of the Bicycle Policy Audit (BYPAD) and Bicycle Traffic Development Plan;
» Development of city-level guidelines for bicycle infrastructure that could be adopted and replicated by the central and local governments;
» Integration of non-motorized transport plans into the national, city and municipalities' urban plans (focus on the forthcoming process for development of the city's urban master plan 2022 – 2032);
» Analyse the options for applying adapted scheme of "Bike to work" to trigger a larger modal shift;
» Develop city's cycling map including the main corridors, interesting routes, bike shops, service places, public pumps for tires (gas stations) etc.;
» Introduce the bicycle account system (by applying bike counters) that should be used to collect and compare statistical data throughout the years for certain point of time and place, hence enabling the city to come up with success stories that will promote and increase the modal share of the alternative sustainable transport;
» Establish cost-efficient data collection system (such as "bicycle climate test) and ensure regular collection of data that are of interest of raising the participation of the alternative transport in the total transport modes;

4.2. Continuous improvement of the alternative transport infrastructure
» Development and implementation of plan for improvement and expansion of the pedestrian network, focusing on people with disabilities and baby strollers;
» Improve the access of people with disabilities to the public buildings and private areas of extensive use;
» Improve the access of people using baby strollers to pedestrian zones (interrupted by parked cars), to public places, green areas, and private areas of extensive use (trade centres, restaurants, banks etc.);

4.3. Continuous improvement of the cycling infrastructure
» Extending the boulevard bicycle lane network and ensure decreased conflicts with other sectors that have interest of using the space dedicated to the bicycle lanes;
» Supporting the 10 municipal authorities in Skopje to connect the existing boulevards' bicycle lanes (city's responsibilities) by expanding the bicycle lanes on the small (service) roads that are under municipal responsibilities;
» Significantly increase the bicycle parking network especially in the public buildings (administrative buildings, universities, schools etc.), public spaces of extensive use, large commercial buildings etc.;
» Establish and maintain a bike sharing system;
» Establish park and ride facilities to improve the commuting system including the bus focused public transport
» Release, rehabilitate and ensure permanent use of the bicycle lane on the Vardar river side;
» Extend the existing bicycle lane in Vardar river side;
» Extending the cycling infrastructure to connect with the inner-city railway stations;
» Significantly improve the cycling "communication" of the city with the municipalities outside Skopje;
» Develop a subsidy-based programs for vulnerable citizens, people with impaired mobility and cargo bikes;
» Organize campaign for targeting parents who could cycle to kindergarten with their children, hence building the cycling habits from the very early stage of their development;

Funding options
» City
» Relevant ministries/gov
» Grant
» Budget & Debt

Carbon saving potential
Yes, a cleaner fleet would result in carbon saving. Increased use of bicycles, walking and car free days - 1

Revenue generating
No

Climate resilience building
No

Implementing and supporting agents
» City of Skopje
» Municipalities
» Government
» Civil Society Organisations
» Chambers of Commerce
» Public Transport Company "Skopje"
» Private operators
» PE Streets and Roads Skopje

Benefits
» Increased use of the alternative transport
» Decreased use of motorized vehicles
» Increased traffic safety
» Decreased emission of greenhouse gases
» Improved air quality
» Increased social development perspectives

Social considerations
» The assessments/plans should integrate the social perspectives. Gender and different vulnerable groups should be analysed from the specific needs and job creation perspectives;
» When identifying the vulnerable groups in selected assessments focus on people with disabilities, children, people in rural areas, marginalized community, cyclists, pedestrians.;
» When undertaking awareness raising activities make sure you reach all ethnic groups, different type of vulnerable groups, and different group of people that have potential to move to alternative transport;
» Ensure city budget to mobilize interest for technical and financial contribution by international organization/s present in the country with environment and climate change portfolio.

Details continued…
» Increase the use of the European Mobility Weak for promotion of the alternative transport and improved sustainability of the urban mobility;
» Work with the municipalities, schools and parents' representatives on development of program and implementation of promotional activities for safe and pleasant cycling to school by targeting first the schools with existing safe infrastructure and parking;
» Introduce the bicycle account system (by applying bike counters) that should be used to collect and compare statistical data throughout the years for certain point of time and place, hence enabling the city to come up with success stories that will promote and increase the modal share of the alternative transport;
» Establish cost-efficient data collection system (such as "bicycle climate test) and ensure regular collection of data that are of interest of raising the participation of the alternative transport in the total transport modes;

TR-5: Improve private motorized transport towards a cleaner fleet

Timescale	Strategic objectives	Pre-investment	Capex	Opex
2025 – 2035	AQ1; GH3	-	EUR 11 Million	EUR 1 Million

Description
Improving the quality of the private car fleet and discouraging extensive use of the private vehicles .

Notes on estimate
Costs incurred to introduce EV charging points and low emission zones

Details

5.1. Stimulate the interest for moving towards low carbon transport

» Analysing and introducing joined city/state subsidies for (taxi operators and logistics related companies) purchasing hybrid and electric vehicles;
» Significantly expand the number of EV charging points by accessing existing state funding for charging points;
» Restrict selective streets for access only to e-vehicles;
» Restrict selective parking lots for access only to e-vehicles;
» Encourage the private sector to upgrade their vehicle fleet as in-practice commitment to their corporate social responsibility framework;
» Develop and implement long-term campaign aiming at increased awareness and capacities of the citizens and private companies for costs and benefits of moving towards low carbon mobility.

5.2. Discourage citizens and private companies to invest in carbon intensive vehicles

» Supporting the Government in initiating process for development and application of methodology for selecting the fees for vehicles according to their level of greenhouse gas emissions;
» Propose program for applying gradual restriction criteria for vehicle that are first time registering in the country, build upon the EU emission standards;
» Applying low carbon zones that ban access to carbon intensive vehicles;
» Analyzing and introducing models for incentives to employees and/or companies that apply the car- pooling scheme;
» Analyze the potentials and models for introducing incentives for employees and/or companies that apply the Bike-to-Work scheme;
» Develop system for collection of data focused on distribution of hybrid and e-vehicles

Funding options
» City
» City related company funding
» Private sector funding (PPP)
» Grant
» Debt

Carbon saving potential
Yes, a cleaner fleet would result in carbon saving.
Use of 10% biofuels in Transport sector in 2020 - 70
Use of 5% biofuels in Transport sector in 2020 - 37
Purchase of vehicles for the City of Skopje in accordance with
the criteria for Green Public procurement - 1

Revenue generating
No

Climate resilience building
No

Implementing and supporting agents
» Central Government
» City of Skopje
» Private companies
» Citizens

Benefits
» Improved quality of the private vehicles
» Decreased use of private cars
» Increase use of the alternative transport
» Increased use of public transport
» Decreased greenhouse gas emissions
» Improved air quality

Social considerations
» The assessments should integrate the social perspectives. Gender and different vulnerable groups should be analysed from the specific impact if the proposed schemes are implemented in practice;
» When identifying the vulnerable groups in selected assessments focus on people facing poverty and using carbon intensive vehicles for economic activities (waste selection), people in rural areas with limited access to public transport etc.;
» When undertaking awareness raising activities make sure you reach the private companies, all ethnic groups, different type of vulnerable groups, and different group of people using different mode of transport;
» Prepare in-dept analysis of the popular and restrictive measures prior communicating the partnership with the state institutions;
» Ensure combined implementation of restrictive measures with several popular measures to decrease the initial reluctance to contribute

Appendix A.2. Energy Supply and Efficiency

EN-1: Plan and strengthen administrative capacities for implementation of the national law on Energy Efficiency				
Timescale 2021 – 2024	**Strategic objectives** AQ3 AQ4 GH5	**Pre-investment** EUR 1.2 Million	**Capex** -	**Opex** EUR 100k
Description Build administrative capacities for implementation of the national law on Energy Efficiency		**Notes on estimate** » €1.2m for development of plan and initial set up of auditors » €100,000 per annum for ongoing implementation of energy audits and training for capacity building		
Details 1.1. Conduct assessment, identify the challenges and develop plan for implementation for building renovation » Development and implementation of the Plan for Renovation of Buildings used by Public Sector Entities in line with the article 10 paragraph (7); » Prepare comprehensive Building Typology for Skopje; » Active use of the Monitoring and Verification Platform from Article 12 paragraph (3); » Ensure that city administration is part of the national Program for the training of energy auditors of buildings, from Article 40 paragraph (3); » Analyse the foreseen Energy Efficiency Fund and become ready for its eventual use. 1.2. Capacity building for City and Municipalities to develop and implement EE programs and action plans » Support to 10 Municipalities in Skopje in development of the EE Programs and Action Plans, linked with the Article 7 paragraph (9); » Strengthening the capacities in the area of use of the Information System for Monitoring and Management of the Energy Consumption of the Public Sector Entities, from Article 11 paragraph (4); » Improving internal capacities for following the forthcoming Rulebook on EE in Public Procurement from Article 13 paragraph (5); » Getting familiar and implement the expected Rulebook for Preparation of the Cost-benefit Analysis from Article 24 paragraph (2); » Capacity building and in-practice implementation of the Rulebook on Energy Performance of Buildings, from Article 32, paragraph (3); » Strengthening the capacities for applying the Rulebook on Energy Audits of (public) Buildings (under city's authority), from Article 38 paragraph (2); 1.3. Develop and implement proactive framework towards a certification program, proper auditing requirements and monitoring » Support the national authorities in improving the LEED certification program; » Map the champion certified energy controllers that should be including in the processes of development and implementation of the EE and RE programs; » Develop and implement the city's program for energy audit of the public buildings by using the capacities of the certified energy auditors; » Use the capacities of the energy auditors to strengthen the internal city's capacities for implementation of energy audit; » Integrate the city's technical personnel in the national energy audit programs and ensure internal certified energy auditors that will be able to do energy audit to the buildings under city's responsibilities; » Review the possibilities to use the internal capacities for initiating a process for supporting the residential buildings in applying energy audit through the home associations; » Use certified experts to analyse the current heating management system in the households (indicators such as: number of households that are heating only 1 room) that could significantly improve the processes of planning; » Use the national experts to come up with innovative ideas/measures that will strengthen the results in achieving the city's EE and RE targets.		**Funding options** » Relevant ministries /gov » Grant	**Carbon saving potential** Yes, this policy aims to improve energy efficiency in buildings and will indirectly result in carbon saving.	
		Revenue generating No	**Climate resilience building** No	
		Implementing and supporting agents » City of Skopje » Ministry of Economy » Energy Agency » Energy Community » National experts » Donor community	**Benefits** » Align with the national and local obligations in training of energy auditors » Decreased energy consumption and increased use of renewables in the public buildings through application of Rulebooks on energy performance, efficiency and auditing » Strengthened internal city's capacities through use of certified energy auditors » Improved energy management systems in public and residential buildings.	
		Social considerations » Ensure equal represetantion of men and women during capacity building activities and training sessions; » Putting socially excluded and women as prime beneficiaries as priority where applicable. » Implement good governance principles involving interested parties including social aspects and securing gender mainstreaming during planning process;		

EN-2: Develop City level strategy and strengthen of collaborative working practices

Timescale	Strategic objectives	Pre-investment	Capex	Opex
2021 – 2024	AQ3 AQ4 AQ5 SL4 GH1 GH2	EUR 750,000	-	-

Description
Development of the local strategic documents and integrating them in practice

Notes on estimate
» €500,000 for comprehensive city-wide energy efficiency strategy
» €250,000 for industrial energy planning
» €50,000 for management of plans and maintenance of collaborative working groups

Details

2.1. Develop Skopje city energy and energy efficiency strategy
» Development of 10 years City's Energy and Climate Plan, in line with the National Energy Development Strategy and foreseen National Energy and Climate Plan;
» Development of 3 years Program on EE for city of Skopje, in line with the National EE Strategy;
» Development of 3 years Program for Renewable Energy Sources (RES), in line with the National Action Plan for RES;
» Restructure the current "resilience city" document to city's 3 years Program on Climate Action;
» Adopt the EE Targets for city of Skopje, in line with national perspectives and Article 5 paragraph (1) of the Law on EE;
» Adopt the RES Targets for city of Skopje, in line with the national perspectives;
» Adopt the GHG Emission Reduction Targets, in line with the national perspectives;
» Develop standard operating procedure (SOP) for producing annual report for each of the programs and SOPs for development of the programs;
» Build capacities for implementation of the SOPs by delivering regular training based on real case scenarios, best practices, experience from the "champions" etc.;
» Mainstream the energy targets and measures in other strategic development areas;
» Analyze the potentials and opportunities for increased green jobs in the city;
» Maximize the use of the innovation lab and social innovation hub in improving the energy related research and innovation initiatives.
» Analyse the potentials of waste management in energy production.

2.2. Mainstream industrial energy efficiency planning into city planning processes
» Map the companies that are subject to city's responsibilities (B installations);
» Map the large companies (A installations) that have significant influence to the citizens of Skopje;
» Establish strong partnership with the identified companies of interest;
» Ensure that the city's energy and climate related plans and programs include a specific industry chapter and establish industry working group;
» Include the working group into the processes of planning and implementation;
» Develop a capacity needs assessment for the industry and identify the topics that are going to require significant involvement (obligation) of the industry (Law on EE and Law on Climate);
» Deliver topic-based meetings and advanced trainings related to their obligations;
» Strengthen companies' corporative social responsibility programs;

2.3. Strengthen collaborative working practices
» Significantly improve the collaboration with the Ministry of Economy (Energy Department) and Energy Agency;
» Establish in-practice energy working group including the representatives of the public entities covered by the city;
» Strengthen the in-practice collaboration with the national experts in energy and climate change, including the Research Centre for Energy and Sustainable Development of the Macedonian Academy of Arts and Science;
» Develop capacities in energy and climate related modeling processes, including the technical use of modeling tools such as MARKAL, PRIMES, EFOM, TIMES etc

Funding options
» City
» Grant
» Budget

Carbon saving potential
Yes, this policy aims to improve energy efficiency in buildings and will indirectly result in carbon saving.

Revenue generating
No

Climate resilience building
No

Implementing and supporting agents
» City of Skopje
» Ministry of Economy
» Energy Agency
» Civil Society Organizations
» National experts
» Donor community

Benefits
» Improved quality of the strategic planning and aligned framework with the national vision will increase implementability of the city's plans, strengthen funds mobilization processes and improve partnership development.
» The increased application of EE and RE measures will decrease energy consumption, decrease GHG emissions and increase employment opportunities.

Social considerations
» Use the certified experts to analyse the current energy usage the households (indicators such as: number of households and type of energy they use for different activities at home/ general usage of electricity appliances) that could significantly improve the processes of planning . Data to be analysed by gender and appliances usage;

<table>
<tr><th colspan="5">EN-3: Retrofitting of energy efficiency and renewable energy measures in residential buildings</th></tr>
<tr><td>Timescale
2022 – 2032</td><td>Strategic objectives
AQ3 AQ4 AQ5 SL4 GH1 GH2</td><td>Pre-investment
EUR 150,000</td><td>Capex
EUR 35,000,000</td><td>Opex
EUR 1,500,000</td></tr>
<tr><td colspan="2">Description
Implementation of EE and RE measures by targeting the citizens that face significant energy poverty</td><td colspan="3">Notes on estimate
» Main measure - Implementation of EE and RE measures: €10m revolving fund
» Supporting measures - District heating: €20m; Mapping and awareness raising: €500,000
» Opex costs estimated 5% for maintenance of measures and management of fund</td></tr>
<tr><td colspan="2" rowspan="4">Details
3.1. Map Development of awareness raising programmes to promote more suitable heating sources and promote new EE scheme
» Develop an in-depth plan for implementation of EE and RE measures in the residential sector, in line with the recommended 3 years programmes for EE and RE;
» Map the citizens (households) that are facing extreme energy poverty;
» Map the citizens (households) that are using emission intensive materials (tires, plastics, wet wood etc.);
» Develop a modelling tool to significantly strengthened the city’s subsidy programs;
» Prepare 3 years subsidy programs for renewables (solar electric, solar thermal, solar ventilation air preheating, geothermal heat pump, biomass systems etc.);
» Position the mapped vulnerable population (facing energy poverty) as prioritized for receiving subsidies for RE measures:
» Develop awareness raising program on the use of low grade heating fuels on health and the environment

3.2. Implement EE and RE in residential buildings
» Prepare revolving fund/3-year subsidy programs for energy efficiency (energy efficient heating, energy efficient ventilation, air conditioning systems, LED lighting, insulation, energy management system in the buildings);
» Introduce the renewable energy applications in residential buildings: (i) solar electric (photovoltaics), (ii) solar thermal, including solar hot water (domestic water heating and space heating), and solar ventilation air preheating; (iii) geothermal heat pump; and (iv) biomass systems;

3.3. District heating in residential buildings
» Expand and improve the district heating systems to residential sector;
» Equip customers with individual heat metering solutions, either apartment level meters or heat cost allocators</td><td colspan="2">Funding options
» City
» Private sector funding
» Relevant ministries/ gov
» Grant
» Budget
» Debt</td><td>Carbon saving potential
Installation of heat pumps in households – 406 $ktCO_2$
Behavioural change campaigns/activities – 192
Connection to district heating network – 117
Construction of passive buildings for dwelling – 93
Improve the thermal insulation of buildings – 26
Renovation of buildings for dwelling – 8
Installation of solar thermal collectors for households - 1</td></tr>
<tr><td colspan="2">Revenue generating
Payments for district heating provision. Revolving fund with payments from energy bill savings</td><td>Climate resilience building
No</td></tr>
<tr><td colspan="2">Implementing and supporting agents
» City of Skopje;
» Ministry of Economy;
» Ministry of Labour and Social Policy;
» Civil Society Organizations;
» National Energy Efficiency Fund;
» Donor community.</td><td>Benefits
» Measures will target those most in need of support ensuring cost savings, supporting poverty reduction for citizens.
» Significantly improved air quality will improve health of citizens and support decreased greenhouse gas emissions..</td></tr>
<tr><td colspan="3">Social considerations
» Put specific attention to socially excluded groups
» Tailor subsidies to have higher absorption by socially excluded, persons with lower income and citizens facing energy poverty;
» Expand and improve the district heating systems to vulnerable communities</td></tr>
</table>

<table>
<tr><th colspan="5">EN-4: Implementation of energy efficiency (EE), renewable energy (RE) into city/public building stock</th></tr>
<tr><td>Timescale
2022 – 2032</td><td>Strategic objectives
AQ1 AQ3 AQ4 AQ5 SL4 GH1 GH2</td><td>Pre-investment
-</td><td>Capex
EUR 32,000,000</td><td>Opex
EUR 2,500,000</td></tr>
<tr><td colspan="2">Description
Implementation of energy efficiency (EE), renewable energy (RE) and greenhouse gas (GHG) emission reduction measures</td><td colspan="3">Notes on estimate
» Main measure - Retrofitting of EE and RE measures: €30m
» Supporting measures - District heating: €20m; Capacity building: €1m
» Opex costs estimated 5% for maintenance of measures and management of funds</td></tr>
<tr><td colspan="2" rowspan="4">Details
4.1. Prepare
» Ensure nomination of energy and climate focal point for each public entity under city's responsibility;
» Establish energy and climate working group by using the nominated personnel;
» Deliver topic specific trainings;
» Analyze the available options for co-financing and get results oriented partnerships;
» Map the potential donor agencies for co-financing the EE and RE measures;
» Ensure pragmatic preparatory work for becoming ready to absorb the available state funds;
» Develop concepts and project documents aligned with the framework of the forthcoming Energy Efficiency Fund;
» Develop SOPs and formats for collection of the energy and climate related data;

4.2. Implement EE and RE in public buildings
» Develop energy management plan for each public building under city's responsibility;
» Retrofit City buildings to lower the levels of energy consumption: (i) installing energy efficient heating, (ii) energy efficient ventilation, (iii) air conditioning systems, (iv) move to LED lighting, (v) improve the isolation, and (vi) significantly increase the energy management system in the buildings;
» Introduce the renewable energy applications in the city's buildings: (i) solar electric (photovoltaics), (ii) solar thermal, including solar hot water (domestic water heating and space heating), and solar ventilation air preheating; (iii) geothermal heat pump; and (iv) biomass systems;
» Use the capacities of the recently established ESCO companies for implementation of the energy efficiency measures;

4.3. District heating
» Expand and improve the district heating systems to public buildings under city's responsibilities;
» Equip customers with targeted heat metering solutions</td><td colspan="2">Funding options
» City
» City related company funding
» Private sector funding (PPP)
» Grant
» Budget
» Debt</td><td>Carbon saving potential
Phasing out incandescent lamps – 145 KtCO_2e
Solar thermal collectors for the Municipalities and City of Skopje buildings – 7</td></tr>
<tr><td colspan="2">Revenue generating
Payments for district heating provision.</td><td>Climate resilience building
No</td></tr>
<tr><td colspan="2">Implementing and supporting agents
» City of Skopje;
» Ministry of Economy;
» Ministry of Labour and Social Policy;
» Civil Society Organizations;
» National Energy Efficiency Fund;
» Donor community.</td><td>Benefits
» Improved capacity and preparatory work will improve access to and absorption of funding
» Improving the energy demand of city buildings will decrease GHG emissions and improve air quality;
» Lower air pollution will improve citizens health and promote biodiversity in the city</td></tr>
<tr><td colspan="3">Social considerations
» Expand and improve the district heating systems to vulnerable communities</td></tr>
</table>

<table>
<tr><th colspan="5">EN-5: Install energy reduction technologies and processes into industrial sector</th></tr>
<tr><td>Timescale
2022 – 2034</td><td>Strategic objectives
AQ3 AQ4 SL4 GH1 GH2</td><td>Pre-investment
EUR 250,000</td><td>Capex
EUR 30,000,000</td><td>Opex
EUR 2,000,000</td></tr>
<tr><td colspan="2">Description
Implementation of energy efficiency (EE), renewable energy (RE) and greenhouse gas (GHG) emission reduction measures</td><td colspan="3">Notes on estimate
» Main measure - Installation of energy saving technologies: €10m
» Supporting measures - District heating: €20m; Capacity building: €500,000
» Opex costs estimated 5% for maintenance of measures and management of funds</td></tr>
<tr><td colspan="2" rowspan="4">Details
5.1. Capacity building and data collection
» Improve the coordination capacities with the national institutions in charge of energy and climate;
» Prepare standard operating procedures and deliver training to industry and technical city administration representatives in charge of energy and climate;
» Support the installation to implement ISO 50001 (energy management system in industry);
» Develop standardized forms (templates) for collecting energy and climate data from industry;
» Prepare annual reports on energy and climate focused on applied energy efficiency and renewable energy measures, and greenhouse gas emission reductions;
» Share the energy and climate plans and reports (from industry) with the Ministry of Economy, Energy Agency, and Ministry of Environment and Physical Planning for strengthening their processes of planning and implementation.
» Application of Energy Audits;

5.2. Installation of energy saving technologies to improve efficiency of industrial processes
» Establish a gas-main system in City of Skopje (Note: address the challenge with the limited information on the current underground cadastre, competition-based regulations with the existing heating system etc.);
» Work with the Ministry of Economy and Energy Agency in establishing incentives for the industry sector in the area of clean production;
» Encouraging application of utilization systems from exhaust gases in the industry;

5.3. District heating to industrial sites
» Expand and improve the district heating systems to the industry;
» Equip customers with targeted heat metering solutions</td><td colspan="3">Funding options
» City
» Private sector funding
» Relevant ministries/ gov
» Grant
» Budget
» Debt</td></tr>
<tr><td colspan="2">Carbon saving potential
Rooftop solar plants – 26 $KtCO_2e$</td></tr>
<tr><td colspan="2">Revenue generating
Payments for district heating provision.</td><td colspan="2">Climate resilience building
No</td></tr>
<tr><td>Implementing and supporting agents
» City of Skopje
» B installations
» A installations
» State Energy Efficiency Fund
» Reliable national and international banks
» Ministry of Economy
» Energy Agency
» Donor community</td><td colspan="2">Benefits
» Improved technological processes will offer cost savings
» Decreased energy consumption will come from onsite generation from alternate sources
» Improved industrial efficiency will result in decreased GHG emissions and improved air quality.</td></tr>
<tr><td colspan="3">Social considerations
» Expand and improve the district heating systems to vulnerable communities</td></tr>
</table>

Appendix A.3. Solid Waste Management

SW-1: Assess legislation and gaps to promote strengthened waste management in city of Skopje				
Timescale 2021 - 2025	**Strategic objectives** SL1 SL3 GH4	**Pre-investment** EUR 350,000	**Capex** -	**Opex** -
Description Support the law improvement on illegal dumping and waste management processes and assess the gaps in current waste management processes		**Notes on estimate** Estimate for increased enforcement (patrols support police), remediation (cost for clean ups) and litigation (administration of fines, prosecuting offenders)		
Details 1.1. Improving the national law on waste management to enable strengthened waste management in Skopje » Review the current law on waste management and propose changes that could significantly improve the quality of waste management in the city; » Propose bylaws that could support the vision for greenhouse gas emission reduction, increased waste to energy practices, increased recycling, improved soil and groundwaters protection, and applied practice of adequate treatment of the hazardous waste; » Work closely with the Ministry of Environment and Physical Planning in addressing the current legislative- based challenges; » Raise awareness of the Ministries of finance and economy in order to consider the waste management as economic development tool and ensure interest for significant investment under the green jobs framework. 1.2. Assessing the waste management gaps » Conducting integrated gap assessment of the current waste management system in the city focussing on technical challenges, legislative barriers, capacities, partnerships, and overall framework; » Assessing the coordination gaps between the involved institutions, organizations, and individuals, and providing options for improved coordination; » Assessing the quality of the data collection system; » Assessing the planning, monitoring and reporting processes; 1.3. Awareness raising and enforcement to reduce waste disposal » Downscaling the number of illegal dump sites by strengthened law enforcement and increased number of fines issued through maximized use of capacities of the environmental inspectors; » Reducing the quantity of disposed waste by increased charity-oriented schemes; » Implementation of awareness raising measures for increased primary waste selection; » Development of database for following the trend of increased waste separation, participation to charity schemes etc		**Funding options** » City » Budget	**Carbon saving potential** Yes, the policy aims to ban illegal dumping and improve waste management processes (reduce, reuse and recycle waste) which are measures that are effective and high-impact means of reducing GHG emissions.
		Revenue generating No	**Climate resilience building** No
		Implementing and supporting agents » Ministry of Environment and Physical Planning » City of Skopje; » “Komunalna Higiena” » “Drisla” » Non-for-profit companies involved in waste management	**Benefits** » Increased law enforcement; » Improved waste management mechanism; » Strengthened implementing capacities; » Decreased illegal dumping sites; » Reduced quantity of disposed waste; » Combating grey economy; » Improved air quality. » Increased energy production (waste to energy system); » Improved soil and groundwater quality; » Decreased impact to environment; » Increased primary waste sorting and introduce full recycling cycles.
		Social considerations » The review of the law and bylaws should integrate the social development perspectives; » The social development perspectives should address the needs of the vulnerable groups, in this case focussed on the informal waste collectors and community living near illegal dumps; » The transport facilities for informal waste collectors should be focussed on minimizing the number of currently used carbon intensive vehicles and replacing them with alternative vehicles that have adaptive waste transport space but also wide inner space for eventual interest of private companies for commercials, hence enabling increased income potentials. » The city should work closely with the Ministry of Environment and Physical Planning and Ministry of Economy in order to ensure funds for implementation of the measures	

<table>
<tr><th colspan="5">SW-2: Improve the internal processes of planning and implementation</th></tr>
<tr><td>Timescale
2023 - 2025</td><td>Strategic objectives
SL1 SL2</td><td>Pre-investment
EUR 1,000,000</td><td>Capex
-</td><td>Opex
-</td></tr>
<tr><td colspan="2">Description
Development of the local waste management strategy documents, sector targets and action plans.</td><td colspan="3">Notes on estimate
Cost estimate for development of city-wide strategic planning framework and action planning documents</td></tr>
<tr><td colspan="2" rowspan="4">Details
2.1. Development of the main city waste management framework
» Development of 10 years city’s waste management strategy;
» Development of 3 years programs on waste management;
» Adopt a sector specific targets and indicators;
» Prepare development scenarios (including green scenario) by using a modelling tools that integrate environmental, social and economic parameters;
» Improve the public involvement in the processes of development and adoption of the strategic documents by strengthened participation of the CSOs, and increased number of public hearings focused on achieving citizens’ ownership;

2.2. Development of residential sector waste management framework
» Develop an in-depth plan for implementation of waste management measures in the residential sector, in line with the recommended 10 years strategy and 3 years programs on waste management;
» Map the citizens (households) that are facing extreme poverty;
» Map the citizens (households) informally involved in waste collection system;
» Develop plan for official integration of the vulnerable population and current informal waste collectors in the waste management system;
» Capacitate the integrated population with knowledge, transport assets, and facilities;

2.3. Ensure technical background information is included in strategic documents and plans
» Analyse the potentials and sustainability of Drisla landfill;
» Identification of eventual options for construction of a new modern landfill and prepare a feasibility studies to evaluate the sustainability of the options;
» Develop an in-depth plan for management of the hazardous waste, including gas under pressure, flammable waste, explosives, oxidising elements, corrosive structures, health hazard, acute toxicity, and hazardous to environment;
» Develop plan that defines the location/s for disposed construction waste (bricks, concrete, mortar, wood, steel rebar, insulation material, electrical wiring, plastic materials, glass, iron plate, tile, sanitary pieces, etc);
» Decide where to place the waste management in the Strategic Plan of city of Skopje (currently is independent, not in environment chapter neither in economic development);
» Mainstream the normative and guidelines for positioning the waste selection points within the foreseen new master plan of Skopje;
» Development of progressive mechanism for significant improvement of the primary waste selection system for city of Skopje.
» Improve the tariff policy by stimulating decreased quantity of waste disposed;
» Intensive communication of the eventual plan for substantive changes in the waste management system;</td><td colspan="3">Funding options
» City
» Grant
» Budget</td><td>Carbon saving potential
Yes, the policy aims to ban illegal dumping and improve waste management processes (reduce, reuse and recycle waste) which are measures that are effective and high-impact means of reducing GHG emissions.</td></tr>
<tr><td colspan="3">Revenue generating
No</td><td>Climate resilience building
No</td></tr>
<tr><td colspan="2">Implementing and supporting agents
» City of Skopje;
» 10 recipient municipalities;
» “Komunalna Higiena”
» “Drisla”
» Ministry of Environment and Physical Planning
» Spatial Planning Agency
» Non-for-profit companies involved in waste management</td><td>Benefits
» Integrated waste management framework established;</td></tr>
<tr><td colspan="3">Social considerations
» The strategic documents should ensure that the needs and challenges that vulnerable groups are facing are properly assessed and addressed;
» The options for new landfill should ensure that the place, biogas, complete recycling process, standardized incinerator and absorption of the current informal waste collectors (representing the vulnerable population) are also subject to evaluation</td></tr>
</table>

SW-3: Capacity building and collaboration to improve waste management processes

Timescale	Strategic objectives	Pre-investment	Capex	Opex
2021 - 2027	SL1	EUR 375,000	-	-

Description
Strengthening capacities and develop collaborative frameworks in both the public and private sectors to raise awareness on responsibilities in the waste management system

Notes on estimate
Cost estimate for data management system and capacity strengthening

Details

3.1. Strengthening the city's planning and implementing capacities
» Establishment of the city technical working group on integrated waste management
» Deliver regular topic specific trainings to the working group by involving internal capacities, national consultants and/or international consultants;
» Ensuring that everyone has same understanding of the scenarios, targets and indicators;
» Development of indicator-based division of roles and responsibilities.

3.2. Improving the data collection system
» Development of user-friendly indicators-oriented templates for data collection;
» Delivering regular training to the involved entities on data collection;
» Organizing regular meeting of the working group to discuss the opportunities for strengthened processes by joined analyses of the innovative solutions and worldwide good practices;
» Maximization of the collected data for improved quality of waste management reporting and re-planning.

3.3. Improving the partnership with the public and private sector companies
» Mapping of the public and private companies involved in city waste management system;
» Establishment of strong partnership with the identified companies of interest;
» Strong involvement of the public and private companies in development of the strategic plans on waste management;
» Achieving companies' ownership over the city's plans for waste management, hence increasing their implementability;
» Strongly emphasizing the public and private sector's role in securing sustainability of the waste management system in city of Skopje.

3.4. Develop and strengthen waste reduction measures for improved waste management
» Strengthen companies' corporative social responsibility programs by stimulating integration of waste management investments;
» Develop and implement city reuse framework that will encourage waste reduction-oriented activities;
» Raise awareness of the citizens for increased participation to city's reuse framework;
» Supporting the CSOs activities for awareness raising focused on waste reduction and waste selection.

Funding options
» City
» City related company funding
» Grant
» Budget

Carbon saving potential
Yes, the policy aims to implement plans that aim to improve waste management processes (reduce, reuse and recycle waste) which are measures that are effective and high-impact means of reducing GHG emissions.

Revenue generating
No

Climate resilience building
No

Implementing and supporting agents
» City of Skopje;
» Private sector companies
» Public and non-profit companies
» Citizens
» 10 recipient municipalities;
» "Komunalna Higiena"
» "Drisla"
» Waste management experts
» Spatial Planning Agency
» Non-for-profit companies involved in waste management
» Informal waste collectors

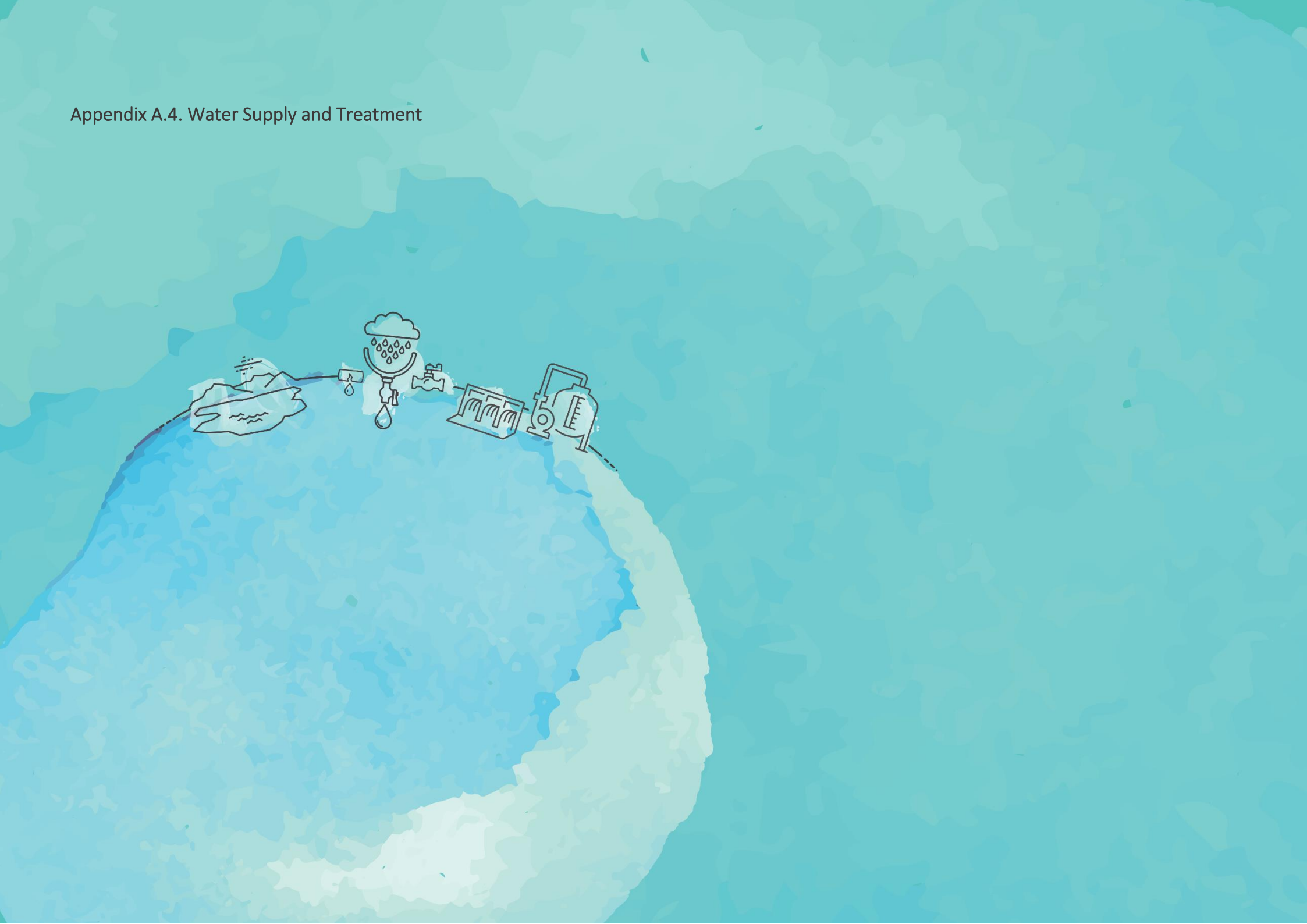
Benefits
» Improved planning, implementing and reporting processes.

Social considerations
» When conducting analysis and plans for addressing the forest fire make efforts to also include the man-made wildfires (in urban and rural areas);
» When identifying the vulnerable community focus first on the historic cases and locate the people facing infrastructure damage, people in affected area that have vision and mobility impairment, elderly people, people with limited access to information, people with mental health conditions, single parents etc.;
» Make sure the early warning system is addressing the identified vulnerable communities;

<table>
<tr><th colspan="5">SW-4: Implement new infrastructure and processes to improve city-wide waste collection, management and disposal</th></tr>
<tr><td>Timescale
2023 - 2035</td><td colspan="2">Strategic objectives
WQ3 SL4 GH1 GH4</td><td>Pre-investment
EUR 375,000</td><td>Capex
-

Opex
-</td></tr>
<tr><td colspan="3">Description
Invest in vehicles, containers and logistical infrastructure to improve separation, strengthen recycling and sorting, introduce a composting system, and facilitate the process of remediation</td><td colspan="2">Notes on estimate
Estimate cost of purchasing of household bins (€50 per bin x100,000) and street containers (€500 per bin x1,000); improvement of MRF facility (EUR 5m); and development of WtE facility (EUR 20m)</td></tr>
<tr><td colspan="3" rowspan="4">Details
4.1. Strengthening the waste management logistics
» Increasing the logistical capacities of the waste management system by enlarging the number of reliable collection vehicles and waste collection containers;
» Increase the logistical capacities for enabling improved primary waste selection, including enlargement of the number of waste separation bins;
» Adjustment of the waste collection infrastructure of “Komunalna Higiena” by integration of additional waste transfer station;
» Improve the current landfill facility “Drisla” (if new facility is not an option) by strengthening the system of collection, sorting, recycling, reuse, transfer and transport of the solid waste;
» Introducing a composting system, refuse-derive fuel (RDF) production, and waste to energy scheme through methane capture, hence extending the life of the landfill</td><td>Funding options
» City
» Private sector funding
» Grant
» Debt</td><td>Carbon saving potential
Yes, the action aims to improve current processes of waste collection and waste management which will reduce GHG emissions and extend the life of the current landfill.</td></tr>
<tr><td>Revenue generating
No</td><td>Climate resilience building
No</td></tr>
<tr><td>Implementing and supporting agents
» City of Skopje
» Private sector companies
» Public and non-profit companies
» Citizens
» 10 recipient municipalities
» “Komunalna Higiena”
» “Drisla”
» Ministry of Environment and Physical Planning
» Waste management experts
» Spatial Planning Agency
» Non-for-profit companies involved in waste management
» Informal waste collectors</td><td>Benefits
» Improved law enforcement;
» Improved waste management mechanism;
» Strengthened implementing capacities;
» Reduced quantity of disposed waste;
» Increased energy production (waste to energy system);
» Increased primary waste sorting and introduce full recycling cycles.</td></tr>
<tr><td colspan="2">Social considerations
» When conducting analysis and plans for addressing the forest fire make efforts to also include the man-made wildfires (in urban and rural areas);
» When identifying the vulnerable community focus first on the historic cases and locate the people facing infrastructure damage, people in affected area that have vision and mobility impairment, elderly people, people with limited access to information, people with mental health conditions, single parents etc.;
» Make sure the early warning system is addressing the identified vulnerable communities;</td></tr>
</table>

Appendix A.4. Water Supply and Treatment



<table>
<tr><th colspan="5">WT-1: Promote private sector investment to reduce potable water use</th></tr>
<tr><td>Timescale
2022 - 2024</td><td colspan="2">Strategic objectives
SL2 WA1 WA2 WA3</td><td>Pre-investment
EUR 500,000</td><td>Capex
-

Opex
-</td></tr>
<tr><td colspan="3">Description
Encourage private sector investment into water management systems to reduce the use of potable water for industrial and agricultural purposes.</td><td colspan="2">Notes on estimate
Cost needed to maintain enforcement of illegal access to potable water</td></tr>
<tr><td colspan="3" rowspan="4">Details
1.1. Stimulate the private sector to improve their water management systems
» Analyse the quantity of drinking water used for industrial processes and develop plan for increased use of technical water where applicable;
» Stimulate the private sector companies to invest in installing system that will allow application of system for re-using the technical water, hence minimizing the use of potable water;

1.2. Assess the quantity of potable water used for irrigation and develop plan for subsidised solutions that will decrease the use of potable water;
» Develop database on use of the potable and technical water for industrial processes;
» Identify and decrease the illegal access to potable water;
» Develop measurable indicators for improved industrial water management systems that will be monitored and communicated on yearly bases;</td><td>Funding options
» City
» City related company funded
» Private sector funding
» Grant</td><td>Carbon saving potential
No</td></tr>
<tr><td>Revenue generating
No</td><td>Climate resilience building
No</td></tr>
<tr><td>Implementing and supporting agents
» City of Skopje
» Industry
» Agriculture practitioners
» PU “Vodovod I Kanalizacija”
» PE “Parks and Greeneries”
» Municipalities
» Ministry of environment and physical planning</td><td>Benefits
» Increased availability of the potable water by reducing demand from private sector in Skopje
» Increased use of technical water by forcing investment in reuse technologies
» Improved efficiency of the industrial and agricultural sector</td></tr>
<tr><td colspan="2">Social considerations
» Identify the champion companies (small, medium and large) and use their practices for awareness raising and replication purposes;
» Support and promote the champions on sustainable agriculture practices, hence raising the awareness on minimized use of pesticides, increased organic production and strengthened sustainability of their businesses.</td></tr>
</table>

<table>
<tr><th colspan="5">WT-2: Capacity building to enforce measures to limit pollution of rivers and groundwaters</th></tr>
<tr><td>Timescale
2022 - 2024</td><td colspan="2">Strategic objectives
SL2 AR2 WA3</td><td>Pre-investment
EUR 500,000</td><td>Capex
-

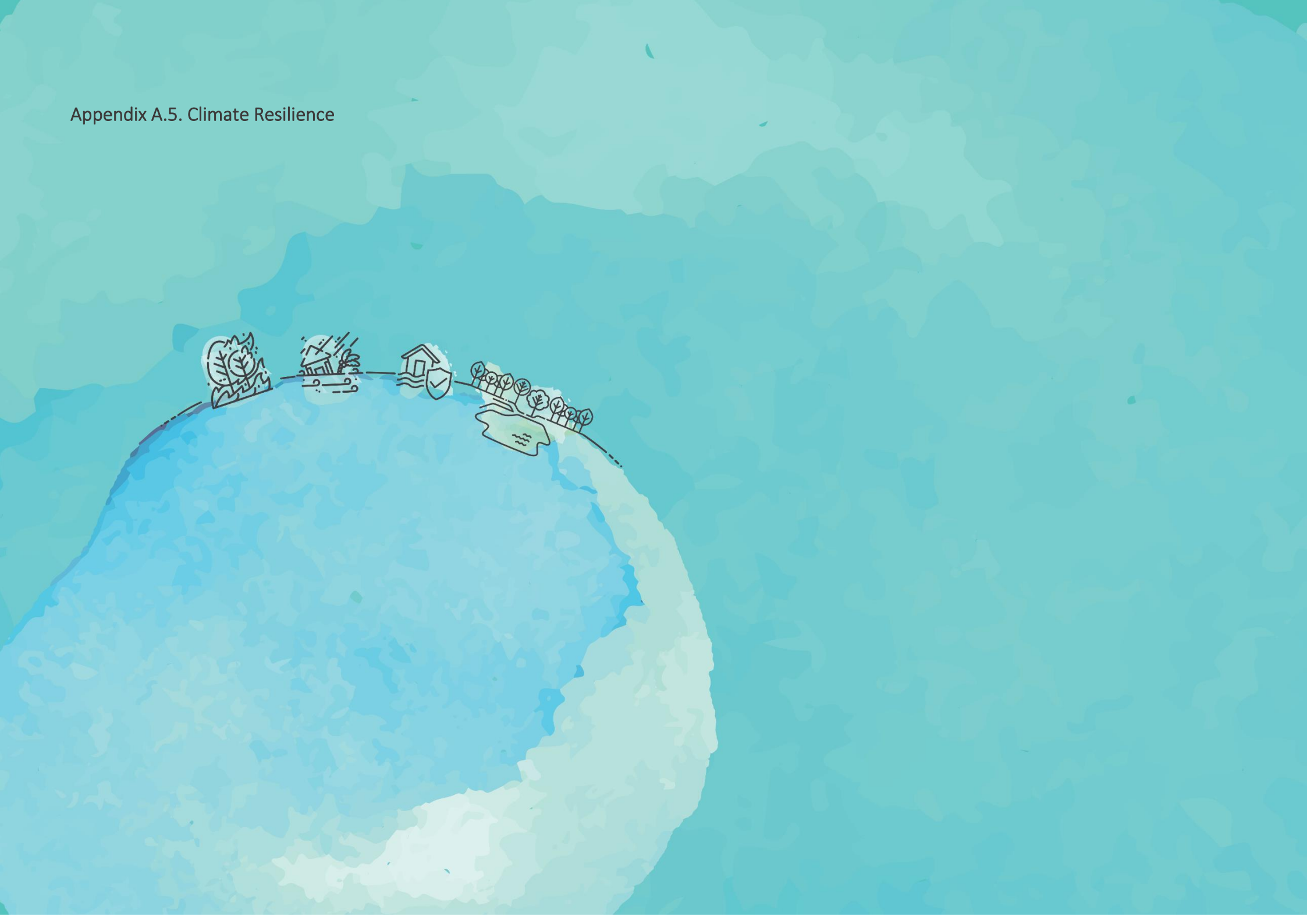
Opex
-</td></tr>
<tr><td colspan="3">Description
Strengthen collaboration and raise awareness of the need to improve process of local government, city departments, rural and agricultural populations to groundwater pollution.</td><td colspan="2">Notes on estimate
EUR 200,000 first phase
EUR 300,000 for policy measure implementation Cost used to maintain collaborative partner working</td></tr>
<tr><td colspan="3" rowspan="4">Details
2.1. Improving partnership for improved rivers’ and groundwaters’ quality
» Intensify the collaboration with Government and municipalities of Gostivar, Brvenica, Bogovinje, Tetovo, Zelino, and Tearce to reduce the pollution of Vardar in its upstream section (prior entering Skopje);
» Strengthening the collaboration between city’s departments for communal affairs and environment with Ministry of Environment and Physical Planning for reduced intensity of soil and groundwaters pollution by improving the waste management system.
» Identification of the illegal discharge of communal and industrial waste waters;
» Strengthening the partnership with the Ministry of Environment and Physical Planning for improved enforcement of the law for installation and regular use of appropriate wastewater treatment plants by the industries;
» Improving the partnership with the agriculture associations and practitioners and build their capacities in sustainable agriculture practices and decreased use of pesticides;
» Strengthening the capacities of the rural population on the importance of sustainable land use in areas close to springs and riverbeds.

2.2 Implementation of policy measures to reduce river and groundwater pollution
» Stimulation of sustainable agriculture practices that will decrease the use of pesticides and improve the quality of the rivers and groundwaters;
» Implementation of soil protection measures that will decrease the groundwaters pollution;
» Implementation of awareness raising activities that will encourage agriculture practitioners to move towards use of sustainable agriculture practices;</td><td>Funding options
» City
» Relevant ministries/gov
» Budget</td><td>Carbon saving potential
No</td></tr>
<tr><td>Revenue generating
No</td><td>Climate resilience building
No</td></tr>
<tr><td>Implementing and supporting agents
» City of Skopje;
» Municipalities;
» Ministry of Environment and Physical Planning;
» Industries
» Investment banks
» Agriculture practitioners
» PE Komunalna Higiena</td><td>Benefits
» Improved downstream surface and groundwater quality through improved agricultural practices that will decrease the use of pesticides
» Improved biodiversity status of the rivers through minimising illegal communal and industrial waste waters</td></tr>
<tr><td colspan="2">Social considerations
» Identify the champion companies (small, medium and large) and use their practices for awareness raising and replication purposes;
» Support and promote the champions on sustainable agriculture practices, hence raising the awareness on minimized use of pesticides, increased organic production and strengthened sustainability of their businesses.</td></tr>
</table>

WT-4: Urban water infrastructural measures for improved treatment of waste and atmospheric waters				
Timescale 2024 - 2035	**Strategic objectives** WQ1 WQ2 SL2 AR1 BE1 WA1 WA3	**Pre-investment** -	**Capex** EUR 30,000,000	**Opex** EUR 150,000
Description Invest in integrated, city-wide rainwater and sewerage management infrastructure to improve management and treatment of waste and atmospheric waters to decrease the use of potable water for industrial services		**Notes on estimate** EUR 20 Mil for the construction of separated sewerage system EUR 10 Mil for developing SUDs and rainwater harvesting system 5% opex for maintenance of infrastrcture		
Details 5.1. Strengthen the technical level communication with the government for construction of a 650,000 p.e. wastewater treatment plant in Skopje ensuring mechanical and biological treatment of Vardar river. 5.2. Implementation of technical measures strengthened river and groundwaters quality » Separation of the Collection System for rainwaters from the Sewage System » Partial Reconstruction of the Sewage System to protect inflow of the underground water. 5.3. Improving the public rainwater harvesting system » Assessing the quantity of potable water used for washing the streets and green areas and develop plan for enlarging the supply network to decrease the use of potable water; » Introducing SUDS and a public system of rainwater harvesting where applicable; » Decreasing the use of water by addressing the irrational water management.		**Funding options** » City » City related company funded » Private sector funding » Grant » Budget		**Carbon saving potential** No
		Revenue generating No		**Climate resilience building** No
		Implementing and supporting agents » City of Skopje; » Municipalities; » Ministry of Environment and Physical Planning; » Industries » Investment banks » Agriculture practitioners » PE Komunalna Higiena		**Benefits** » Increased resilience to floods through improved management of rainwater » SUDS will promote the increased use of technical water and thereby » Increased availability of the potable water for drinking will promote resilience to climate change » Improved management of rainwaters will support operation of the planned waste water treatment plant » Secured quality of the potable water supply by extending protection areas around freshwater supply and intensifying inspection controls » Minimized water losses and decreased energy consumption » Ensuring access to all residents through expansion of the network
		Social considerations		

WT-5: Update and protect the water distribution network to improve supply and guarantee quality				
Timescale 2023 - 2032	**Strategic objectives** WQ2 SL2 WA1 WA2 WA3	**Pre-investment** EUR 1,200,000	**Capex** EUR 10,000,000	**Opex** EUR 400,000
Description Enforce protection of freshwater sources, and improve the supply network to decrease losses in the water supply system and expand access to all citizens.		**Notes on estimate** EUR 1 Mil for the first phase EUR 12 Mil for improving the quality and efficiency of the water supply system EU 2 Mil for addressing the needs of the people facing challenges Opex of 5% to maintain infrastructure		
Details 3.1 Increase the quality and security of the springs used by the citizens of Skopje » Analyse and implement the Decision on protection zones of the Rasce Springs, hence preserving the water capacity and water quality; » Intensify the inspection controls to the protected sites; » Minimize the possibilities for affecting (polluting) the groundwaters contributing to Rasce and Nerezi- Lepenec Springs from Jugohrom dump in Jegunovcei; » Assess the possibilities for finding alternative resources for water supply. » Improve the monitoring of the water quality indicators; 3.2 Improve the quality and efficiency of the water supply system » Assess the losses of the water supply system and implementing active water loss control measures (monitoring, listening, location, and repair). » Reconstruction and modernisation of the water supply system of the City of Skopje to improve efficiency; » Improving energy efficiency by replacing the pumps and completing the system for automatic pump and reservoir management; » Dividing the water supply system in consumption zones and determining the need of pressure regulation; » Improve the mechanism for identification of water losses and strengthen the response procedures. 3.3 Address the needs of the people facing water supply-based challenges » Improve the quality of potable water in rare rural areas where there are regular cases of having water quality not in line with the standards; » Analyse the options for connection to the water supply system to households who use backyard dwells and pumps; » Provision of subsidised water supply schemes for the socially excluded and poor; » Regulation of water loses in areas/zones where the connections are old or illegal. 3.4 Improve the data management and increase awareness on water supply » Establishing a register/inventory of underground wells used by public entities, companies and households; » Map the vulnerable communities excluded of the water supply network; » Develop measurable indicators for improved water supply system that will be monitored and communicated on yearly bases; » Increase awareness of the citizens excluded of water supply network for the costs and benefits for being integrated in the network; » Improve communication of the planned options (subsidies) with the target groups in order to strengthen the modality and gain their ownership/interest.		**Funding options** » City » City related company funded » Private sector funding » Grant » Budget » Debt	**Carbon saving potential** No	
		Revenue generating No	**Climate resilience building** No	
		Implementing and supporting agents » City of Skopje » PU Vodovod I Kanalizacija » Municipalities » Ministry of environment and physical planning » Ministry of economy	**Benefits** » Secured quality of the potable water supply by extending protection areas around freshwater supply and intensifying inspection controls » Minimized water losses and decreased energy consumption » Ensuring access to all residents through expansion of the network	
		Social considerations » The needs of the people facing water supply-based challenges should be driven by the social perspectives. The expected results should strongly integrate the targeted benefits on improved gender equality and decreased vulnerability of certain vulnerable groups; » When identifying the vulnerable groups focus on people facing deep poverty, rural population, people with no access to the water supply network, citizens facing portable water quality challenges; » When undertaking awareness raising activities make sure you reach the targeted population by using the capacities of NGOs that can reach different ethnic groups, different vulnerable groups, and citizens facing different water supply challenges (access to network, quality of the portable water, water pressure, regular brake downs of the system etc.)		

Appendix A.5. Climate Resilience



<table>
<tr><th colspan="5">CR-1: Develop the strategic planning and collaborative resilience capability of Skopje</th></tr>
<tr><td>Timescale
2021 - 2024</td><td colspan="2">Strategic objectives
AR1 AR2</td><td>Pre-investment
EUR 500,000</td><td>Capex
-</td><td>Opex
-</td></tr>
<tr><td colspan="3">Description
Update planning documents and improving the coordination and implementation capacities of City of Skopje in the area of climate resilience</td><td colspan="3">Notes on estimate
€500,000 for development of disaster risk profiles
€50,000 for ongoing coordination and undertaking of risk preparedness drills</td></tr>
<tr><td colspan="3" rowspan="4">Details
1.1. Strengthening the capacities for improved processes of planning and decision making in climate resilience area
» Develop comprehensive disaster risk profiles (risks and hazards) for city of Skopje to identify households, infrastructure assets and communities at risk. This profile should heavily include the climate risk component;
» Development and regular update of the city's integrated disaster and climate risk management strategy that includes an urban resilience action plan;
» Mainstreaming disaster and climate risk management into the sectoral strategic documents;
» Integration of the Resilient Skopje and Sustainable Energy Action Plan in joined Local Energy and Climate Plans, including resilience and greenhouse gas emission, in line with the national energy and climate plan;
» Development of the Climate Atlas for City of Skopje to present the distribution of temperature and cold air movement in relation to topographic features and land use.
» Strengthening the coordination mechanism for disaster and climate risk management;
» Increasing the capacity of the City of Skopje and the municipal administrations to strengthen urban resilience to climate change by introducing innovative measures;
» Development and update of the plans and scenarios for climate and disaster risk prevention for the City of Skopje and inner municipalities;

1.2. Implementation of climate resilience measures
» Conducting tactic exercises in schools and other institutions under the competence of the City of Skopje for preparing and responding to natural and man-made disasters;
» Implementation of the priority measures covered by the city's disaster and climate risk management strategy;
» Strengthening the partnership with government, municipalities and international organizations for implementation of the strategy;
» Updating the Greenhouse Gas Inventory for the City of Skopje;
» Establishment of a community early-warning system;
» Enabling the system of prevention, response and recovery to be inclusive for persons with disabilities and other vulnerable groups.</td><td colspan="3">Funding options
» Cities
» Relevant ministries/gov</td><td>Carbon saving potential
No</td></tr>
<tr><td colspan="3">Revenue generating
No</td><td>Climate resilience building
Yes, this policy measure aims to lay the ground work in enhancing climate resilience through improving the processes of planning and decision making. The measure also includes implantation of other measures including preparing and responding to climate emergencies in institutions and having a risk management strategy in place.</td></tr>
<tr><td colspan="3">Implementing and supporting agents
» City of Skopje; Municipalities. Hydro-Meteorological Institute;
» Joint Stock Company (JSC) "Vodostopanstvo" (Water Economy of the North Macedonia);
» Ministry of Environment and Physical Planning;
» Agency for Spatial Planning;
» Hydro Power Stations; Crisis Management Centre;
» Directorate for Protection and Rescue;
» Ministry of agriculture, forestry and water economy;</td><td>Benefits
» Improved planning capacities through development of urban resilience action plan
» Increased resilience to floods; decreased economic losses and decreased environmental damage by increasing the capacity of the City of Skopje and
the municipal administrations to strengthen urban resilience to climate change by introducing innovative measures;
» Improved early response mechanisms through improved institutional capacity and coordination</td></tr>
<tr><td colspan="4">Social considerations
» When identifying the vulnerable community focus first on the historic cases and locate the people facing infrastructure damage, people in affected area that have vision and mobility impairment, elderly people, people with limited access to information, people with mental health conditions, single parents etc.;
» Make sure the early warning system is addressing the identified vulnerable communities;</td></tr>
</table>

<table>
<tr><th colspan="5">CR-2: Improve the city's resilience to forest fires</th></tr>
<tr><td>Timescale
2021 - 2030</td><td>Strategic objectives
AR1 AR2 BE3 GS1</td><td>Pre-investment
EUR 1,200,000</td><td>Capex
-</td><td>Opex
-</td></tr>
<tr><td colspan="2">Description
Implementation of policy measures that will increase the city's resilience to forest fires including improving infrastructure to enable vehicles to reach affected forest areas, improving equipment, and raising awareness for prevention.</td><td colspan="3">Notes on estimate
€2,000,000 for strengthened planning and initial set up
€1,000,000 per annum for ongoing maintenance of measures</td></tr>
<tr><td colspan="2" rowspan="4">Details
2.1. Strengthening the planning processes for improved wildfire resilience
» Prepare in-depth analysis of the forest fire history within the borders of city of Skopje;
» Develop plan for integrated forest fire prevention;
» Significantly increase the budget for implementation of prevention measures;
» Strengthen the early warning system;
» Develop gender and social analysis of the exposure and vulnerability to wildfires and identify the most vulnerable community and their representatives;
» Develop pragmatic mechanism for forest fire response;
» Strengthen the response coordination mechanism by organizing focused trainings, field exercises, joined planning and evaluation, etc.;
» Analyse the possibilities for introducing intensified aerial surveillance during the picks of forest fires;
» Improve the forest fires recovery process;

2.2. Implementation of in-practice measures for improved forest fire resilience
» Apply tree species make-up and forest conversion where applicable;
» Invest in improved planning and implementation of the shelterbelts and fire breaks;
» Introduction of automatic, camera supported forest fire observation systems to reduce the forest fires extent;
» Improve the state of reliable equipment (vehicles, communication assets, fire extinguish equipment etc.);
» Implementation of targeted measures for increasing the resilience of the most vulnerable community;
» Develop and implement strong awareness raising program with increased activities before and during the forest fires pick (summer period);</td><td colspan="2">Funding options
» Cities
» Relevant ministries/gov
» Grant
» Budget</td><td>Carbon saving potential
No</td></tr>
<tr><td colspan="2">Revenue generating
No</td><td>Climate resilience building
Yes, this policy measure aims to lay the ground work in enhancing fire resilience through improving the planning processes. The measure also includes implantation of other measures including preparing and responding to forest fires specifically.</td></tr>
<tr><td colspan="2">Implementing and supporting agents
» City of Skopje;
» Municipal authorities;
» PE National Forests;
» Directorate for Protection and Rescue;
» Army of North Macedonia;
» Crisis Management Centre;
» Hydro-Meteorological Institute;
» Ministry of Environment and Physical Planning;
» Ministry of agriculture, forestry and water economy;</td><td>Benefits
» Improved planning, awareness raising reduce risk of forest fires
» Implementation of preventative measures will increase resilience, thus decreasing economic losses and environmental damage;
» Strengthened forest management will improve biodiversity and long-term green space management for the City</td></tr>
<tr><td colspan="3">Social considerations
» When conducting analysis and plans for addressing the forest fire make efforts to also include the man-made wildfires (in urban and rural areas);
» When identifying the vulnerable community focus first on the historic cases and locate the people facing infrastructure damage, people in affected area that have vision and mobility impairment, elderly people, people with limited access to information, people with mental health conditions, single parents etc.;
» Make sure the early warning system is addressing the identified vulnerable communities;</td></tr>
</table>

<table>
<tr><th colspan="5">CR-3: Improve city's resilience to other natural disasters</th></tr>
<tr><td>Timescale
2021 - 2024</td><td>Strategic objectives
AR1 AR2</td><td>Pre-investment
EUR 500,000</td><td>Capex
-</td><td>Opex
-</td></tr>
<tr><td colspan="2">Description
Implementation of policy measures and link up with other sectoral measures to address the risks of droughts, landslides, earthquakes, cold waves, heat waves etc. through prevention planning and strengthening the response system.</td><td colspan="3">Notes on estimate
€1,000,000 for strengthened planning and initial set up
€500,000 per annum for ongoing maintenance of measures</td></tr>
<tr><td colspan="2" rowspan="4">Details
» Conducting analysis for each of the risks;
» Ensure that the foreseen city's disaster risk management strategy will dedicate a specific chapter and list of measures for each of the identified risk;
» Identifying the vulnerable communities and conduct targeted measures to reduce their vulnerability;
» Strengthening the early warning system;
» Development of mechanism for fast response;
» Strengthening the response coordination mechanism by organizing focused trainings, field exercises, and increased participation of the communities;
» Improving the recovery process;
» Develop social/gender vulnerability assessment to the disasters and implement measures for increasing the vulnerability of the most vulnerable population;
» Development and implementation of awareness raising campaign for improved resilience of the citizens;
» Link up with other sectoral measures in terms of prevention
» Partial Reconstruction of the Sewage System to protect inflow of the underground water.</td><td colspan="2">Funding options
» Cities
» Relevant ministries/gov
» Grant
» Budget</td><td>Carbon saving potential
No</td></tr>
<tr><td colspan="2">Revenue generating
No</td><td>Climate resilience building
Yes, this policy measure aims to lay the ground work in enhancing resilience through conducting a risk analysis and preparing a prevention program.</td></tr>
<tr><td colspan="2">Implementing and supporting agents
» City of Skopje;
» Municipal authorities;
» Directorate for Protection and Rescue;
» Crisis Management Centre;
» Hydro-Meteorological Institute;
» Public health institute;
» Institute of Earthquake Engineering and Engineering Seismology;
» Ministry of Environment and Physical Planning;
» Ministry of health;
» Ministry of transport and communications;
» Ministry of agriculture, forestry and water economy;</td><td>Benefits
» Improved planning, awareness raising reduce risk of natural disasters;
» Implementation of preventative measures will increase resilience, thus decreasing economic losses and environmental damage;
» Strengthened nature and urban areas' management will improve biodiversity and long-term green space management for the City.
» Secured quality of the potable water supply by extending protection areas around freshwater supply and intensifying inspection controls
» Minimized water losses and decreased energy consumption
» Ensuring access to all residents through expansion of the network</td></tr>
<tr><td colspan="2">Social considerations
» When identifying the vulnerable community focus first on the historic cases and locate the people facing infrastructure damage, people in affected area that have vision and mobility impairment, elderly people, people with limited access to information, people with mental health conditions, single parents etc.;
» Make sure the early warning system is addressing the identified vulnerable communities;</td></tr>
</table>

<table>
<tr><th colspan="5">CR-4: Rehabilitate and improve flood protection infrastructure in Skopje</th></tr>
<tr><td>Timescale
2023 - 2035</td><td>Strategic objectives
AR1 AR2 WA3</td><td>Pre-investment
EUR 150,000</td><td>Capex
EUR 20,000,000</td><td>Opex
EUR 1,000,000</td></tr>
<tr><td colspan="2">Description
Increase the city’s resilience to floods through improved spatial planning, risk management of dams and reservoirs and building or maintaining existing flood control structures</td><td colspan="3">Notes on estimate
€2,000,000 for strengthened planning and initial set up
€1,000,000 per annum for ongoing cleaning and maintenance of flood defences</td></tr>
<tr><td colspan="2" rowspan="4">Details
4.1. Strengthen the planning processes for increased flood resilience
» Establishment of new criteria and standards for spatial and urban planning documentation where draining systems in urban areas with high levels of urbanisation and economic significance will be mainstreamed;
» Identifying the vulnerable communities and propose a set of targeted measures to reduce their vulnerability;
» Development of gender analysis to assess the vulnerability of women to floods and prepare set of measures for reducing the vulnerability;
» Development of a city integrated flood resilience program as integral part of the city’s strategy for disaster and climate risk management.

4.2. Implementation of in-practice measures for improved floods resilience
» Intensifying the process of upgrading the weather stations network;
» Regular cleaning and maintenance of the entire infrastructure for flood protection focusing on improving resilience and enhancing biodiversity by changing the current practices of damaging the riparian zones and the habitats for amphibians, reptiles and birds;
» Treating the torrents that affect Skopje from the Vodno side and from the southern slopes of Skopska Crna Gora;
» Improve the flood protection mechanism in the rural areas for residential (semi-urban) and agriculture areas located downstream the city central/urban zone;
» Establish proper risk management of dams and reservoirs upstream from the City of Skopje in order to minimize the impact of eventual failure of the system;
» Identify the degree of flood protection for Lepenec river and adequately prepare the flood control structures (number and geometric features of the canalised bed) that should reduce the risk of floods along the river throughout its flow through the populated area of the wider Skopje City;</td><td colspan="2">Funding options
» Cities
» Private sector funding
» Relevant ministries/gov
» Budget
» Debt</td><td>Carbon saving potential
No</td></tr>
<tr><td colspan="2">Revenue generating
No</td><td>Climate resilience building
Yes, this policy measure aims to lay the ground work in enhancing flood resilience through planning processes. The measure also includes implantation of other measures including preparing and responding to floods specifically.</td></tr>
<tr><td colspan="2">Implementing and supporting agents
» City of Skopje;
» Hydro-Meteorological Institute;
» Joint Stock Company (JSC) “Vodostopanstvo” (Water Economy of North Macedonia);
» Ministry of Environment and Physical Planning;
» Agency for Spatial Planning;
» Hydro Power Stations;
» Crisis Management Centre;
» Directorate for Protection and Rescue;
» Ministry of agriculture, forestry and water economy;
» Municipalities.</td><td>Benefits
» Improved planning, awareness raising reduce risk of natural disasters;
» Implementation of preventative measures will increase resilience, thus decreasing economic losses and environmental damage;
» Strengthened nature and urban areas’ management will improve biodiversity and long-term green space management for the City.</td></tr>
<tr><td colspan="3">Social considerations
» When identifying the vulnerable community focus first on the historic cases and locate the people facing infrastructure damage, people in affected area that have vision and mobility impairment, elderly people, people with limited access to information, people with mental health conditions, single parents etc.;
» Make sure the early warning system is addressing the identified vulnerable communities;</td></tr>
</table>

Appendix A.6. Land Use and Protection

LU-1: Improve data collection and collaboration to inform future urban planning				
Timescale 2023 - 2035	**Strategic objectives** GS1 GS2 GS3	**Pre-investment** EUR 800,000	**Capex** -	**Opex** -
Description Develop city-wide impact studies of urban development on Green City challenges to inform the process of urban planning and limit the extent and impact of future development		**Notes on estimate** Pre-investment urban impact studies, and awareness raising and enforcement to restrict encroachment on the environment		
Details 1.1. Development of baseline and justification for undertaking strong restriction on raising the number of residential buildings on greenfield sites » Develop nature conservation-based impact assessment for city of Skopje with clear division of municipalities borders; » Develop green map and infographic where m²/inhabitant and % of green space area is clearly presented, and make comparison with the agreed minimum for city of Skopje, and comparison with the good practice cities; » Develop city in-depth (municipal specific) analysis of the number of vehicles of the resident citizens, number of vehicles of non-resident citizens visiting the municipality per day, and number of reliable parking lots; » Develop infographic where (municipal specific) pollution data (PM_{10}, PM_2, CO_2, NOx etc.) are going to be clearly presented; » Update and increase air quality monitoring stations to accurately measure air pollution information » Establish an inter-municipal pollution reduction panel (on Mayors level) and inter-municipal technical working group of City of - Skopje (with relevant 10 municipalities) for improved joined planning, decision making, and implementation of the environment and energy initiatives; » Make analysis of the availability and sustainable use of reliable water resources, compare it with the current demand and make scenario for the scenario of eventual additional increase of resident citizens; » Develop an assessment on number of flats and houses that are not in use. 1.2. Technical implementation of the plan for restriction on construction works » Develop an integrated sustainability framework based on the baseline indicators and provide clear justification why city of Skopje including all inner municipalities should have moratorium for increasing the number of residential buildings; » Develop results-oriented PR materials to strengthen the awareness of the citizens of Skopje, make efforts to spread the information national wise, and partner civil society organisations for joined implementation of PR measures; » Establish an inter-municipal Sustainability Panel on Mayors level (or use the current mayors' group) and support it through establishment of an inter-municipal technical working group of City of - Skopje (with relevant 10 municipalities) for improved joined planning, decision making, and implementation of the environment and energy initiatives; » Develop a plan for strengthening the capacities of the municipal councils of all 10 municipalities including the city council of city of Skopje; » Building upon the results of the sustainability framework, use the inter-municipal Sustainability Panel to make joined decision on: (i) strengthening the legislation; (ii) announce long-term moratorium of constructing residential building; and (iii) continuous delivery of capacity building trainings to mayors and members of the municipal councils.		**Funding options** » City » Relevant ministries/gov » Grant	**Carbon saving potential** No
		Revenue generating No	**Climate resilience building** No
		Implementing and supporting agents » Lead role: City of Skopje; » Main Partners: 10 local self-governments administration, International organization (support for providing technical documents); » Implementing Partners: 10 local self-governments administration, local civil society organizations; » Other partners: Relevant Ministries and Agencies.	**Benefits** » Reduced pressure to environment and improved environmental condition in City of Skopje; » Reduced pollution and reduced number of cases of citizens facing health challenges; » Enabling municipal authorities to improve their planning process based on the fix data on number of inhabitants; » Strengthened inter-municipal cooperation through joined planning, decision making and implementation processes; » Increased environmental, social and economic conditions, hence increased quality of life of Skopje citizens;
		Social considerations » The assessment should also consider the recommendations provided by the national strategy for balanced regional development; » The analysis should be based on the well-defined indicators that lead towards clear justification on the foreseen measure; » The analysis should integrate the current status of homeless; » The set of proposed measures should be subject to technical and financial support delivered by the international donor community with environmental portfolio present in the country; » Municipalities' ownership should be gained prior implementation of the measures.		

LU-2: Improve planning and collaboration for contaminated sites remediation				
Timescale 2021 - 2024	**Strategic objectives** SL1	**Pre-investment** EUR 1,000,000	**Capex** -	**Opex** -
Description Develop city-wide impact studies of urban development on Green City challenges to inform the process of urban planning and limit the extent and impact of future development		**Notes on estimate** Pre-investment for establishment of knowledge sharing across stakeholder groups and facilitation of process to remediate.		
Details 2.1 Enabling technical environment for remediation of the contaminated sites » Development of plan for conducting integrated analysis of the state of contamination; » Development of donor map for technical and financial support to the process of implementation of the plan for overall analysis; » Selection of the implementation partners (donors, consulting companies and CSOs) and enter the process of implementation; » Apply the same methodology for all covering municipalities; » Development of full technical project documentation; » Development of database for contamination sites; » Development of the City's Map of Contaminated Sites; 2.2. Strengthening the partnership in addressing the contamination challenges » Establishment of technical working group with strong representation of the city of Skopje, Municipalities, academia, Ministry of Environment and Physical Planning, Ministry of Finance, installations and civil society organizations; » Development of joined plan for remediation including annual state, municipal and city budgeting to secure substantive co-financing; » Development of result-oriented awareness raising campaign for rehabilitation of the contaminated sites; » Ensuring strong inclusion of national and local civil society organizations within the process of implementation of the awareness raising campaign; » Handover the ownership, resource mobilisation and implementation leadership to Ministry of Environment and Physical Planning and serve as substantive technical support body and backstopping over the entire process of implementation and re-planning; » Continue with strong pressure to the national body in charge of addressing the contamination sites, and invest in building the capacities of the civil society organizations as partner in ensuring the soil quality for citizens of Skopje; » Establish system for monitoring, reporting and verification of soil pollution data. » Provision of substantive support to the national institutions in development of Law on soil, in collaboration with the civil society organisations and the capacities of the Faculty for agriculture; » Review and if necessary, revise the existing draft law, propose pragmatic bylaws that will ensure smooth implementation of the law, and strengthen the capacities of the city's and municipal environmental inspectors, hence enabling proactive implementation of the foreseen law; » Work with the main soil polluters and establish partnership-oriented collaboration where corporate social responsibilities are substantively used; » Focus on identifying the small-scale contaminated sides and use the practice-proven measures for addressing the challenges. At the same time make strong pressure to the Government to invest in solving the three industrial hot spots and former landfills Vardarishte.		**Funding options** » City » Grant » Budget	**Carbon saving potential** No
		Revenue generating No	**Climate resilience building** No
		Implementing and supporting agents » Lead role: City of Skopje and Ministry of Environment and Physical Planning; » Main Partners: 10 local-self governments administration, International organization (support for providing technical documents); » Implementing Partners: Ministry of Environment and Physical Planning, International organizations, 10 municipal authorities, local civil society organizations; » Other partners: Universities.	**Benefits** » Remediated contaminated sites; » Reduced pressure to environment and improved environmental condition in City of Skopje; » Improved quality of the soil; » Improved quality of the groundwaters; » Reduced contamination of the agricultural products and improved health of the citizens; » Increased competitiveness of the products (fruits and vegetables) produces in Skopje, and improved economy; » Increased environmental, social and economic conditions, hence increased quality of life of Skopje citizens;
		Social considerations » Development of the plan should be jointly planed and implemented in close collaboration with the Ministry of Environment and Physical Planning, Ministry of Agriculture, Forestry and Water Economy, Faculty for agriculture, Municipalities, and Civil Society Organizations involved in this area; » It is recommended the 7 neighbouring municipalities to also be subject to analysis; » The analysis should be integrated and assess the overall indicators not focused only on the 15 heavy metals currently analysed; » The database on contamination sites at its minimum meet the technical criteria (indicators) of the database framework of the Ministry of Environment and Physical Planning; » The plan for remediation should integrate mapping of the potential donors, clearly described measures, total budget per measure, intended time for implementation of remediation measures, responsible entity and partner institutions; » Make sure the awareness raising campaign is followed by strong capacity development measures; » When prioritizing the industrial hot sport, make sure "Ohis" is placed high in the agenda of the Government.	

LU-3: Increase the quality and accessibility of green spaces and parks				
Timescale 2021 - 2024	**Strategic objectives** BE1 GS1	**Pre-investment** EUR 1,500,000	**Capex** -	**Opex** -
Description Implement innovative and good practice measures for pocket parks and larger green areas to promote greening of the city.		**Notes on estimate** Cost estimate for range of pre-investment studies, internal capacity building and cross sector working for three years		
Details 3.1. Strengthen the planning processes for improved pocket parks management » Assess the current state of the pocket parks in urban areas; » Identify the best practice pocket parks measures worldwide and assess their applicability for city of Skopje; » Establishing partnership with European champion cities in this area for improved planning, funds mobilization and implementation; » Invest in listing of innovative measures for increased number of pocket parks in the city; » Development of detailed plans for pocket parks in urban areas; » Influence the detailed plans and budget distribution of the Public Entity "Parks and Greeneries"; » Secure medium-term annual budgets for achieving increased number and area of pocket parks in the city; » Identify the most relevant donors in this area; » Develop a joined program with the PE "Parks and Greeneries", Municipalities, International organizations and CSOs; » Provide strong support to the CSOs to mobilize additional funds based on the joined plan; » Establish partnership with the Public Enterprise "National Forests" for eventual easy access to trees; » Establish strong and long-term partnership with the large and medium size companies by using the modality of corporate social responsibilities. 3.2. Strengthening the planning and decision-making processes » Establish strong partnership with the municipal authorities for improving the conditions of the large green areas; » Establishment of working group on nature conservation (or broader environment group); » Conducting integrated assessment of the curent state of the large green areas; » Identify the available potentials for establishing additional large green areas in city of Skopje; 3.3. Implementation of technical measures that should enable improved substantiality of the large green areas » Conducting valorization studies (and revalorisation studies of those already valorized); » Proposing appropriate IUCN based categorisation; » Development of content-based map of current and potential green areas; » Increase the pressure for proclamation of Skopska Crna Gora; » Downscaling the infrastructure activities in Vodno through strong involvement of the civil society organisations, municipal authorities and local population; » Strengthening the implementation capacities of PE Parks and Greeneries; » Establishment of strong partnership with the PE National Forests; » Development of detailed plan for improvement of the environmental conditions of the large parks; » Mainstreaming a strong social development component, integrated in the management plan for large green areas; » Include program for awareness raising and field education for elementary students in the management plan of the large green areas; » Enable environment for progressive nature conservation oriented management of the site and improve the status of biodiversity;		» Evaluate the reliable nature capacities and opportunities offered by each site, and develop an integrated program of site specific activities (birds, habitats, carnivores, fungi, plants etc.); » Identify and nominate acreditated specialists for different areas that should be used for implementation of the educational activities (deliver lessons, in-practice tainings etc.); » Building a strong inner-infrastructure for strengthened large areas management; » Development of database that follows the clearly identified indicators that should be regularly monitored in order to improve the planning and reporting processes; » Establish regular practice of active communication of the results in order to gain citizens ownership and active participation in large green areas management. 3.4. Enable larger green areas to improve their accessibility » Improving the urban mobility conditions and enabling citizens to easily access the green areas; » Analyzing the potential impact of the motorized vehicles; » Increasing the limitations of access to motorized vehicles in the green areas; » Conducting in-depth assessment of each green area for best available routes categorized by lenght, width, material used for road constructing, vicinity to the areas used regularly by different species etc.; » Ensuring that pedestrians are the second hosts of the green areas (after the resident and migratory species in the area); » Enabling cyclists to have easy access to all offered services; » If motorized vehicles have any access inside the green areas, ensure that they are guest in the traffic; » Planning vehicles parking lot according to the green areas' absorption capacities; » Application the system of payment for ecosystem services where applicable; » Stimulate entry of users of alternative transport modes; » Stimulate schools, universities and CSOs to organize educational activities in the large green areas; » Development of database for modal transport specific counting of the visitors; » Regular communication of the data collected; » Implementation of awareness rasing activities focused on accessibility, the impact to existing biodiversity, the code of conduct for each large green area, the potentials for citizens active contribution via regular visit, or with available voluntary work etc.;	

LU-3: Increase the quality and accessibility of green spaces and parks		
Social considerations When identifying the partner cities for improved pocket parks, make sure they are: (i) recognized as champion in this area; (ii) have potentials to technically and financially support the city's initiative; (iii) could heavily contribute to achieving trust from citizens of Skopje over the idea for improved pocket management; When selecting the demonstration projects (areas for building/relearning pocket parks) analyse the options from visibility perspectives, balanced distribution, and impact to society; Identify the medium and large size companies active in regular application of measures under their corporate social responsibility framework, and negotiate for their involvement as partner in supporting the green city agenda; Make sure that all processes should be communicated with the citizens, including the planning, decision making and implementation measures; Integrate measures that could significantly stimulate citizens participation in planning and implementation of the measures. The working group should be represented by the institutions and organizations that are addressing the green areas challenges. It should be mainly driven by the Ministry of Environment and Physical Planning and municipal authorities; Make sure all plans are developed in joined collaboration with the Ministry of Environment and Physical Planning (in charge of the process for protected areas proclamation) in order to achieve their ownership over the process; Walk the talk process for proclamation of Skopska Crna Gora with Ministry of Environment and Physical Planning by: (i) development of valorisation study, (ii) preparing business and management plan; (iii) secure ownership of the Ministry of Environment and Physical Planning, (iv) proclamation of the area, (v) nomination of management body, (vi) lead or support the implementation measures; The accredited specialist should also be very familiar with the national and global initiatives including NBSAPs, NSNC, Aichi targets, SDGs, CBD convention etc. The database should be linked with the integrated information system of the Ministry of Environment and Physical Planning;	**Funding options** » City » Grant » Budget **Revenue generating** No **Implementing and supporting agents** » Lead role: City of Skopje, 10 Municipal authorities; Ministry of Environment and Physical Planning; » Main Partners: Public Entity "Parks and Greeneries", Local CSOs, International organizations, eventual european "sister cities"; » Implementing Partners: International organizations, 10 municipal authorities, local civil society organizations, private companies; » Other partners: Ministry of Environment and Physical Planning, Universities, PE "National Forests"	**Carbon saving potential** Yes – the strengthen capacities to maintain and improve green spaces will result in increased carbon sequestration potential from the natural environment **Climate resilience building** Enabling measure will support realisation of CR4 climate resilience potential **Benefits** » Number of pocket parks and their total area increased; » Improved air quality in the city; » Increased mobility of the citizens; » Increased number of childrens playgrounds; » Increased number of options for social integration of alderly people and people with disabilities; » Improved conditions of the larger green areas; » Raised awereness on nature conservation; » Improved nature conservation conditions; » Improved overal environmental condition in City of Skopje; » Strengthened social conditions of the citizens. » Improved urban mobility infrastructure and increased number of citizens using alternative transport modes.

LU-4: Establish green city spaces and corridors				
Timescale 2024 - 2035	**Strategic objectives** BE1 GS1	**Pre-investment** -	**Capex** -	**Opex** EUR 10,000,000
Description Develop a connected network of green areas (including corridors and pocket parks) across the city to improve urban biodiversity, enhance resilience to flooding, reduce the city's 'heat island' effect, and reduce air pollution		**Notes on estimate** Pre-investment for establishment of knowledge sharing across stakeholder groups and facilitation of process to remediate.		
Details 4.1 Development of plan for establishment of the city's green corridors » Achieving agreement with the Ministry of Environment, PE Parks and Greeneries, and Municipalities for development and implementation of plan for establishment of green corridors of city of Skopje; » Building upon the capacities of the environmental working group in order to achieve proactive participation of the civil society organizations, private companies and donor community; » Development of the green map (green cadastre) for city of Skopje; » Conducting initial map-based analysis for potentials of establishment of the green corridor for city of Skopje; » Identification of the challenges of city's heat islands, air pollution and increased status of species and habitats; » Mapping the current presence of the invasive species and providing adequate options for conversion. Make sure that in cases of positive impact there is no need for transformation.; » Mainstreaming plant species that have increased capacities for absorbing air pollutants and make sure the species that have yields who affect the cyclists (punctures or sliding) should be avoided to be placed on the cycling routes; » Conducting integrated assessment on the potentials for establishment of green corridors based on the current state, challenges, mapping of the invasive species etc.; » Development of the plan for establishment of the green corridors. » Analyse the potential of forests and large green areas for climate change mitigation through carbon sequestration, carbon substitution, and carbon conservation; 4.2. Implementation of the plan for establishment of the city's green corridor » Implementation of measures covering the parts of the green corridors focused on the main boulevards; » Encourage and technically support the municipal authorities to follow by covering the service streets, hence improving the conditions of the entire city area; » Encourage the government through the capacities of the Ministry of Environment and Physical Planning to invest in fulfilling the gaps of the green corridors; » Implement awareness raising activities for the green corridors to stimulate the private companies to be engaged and increase their visibility by using the corporate social responsibility framework; » Regularly update the green cadastre to record the changes and analyse the improvement; » Development of simulation model for visual presentation of the yearly improvement of the green corridors;		» Identify the species and people having strongly increased beneffits from the green corridors; » Identify the species and people having strongly increased beneffits from the green corridors; » Use the data on improved green corridors and identified focused beneficiaries for raising the awareness on the achievements and importance of the investments in improvement of the green corridors in order to gain citizens participation in maintaining the areas of joined importance. 4.3. Implementation of practice proven measures for increased number of pocket parks in city of Skopje » Ensure inclusive program implementation phase with clear division of responsibilities; » Use the capacities of the international organizations and consulting companies for ensuring technical justification; » Work with municipal authorities and PE Parks and Greeneries to secure long-term sustainability and invest in establishing strong partnership with CSOs for development of innovative measures and implementation of awareness raising activities; » Identify the best practices that have significantly improved the status on pocket parks and use them to increase the awareness of the citizens and municipal authorities; » Develop indicators-oriented database that will enable city's authorities to measure the improvement and share the results; » Develop infographic for recorded innovative measures, the lessons learned and good practices that should be shared in order to handover the leadership to the 10 municipal authorities and PE Parks and Greeneries, hence undertaking the role of program-based supervision and technical support; » Implement awareness raising activities that should show the improvement but also gain their ownership over the idea, hence achieving their active participation in pocket parks management.	

<table>
<tr><th colspan="3">LU-4: Establish green city spaces and corridors</th></tr>
<tr><td rowspan="3">Social considerations
» When assessing the invasive species consult the case with the lower part of Vodno that serve as an example for positive impact - the initial assessments came up with information that the non native, invasive species (trees) could better prevent erosion and landslide than the native trees in the area that is under strong influece of the intensive construction.
» Focusing the species, pedestrians and cyclist in the core of the plan for establishment of the green corridors.
» Since the technical background and required budget are applicable to the environmental portfolios of the donor community present in the country, it is
highly recommended that the initiative is well communicated with the international organizations hence maximizing the chances for achieving technical and financial support for implementation;</td><td>Funding options
» City</td><td>Carbon saving potential
Yes-Reforestationandestablishment ofgreen corridorsofferpotentialfor carbon sequestration</td></tr>
<tr><td>Revenue generating
No</td><td>Climate resilience building
Yes – potential to improve urban biodiversity, enhance resilience to flooding, maintain soil integrity, reduce the city’s ‘heat island’ effect, and reduce air pollution</td></tr>
<tr><td>Implementing and supporting agents
» Lead role: City of Skopje, 10 Municipal Authorities;
» Main Partners: PE Parks and Greeneries, Local CSOs, International organizations, Ministry of Environment and Physical Planning;
» Implementing Partners: International organizations, local civil society organizations;
» Other partners: Universities, PE “National Forests”, private companies</td><td>Benefits
» Improved mobility conditions of the citizens;
» Improved environmental conditions;
» Improved nature conservation conditions;
» Reduced air pollution;
» Strengthened social conditions of the citizens;
» Reduced health related risks of the citizens.</td></tr>
</table>

Appendix B – Financial Analysis

Financial analysis

The objective of the financial assessment is to provide a preliminary review and indicative impact assessment of the policy options/actions proposed for GCAP.

A financial assessment is a high-level analysis without detailed analysis and determination of the situation from the obtained results.

The analysis will determine what the easiest and most affordable way of financing the proposed policy option/ actions is.

Analysis of the city budget

The analysis is done based on submitted budget rebalance for 2019. and execution reports for previous years. For projections for possible new long term debt, we used budget reports related to planned expenditures (2020- 2022).

The following table shows the structure of detailed budget revenues and expenditures through periods, as well as the final financial result.

Table B-1: Structure of budget

			A	B	C		
		Budget Realization 2017	Realization 2018	Budget Realization 2018	Budget 2019 (rebalans)	Index B/A	Index C/B
1	Tax Revenues	36.4m	39.8m	36.3m	40.5m	91%	112%
2	Non-Tax revenues	4.7m	7.3m	5.3m	7.9m	73%	149%
3	Transfers and donations	29.5m	33.6m	27.2m	49.3m	81%	182%
4	Borrowings in country	2.5m	41k	36k	0.00	90%	0%
i	Total Operating Revenues	73m	81m	68.7m	97.7m	85%	143%
5	Captial revenues	3.5m	19.7m	2.7m	8.2m	14%	301%
6	Transfer and donations	2.4m	0.00	861k	0.00		
ii	Total Capital Revenues	5.7m	19.7m	3.6m	8.2m	19%	229%
i + ii	Total Revenues	79m	101m	72.3m	106m	72%	147%
1	Salaries and Allowances	19.8m	21m	19.9m	22.1m	95%	111%
2	Reserves and non-defined expenditures	18.6m	163k	33.5k	342k	21%	1017%
3	Goods and services	21.8m	28.9m	22m	31.6m	76%	144%
4	Interest payments	405k	618k	326k	309k	53%	95%
5	Subsides and transfers	9m	12.1m	8.8m	13.9m	73%	158%
6	Repayment of principal	2.2m	2.9m	2.5m	2.8m	87%	109%
iii	Total Operating Expenditures	53.2m	65.7m	53.6m	70.9m	82%	132%
7	Captial expenditures	25m	34.8m	15.5m	35.1m	45%	227%
iv	Total Captial Expenditures	25m	34.8m	15.5m	35.1m	45%	227%
iii + iv	Total Expenditures	78.2m	101m	69.1m	106m	69%	154%
	Net financial result (i+ii)-(iii+iv)	**549k**	**0 (TBD)**	**3.3m**	**0 (TBD)**		

Table B-2: Recapitulation of the city budget for 2019 in EUR

Item	Realization 2017	Realization 2018	Budget 2019 rebalance	Rate of change 2018/ 2019
Budget revenues	72.9m	69.5m	97.7m	40%
Budget expenditures	-51m	-51.1m	-68.1m	33%
Net expenditures for non-financial assets	-21.5m	-12.7m	-26.9m	110%
Budget surplus	311k	5.8m	2.7m	-52%
Net financing	238k	-2.5m	-2.7m	10%
Difference in financing	548k	3.3m	*TBD	

TBD= to be determined in accordance with realisation of budget

Budget revenues in 2019

Tax revenues amount to EUR 40,521.19 and for 2018, EUR 36,245,265, non tax revenues EUR 7,803,252.03 in 2018 amounted to EUR 5,276,253.87.

The largest item of other revenue is Transfers from other levels of government EUR 47,052,422.76 and for (2018/2017 app EUR 27,642.28).

The biggest increase in revenue compared to 2018 is precisely from the fundamentals of Transfers by EUR 20,235,110.61, along with increases in tax revenues and non-tax revenues.

The majority of these revenues are transfers/Grants: in 2019, EUR 27,081,154.55, and appropriations EUR 19,971,268.29.

Budget expenditures in 2019

In 2019 the highest cost is the cost of labour, EUR 22,023,512.16, which was EUR 19,856,676.55 in 2018.

The presented increase in budget expenditures compared to 2018 is mostly reflected in Goods and services, in 2019 amounted to EUR 31,559,934.96, and in 2018 it was EUR 21,718,223.41, and in Subsidies and transfers EUR 13,841,040.41 in 2019, and EUR 8,787,368.72 in 2018. The budget mostly finances them.

Net expenditures for non-financial assets Revenues from Capital Activities amount to EUR 8,148,243.90 and the largest part relates to the sources of own resources of the budget.

On the other hand, Capital Investments for 2019 amounted to EUR 35,119,756.10, while in 2018 they amounted to approximately EUR 15,479,674.80, and most are related to investments in buildings, EUR 25,316,764.28, while in 2018, for the same purposes the amount of EUR 12,731,707.32 was spent. Funding is planned mainly from the City budget.

Budget surplus/deficit

Given the positive trend, 2019 is also expected to result in a budget surplus.

The largest increase in revenue from Transfer/Grant is directed to current operations, while the bulk of the investment in Capital expenditures is planned to be made from budgetary funds.

Net financing

The report shows Domestic borrowings (which were not planned for 2019 and in 2018 it amounted to EUR 36,185.79). Repayment of principals repayments are made for both domestic and non-resident creditors (2019 EUR 2,731,707.32, and for 2018 EUR 2,520,954.68).

Based on data for 2018, and planned payments for 2020- 2020 (principal and interest payments), and taking into account the law constraints, the City of Skopje could add approximately add new annual repayments to the city Budget as follows: EUR 9.285.723,58 with a note that this amount should be additionally decreased for annual obligations toward long-term borrowing from the Central Budget of North Macedonia (annual obligations are known to City administration). The amount of the debt itself would depend on the number of annual repayments.

According to the law on financing local self-government Article 20 under 4, it is stated:" In the case of long-term borrowing, the total annual debt repayment (principal, interest and other expenses) made based on long-term borrowing and long-term borrowing from the Central Budget of North Macedonia may not exceed 30% of the total revenue of the municipality's current operating budget in the previous fiscal year. "

This is an estimate, and the projections of the competent authorities would show what level of borrowing could

be achieved, while still securing a budget surplus. It's recommended to create a Framework Budget Document for the period of 2020-2023.

In terms of spending, in 2018, the surplus of revenue was EUR 3,253,829.37, while in 2017, it was EUR 548,378.75.

According to these numbers, we estimate that there is room for approximately EUR 1.788.617,89 of additional spending related to the GCAP per year.

Again, this is a calculation based on the current data, assuming that the surplus is indeed available, i.e. that its spending has not been carried forward to the next year by the City of Skopje (as coverage of expenses not realised in the current year).

To present the current sources of financing in Capital expenditures, as well as planned for 2019 on the revised budget, we submit the following table:

* Expenditures from loans refer to a loan taken in the country, Looking at the historical budget execution data, a debt from abroad was last taken in 2016 (International Development Agencies) in the amount of EUR 125.512,34

An insight into the present data shows that budget funds finance most of the investments in capital investments and that credit borrowings are minimally present in the sources of capital investments.

Table B-3: Recapitulation of the sources for Capital expenditures through periods: EUR

Capital Expenditures	Realization 2017	Realization 2018	Budget 2019. g-rebalans
Expenditures of Budget	21.772.894,28	14.023.693,71	32.332.910,57
Expenditures from self-financed activities	103.499,38	81.859,82	741.300,81
Expenditures from Grant(Transfers)/ Block supsidies	424.608,00	1.237.045,76	1.312.211,38
Expenditures from donations	217.701,72	101.234,15	733.333,33
Expenditures from loans	2.445.190,52	36.185,79	0,00
Total	**24.963.894**	**15.480.019**	**35.119.756**

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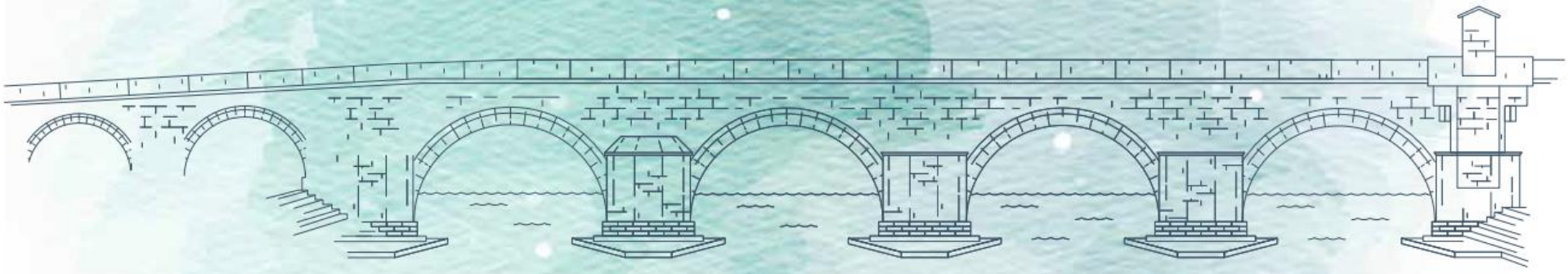

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