

The Green City Action Plan



Zenica: Bosnia and Herzegovina

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Contents

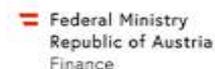
Foreword from the Mayor	3
Executive summary	4
1 Ambition & purpose of the GCAP	13
2 How the GCAP was developed	21
3 Zenica's environment today	26
3.1 Political and socio-economic context	26
3.2 Current state of the environment, infrastructure and land use	30
4 Green City vision and strategic objectives	46
4.1 Vision statement and strategic objectives	46
5 Summary of actions	50
5.1 Introduction	50
5.2 Energy and buildings	51
5.3 Blue-green infrastructure	52
5.4 Transport	53
5.5 Waste management	54
6 Delivering the GCAP	57
6.1 Roadmap to a successful GCAP	57

6.2 Action timeline	62
6.3 Financing the GCAP	66
6.4 Future benefits of the GCAP	70
7 Monitoring, Implementation, Evaluation and Verification	77
Appendix 1: Action prospectuses	83
Appendix 2: Approaches to financing	132
Endnotes	133

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Foreword from the Mayor

First of all, I would like to express my gratitude to the Federal Ministry of Finances of Austria, which, with the support of the European Bank for Reconstruction and Development, is financing the project for the development of the Green City Action Plan for the City of Zenica. I would also like to thank the City administration, all citizens of the City of Zenica, the EBRD team and the consulting consortium of PwC and ARUP, together with local consultants, for their great effort and dedication to identify all the environmental challenges Zenica is facing. This is helping Zenica produce an important action document that will certainly not be one of the documents that will collect dust in the drawers of the local administration, but will be a plan of concrete activities that will provide a business model for the sustainable development of the City of Zenica in order to attract donors for co-financing of major investments. The areas covered by this plan are: green transport, water and waste management, air quality management, renewable resources, biodiversity, spatial planning and climate change, all with the aim of improving the urban environment and the quality of human lives.

The state of the environment in Zenica is very complex. It is a City located in a valley and is heavily influenced by the ironworks, which has been the mark of the City for over 130 years. We are faced with the challenge of meeting economic needs but also with the need for a clean and healthy environment. We have already implemented several projects aimed at improving the state of the environment which I, together with my associates, am particularly proud of.

The first of these is the project to provide a new source of district heating to the City from the gases by-product of steel production and on natural gas. Realisation of this project is expected to reduce SO₂ emissions by about 4 300 t / year directly, and much more by lowering the number of homes using coal for heating. This is one of the projects that is being implemented with the assistance of the EBRD, in addition to the large project at the cantonal level, which is seeking to improve the energy efficiency of the hospital. Also, Zenica Gas Company has been formed, which offers the possibility of heating based on natural gas in suburban settlements not included in the district heating system.

The project "Waste Water Collection and Treatment" is also being carried out together with German development bank KfW. This project, in addition to the modern treatment of domestic wastewater, will deal with the separation of urban and industrial wastewaters, regular water and sewage network rehabilitation projects. The "Blue Water" project, which addresses the issue of water supply in two cantons is currently under implementation too.

More broadly, we are drafting the Air Pollution Register and the Action Plan for Energy Efficiency and Climate Change has been developed. Public lighting is being reconstructed and modernised in the form of replacement of lighting fixtures with LED lamps and network expansion. The City is also co-financing projects for improving energy efficiency in buildings, and trees are being continuously planted, especially in the industrial zone, amongst other initiatives.

So far, implementing all the above mentioned projects, we have been driven with great desire and enthusiasm, and now we have an action plan that will help us turn ideas into concrete projects that have the goal to make all think of Zenica as a green City, not as a heavy industrial City.

Another great thank you to everyone who supported and supports this vision!



Fuad Kasumović
Mayor of Zenica

Executive summary

This Green City Action Plan (GCAP) sets out Zenica's actions to achieve a '**clean, liveable and active City, resilient to future environmental pressures**'. The City has a responsibility to protect the environment and make Zenica a clean and liveable place, fostering healthy and active lives. It will be an attractive and green place to live and visit where all citizens respect and value the environment.

The selection of priority challenges for the City and the actions to address them were based on a technical assessment and a review of the political framework for the city. The review concluded that Zenica faces multiple environmental challenges and pressures on the environment and community and the GCAP includes actions by the City across them all. We have identified the following three priority environmental challenges for the city: air quality, water quality and preservation of biodiversity and ecosystems in and around the city. We have also identified the following priority pressures which affect these environmental challenges: industry, energy, water treatment and transport.

A collective effort will be made between the City, other public agencies and enforcement bodies, residents and industry, to achieve these high standards. This aspirational plan looks to **deliver eighteen key actions over the next 3-5 years** across the following four priority sectors. Each of these actions seeks to make improvements in the respective sectors in order to enhance the overall state of the environment.

- **Energy and buildings:** The City's district heating network supplies 50% of the City's heating demand but the system is old and in need of investment, refurbishment and expansion. Industries such as the ArcelorMittal Zenica steelworks are also major users of coal for energy and industrial processing. A project is underway to replace the coal-based heat source for the City and for AMZ with cleaner and lower carbon gas; the next step is to renew the heat network infrastructure to provide an efficient and well-functioning system fit for the future. Furthermore, there are opportunities to reduce overall energy consumption within the City by investing in energy efficiency measures in residential units, municipal buildings and public lighting.
- **Blue-green infrastructure:** Zenica's most pressing water problem is the lack of wastewater treatment. A wastewater treatment project for Zenica's urban sewer network has been funded and construction is expected to commence in 2020. This

investment will prevent untreated municipal sewage into water systems and enable stronger enforcement of wastewater controls by industries as well. Other challenges include a lack of proper infrastructure in mountain recreational zones, and a need to designate national heritage sites protected areas around the City.

- **Transport:** The focus of the GCAP is to improve active forms of transport since Zenica is a small City suited to this mode of transport. A focus is also on improving the bus service which is currently infrequent and equipped with old stock.
- **Spatial planning:** The plan foresees improvements in managing places for sports, recreation and other social interactions supporting the health and wellbeing of the community, as well as protecting the environment.
- **Waste management:** City waste collection is provided to only 75% of households, resulting in many illegal dumpyards that contaminate the environment and make space dirty and unappealing. Furthermore, of the waste that is collected, only 5% is recycled and the majority is directed to landfill. Increased collection and recycling rates will bring environmental benefits to the City.

GCAP Vision and Strategic Objectives

The proposed vision statement for Zenica is:

Zenica to be a clean, liveable and active City, resilient to future environmental pressures?

Zenica's vision and strategic objectives for the GCAP are centred on three core pillars (see Figure 1). Each of the pillars contains a high-level objective and a set of sub-objectives. The three pillars can be explained as follows:

- **Clean and liveable City:** Zenica will create a clean environment with a main focus on delivering clean air, land and water. The improvement in air quality will help the City achieve its goal of becoming a leading sports destination. There will also be improved public transport to minimise pollution from private car usage. The City will work to clean up contaminated land, connect all homes to the wastewater treatment

service, increase waste collection coverage and divert waste away from landfill where possible.

- **Active City:** Zenica will become a City which encourages residents to lead healthier and more active lifestyles. Specifically, more residents will be encouraged to commute using active modes of transport such as cycling and walking due to improvements in air quality and access to necessary infrastructure. Furthermore, the level of sports participation will increase at a local, regional and international level, bringing Zenica a step closer to becoming a sports City. Finally, citizens will be empowered to care for the natural environment and enjoy the recreational facilities it offers both in and around the City's urban core.
- **Resilient City:** The ambition of the City is to use natural protection measures to build resilience to risk of future natural disasters which are predicted to intensify from climate change. Examples include the development of sustainable urban drainage systems, and the protection of surrounding forests. Zenica will also become a City committed to climate change mitigation, with specific attempts to improve energy efficiency in buildings and street lighting and the efficiency of the district heating network.

In summary, completion of actions already committed along with delivery of the new actions contained in this plan will see Zenica achieve substantial improvements in air and water quality, which will reduce the risk factor for the health of the population and raise the quality of life and the attractiveness of the City to visitors, employers and residents. Action plan investments will also deliver steady improvements to the amenity and ecological value of the local environment, while improving access to green spaces, homes and workplaces through improvements to public transport, cycling and walking infrastructure. Actions directly by the City will be complemented with closer working with other agencies to improve environment regulation and enforcement, to address challenges which are not within the control or responsibility of the City. As the plan is implemented, a robust monitoring and verification plan will help to track performance and provide early indication of whether review and adjustments to the plan are needed along the way.

<i>Zenica will be a clean and liveable City</i>	SO1: Zenica will create a clean and liveable environment. This includes delivering clean air and clean water for a good quality of life.	SO1.A Improve air quality through action on industry, energy and transport
		SO1.B Encourage principles of the circular economy to divert waste from landfill
		SO1.C Ensure the whole City has a fully serviced wastewater treatment service
<i>Zenica will be an active City</i>	SO2: Residents will lead healthier and more active lifestyles. More residents will be encouraged to undertake active modes of transport in a cleaner environment.	SO2.A Increase the proportion of people using active modes of transport
		SO2.B Increase levels of sport participation and become a step closer to vision of becoming a sports City
		SO2.C Encourage citizens to enjoy and care for the natural environment
<i>Zenica will be a resilient City</i>	SO3: Zenica will become an attractive and green place to visit, with adequate resilience measures to protect against future changes to the climate	SO3.A Improve resilience of the City to extreme weather events
		SO3.B Protect green space within and around the City
		SO3.C Improve energy efficiency within buildings and the heating network

Figure 1. Strategic Objectives

The actions

The GCAP consists of eighteen core actions and a number of supporting actions across each of the four priority sectors. Each action has been designed to build on existing environmental plans and activities that the City has already undertaken, as well as aligning to the GCAP strategic objectives shown in Figure 1. The actions include a mix of capital investment programmes and projects, as well as supporting policy, legislative and regulatory measures.

The list of prioritised actions is shown in Table 1 on the adjoining page.

The plan aims to bring the following benefits to the City of Zenica

1. **Environmental:** GCAP actions have great potential to provide benefits to air and water quality and to preserve and improve biodiversity. Through the actions Zenica will become substantially cleaner and greener in synergy with actions by other parties to reduce industrial pollution.
2. **Social:** The GCAPs will improve livelihoods through investment in the City's infrastructure and buildings and increase health and wellbeing through significant improvements to air quality and the City's heating systems. The GCAP implementation itself can be the mean for greater engagement and cooperation between citizens, the City and industry as they work together on a shared vision for the City.
3. **Economic:** The GCAP actions and investments will bring significant financial savings through energy efficiency measures and will support local economic growth through measures which will increase land values, as well as will boost tourism and the local economy.

Cost estimation and financing of actions

The tables below summarise the total capital and net operating costs associated with each action. Potential financing routes for each action have also been considered, with details provided in the action prospectuses (see Appendix). Note that these cost estimates are conservative, and in some circumstances the financing sources have already been obtained or are being secured by a third party such as a municipal company or private developers. On this basis actual financing costs may be lower than the overall cost totals presented here. Furthermore, project phasing will be used to stagger these total costs over time.

Total financing requirements within the GCAP are large, but the proposed programme is a comprehensive one which will provide radical improvements for Zenica across all aspects of municipal management if enacted in its totality. Even progressing a selection of the listed

actions could still deliver major economic and wellbeing benefits for residents and strong improvement in the City's green credentials.

Overall, the City is currently constrained in its capacity to take on additional loans, with a large proportion of capital budget already allocated to existing project repayments over the next 15+ years. However, there is some scope for modest further City borrowing, including from international sources. Additionally, options will be explored around the feasibility of intragovernmental transfers, whereby the national government takes on international loans and responsibility for their repayment, making a transfer of funds to Zenica without increasing the City's debt liabilities.

Table 1. Green City Action Plan Themes

Theme	CAPEX and development costs (EUR – 2019 cost – € '000s)¹	Net (increase)/decrease in annual OPEX (EUR – 2019 cost – € '000s)
Energy & Buildings	(90,555)	2,395
Blue-Green Infrastructure	(68,341)	(1,144)
Transport & Urban Planning	(77,190)	941
Waste Management	(29,323)	(1,177)

Table 2. Green City Action Plan Actions

ID	Short-term energy and buildings actions	Strategic Objectives	Potential implementing body	CAPEX and development costs (EUR – 2019 cost – € '000s)²	Net (increase)/decrease in annual OPEX (EUR – 2019 cost – € '000s)
E.01	Renewal of Zenica's heat network infrastructure	SO1.A, SO2.B, SO3.C	City of Zenica / JP Grijanje	(62,925)	1,788
E.02	Citywide heating strategy for Zenica	SO1.A, SO3.C	City of Zenica /JP Grijanje / Toplana Zenica	(160)	N/A

E.03	Energy efficiency programmes for public and private buildings	SO1.A, SO2.B, SO3.C	City of Zenica	(22,195)	674
E.04	Public lighting programme for energy efficiency and safety	SO1.A, SO2.B, SO3.C	City of Zenica	(5,276)	(68)

<i>ID</i>	<i>Short-term blue-green infrastructure actions</i>	<i>Strategic Objectives</i>	<i>Potential implementing body</i>	<i>CAPEX and development costs (EUR – 2019 cost – € '000s)</i>	<i>Net (increase)/decrease in annual OPEX (EUR – 2019 cost – € '000s)</i>
BG.01	Wastewater collection and treatment for City centre and other community systems	SO1.C, SO2.C	City of Zenica / JP Vodovod i kanalizacija	(19,530)	(192)
BG.02	Climate change risk assessment and sustainable urban drainage systems (SUDS)	SO3.A	City of Zenica/JP Vodovod i kanalizacija	(6,880)	(86)
BG.03	Mountain protection, forest restoration and tree planting programme	SO2.C, SO3.A, SO3.B	City of Zenica / NGOs / Public Forest company of Zenica-Doboj Canton	(1,100)	(48)
BG.04	Development of sustainable recreation areas with potential cable car access	SO2.C, SO3.B	City of Zenica / Public company for management and maintenance of sport-recreational facilities in Zenica	(40,721)	(818)
BG.05	Open Space Survey and GIS mapping	SO3.B	City of Zenica / Cantonal office for Urbanism and Spatial Development	(110)	N/A

ID	Short-term transport and urban planning actions	Strategic Objectives	Potential implementing body	CAPEX and development costs (EUR – 2019 cost – €'000s)	Net (increase)/decrease in annual OPEX (EUR – 2019 cost – €'000s)
T.01	Real time bus information systems, bus route optimisation and better bus shelters	SO1.A	JP Zenicatrans	(119)	(34)
T.02	Expansion and replacement of bus fleet, with transition towards low/zero emission buses	So1.A	City of Zenica / JP Zenicatrans	(12,209)	997
T.03	Cycle lanes and cycling promotion	SO1.A, SO2.A, SO2.C	City of Zenica and relevant NGOs	(1,576)	(22)
T.04	Sustainable Urban Mobility Plan (SUMP)	SO1.A, SO2.B	City of Zenica	(260)	N/A
T.05	Bus and rail station site redevelopment	SO2.A, SO2.C	City of Zenica/ Railways of the Federation of Bosnia and Herzegovina	(63,026)	N/A

<i>ID</i>	<i>Short-term waste management actions</i>	<i>Strategic Objectives</i>	<i>Potential implementing body</i>	<i>CAPEX and development costs (EUR – 2019 cost – € '000s)</i>	<i>Net (increase)/decrease in annual OPEX (EUR – 2019 cost – € '000s)</i>
W.01	Extension of household waste collection and construction of new waste handling infrastructure	SO1.B, SO3.B	City of Zenica / ALBA Zenica d.o.o. Zenica	(8,898)	(1,136)
W.02	Sustainable waste treatment solution	SO1.A, SO1.B, SO2.B, SO3.C	City of Zenica / JP Moscanica / ALBA Zenica d.o.o. Zenica	(100)	N/A
W.03	Waste awareness campaign	SO1.B	City of Zenica / ALBA Zenica d.o.o. Zenica and NGOs	N/A	(24)
<i>ID</i>	<i>Long-term waste management actions</i>	<i>Strategic Objectives</i>	<i>Potential implementing body</i>	<i>CAPEX and development costs (EUR – 2019 cost – € '000s)</i>	<i>Net (increase)/decrease in annual OPEX (EUR – 2019 cost – € '000s)</i>
W.04	Rača industrial landfill remediation	SO1.B	City of Zenica / Arcelor Mittal	(20,325)	(17)

Putting the GCAP into practice

Once the GCAP has been approved by the City Council of Zenica it will be adopted formally by the City and its citizens. The document will be embedded into the core organisational structure and processes within relevant departments of the City of Zenica. A central coordination body will oversee the implementation of the GCAP with relevant sectors responsible for specific actions. Since many of the actions are interlinked and achieve multiple objectives, collaboration between different sections within the City administration and public companies will be key. The GCAP will also inform future policy documents for the City.

Monitoring of the GCAP will be undertaken on two levels:

- **Monitoring the implementation of the GCAP** – a coordination body will be set up to monitor the implementation of the GCAP. The coordination body will assign each

GCAP action to the responsible department or public company. Each department will be responsible for setting a budget and timescale for delivering the action and will be responsible for providing regular updates to the central coordination body. The central coordination body will compile impact-related achievements into the annual development report, accompanied with the implementation report, and present to the City Council.

- **Monitoring the impact of the Plan** – a set of metrics will be developed to monitor the impact of the GCAP, which will be reported annually. This will be used to evaluate whether the actions being delivered achieve their intended outcome and contribute to the successful delivery of the strategic objectives of the GCAP. Each indicator will be assigned to the appropriate department or agency who will have responsibility for ensuring monitoring and reporting to the central coordination body. Each action will be evaluated in relation to data collected on the indicators.

Abbreviations

AMZ	ArcelorMittal Zenica steel plant	kW	Kilowatt
BFG	Blast furnace gas	kWh	Kilowatt-hours
BiH	Bosnia & Herzegovina	LEAP	Local Environmental Action Plan
BOD	Biological oxygen demand	LED	Light emitting diode
Capex	Capital expenditure	LPG	Liquified petroleum gas
COG	Coke oven gas	MIEV	Monitoring, Implementation, Reporting and Evaluation
EBRD	European Bank for Reconstruction and Development	MWh	Megawatt-hours
EDZ	Elektrodistribucija do.o. Zenica	MSW	Municipal Solid Waste
EEA	European Environment Agency	NH ₄	Ammonium
ESIA	Environment and Social Impact Assessment	OECD	Organisation for Economic Co-operation and Development
EU	European Union	Opex	Operational expenditure
FBiH	Federation of Bosnia & Herzegovina	PAH	Polycyclic aromatic hydrocarbons
FIA FBiH	Federal Institute of Agropedology	PE	Population equivalent (a measure of wastewater pollution load)
FMET	Federal Ministry of Environment and Tourism	SECAP	Sustainable Energy and Climate Action Plan
FHI FBiH & Herzegovina	Federal Hydrometeorological Institute of the Federation of Bosnia & Herzegovina	SECO	Swiss State Secretariat for Economic Affairs
GCAP	Green City Action Plan	SUDS	Sustainable Urban Drainage Systems
GGM	Glavna Gradska Magistrala (Major Urban Highway)	WHO	World Health Organisation
GIS	Geographical Information Systems	WWTP	Wastewater treatment plant
HEIS	Hydro-Engineering Institute Sarajevo		
ICLEI	Local Governments for Sustainability		
KfW	German Development Bank (“Kredit für Wachstum”)		

Introduction

1



1 Ambition & purpose of the GCAP

1.1.1 Context

The GCAP is financed by the Federal Ministry of Finance of Austria and has been prepared with support from the European Bank for Reconstruction and Development (EBRD). It follows the GCAP methodology developed by EBRD together with expert input from the Organisation for Economic Co-operation and Development (OECD) and Local Governments for Sustainability (ICLEI). It is also in line with various international agreements and conventions aimed to counteract the worsening of the quality of environment (such as the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (UNECE Convention) or Paris Agreement) as well as in compliance with the relevant strategic documents at the regional, national federal, cantonal and City level.

1.1.2 Purpose

The purpose of the GCAP is to update and present the evidence base for identifying and determining the priority of environmental challenges Zenica faces, and to set a plan of actions to overcome them, and in doing so realise an environmentally-enhanced vision for Zenica. The GCAP will help the City of Zenica to secure investment into priority environmental infrastructure projects and to identify relevant policy actions that Zenica can implement in order to improve the quality of the environment within the City. It also delivers a comprehensive system for monitoring and verification of the Plan, and for communicating the actions and engaging with key stakeholders and the wider community.

1.1.3 Limitations

This document has been prepared using data collected according to the GCAP methodology. The results of data collection were limited by the availability of environmental data within the time available for the baseline phase of the GCAP project.

For example, certain data is not collected at all at the local and national level; recent data was not available; or data requested from stakeholders was not provided within the timing of the GCAP process.

The financial assessment of actions is an indicative cost only and is based on the information that was available at the time of estimation. As the GCAP implementation progresses a further feasibility study including detailed costings should be undertaken for each action. Similarly, the assessment of benefits from the actions was based in part on the cost estimations.

It should be noted that only actions that are under the jurisdiction of the City of Zenica have been considered. Most notably, the City does not regulate or control major industries such as ArcelorMittal Zenica. The City is committed to work with other agencies and bodies which have relevant regulatory and enforcement powers to achieve needed improvements in synergy with the GCAP actions.

1.1.4 Structure of the GCAP

The GCAP has been structured into six chapters as briefly described below:

Chapter 1: Provides an introduction to the GCAP, and presents the purpose of the plan, the overview of the structure of the GCAP and a review of how the plan aligns with other City plans and strategies.

Chapter 2: Summarises the methodology for developing the green city actions, vision and strategic objectives.

Chapter 3: Highlights key results from the findings of the technical report and the political framework report.

Chapter 4: Outlines Green City vision and strategic objectives, set out based on the findings of the baseline.

Chapter 5: Presents the Green City actions and policy measures in each of the following sectors: energy and building, blue-green infrastructure, transport and waste management.

Chapter 6: Links the actions to the strategic objectives.

Chapter 7: Presents timeline for each of the actions over the duration of the GCAP implementation period.

Chapter 8: Provides a high level financial assessment of each of the actions in terms of CAPEX and development costs and net changes to OPEX.

Chapter 9: Outlines the assessment of the benefits of actions including environmental and social benefits.

Chapter 10: Provides the guidelines for Monitoring, Reporting and Verification (MRV) and sets out the tools for measuring the effectiveness of the GCAP implementation, in relation both to actions taken and outcomes achieved.

Two Appendices are attached to this document:

- A1: Action Prospectus – describes the actions to be taken as part of the GCAP
- A2: Financial mechanisms – outlines financing mechanisms available for each action.

1.1.5 Spatial coverage of the GCAP

Zenica is located in the central part of Bosnia and Herzegovina, about 70km northwest of the national capital Sarajevo. A small City of around 111,000 people, its boundary incorporates villages and small settlements in the hills of the Dinaric Alps which enclose the river valley. It is the fourth largest City in the country, after Sarajevo, Banja Luka and Tuzla. Zenica is the administrative centre of the Zenica-Doboj Canton and accounts for approximately 30% of the total of canton's 430,000 inhabitants. The area of the City is approximately 550 km². It borders with the Republika Srpska to the north, Central Bosnia Canton to the west and with three other municipalities of the Zenica-Doboj Canton to the east, namely the municipalities of Žepče, Zavidovići and Kakanj.

Zenica has built its economy on the steel industry and was previously known as the capital of mining and metal within the former Yugoslavia. Both the steel and coal industry as well as metal processing remain a key industry within Zenica today, with the majority of steel production dominated by the ArcelorMittal Zenica (AMZ) plant at the northern end of the

City. Although this industry has been the foundation of Zenica's economy, it has also been the source of significant environmental degradation in Zenica's air, water and soils. The urban area of Zenica (Inner Zenica) is broadly characterised by a mixed use and civic core to the south and an industrial zone to the north. The industrial zone is dominated by the ArcelorMittal steel plant. Residential zones are located in and around the periphery of the City. The City benefits from the river corridor and public open space zones along the river. The GCAP and the proposed actions concern the whole area of Zenica.

Zenica is situated in the valley of the Bosna River, which has its source in is in Ilidža near Sarajevo. Zenica is surrounded by mountain ranges, which influences the air flows and can exacerbate the effects of air pollution within the valley. The mountains have also constrained and shaped the City's urban development into an elongated band of development on either side of the River Bosna.

Zenica has a mid-continental climate, characterised by warm summers and cold winters. Modest wind speeds and still weather tend to have the effect of preventing dispersion of pollutant emissions from local industry, energy generation and vehicle traffic. Global climate change from human activities is affecting the City as well. Climate change projections for Zenica-Doboj Canton indicate significant warming over the coming decades, with significant reduction in precipitation, especially in the summer months. The frequency and severity of extreme heat, drought and rainfall events is also projected to increase over this period. These future risk projections have informed the selection of actions within the GCAP.

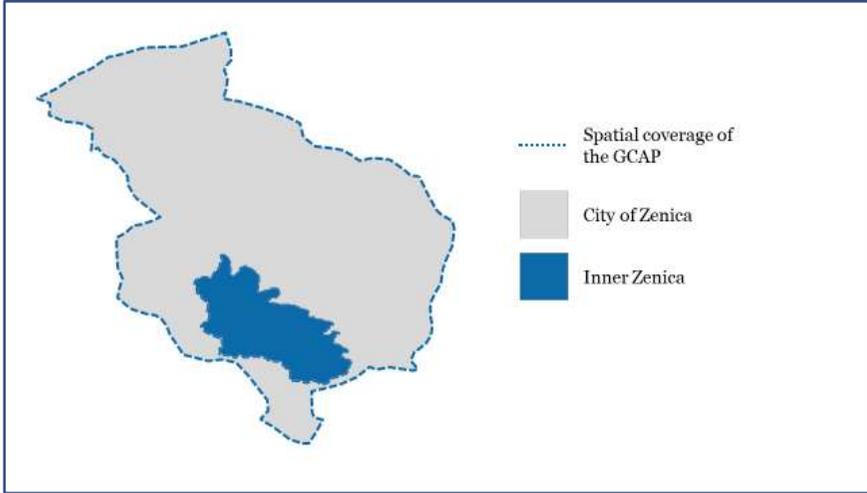


Figure 2. Map showing spatial coverage of the GCAP actions and policy measures

1.1.6 Alignment with existing plans and strategies

This section of the report gives a summary of strategic objectives from Zenica’s existing plans and strategies. It builds on the information from the Political Framework Report to map the proposed GCAP strategic objectives to Zenica’s existing plans and policies. This is a useful assessment to ensure that the GCAP’s strategic objectives are aligned and will aid in the adoption of the GCAP.

Table 3. Zenica's existing plans and strategies

<i>Zenica’s existing plan and strategy</i>	<i>Aims and objectives of the plan/strategy</i>	<i>Related GCAP strategic objectives</i>
Sustainable Energy and Climate Action Plan of the City of Zenica (Adopted October 2018)	<p>Aim to have a reduction of CO₂ emissions in the total amount of at least 40% for the period until 2030.</p> <p>The most important sectors, and the objectives that are planned to be achieved are as follows:</p> <ul style="list-style-type: none"> • Energy Efficient measures for the Public buildings; More sustainable and eco-friendly district heating system and infrastructure; Responsible and sustainable City planning system; Use of renewable energy sources for heating water; Energy efficiency of lighting • Public lightning: Improving energy efficiency of public lighting • Transport: Upgrading of the transport fleet owned by the City; Encouraging the use of bicycles as a means of transport; Upgrading of the fleet for public transport vehicles • Waste: Sanitary waste disposal and promotion of recycling • Water supply and wastewater: Improvement of the sewerage system • Energy: Increasing energy efficiency; Reducing air pollution 	<ul style="list-style-type: none"> • SO1.A Improve air quality through action on industry, energy and transport • SO1.B Encourage principles of the circular economy to divert waste from landfill • SO1.C Ensure the whole City has a fully serviced wastewater treatment service • SO3.C Improve energy efficiency within buildings and the heating network
Integrated Development Strategy of the Municipality of Zenica 2012–2022	<p>The development strategy sets out a vision that by 2022 Zenica will be a leading City that people want to live in. A City in which you want to raise your children in a safe environment, at top quality educational institution while enjoying top sports and cultural events, where you can find a good job.</p>	<ul style="list-style-type: none"> • SO1.A Improve air quality through action on industry, energy and transport • SO1.B Encourage principles of the circular economy to divert waste from landfill • SO2.B Increased levels of sport participation and step closer to vision of becoming sports City

Strategic objectives:

- Diversified economic structure through new investments, entrepreneurship research and sustainable development
- Clean air, water, soil, efficient usage of energy, sustainable waste management and sustainable environmental management
- Development of communal infrastructure and efficient public administration rendering quality and accessible health, social and other public services
- Top university and sports centre with well-established lifelong learning system and highly educated workforce

- SO2.C People enjoy and care for the natural environment

**Spatial Plan of the City of Zenica
2016-2036**

The Spatial Plan of the City of Zenica was developed with the aim to prevent the irrational use of space for purpose of the economic, social, special and environmental development of the City.

The main proposals of the Plan of can be summarised as the following:

- Construction of the remaining section of the highway in the corridor Vc through the City of Zenica, reconstruction of regional roads R473 (Enity border-Bistričak-Nemila) and R-413a (Donji Čajdraš-Stranjani-Guča Gora-Dolac na Lašvi) in order to improve the connection with Republica Srpska and Central Bosnia Canton, and construction and reconstruction of local roads passing through the City of Zenica
- Improvement of the quality of public transport services
- Construction of the second railroad Zenica –Sarajevo
- Expansion of the heat supply network in order to connect all residential and commercial buildings in the urban area and connection of densely populated urban and suburban settlements (Pišće, Broda, Rujev Do, Vardište, Trgovišće, Zukići, Krivače, Krč, Brist, Podbrežje, Tetovo)
- Implementation of energy efficiency measures in buildings
- Construction of new heating plants and heat supply pipelines

- SO1.B Encourage principles of the circular economy to divert waste from landfill
- SO1.C Ensure the whole City has a fully serviced wastewater treatment service
- SO2.A Increased proportions of people using active modes of transport
- SO3.C Improve energy efficiency within buildings and the heating network

<i>Zenica's existing plan and strategy</i>	<i>Aims and objectives of the plan/strategy</i>	<i>Related GCAP strategic objectives</i>
	<ul style="list-style-type: none"> • Construction of a WWTP, separation of the City sewage from the existing industrial main collector and construction of new collectors on both sides of the river and their connection with the WWTP • Increase of waste collection coverage, removal of illegal landfills, rehabilitation and closure of the existing City dumpsite "Side" (City update: the dumpsite is closed and site rehabilitated) • Reduction in the amount of waste for final disposal on the regional sanitary landfill "Mošćanica" by prevention of waste generation and by establishment of a separate waste collection system 	
Local Environmental Action Plan (LEAP) of the Municipality of Zenica (2009)	<p>According to LEAP, the priorities in solving environmental problems and proposed measures are divided into following fields:</p> <ul style="list-style-type: none"> • Air quality management integrated with the impact of economic activities on air quality, human health and food safety • Management, protection and use of water resources with the impact of economic activities on waters, human health and food safety • Management, protection and use of soil and forest ecosystems integrated with the impact of economic activities on soil, forest resources, agricultural land, human health and food safety • Spatial-planning management and protection of natural and cultural historical heritage • Waste management • Legal framework 	<ul style="list-style-type: none"> • SO1.A Improve air quality through action on industry, energy and transport • SO1.B Encourage principles of the circular economy to divert waste from landfill • SO1.C Ensure the whole City has a fully serviced wastewater treatment service • SO2.C People enjoy and care for the natural environment • SO3. B Protect green space within and around the City • SO3.C Improve energy efficiency within buildings and the heating network
Strategic Plan for Rural Development of the Municipality of Zenica 2012-2016	<p>Main objective of the Plan is to contribute to the balanced development of the City as a prosperous, democratic, tolerant, regionally and internationally integrated community whose stable socio-economic development is based on the principles of strong public-private partnership and sustainability.</p> <p>Three strategic objectives developed in order to achieve the aforementioned main objective, are as follows:</p>	<ul style="list-style-type: none"> • SO2.C People enjoy and care for the natural environment • SO3. B Protect green space within and around the City

<i>Zenica's existing plan and strategy</i>	<i>Aims and objectives of the plan/strategy</i>	<i>Related GCAP strategic objectives</i>
	<ul style="list-style-type: none"> • Strategic objective 1: The rural areas of the Municipality of Zenica are economically and socially revitalised • Strategic objective 2: The natural environment is valorised and sustainable management of natural resources achieved • Strategic objective 3: General conditions and quality of life are improved in the rural areas of the Municipality of Zenica 	
Waste Management Plan of the Municipality of Zenica 2011-2016	<p>Waste Management Plan of the Municipality of Zenica contains four main objectives, as follows:</p> <ul style="list-style-type: none"> • Expansion of the waste collection system coverage in the Municipality of Zenica • Gradual introduction of selective collection and recycling of waste • Removal and rehabilitation of illegal landfills in the area of the City • Raising public awareness 	<ul style="list-style-type: none"> • SO1.B Encourage principles of the circular economy to divert waste from landfill • SO2.C People enjoy and care for the natural environment



Creating the Green City Action Plan

2

2 How the GCAP was developed

2.1.1 GCAP preparation

The GCAP methodology sets out four main steps in the process as set out below. This GCAP document finalises step 2 of the methodology. It presents a summary of the results from the baseline assessment of the City and sets out the vision, strategic objectives and short-term actions for the City of Zenica.

- **Step 1 Green City Baseline:** What is the current state of the environment?

Aim: The Green City Baseline aims to inform policy and strategic decision-making at the start of the process (or the review phase for advanced local governments) and provide the reference scenario for the business-as-usual against the Green City approach and action.

- **Step 2 Green City Action Plan:** Where do we want to go as a City and how do we get there?

Aim: The GCAP compiles and presents the agreed development vision and objectives for a period of 10-15 years along with actions and targets.

- **Step 3 Green City Implementation:** How do we operationalise the plan, and what are the resources available to assist?

Aim: The Green City Implementation Plan will operationalise the Green City Action Plan, break it down into concrete tasks, allocate budget, time and staff, and monitor the contribution of each measure to the objectives and targets established in the Plan. This will include building political support for the Plan's targets and actions by linking to the City budget resources and reaching out to key government members.

- **Step 4 Green City Reporting:** What have we been able to achieve – and how?

Aim: The Green City Report will analyse successes and failures during the implementation period of 3-5 years, provide the basis for taking further political decisions and inform the Zenica City Council, stakeholders and the public on what the City has done and achieved.

2.1.2 Selecting and developing actions

A key part of the GCAP document is the identification of actions which City of Zenica will implement over the next 1-5 years. The actions within this Plan have been designed to address the challenges identified within the baselining phase and have been specifically identified from the following three activities:

- **Technical assessment of environmental indicators:** A technical assessment of a variety of state, pressure and response indicators was undertaken in accordance with the GCAP methodology. Indicators were ranked using a traffic light system and a trend analysis was undertaken to assess if the indicator was improving or worsening. The actions within the GCAP have been selected to address the worst performing indicators where there is the greatest scope for improvement in the environment to be made.
- **Political, socio-economic baseline assessment:** A baseline assessment of the political and socio-economic state of Zenica was undertaken. This analysis identified where the City has the power, ability and financial capability to implement environmental actions. It also identified key stakeholders and governing bodies responsible for different infrastructure groups.
- **Stakeholder engagement process:** Results have been collated from both the kick-off meeting and the prioritisation mission in order to ensure that stakeholder views have been expressed within the assessment of actions. The engagement process has been undertaken to verify the challenge areas and to identify where suggested actions could have the greatest impact.

Based on these three information sources a long list of current, planned and potential new actions was established in the City across the four priority sectors identified. Each of the actions was then assessed according to their ease of implementation and their relative scale of impact to create a shortlist of priority actions per priority sector.

Further details on the prioritisation of actions can be found in Chapter 5.

2.1.3 Types of actions

The types of actions listed within this document follow GCAP methodology and are either:



Figure 3. Types of actions

Some additional actions have been identified which are deemed beneficial to the implementation of the policy measures proposed in the GCAP and to support Zenica's long-term green vision. Although these actions are not provided as the actions that are core to this GCAP, they are included after the GCAP methodology within a Supporting Actions sub-section (refer to Chapter 5).

2.1.4 Long-term vision, medium-term targets and short-term actions

Within each strategic objective topic section, the overall GCAP vision was translated into a long-term vision statement reflecting the City's ambition over the next 10-15 years (i.e. 2019-2034) (refer to Chapter 4).

The long-term strategic objectives have in turn been converted to a set of medium-term (5-7 years) targets against which it will be possible to establish whether the City of Zenica is making progress towards the long-term vision. These medium-term targets have been taken directly from the GCAP methodology. GCAP indicators which align to each of the strategic objectives have been selected and the target for 'good performance' has been chosen as a target. Where Zenica's proposed targets did not align with a GCAP specific indicators, other references for the proposed target values have been identified.

Short-term actions, which are actions that the City can implement over the next 1-3 years are designed to make progress towards the medium-term targets and long-term objectives. They are set out in the form of a timeline indicating the key steps needed to enable each action to be implemented. As noted above, these actions are proposed as linked packages of measures which combine data and information gathering, policy and legislation change and capital and operational investment in the City's infrastructure and built environment.

2.1.5 Benefit assessment of actions

The actions presented in the GCAP have the potential to deliver a range of environmental, social and economic benefits to Zenica. The GCAP methodology (see Chapter 5) provides an indication of both quantified and qualitative benefits once the actions are fully delivered (see Chapter 8 for the phasing of actions).

The benefits of the GCAP actions were assessed at a high level; results are indicative only, and further technical analysis would be needed in each case to make more confident estimations of the benefits which each action can deliver. Within that overall limitation, quantified estimates of benefits were made where adequate data and evidence were available; in other cases, the benefits are described on a qualitative basis. The calculation methods for different types of benefit are described below. Unless otherwise stated, benefit estimates were quantified on annual basis as of the year when the action is planned

for completion. The benefits assessment uses the same scale of action (e.g. number of buildings retrofitted, number of trees planted) as the financial estimate.

Energy benefits: The carbon and air pollution reduction benefits resulting from building and heat network investment were calculated based on the expected thermal energy savings and the carbon dioxide³ and air pollutant⁴ emission factors of the replaced fuels. Energy consumption and infrastructure information was collected from the City's Sustainable Energy and Climate Action Plan (SECAP)⁵ and the district heating network operator, Grijanje Zenica d.o.o.⁶ System efficiencies and expected demand reductions were estimated based on comparison data from other cities. Recognising that some properties are underheated during the coldest times of the year, a "comfort taking" factor which assigned some efficiency benefits to improved comfort was applied to the energy efficiency measures in buildings.⁷ The carbon benefits resulting from the street lighting programme were calculated based on the current electricity demand of street lights,⁸ the carbon emissions factor of the Bosnian electricity grid⁹ and expected demand reductions based on comparison data from other cities.

Transport benefits: The transport sector currently lacks robust, up to date data on Zenica's transport mode shares between car, taxi, bus, rail, walking and cycling. The City's current and projected mode splits were estimated based on comparison data from other cities and observations made by the project team. Data on the proportion of cars by fuel type¹⁰ and the distribution of vehicle emissions performance (i.e. Euro standards) across the car fleet¹¹ and road transport emission factors¹² were used to calculate the expected emissions of carbon dioxide and air pollutants per kilometre. Average distances per trip were estimated based on comparison data from other cities. The estimated potential reduction in total trips made with cars and was used to calculate the benefits in terms of reduced emissions.

Waste benefits: The carbon emissions reduction resulting from the waste collection extension were calculated based on estimations of the amount of waste that is sent to unmanaged landfills¹³.

Green and blue infrastructure benefits: The potential carbon emission benefits resulting from the tree planting programme were calculated based on the estimated increase in the area covered by trees and the estimated carbon dioxide sequestration¹⁴ and air pollutant removal¹⁵ per area of tree cover.

Other benefits: In addition to the quantified benefits, other potential benefits include improved health, climate and infrastructure resilience, social inclusion, community

cohesion, air and water quality improvements, land value increases, increased wellbeing, biodiversity, reduced flood risk, economic growth and investment, mobility access to services, amenity value and many more. These benefits are described qualitatively in the benefits assessment chapter.

2.1.6 Financial and economic assessment

For each intervention shortlisted for the City, an appraisal has been made of its potential costs and sources of financing available. The core components of the assessment were:

- **Upfront capital costs:** For interventions with a capital investment element, expected costs were estimated with reference to current or recent historical benchmarks. Cost levels were tailored to Zenica when necessary, such as through adjusting price data over five years old for inflation, translating from foreign currencies and amending investment requirements to reflect relative labour costs, if an international comparison was used.
- **Upfront development costs:** For interventions with research expenditure or capitalised development costs, current and recent historical benchmarks have been used, or estimates based on standard inputs, such as local labour costs. These were also adjusted for inflation and translated from foreign currencies when local comparatives were not readily available.
- **Net change to annual operating expenditure:** For interventions with ongoing operating or other recurring costs, such as public incentive schemes, the net financial impact was estimated. This took into account the various components of each intervention, and a net position has been provided after additional costs and efficiency savings have been taken into account. Note that externalities for the wider Zenica economy have not been costed, although there will be positive externalities arising from many of the proposed interventions.
- **Financing mechanisms:** A variety of potential financing approaches were identified for the City of Zenica, and the viability of each strategy was assessed for each intervention. These mechanisms vary from large to medium-scale investment by public institutions, to medium to small-scale investment by private or part-private funding sources. The viability of introducing regulation and enforcement to bypass the need for public funding was considered as part of this assessment, whereby the cost of improvements would be absorbed by private sector landlords or businesses.

The results of these assessments are presented in 'Chapter 5: summary of actions' below. They demonstrate that the financing requirements for these diverse interventions vary greatly, but all projects proposed have at least one financing source that would be a good match. On this basis all listed interventions may be considered for financing. All are capable of being financed individually or as part of a single integrated delivery plan.

City baseline

3

3 Zenica's environment today

3.1 Political and socio-economic context

Zenica operates within economic, social, political and financial boundaries which are important to consider for the implementation of the GCAP. This section summarises these areas and lists the key opportunities and constraints for the GCAP. The conclusion for the baseline assessment is that Zenica has a strong foundation to implement the Green City Action Plan. The key messages for each analytic area are stated below and then described in more detail throughout the chapter:

1. **Local Governance:** The City of Zenica has a number of strategic and action plans (e.g. Integrated Development Strategy of the Municipality of Zenica 2012 – 2022, Draft Spatial Plan) which align with the goals of the GCAP. Integrated development strategies in Federation BiH are developed for the 10-year period (or shorter, where needed to align with the EU planning, i.e. until 2027), foreseeing revision of the documents after five years of implementation. The revision aims in validating and/or introducing necessary changes into strategic objectives, in case new circumstances have arisen. The City initiated latest revision back in 2017. However, the revised document has not been finalized and adopted by the City Council by date of this report issuance. This may be considered a policy window to integrate GCAP into revised objectives and strategic and operational plans of the City.
2. **Societal context:** There are opportunities to use the GCAP to promote the wider social agenda for the City, including the goal of becoming a leading sports City and promoting the young, highly skilled workforce to remain in the City.

3. **Economic context:** Zenica has a high proportion of heavy polluting industries within the City and the GCAP is an opportunity to work with these industries to improve the quality of the environment (e.g. air quality).
4. **City finances:** Zenica exhibits generally a sound foundation from which to establish a strong long-term fiscal position. However, implementation of the Plan will require significant investment and budgetary planning, ideally involving new sources of funding, finance and revenue leveraged by the City.

3.1.1 Local governance

Administrative structure: Bosnia and Herzegovina comprises two entities: the Federation of Bosnia and Herzegovina (FBiH), and Republika Srpska. In addition to two entities, there is the Brčko District, a multi-ethnic self-governing administrative unit. The Federation is furthermore divided into ten cantons, each with its own administrative government and relative autonomy on local issues. FBiH shares some responsibilities with cantons, such as healthcare, environmental issues, communications and transport infrastructure, social issues, tourism and natural resources. Each canton is responsible for establishing and controlling police forces, education, cultural policy, housing policy, regulating and provision of public services, regulating local land use including by zoning.

The City of Zenica is situated within the Zenica-Doboj Canton. Zenica accounts for 30.5% population of the canton which has a total population of 430,000 inhabitants¹⁶. The City is governed by the City Mayor and the City Council. The Mayor is elected by the citizens on elections every 4 years. The Council communicates and organises its function through the Council Secretary.

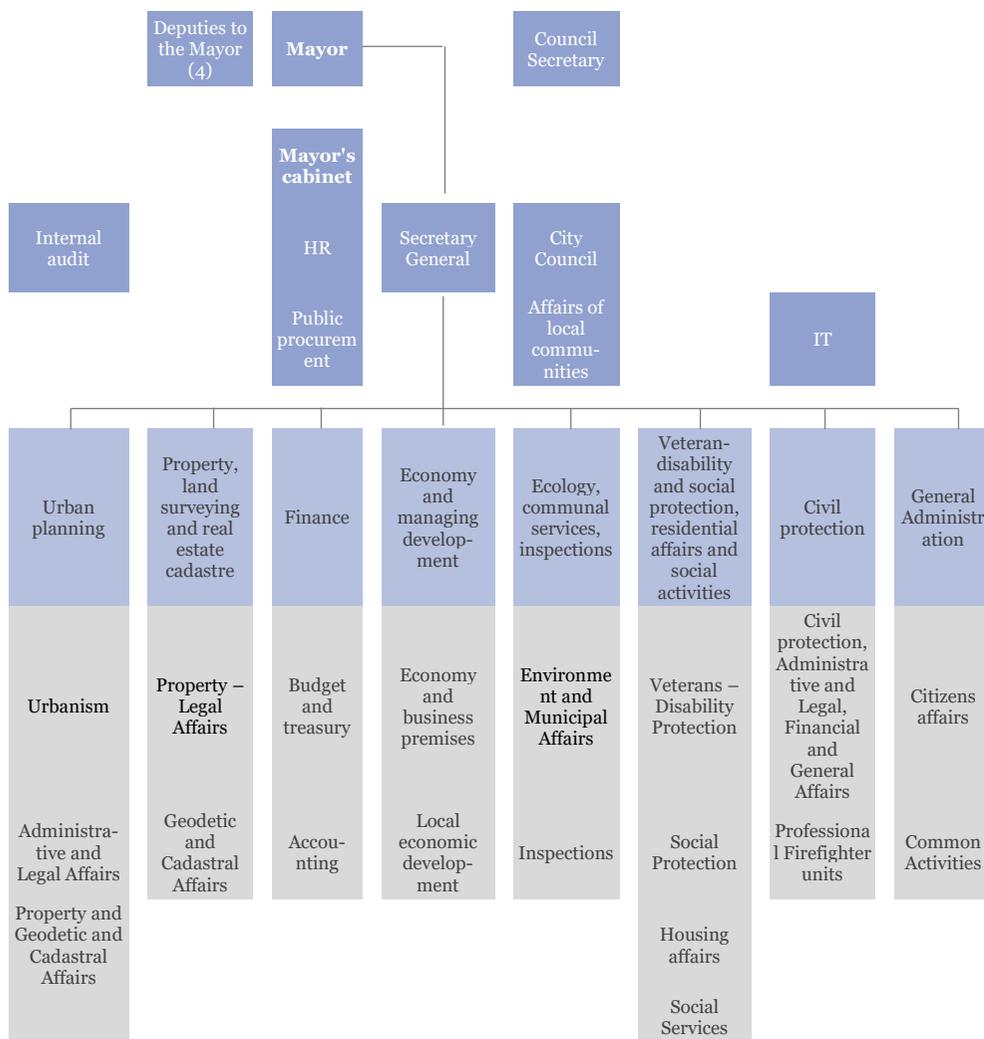


Figure 4. Division of responsibilities within Zenica City Administration

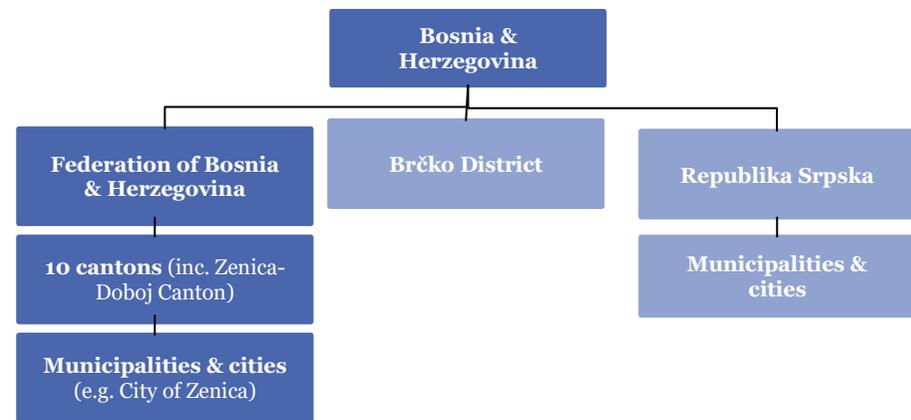


Figure 5. Structure of Bosnia and Herzegovina political system

The Unit for Local and Economic Development within the City coordinates the work of all departments on strategic management level.

Latest changes in systematization and organization of the local government introduced changes in positioning of the Unit (initially positioned within the Mayor's Cabinet), transforming the Unit into the sub-section of the Department for Economy and Development Management.

Some of the roles undertaken by the Unit are crucial in supporting the GCAP process. Planning, implementation and monitoring relate to the ability of the authority to implement development strategies, prepare respective action plans and monitor the implementation of annual plans at the departmental level. The Unit also takes an active role in proposing financing instruments (e.g. loans) and partnerships with international organisations to the Mayor.

In that regard it is highly expected that the Unit for Local and Economic Development:

- Provides support to all departments in developing annual work plans that embrace implementation of GCAP actions;
- Undertakes to coordinate implementation of actions among departments and with external stakeholders;

- Monitors implementation and notifies Mayor on any deficiencies and/or burdens in the implementation; and
- Provides support to drafting development reports and that contain information on (the level) of actions implemented.

3.1.2 Societal context

Demographics: Zenica has two key societal concerns, first of which is the City's ageing population. This is a common trend of the countries across Europe, including Bosnia and other countries in the region. In 2017, only 15.7% of the population was aged 15 or below, while the share of people over the age of 65 accounted for 13.9% of the City's population. The working age population in the City accounts for 70.5% of the total population, which is higher than in other urban areas (Sarajevo 68.8%, Mostar 68.6%, Tuzla 69.2%), whilst the FBiH average accounts for 70.4%.

Secondly, Zenica is losing its most highly skilled workforce. On an annual basis registered in-country migration from the Zenica accounts for some 0.8% of the total population of Zenica. Although this value may not seem alarming, it is worth noting that in the majority of cases highly skilled youth migrate from Zenica to Sarajevo (including commuting on a daily basis). However, majority of population commuting on daily basis, remains registered with their residence in Zenica. This phenomenon is therefore not embraced in the official statistics. At the same time migration to EU countries e.g. Germany is an increasingly common problem, and the scale of this phenomenon is very noticeable.

Youth who migrate to other places for work, typically receive better employment opportunities and conditions (service industry, IT sector, financial institutions, embassies and international organisations) and better access to social benefits and healthcare services. Poor supply of quality jobs locally and lucrative offers in Sarajevo attracts young highly skilled professionals to work in the capital and weakens local labour market demand (despite the fact that unemployment figures nominally present high numbers of unemployed with higher education). This GCAP document seeks to demonstrate how improving the state of the environment can encourage more people to remain in the City.

Access to urban services: Some 80,000 citizens (73% of total) are provided with water from the local water supply network. Furthermore, 75% of the population (26,000 households) is served by a weekly City waste collection service. The City's district heating network supplies around 50% of the City's building heating needs, with the remainder

being heating with gas, fuel oil, solid fuels and electric heating systems. The district heating network is owned and operated by Grijanje Zenica d.o.o, a City-owned enterprise which is 100% in the City's ownership. In the past three decades the central heating network has extensively expanded, with the energy for central heating being provided by a coal-based energy centre located on the ArcelorMittal site. The existing heat generation plant is ageing and is a significant contributor to air pollution in the City but it will be replaced in 2019-2020 with a new cleaner, more efficient and more reliable gas-based plant which will use gas captured from the industrial processes in the ArcelorMittal site. Public health services in Zenica are provided in the cantonal hospital and primary healthcare centres with the total number of 98 doctors working in those facilities (1.12 doctors per 1,000 citizens). In conclusion, providing better provision of basic urban services will improve public health and well-being in the City.

3.1.3 Economic context

National economic context: Bosnia and Herzegovina has a transitional economy with ongoing market reforms. In September 2007 the country became a full member of the Central European Free Trade Agreement, and the economy made progress until 2008, when the global economic crisis caused a downturn. The country's private sector is growing slowly, but foreign investment dropped sharply after 2008 and remains low.

Since 2013, Bosnia and Herzegovina has posted positive economic growth, though severe flooding hampered recovery in 2014. Currently, the top economic priorities for the country are: acceleration of integration into the EU, strengthening the fiscal system, public administration reform, WTO membership, and facilitating economic growth by fostering a dynamic, competitive private sector.

Bosnia and Herzegovina has experienced high unemployment for years, although unemployment has fallen from 25.4% in 2016 to 20.5% in 2017, mainly as a result of steady GDP annual growth above 3%, private sector development and respective increase in labour market demand. Over half of employment is within the services sector, 29.5% in industry and construction and 18.9% in agriculture, forestry and fishing.

Local economic context:¹ : Total employment in the City is 26,590, of which 15,535 or 58% is in private and public enterprises and the remaining 42% is in public administration. Average net salary amounts to 845 BAM (95% of Federation BiH average). Total reported unemployment is 20,541 or 44% of active labour force.

The economic activity in Zenica strongly depends on the large industry and public enterprises, where local private sector accounts only for 50% generated revenues and participates in total employment in industry with 53.3%. Out of total 445 million BAM exports in 2016, 83.8% is provided by ArcelorMittal. As of 31 December 2017, private ownership enterprises registered on the territory of the City, generated 785 million BAM revenue with employment of 8,287. Small businesses employ 33.4% of total with 22.5% share in total revenue, while medium enterprises' share in most indicators is between 27-37%. On the other hand, new employment, export and investment generators are large enterprises.

The economy is predominantly based on domestic trade (wholesale) and industry, accounting for more than 60% of total employment and 75% of generated revenues. The transportation and construction sector is somewhat developed as well, while tourism and catering, agriculture and ICT in aggregate account for less than 10% of total employment. Out of 1,905 registered entities, 410 are in trade (21.5%), 187 in industry (9.8%) and 92 in construction (4.8%).

Twenty local entrepreneurs in metal sector employ 554 and generate revenue of 65 million BAM, 13 wood-processing sector representatives employ 97 and generate revenue of 7 million BAM. Textile sector is represented by 11 producers that generate aggregate revenue of 21 million BAM and employ 1,010.

Local small and medium enterprises generate over 52% working places in the economy and are somewhat considered crucial for sustainable development in the future development of Zenica. On the other hand, low level of investment capacities and limited competitiveness make this sector especially vulnerable to any deviations on the market. In that regard, sensitivity analysis is provided to enlighten added value created in this sub-sector.

¹ The economy overview represents the data compiled and analysed by an expert in GCAP process. The secondary data used for the analysis are those extracted from the

The majority of mid-size local enterprises generate profit per employee below 40 thousand BAM, whereas low profitability is common among mid-size enterprises employing 30 to 100 staff.

Continued economic development is essential to improving the health and well-being of Zenica's residents and visitors. The GCAP represents an opportunity to develop actions which deliver improvements to the health and amenity of the City's environment while also supporting the local economy through indirect measures (reducing pollution) and direct measures (local investment in infrastructure and buildings and efficiency measures to improve productivity).

3.1.4 City finances

Fiscal governance: The City has control over its own municipal finance and budgetary matters. Specifically, they have responsibility for management of the following urban infrastructure elements: solid waste, water & wastewater, transport and lighting as described in chapter 3.2. All of these aspects are managed by public companies that are owned by the City, with an exception of the collection of solid waste management is undertaken through a public-private partnership. The City is responsible for maintenance of some local and regional (under cantonal jurisdiction) roads which are not under the jurisdiction of the City.

At present the City of Zenica gains approximately 60% of its budget from central transfers coming from both the Federation of Bosnia and Herzegovina and the Zenica-Doboj Canton. This revenue comes in two main forms: i) shared tax receipts and ii) transfers from the entity or canton level. The remaining budget comes from fees and charges which are primarily collected at the City level which account for 28% of the total budget. The final parts come from the sales of land and property by the City and excess expenses from the previous year's budget.

official database of financial reports for private and public entities registered on the Zenica territory (source: FIA - Financial Intermediation Agency Federation BiH)

Five recommendations are being considered to enhance the City's finance capabilities which will have significant implications for the implementation of the GCAP:

1. **Prepare budgetary and capital planning processes for the GCAP.** To prepare for this, the City should consider how it will expand its capital programme and what structural adjustments may be needed to its budgetary framework, staffing and processes.
2. **Seek expanded core funding opportunities.** The City already receives a significant portion of its budget from central allocations. The GCAP pipeline and implementation plan may provide an opportunity to expand central transfers to support the City's development. At a future date there may be access to EU funding channels which would also expand the core funding of GCAP opportunities.
3. **Reform City finances (including local revenue base and local expenditure).** Zenica already generates a reasonable local revenue accounting for some 30% of its total budget. The current budget position indicates that the City of Zenica gains 60% of its budget from fiscal transfers and shared tax receipts which are a stable source of income, while remaining 10% are vertical transfers from higher authorities relating to dedicated funds for specific purposes. In the short term, Zenica could explore expanding its fiscal base by increasing a number of its own revenue streams.
4. **Improve City creditworthiness.** Since Zenica is very close to its current borrowing limits, the City may seek to improve its credit worthiness in order to access greater levels of sustainable borrowing for sustainable urban infrastructure projects. An important element of this would be to increase its revenue base to demonstrate its ability to sustainably service its debt. This would assist Zenica in attaining a recognised credit rating, especially if it is seeking access to commercial and international grade finance.
5. **Smart, long term asset management.** The City sells land and assets to realise some of its revenue. Assets are a finite resource and can be used in a number of alternative ways and can be used to support the City financing. In some cases there will be missed opportunities to retain and utilise assets in long term productive ways, such as revenue generating activities or services. Land in particular can be invested in and the value shared via Land Value Capture (LVC) between public and private counterparts.

3.2 Current state of the environment, infrastructure and land use

This chapter summarises the findings from the baseline data collection and technical assessment stage of the GCAP development process. Together with the political and socio-economic baseline, this information provides the evidence base from which the priorities for the GCAP were identified and actions were subsequently developed.

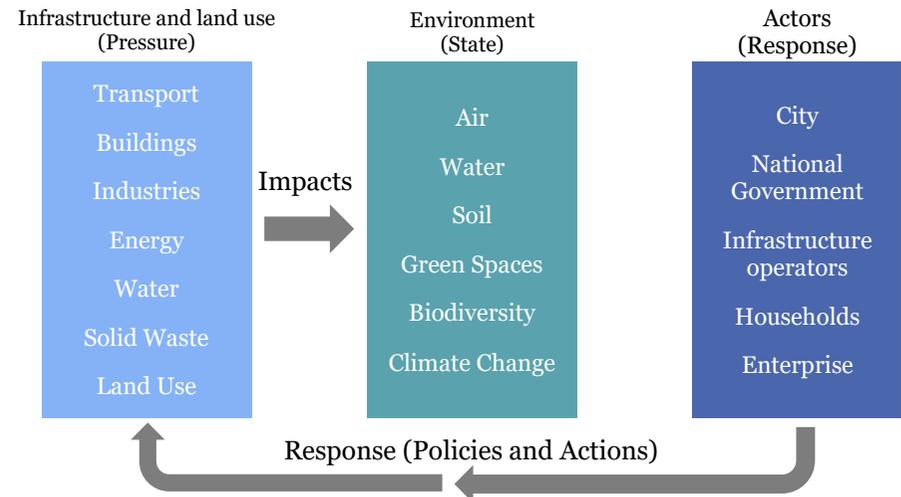


Figure 6. Structure of the GCAP Methodology Pressure-State-Response (PSR) framework

The GCAP methodology sets out a schedule of 121 benchmarked indicators which together provide an overall profile of the City's environmental and urban systems. The indicators are categorised into Pressures, States and Responses in accordance with the Pressure-State-Response framework within the GCAP Methodology (see Figure above). The Green

City Pressure-State-Response (PSR) framework recognises that human activities exert *pressures* on the urban environment and change its *state* in terms of environmental performance. It also identifies how society *responds* to these changes through policy, investment and behaviour, thus mitigating or exacerbating the pressures caused by human activities.

The purpose of these indicators is to enable the GCAP project team, working with City specialists and stakeholders, to undertake a rapid but evidence-based evaluation of the key issues and challenges for the City. The conclusions on issues and challenges provided the basis for agreeing the shortlist of key priority themes to address in the GCAP.

Data for a total of 95 indicators was collected. The data collection process intended to collect time series data from 2009 or later and over multiple locations, depending on availability. Additional quantitative data and contextual information for the GCAP indicators were obtained from a range of sources, including national, federal and cantonal government departments and agencies, the City of Zenica and utility and public service companies. Sources included published reports and data, draft information, direct email communications and consultations with relevant bodies. Where gaps in data remained at the end of the data collection period, local experts and City staff provided additional input, advice and judgement to achieve a comprehensive assessment of Zenica's key issues and challenges.

3.2.1 Environment

Air pollution is a major environmental issue in Zenica. There are three major sources of pollution – local industrial production, energy generation, and road traffic. Air quality has improved recently, but pollutant levels remain high, particularly PM₁₀ and SO₂. Climate change will put pressure on human and natural systems, with increasing frequency of heat waves, droughts and extreme rainfall events in the coming decades. Surface water quality is also a concern, with high BOD and ammonium levels in the River Bosna and the corresponding Sava River Basin, which is primarily due to upstream pollution from industry, untreated wastewater, and agricultural run-off. Biodiversity abundance levels and green infrastructure cover are adequate, however local monitoring is limited.

Air pollution

Air pollution has been a persistent environmental issue for decades in Zenica.¹⁷ Although air quality has improved over the last five years, pollutant levels remain above what the

EU and WHO consider safe limits¹⁸. Poor air quality results from a combination of local industrial production, energy generation, and road traffic.

The City currently monitors air quality from four monitoring stations located near the City centre and the industrial zone. Average annual concentrations of PM₁₀ have remained within a range of 60 to 70 µg/m³ since 2014¹⁹. This level is considerably higher than the annual EU limit of 40 µg/m³ and the WHO limit of 50 µg/m³. Average annual SO₂ concentrations are also well above the WHO limit of 50 µg/m³.²⁰

The AMZ steelworks is the dominant industrial operation in the Zenica and its proximity to residential areas makes it a major contributor to air pollution. Emissions from energy generation comes from large facilities such as the coal-based energy plant located on the AMZ site which supplies energy to the site as well as heat for the City's district heating network and is responsible for a sizeable portion of these emissions (see Industry section).

The Zenica Cantonal Hospital is the second largest polluter in the City. It is an ageing facility with its own, lignite-fired energy generation source (see Land use and buildings section).

Two current projects – which will replace the heat source for the district heating system and the heating system in the cantonal hospital – will deliver significant air pollution reduction, but there is much more than can be done.

Residents and businesses which are not connected to the City's heat network use individual heating systems supplied by biomass, coal, electricity and fuel oil, and other fuels making up 55% of heat consumption in Zenica. The use of solid fuels and fuel oil further contributes to poor air quality in Zenica (see Energy section).

Road vehicles contribute to the poor air quality levels, in particular NO₂ and PM₁₀, due to a combination of old and inefficient vehicles (see Transport section).

Existing air pollution levels has associated health risks for local people and deters residents from using active modes of transport (cycling and walking). Air quality modelling is being carried out at the Cantonal level, and AMZ has committed to fund a more detailed air quality study for Zenica, as part of its current environmental permit. The study is expected to take place in 2019-2020.²¹

Climate change

Zenica has a mid-continental climate characterised by warm summers and cold winters. Modest wind speeds and still weather can at times have the effect of preventing dispersion of pollutant emissions from local industry, energy generation and vehicle traffic.

Zenica has experienced average temperature increases of around 0.5°C from the historic baseline (1961-1990), with summer averages having increased by around 1°C.²² Climate change projections for the Zenica-Doboj Canton indicate significant warming over the coming decades.²³

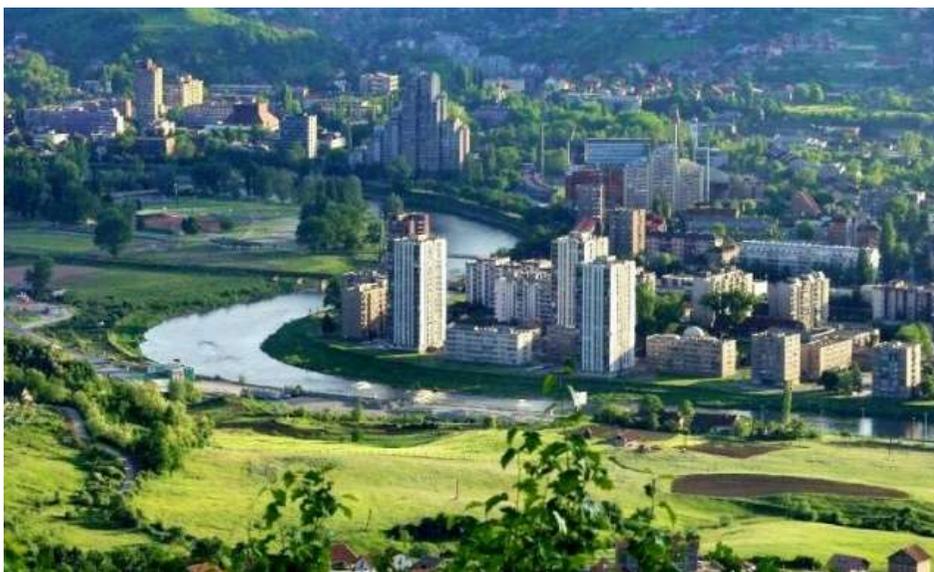


Photo 1. View of Zenica

The CO₂ emissions per capita are relatively low, however dependence on coal as the main energy source makes the carbon intensity of Zenica's economy substantial.²⁴ The City does not currently report its emissions through online disclosure platforms.

Climate change will put pressure on human and natural systems in the coming decades with projections of considerable reduction in precipitation combined with increasing frequency of extreme rainfall events, heat waves and droughts. Zenica is also exposed to

risks from natural hazards, including floods, earthquakes and landslides, based on risk exposure data for the Zenica-Doboj Canton.²⁵

The City does not currently monitor the frequency and severity of past, current and future climate risks to Zenica, including more specific data on the types, frequency and severity of climatic hazards.

In 2014, BiH was faced with the highest levels of precipitation for 120 years²⁶. This event raised awareness of the need for greater preparedness to natural disasters; however, resilience of the community and businesses to climate and natural shocks and stresses remains inadequate. The City has focused more on resilience to economic changes than physical shocks and stresses.

A UNDP project is in place to support efforts to improve the disaster risk management framework in Bosnia and Herzegovina, with a special focus on strengthening the resilience of local self-government units that are most directly affected by disasters and climate risks. However, Zenica lacks a detailed local climate change risk assessment and resilience strategy to protect its population and infrastructure from the impacts of climate change.

Surface water quality and resources

Surface water quality is a concern in Zenica, with inadequate levels of Biochemical Oxygen Demand (BOD) and ammonium in the River Bosna and Sava River system (this information refers only to rivers, not to drinking water).²⁷ The average BOD level was 3.12 mg/L and that of ammonium was 190 µg/L in 2017. The sources of water pollution include upstream pollution from industry, untreated wastewater from households, and agricultural run-off.

Most of the industrial sites and factories located upstream of the Bosna river have a wastewater treatment plant (WWTP) installed but are known to release pollution into the river due to inadequate maintenance of the plants. These industrial facilities use large volumes of water, and therefore discharge significant pollution loads.²⁸

A major issue is that there are no wastewater treatment plants installed for the treatment of municipal wastewater discharges from Zenica and the nearby municipalities Ilijaš, Breza, Vareš, Visoko and Kakanj, which end in the Bosna river or its tributaries. The only nearby wastewater treatment plant is a new plant in Sarajevo, providing water treatment to the five municipalities that comprise the City of Sarajevo. Together with agricultural

drainage and surface run-off, households that are not connected to sewage contribute to pollution in the Bosna river.

There has been significant improvement in water quality over recent years. This is likely the result of the construction of the new wastewater treatment plant in Sarajevo.

This issue is being addressed locally. Currently, they are conducting a public procurement process for construction of a wastewater treatment plant in Zenica, (see Water infrastructure section). When completed, the new plant will significantly improve the ecological status of the Bosna river.

Biodiversity and green infrastructure

The total green space surface area is estimated at 32,000 ha or 58% of the total area of Zenica.²⁹ The City has three large parks and three smaller parks making up an area of 26 ha, and six green corridors making up 19 ha. There are no notable examples of green roofs or walls.³⁰

Governance and public administration structures have fragmented responsibilities for biodiversity and green infrastructure, which must be overcome to achieve coordinated action to deliver a greener City. While parks, sports and recreational spaces are under the City's jurisdiction, park-forests and forests in urban area are under the Federation of BiH's jurisdiction, leaving insufficient space for targeted local improvement initiatives.

Biodiversity is facilitated in some areas by soft landscaping along the river corridor and inhibited in others with concrete retaining walls. Biodiversity monitoring data is available at the national level and indicates positive annual changes in bird species and woodland habitats. Reliable comprehensive local data was not available.

One of the issues is that there are no nature protected areas established within the City area. The Spatial Plan of the City of Zenica 2016-2036 which was drafted 2 years ago and adopted just recently (August 2019) recognizes the natural value of the areas and localities in the City. Since there is not enough data on these areas, the plan suggests further research based on which the protection category, baseline evaluation, nature components and exact coverage will be established. The plan suggests a designation of nature protected area with a surface of approximately 5.2ha as well as designation of other areas and localities within a range of different categories. The suggestion derived from the results of several field visits and suggestions submitted by associations and individuals. The areas mentioned are well known by hiking associations, hunting associations and individual hikers but not recognized as areas of great natural value by the wider population. The very

low level of recognition and awareness, the lack of infrastructure and difficult access to the areas, creates a situation where citizens do not use the available natural potential.

In regard to recreational zones in Zenica, the citizens currently benefit from 3 large parks within the urban zone. However, recreational zones in the surrounding area such as Bistričak, Ponihovo, Lisac, Vepar, Smetovi and Pepelari are in high need for reconstruction and improvement. Most of the areas are accessible by car and foot and citizens could benefit from making these areas even more accessible, especially when it comes to Smetovi (cable car), Bistričak (road reconstruction), Lisac (hiking trails reconstruction).

Data collection on the quality of natural capital including vegetation, natural habitats, biodiversity and ecosystem services through systematic monitoring on a GIS platform at the local level, is currently lacking.

Illegal wood cutting is an issue for the whole country, contributing to the deterioration of forested land and the endangerment of forests. Forests cover more than 60% of the land area of BiH and the financial loss is estimated as 1,084,000 BAM per year. Sustainable forestry management practices and monitoring are currently lacking in Zenica.³¹ However, the public company ŠPD of Zenica-Doboj Canton is undertaking regular tree planting activities and the City is planning to gather all relevant stakeholders from the forest sector in order to discuss the use of forests in the City as a source of biomass.

Soil quality and land degradation

Contamination of soil by harmful substances is an issue in Zenica. This includes heavy metals from its legacy of metallurgical and other industrial operations, released locally and/or dispersed over a wider area. Soil contamination has been found in six neighbourhoods located in the vicinity of the AMZ complex.³²

The City lacks a systematic approach to soil quality monitoring, with both high-level and more detailed assessments, and also lacks a registry of soil pollutants. A process of risk assessments would enable the identification of key areas of potential concern requiring further consideration in either a regulatory or a development planning context.

Due to the local geology, historic exploitation of coal and mineral resources, and deforestation, land stability is a persistent concern for Zenica.³³ However, certain improvement has been observed thanks to a national level project funded by UNDP³⁴

which has contributed to better landslide management capacity in nine cities around BiH, including Zenica.



Photo 2. View of a roundabout on the City magistrale road (GGM)

3.2.2 Transport

Roads are in good condition following recent and ongoing investments. The City reports a need for more parking, but a plan to expand parking carries the risk of attracting more road traffic. Cycling and pedestrian routes have been expanded recently but there is room for more routes that are safe and attractive, as well as other forms of support (secure parking, changing facilities etc.). The bus service is limited and infrequent, and lacks a real-time information system, although patronage is good.³⁵ More than half of cars are over 15 years old and are likely to be contributing to poor air quality.³⁶ Taxi availability is limited.³⁷

Travel data and mode split

The City lacks a complete recent dataset relating to the transport mode split for commuting and total journeys. This would provide valuable insight into behaviour and the workings of the City's transport system as well as the impact of previous transport plans and programmes.

Roads

Roads that are categorised as 'local' lie within the City of Zenica's jurisdiction and responsibility. The funding for works to regional roads are under the jurisdiction of both the Canton and in some cases the FBiH. The City receives funds from the Federation to maintain them.

Urban roads are in good condition following recent and ongoing investments. The expansion and upgrading of the City's main thoroughfare have helped to increase traffic flow, connect primary and secondary street networks, increase pedestrian safety and improve the aesthetic appearance of the City. Ongoing work on the Corridor Vc motorway is expected to decrease transport times to and within Zenica and reduce freight traffic on the City's streets.³⁸

Rural roads are known to be in poor condition and in need of reconstruction in many places. Cracks, impact holes, flood damage and landslides have all contributed to the deterioration of the quality of these roads.³⁹

Parking

Parking capacity in the City is insufficient to the number of cars now on the roads. This is most pronounced in the City centre, where all free parking spots have been converted to payable spots.

The City reports a need for more parking, of approximately 3,500-4,000 parking spaces.⁴⁰ To avoid converting green spaces such as parks into parking spaces, the City is considering increasing underground parking. However, the real challenge lies in the trade-off between improving the ratio between number of parking places on 1,000 residential units and the aim to preserve share of existing green space (having in mind limitations of the City to intervene in space managed or owned by third parties). Violation over green space against improving number of parking places may worsen the effect of urban heat island and worsen the water run-off.

Moreover, caution is advised to avoid attracting more road traffic through the increase of car parking spaces. This could have consequent implications for mode shift (from active and public transport to private road transport) and would worsen local emissions of air pollutants, noise, accidents, the urban heat island effect and water run-off, as well as compromising green spaces.

Private cars

Cars in the City tend to be old and inefficient, contributing to poor air quality, especially particulate and nitrogen emissions.⁴¹ The average age of all cars in Zenica is high, with 56% of cars more than 15 years old,⁴² while in 2009 over 70% of the cars were diesel.⁴³ In addition, 55% of vehicles meet Euro I to III, which represent the least restrictive emissions targets.⁴⁴

The City has already set out plans to introduce measures to tackle issues related to increased private vehicle use such as congestion charging, expansion of paid parking zones, and parking payment exclusions for low fuel and emission vehicles.⁴⁵ If implemented, these actions could mitigate some of the City's congestion and pollution issues, helping to shift modal share towards cleaner and healthier alternatives.

Taxis

Taxi availability is very limited with no official taxi service operating 24 hours a day. Taxi prices also vary depending on the destination. Meters are not always used and fares are often negotiated. There are also unauthorised taxi services operating in the City.⁴⁶

Public transport

Zenicatrans is responsible for delivering public transport in Zenica. Public communal enterprise Zenicatrans-prevoz putnika is responsible for delivering public transportation in Zenica. The City owns 83% of the company while the remaining 17% is distributed among small shareholders. Funding for Zenicatrans comes from ticket receipts, as well as from the City budget.

The bus service is limited and infrequent, with an average of only two buses per hour, although patronage is good.⁴⁷ The diesel-powered buses are 17 years old on average and in poor condition. They also lack a real-time information system providing reliable schedule information to users.

Improving bus services could help the City to limit the rate at which car use is increasing, offering a healthier more cost-effective means of transportation. The bus company has

very limited investment and borrowing capacity; therefore, alternative financing solutions would be needed to support demanded investments in the City's public transport system.

Information on public transport is limited and could be improved through the collection of data relating to mode share, and other metrics, such as bus use per inhabitant. This would help the City to understand how the system is used and enhance opportunities to improve infrastructure, including ticketing, and support the transition to higher efficiency modes of transport.

Walking and cycling

As a small, compact City with a relatively level topography in the urban area, Zenica is well placed to increase walking and cycling rates.

Cycling infrastructure has improved greatly in the past year in Zenica, moving from a provision of 60m² of cycle parking in 2017 to 210m² in 2018. There are now 10km of cycle lanes in the City, which represents good progress but leaves more room for improvement.⁴⁸



Photo 3. Putting the finishing touch on Zenica's new cycle lanes

Cycling is growing in Zenica and a number of events and organisations have emerged to promote it. In November 2018, for example a project to build cycle and pedestrian paths was initiated in Blatuša. There are also a number of shops selling and repairing bikes in the City. The increased provision for cycle parking demonstrates a positive increase in bicycle use. There is a possibility for expanding bicycle rental in the City, and to increase the number of bicycles and parking locations.

There is room for more routes that are safe and attractive, as well as other forms of support (secure parking, changing facilities etc).⁴⁹

3.2.3 Land use and buildings

Introduction

Zenica is low-density City as a whole, although the City has a dense urban core.⁵⁰ The Spatial plan aims to improve the provision of public and retail services through a

consolidation of the number of separate local communities and improve transportation and communication links from the outlying communities to the urban City centre.

Urban development generally occurs on existing urban land rather than greenfield land.⁵¹ However, the City also has several vacant or underused sites with potential suitability for redevelopment.

Many public buildings are in need of investment for repair, energy efficiency and improved services,⁵² although a major project to renovate the Zenica Cantonal Hospital has been signed, with support from the EBRD.

Land use

Zenica has a low population density of 200 inh./km² in its entire municipal area, although the City has a denser urban core of 2000 inh./km².⁵³ The City's Spatial Plan supports the area's polycentric system of settlements, which is intended to prevent excessive coalescence of settlements or fragmentation of local communities.⁵⁴

Urban development occurs on existing urban land rather than greenfield land⁵⁵. There are several vacant or underused sites with potential suitability for redevelopment. Accurate data on such sites is lacking and would be valuable for the City to assess and promote regeneration opportunities with developers and funders.

The bus railway interchange requires improvement,⁵⁶ and the adjacent sites appear to offer a significant opportunity for a major mixed-use redevelopment site which could be designed around walking, cycling and public transport.

There is potential for the City to collect more land use data, for example data related to commuting, access to everyday services, and building growth and vacancy rates. The City does not currently store data on a GIS platform, which would provide a much stronger platform for data collection and management to inform both long term and day to day decision making about the City.

Buildings

Many of Zenica's public buildings including the university, schools, healthcare, sports and recreational facilities are in need of investment for repair, energy efficiency and improved services. The City is responsible for some school buildings but many of these public buildings are owned and controlled by the Cantonal Authority.

Some investments have been made to the energy efficiency and comfort of schools. For example, the kindergarten "Pinokio" was renovated under a UNDP programme with

302,000 KM funding from the Government of Sweden, the City of Zenica and the Environmental Fund of the Federation of BiH to renovate and provide energy efficiency improvements to kindergarten buildings.

Zenica is the proud home of the national football team for both training and matches. The City plans to further expand the sports and recreational facilities as well as develop open recreational green areas⁵⁷.

A major project to renovate the Zenica Cantonal Hospital has been signed, with support from the EBRD, to deliver energy efficiency and air quality improvements. The Zenica Hospital is the second largest source of pollution in the City. It is an ageing facility with its own, lignite coal-fired energy generation source. The hospital also lacks proper ventilation and air conditioning. Thermal comfort is consequently poor in both winter and summer⁵⁸.

The EBRD-funded project envisages both supply and demand side energy efficiency improvements, including a connection to the gas network (until which the primary fuel will be LPG), modern ventilation and cooling system with air-conditioning chambers with an exhaust air heat recovery system, as well as construction of an energy efficient extension of the hospital of ca. 2,800 m². The project is foreseen to reduce the final energy demand by 47% compared to the current situation. The project will also provide the hospital with new floorspace and equipment, and provide much needed repairs, including removing asbestos sheets and preventing basement flooding.⁵⁹

Commercial land use zones were established within the boundaries of the urban part of the City and as separate zones outside the urban areas in the Spatial Plan. The existing economic zones in the City cover 450ha, while planned new economic zones will require 155ha. Most of the economic zones are planned for small and medium enterprises (SMEs) mostly in the south and heavy industry, energy and production purposes in the north. Other complementary activities for recreation, business and leisure are also planned in the north of Zenica.

The Spatial Plan requires detailed urban planning for each zone with a list of standards for optimal planning and requirements for environment protection.

There is no official statistics about the state of facilities. From 2018 UNDP ran a project that aimed to assess quality of facilities and potential of energy efficiency measures. Several buildings (elementary schools, university buildings) have undergone detailed 6-months measurements, but these data are not publicly available.

3.2.4 Industry

Zenica is an industrial City, and while industrial facilities are a source of employment, they are also a source of pollution and waste in the City. The ArcelorMittal Zenica steelworks has a mixed record of addressing the environmental impacts of its operations in Zenica. With the agreement in place of an environmental permit for the facility, the City expects that environmental management on the site will improve and that enforcement of environmental controls will become more effective.⁶⁰

Pollution from industrial wastewater in the area constitutes at least four times that coming from households. Industrial waste is also a persistent challenge for the City. The major industrial landfill Rača requires remediation.

Governance

Although Zenica is host to many industrial facilities, major industries such as AMZ are regulated at the Federal level while other facilities are regulated at Cantonal level.⁶¹ The City's regulatory power over major industrial operations is therefore limited. However, the City will continue to work with relevant agencies to achieve the enforcement of environmental regulations and the delivery of commitments for environmental investments and management practices made by AMZ and other operators under their environmental permits.

Air pollution

Industrial facilities are a major source of employment but also of pollution, and a major producer of waste in the City. The AMZ steelworks has a mixed record of addressing the environmental impacts of its operations in Zenica.⁶²

AMZ has invested over EUR 154 million to modernise its equipment since 2004, of which EUR 39 million has been invested on environmental performance improvements. The company created a stakeholder engagement plan in 2014 to explore and respond to the social and environmental challenges that the company faces.

The prospect for future action appears to be improving through a new environmental permit and improved reporting processes.⁶³ AMZ's most recent environmental permit issued in 2017 places over 100 obligations for improvements to the site. These will improve energy efficiency and significantly reduce pollutant emissions to air and water.⁶⁴



Photo 3. View across the ArcelorMittal Zenica facility

AMZ's environmental monitoring report issued in January 2019 indicates that AMZ has initiated 40 measures, out of which 23 are completed. AMZ predicts reductions of PM_{2.5} and PM₁₀ emissions by 55%, SO₂ emissions by 73% and NO₂ emissions by 20% once all measures have been implemented by the end of 2020.

In addition, the joint Zenica and ArcelorMittal project "Toplana Zenica" will entail the replacement of the coal-fired district heating energy centre with new gas-fired plant using a combination of captured coking gas from the steelworks and natural gas from the nearby pipeline. These changes will bring dramatic reductions to air and water pollutant emissions from the ArcelorMittal site. Air quality will be improved by the double effect of displacing coal and combusting the coking gas which today is released to the atmosphere. Water quality will be improved by avoiding the creation and disposal of coal ash which has historically found its way into the region's surface water system. Other key measures include secondary dedusting of convertors, installation of hybrid filters in the agglomeration plant and continuous air pollution monitoring. The primary focus of AMZ will be on reducing PM_{2.5}, PM₁₀ and SO₂ emissions, since 41% of these emissions derive from the agglomeration plant and 25% from the coal-based energy plant on the AMZ site.

Energy efficiency

The City plays an important role to support investment in energy efficiency through stakeholder engagement coupled with targeted funding.⁶⁵ The Toplana Zenica project is a flagship example.

Toplana Zenica is a joint venture between AMZ - the main offtaker (50%), the main equipment provider KPA Unicon (Finland, 15%), Finnfund (development fund of the Finnish government, 15%) and the City of Zenica (20%), with support from EBRD. The project will entail the replacement of all outdated, coal-based steam boilers with a new cleaner, more efficient and more reliable energy centre.

The coal-based energy plant on the AMZ site supplies energy to the site as well as heat for the City's district heating network, and as previously noted is responsible for 25% of pollutant emissions from the steelworks.

The current coal-based energy plant has a rated capacity of 174MW but its actual output is limited to around 58MW. This output is insufficient to meet the peak heating needs of the district heating system, resulting in underheating of some properties during cold periods, especially in the upper floors of apartment buildings.

The Toplana Zenica project will replace this plant with modern units fully using recovery gases from the steelworks, topped up with natural gas. The rated output of the new plant will be 112.5 MW, of which up to 60MW will be used to heat the city during the winter. The project is expected to deliver dramatic reductions in air pollutant emissions of 209 tPM_{2.5}/year, 3166 tNO₂/year and 356 tSO₂/year.⁶⁶ Operations are planned to start by the 2020-2021 heating season.

Water consumption and wastewater

Industrial water consumption currently constitutes a relatively high 27% of total urban water consumption, though this appears to be gradually reducing.⁶⁷

Pollution from industrial wastewater in Zenica is 639,000 population equivalent (PE), which constitutes over four times that coming from households.⁶⁸ Most of these industrial facilities have a wastewater treatment plant (WWTP) installed, but occasionally these do not sufficiently treat the water due to inadequate maintenance. These industrial facilities use large amounts of water, and therefore discharge significant pollution loads. The City initiated procurement and instalment of collectors that are meant to separate wastewaters generated by households from industrial wastewater (financed by KfW). This is believed

to key cornerstone to deal with industrial wastewater in an effective manner by applying the “polluter pay” principle.

AMZ has four wastewater discharge points into the river Bosna. Wastewater pollution from AMZ is 300,000 PE.⁶⁹ By implementing the Toplana Zenica project (see section above), the PE value is expected to decrease to around 160,000. The reduction in PE is mainly caused by the substitution of coal with the process gases from the steelworks.

Industrial waste management

Industrial waste is a persistent challenge for the City, but is regulated on the Federal level.

The Rača industrial landfill is in operation since the 1950s and requires remediation. It is owned by the City of Zenica. AMZ disposes of its industrial waste at the landfill but has no obligation to work on its rehabilitation. Currently, companies Sahva Company d.o.o Zenica and Quorum d.o.o Zenica organised in a consortium are exploiting resources from Rača.

In 2014, the City of Zenica financed the development of the Plan for Adjustment and Rehabilitation with Corrective Measures for the Industrial Landfill Rača in Zenica. The plan was supposed to be implemented over the period from 2014 to 2024 but the Plan has not been adopted by AMZ, and activities foreseen in this plan have not been implemented. Action on the plan is stalled due to an unresolved property dispute on the site.⁷⁰

The City of Zenica is actively working to solving this property problem, with the aim of defining the legal owner of the site and then working to complete the agreement to implement the plan for remediation.

3.2.5 Energy

The City’s district heating network supplies 45% of the City’s heating demand but the system is very old and in need of investment, refurbishment and expansion. The heat source for the network will be renewed under the Toplana Zenica project at the AMZ site. Plans are also underway to establish a network of natural gas in the City. Half of buildings use solid fuels or fuel oil for heating, which contributes significantly to Zenica’s poor air quality. Influencing residents to switch to cleaner heating is a key challenge. The largest consumers of energy in the building sector are residential units. Renewable energy makes up less than 1% of the total electricity supply in Zenica.⁷¹ In Federation BiH the overall authority responsible for regulating the energy sector is primarily embodied on the entity

level, whereas cantons have authority to align policies with the regulatory framework on entity level. However, in contrast to Republika Srpska, Federation BiH entity government does not have law on market competition over gas distribution service nor a law on thermal energy.

Electricity system

Zenica receives its electricity from the national electricity grid, which is supplied mainly by coal (65%) and hydro (35%). Elektroprivreda BiH d.d, a public enterprise owned by the FBiH, is responsible for electricity transmission and distribution while Elektrodistribucija Zenica, also owned by FBiH, provides electricity to Zenica. The City requires approval from the Federation to install new capacity of power infrastructure. Zenica has an adequate electricity supply with 99% of the population having an authorised connection.⁷²

Two mini-hydro renewable power plants are installed in the City. Čajdraš, a 485kW plant, is publicly owned and Bistričak, a 940kW plant, is privately owned. Together these make up less than 1% of the total electricity supply in Zenica.



Photo 4. Zenica residential buildings at night

Two new hydropower plants had been planned for installation in Vranduk and Kasapovići. However, the Vranduk hydropower plant will not be constructed since the contract was cancelled due to an increase in the projected cost by up to EUR 12 million.⁷³

The City has no other renewable electricity generation, except for a small number of solar powered parking ticket machines. As an additional source of electricity, the installation of solar panels on building roofs is also planned by the City.⁷⁴ The City does not produce energy from waste and does not use geothermal energy.

District heating

A district heating system has been operating in Zenica since 1967 and covers almost the entire urban area of the City, as well as some suburbs. The City's district heating network covers 50% of the population in Zenica and supplies 45% of the City's heating demand (approximately 13,600 residential households and 69,000m² of commercial customers).⁷⁵ The system is old and in need of investment, refurbishment and expansion. The network's

heat source is supplied by the coal-based energy plant on the AMZ site which will be renewed under the Toplana Zenica project (see Industry section).

Large system losses and insufficient heat supply have led to undersupply of heating during peak cold periods, exacerbated by poor thermal insulation in buildings and pipe networks.⁷⁶ New buildings are required to have a metered supply with thermostatic controls, however existing older buildings typically have no controls and are less energy efficient, causing underheating in upper floors and overheating in lower floors.

Where a building is metered, customers are charged a share of the building's consumption based on their property's floorspace. In non-metered buildings, charges are based on the floorspace of the property.⁷⁷

The declining quality and relatively high cost of the service, caused by the inefficient heat supply and system losses, have led a third of the customers to disconnect from the district heating network from a 1991 baseline. This has led to an increase in freeriding by passive consumers, i.e. where property owners in multi-dwelling buildings receive but do not pay for heat from adjacent properties or pipes passing through their properties.⁷⁸

Disconnections are made possible because there is no legislation preventing customers from disconnecting. Tariff structures which lack a standing charge element undermine the company's revenue base. Under the Toplana Zenica project, the cost of heat for the district heating company will be reduced, enabling JP Grijanje Zenica to make greater investments in pipe renewal and/or to provide reduced heat prices to customers.

A separate, small heat network operates in Nemila, in the northern part of Zenica. The system is powered by a 3MW biomass boiler. According to the report of the district heating company the biomass plant provides inconsistent performance and there is little appetite to expand the use of biomass for district heating.

The district heating company has developed a strategy for the renewal, restoration and expansion of the network.⁷⁹ The first part of the strategy is the new energy plant to be constructed on the ArcelorMittal site. The second part of the strategy would be the renewal of the network. The third part of the strategy is to extend the network to previously served parts of the City.

Further balancing of demand and supply could come from a programme of building retrofit coupled with network expansion. The company states that its full plans for expansion cannot be delivered without additional heat generation. The leading choices for major new generation appear to be gas or Energy from Waste (EfW), with industrial

waste heat from the AMZ facility and solar thermal offering interesting complementary options. These options require further assessment to confirm the optimal strategy for the City and to confirm whether there is a business case for investment.

Gas network

The City of Zenica established the public enterprise Zenicagas d.o.o Zenica to set up a network of natural gas in the City. This will enable the parts of the City lacking a district heating connection to be provided with natural gas as a fuel for heating and cooking.

Gas is a cleaner and lower carbon heating fuel than coal and the gas pipeline is planned to cover parts of the City that are not now covered by district heating network. Expanding gas dependency could also expose the City to supply risks; the region has experience in the past of supply interruptions from Russian gas.^{80,81}

Any decision to invest further in new gas infrastructure should only be taken after technical and environmental assessment of other options, including longer term options for low to zero carbon energy systems.⁸²

Solid fuels

Around 45% of heat consumption in Zenica is supplied by the district heating system, while the remaining 55% is supplied by individual heat systems. Firewood is the most common heating source with a share of 30% in energy consumption. It is estimated that coal provides a significant source of heat with a share of 19%, while electricity and fuel oil supply only 5% and 1% respectively.⁸³

Usage of solid fuels for heating in residential apartment buildings is very rare, while half of households in private houses use some solid fuels or oil for heating. This is the case even in some urban areas due to significant portion of disconnections from the network, but also due to poor implementation of network extension measures in the post-war period (illustratively, many private houses in Mokusnice area installed heaters, but the initial plan to extend the network has never been implemented). There is no law restricting the use of solid fuels, nor any way to prevent customers disconnecting from the district heating network.⁸⁴

Renewable energy and energy efficiency

More than 80% of the energy consumed in the urban part of Zenica is in the building sector (excluding industrial plants). The largest energy consumers in the building sector are residential units.⁸⁵ Industry is also a major energy user.

A large part of the housing stock of the City consists of energy inefficient houses, which need to be insulated, together with the introduction of environmentally friendly materials, heating and cooling systems and recuperation based on circular economy principles.

The City has made efforts to conduct awareness campaigns to promote renewable energy technologies and energy efficiency. However, the City reports a need for further action including fiscal incentives to facilitate responsible green comprehensive measures the installation of heating, ventilation and air conditioning (HVAC) systems, solar systems for hot water and heating and replacing existing lighting with energy efficient light bulbs all in line with principles of circular economy and green procurement.⁸⁶

One major building energy efficiency project is the Zenica Cantonal Hospital renewal project, which is being delivered with support from EBRD (see Land use and buildings section).⁸⁷

Public lighting

The current system of public lighting is largely obsolete and mostly made of high-pressure sodium lamps. There are 8516 street lamps in the City, 85% of which are sodium lamps, 13% are mercury lamps, 1% are metal halide lamps, and only 1% are LED lamps. At 18%, energy consumption from street lighting is extremely high compared to other cities, and needs to be remedied.

In 2014, the City's local regional planning and development agency initiated a project to reconstruct and modernise public lighting in urban areas (24 streets) and suburban areas (65 villages and suburban areas of the City). The selection of locations was based on analysis of the age of luminaires (over 20 years), frequency of malfunction and electricity consumption. Around 60% of this project was completed in 2014.

The City has plans to improve energy efficiency of lighting by replacing existing infrastructure with more efficient LED light fixtures. The City has confirmed that at the time of writing, a citywide public lighting contract is being procured.⁸⁸

3.2.6 Water infrastructure

Zenica's water quality and supply are considered adequate for households served by the main water supply network. However, customers on smaller networks experience a less reliable, lower quality service. Non-revenue water has seen a steady reduction since 2009 and has remained below 30% for the past four years.⁸⁹ The Plava Voda Project will

improve pre-treatment processes and ensure reliable water supply. Zenica's most pressing water challenge is the complete lack of wastewater treatment. Wastewater in the City is collected by sewers and discharged directly into the Bosna river with no treatment. A wastewater treatment project has been funded and construction will commence in 2020.

Governance

The City is responsible for water and wastewater management. This is managed by Vodovod i Kanalizacija (ViK) Zenica, a water utility company that is 100% owned by the City. ViK charges fees for water and wastewater services and is a profitable enterprise. The City does contribute funding for capital and maintenance projects of water infrastructure.

Water supply

Zenica generally has an adequate quality and supply of water of 24 hours a day. It is reported that households served by the main water supply network have experienced no interruptions in service as far back as 2009.⁹⁰ However, customers on smaller networks experience a less reliable, lower quality service. Approximately 30% of Zenica's population is served by local water supply systems not connected to the main network of the City.⁹¹ Of these, around one third do not have a good quality of water or are not well covered by the monitoring.

The existing water system is old, sections being on average more than 30 years old with some sections 40-50 years old. The proportion of non-revenue water due to losses and non-billable consumption has seen a steady reduction since 2009 and has remained below 30% for the past four years, thanks to active monitoring and control of leakages with onsite measurements.⁹² The water supply company Vodovod i Kanalizacija has achieved the best result in terms of the reduction of leakages among all water supply management companies in Bosnia and Herzegovina.⁹³

The national Water Exploitation Index is low - it has had a maximal value of 2.9% in 2011 for the past 10 years, indicating that water consumption is low relative to the available resources.⁹⁴

The long-term plan of ViK is to reconstruct the entire water supply network. The City has recently invested in a major infrastructure project to improve Zenica's drinking water supply, called the Plava Voda Project. This aims to improve pre-treatment processes and ensure reliable and long-term water supply for Zenica.⁹⁵

The proposed project has a total estimated cost of EUR 30 million, supported with funding from Swedish International Development Cooperation Agency (Sida). The scope will cover following works and services: construction of water intake structures at the Plava Voda spring, together with a chlorination station in Travnik; construction of a main pipeline about 33 kilometres long, from the spring in Travnik to the main reservoir Putovići in Zenica; and construction supervision for the Regional Water Supply Project.

The primary water supply source in Zenica is the Kruščica system which has a rated supply capacity of 520 l/s, although at 95% levels of assurance has a yield of 300 l/s. The proposed Plava Voda Regional Water Supply System will result in an additional 350 l/s being made available to Zenica. Improvement in the water supply will improve the coverage of the population with a stable drinking water supply.

Water consumption and conservation

Water consumption was 147 l/day/capita in 2017,⁹⁶ an adequate level, however water meters in residential buildings tend to be installed per building rather than per flat, which does not encourage water conservation. The City and NGOs organise awareness campaigns to encourage water saving and reuse, though these have had limited impact so far.

Wastewater treatment and disposal

Zenica's most pressing water problem is the complete lack of wastewater treatment. At present there is no provision for wastewater treatment in the City, and wastewater is discharged directly into the Bosna River with no treatment. This has led to relatively high concentrations of water pollutants such as Biochemical Oxygen Demand (BOD) and ammonium in the River Bosna and Sava River system (see Environment section).

A wastewater treatment project has been funded and construction will commence in 2020. With a total of EUR 18.25 million in support from the Swiss State Secretariat for Economic Affairs (SECO) and the German development bank KfW and EUR 1 million secured by the City of Zenica, the project will connect the existing sewer network with a new collection system and wastewater treatment plant (WWTP).⁹⁷ In order to secure a sustainable WWTP operation, the City has obtained written confirmation from the coal mine and AMZ to connect to the WWTP, which will enable the service provider to charge the coal mine and AMZ against the treatment of their wastewater, based on the quantity of water discharged. Construction is planned to begin in 2020.

By separating communal wastewater discharge and treatment from industrial discharges, the project will clarify responsibilities over City and industrial wastewater flows and enable AMZ to implement its own planned improvements to manage and treat its wastewater.

While the project will provide an appropriate urban wastewater management system for the main part of the City, a treatment solution is still needed for the remaining communities not connected to the main sewer network.

Surface water and flood risk

The City experienced major flooding in 2014, illustrating the exposure of the City to flooding and landslides.⁹⁸ A joint report by the UN, EU, World Bank and Government of BiH prepared shortly after the flood event estimated the total economic impact of the disaster to have been around EUR 2.04 billion, or 15% of the country's GDP.⁹⁹

Climate change is expected to increase the frequency of extreme flood events. Preparation is important to reduce the impacts when the next event occurs, through both physical measures and human systems, including risk assessment and planning procedures.

On 10 March 2015, the Zenica-Doboj Canton adopted its Response to Flood Operational Plan, determining measures to respond to flooding and ice. The City has initiated a number of preparation and response measures.

3.2.7 Solid waste

The quantity of municipal waste generated per capita in Zenica is increasing. Municipal waste collection is provided to only 75% of households.¹⁰⁰ The City is negotiating with the waste operator to expand the service. The City's recycling rate is low at only 5%.¹⁰¹ Public recycling facilities are considered to be insufficient for the number of residents. The City's landfill site has only one remaining year of service life and urgently needs to be extended. A request to extend this facility has been made by the City's landfill operator. More than 270 illegal dumping sites have been identified¹⁰² and though plans are underway to clean them up, dumping is reported to continue due to the lack of a weekly collection service among some communities.

Generation of solid waste

The quantity of waste generated per capita in the City of Zenica is increasing. However, while solid waste (MSW) generation per capita has steadily increased since 2012 (from

206 to 252 kg/capita/year in 2017), this remains relatively low by comparison with other cities.¹⁰³

Waste composition data for the City is high level and dates from 2009. The City would benefit from detailed analysis of MSW composition carried out regularly every 1-2 years to inform the design of new collection and treatment systems.

The City has sought to raise awareness on waste management through educational campaigns on reducing material consumption and increasing recycling; however, activities planned were not implemented and these measures have not sufficiently addressed the problem.

Collection of solid waste

City waste collection, recycling and disposal are carried out under a contract with ALBA Zenica d.o.o. Zenica, a public-private partnership owned by the City (25%) and ALBA Group (75%). City waste collection is provided to only 75% of households. The City renewed contract with ALBA Group and ALBA Zenica d.o.o. Zenica for a duration of 20 years that will stipulate increasing the waste collection coverage from 75% to 100%.

The City's recycling rate is only 5%, which is considered low. Under the new contract being negotiated with ALBA Group, the City is seeking to agree a target of 100% coverage by 2020 and 50% recycling rate by 2024.¹⁰⁴

There is no separate household collection service for dry recyclable material, but Alba provides large recycling bins at around twenty locations where residents can separately dispose of plastic, paper/cardboard and metal cans. The number of deposit locations is considered to be insufficient for the number of residents in the City. More deposit stations, located closer to homes, could help increase recycling rates in the City.

Material efficiency and waste recycling is neither regulated nor incentivised through fiscal instruments. Increased education and awareness are also needed to promote sorting and recycling and minimise illegal dumping.¹⁰⁵ For example, the City has had previous problems with the rubbish dumping at children's playgrounds on Kamberovic Polje and at the Smetovi excursion site.

Payment for waste collection services is currently a flat rate based on the area of the property rather than on the amount of waste produced. This results in a lack of incentive for citizens to produce less residual waste and recycle more.



Photo 5. Recycling bins in a residential area

Treatment and disposal of solid waste

In 2014, approximately 93% of MSW was disposed of at the Moščanica landfill with the remaining 7% assumed to be littered, burned or dumped in unregistered disposal sites.¹⁰⁶

The landfill site has only one remaining year of service life and urgently needs to be extended. A request to extend this facility has been made by the City's landfill operator but financing has not yet been secured.¹⁰⁷

Capacity for waste separation and recycling in the City are limited and there are no solid waste treatment or disposal plants processing solid waste generated in the City. No City-wide critical waste asset assessment has been performed. The establishment of a regional centre for waste management was foreseen within the Waste Management Plan for the Zenica-Doboj Canton but has not yet been established.¹⁰⁸

More than 270 illegal dumping sites have been identified across the City and though plans are underway to clean them up, dumping is reported to continue. Illegal dumping occurs in part because some communities do not have a weekly waste collection service.¹⁰⁹ The existing penalty mechanism for the non-compliant disposal of waste does not function very well, firstly because they are not high enough. Secondly there is currently no law for indirect proof (e.g. photographs taken by citizens) to be taken into account for proving illegal waste dumping. Improvement of the penalty mechanism (higher penalty and police change) could lead to a higher effectiveness of the City's waste management system.

The new contract between the City and ALBA Group will stipulate two key activities relevant for treatment and disposal of solid waste: establishing the centre for waste management and selective waste collection establishing. The contract also encompasses establishing of GIS database (data on public green space, City roads, communal infrastructure and number of users).

Green City vision and strategic objectives

4



4 Green City vision and strategic objectives

4.1 Vision statement and strategic objectives

The proposed Vision Statement for the Zenica GCAP is:

‘Zenica will be a clean, liveable and active City, resilient to future environmental pressures’

This vision emerged from analysis and discussion on the City’s key environmental challenges and aspirations, following a structured approach which is set by GCAP methodology. Each of the key words of the vision sets the shape of the GCAP’s strategic objectives as shown on the diagram to the right.

The targets for each strategic objective have been aligned to the benchmark for high indicators within the GCAP methodology. These are aligned with EU targets. Furthermore, each of the strategic objectives have been aligned to existing national targets and objectives and have been designed to complement existing efforts to improve the environmental state of City of Zenica.

<p><i>Zenica will be a clean City</i></p>	<p>SO1: Zenica will create a clean and liveable environment. This includes improving air quality and delivering clean water for a good quality of life.</p>	<p>SO1.A Improve air quality through action on industry, energy and transport</p> <p>SO1.B Encourage principles of the circular economy to divert waste from landfill</p> <p>SO1.C Ensure the whole City is fully serviced by the wastewater treatment system</p>
<p><i>Zenica will be an active City</i></p>	<p>SO2: Residents will lead healthier and more active lifestyles. More residents will be encouraged to undertake active modes of transport in a cleaner environment.</p>	<p>SO2.A Increase the proportion of people using active modes of transport</p> <p>SO2.B Increase levels of sport participation and become a step closer to vision of becoming a sports City</p> <p>SO2.C Encourage citizens to enjoy and care for the natural environment</p>
<p><i>Zenica will be a resilient City</i></p>	<p>SO3: Zenica will become an attractive and green place to visit, with adequate resilience measures to protect against future changes to the climate</p>	<p>SO3.A Improve resilience of the City to extreme weather events</p> <p>SO3.B Protect green space within and around the City</p> <p>SO3.C Improve energy efficiency within buildings and the heating network</p>

Figure 7. Vision Statement

4.1.1 SO1. Zenica will create a clean and liveable environment, including delivering clean air for a good quality of life

SO1.A Improve air quality through action on industry, energy and transport

The long-term vision is to reduce the levels of CO₂ emissions and air pollution from industry, homes and transport and reduce the associated health risks. Air quality is a major environmental issue for the City and although air quality has improved in recent years, pollutant levels remain well above EU and WHO values. Poor air quality is driven by three main sources: steel industry in close proximity to the City centre, burning of fossil fuels for heating and air pollution from vehicle use. This is a key issue for stakeholders within the City and is affecting many aspects of the City life. Firstly, high levels of air pollution have health risks for the population. Secondly, Zenica would like to become a leading sporting City, and improving the air quality would allow people to engage with sport in a clean environment at a local level. Finally, air pollution is limiting tourism inflow to Zenica which could become a future income stream for the City.

SO1.B Encourage principles of the circular economy to divert waste from landfill

Over the next 10-15 years, Zenica will become a circular City, that uses resources efficiently and recycle and reuse most of its waste produced. Collection coverage will be increased and new facilities provided for reuse, recycling and recovery of energy from waste instead of landfilling. These measures will improve the local environment, increase the efficiency of the local economy and prolong the life of limited landfill capacity.

SO1.C Ensure the whole City is fully serviced by the wastewater treatment system

The long-term vision is to ensure that the entire City is connected to the sewage system to ensure that no untreated waste is released into the natural water system. Zenica's most pressing outstanding water problem is the complete lack of wastewater treatment. At present there is no provision for wastewater treatment in the City, and wastewater is discharged directly into the Bosna River. A project to address this issue is now in preparation (as described in Chapter 3).

4.1.2 SO2. Residents will lead healthtier and more active lifestyles. More residents will be encouraged to undertake active modes of transport in a cleaner environment

SO2.A Increased proportions of people using active modes of transport

In the long-term car ownership or usage will be radically reduced to improve air quality and congestion. This will be achieved by fostering and encouraging the use of active transport in association with improved public transport services. With its small, compact urban centre located mainly on the Bosna River valley floor. Zenica could become a place with very high walking and cycling rates. More dedicated cycling and walking routes will be built to facilitate this. Although Zenica has made efforts to improve the cycling infrastructure in the City in the past year there is still room for improvement. The Sustainable Energy and Climate Action Plan (SECAP) has further plans to continue to develop cycling infrastructure including cycle parking, cycling path system and bicycle storage facilities. Overall, increasing cycling rates could lead to improved health of the population and potentially reduced rates of air pollution as people switch from the use of private cars to cycling.

SO2.B Increased levels of sport participation and step closer to vision of becoming a sports City

The long-term vision for Zenica is that it will become a City where more sport is undertaken at a recreational level. There are two aspects to this strategic objective. The first is to affirm non-formal sports, for example, through increased active transport such as cycling as well as increased sport participation at a recreational level, for example out door running. The second aspect is the beautification of the City and its surroundings. It is important that visitors see a beautiful City, not just a stadium and sports infrastructure. Improving the quality of life of citizens in all areas is a personal priority for the current Mayor of Zenica.

SO2.C Encourage citizens to enjoy and care for the natural environment

The long-term vision is to create a mentality amongst citizens of caring and protecting for the environment which would allow more people to ensure the benefits that it brings. The City has had previous problems with the destruction of children's playground, dumping garbage at the Smetovi excursion site, parking accidents on a bicycle trail and playgrounds on Kamberovic Polje that were ruined. It is important to ensure that citizens respect and promote the objectives of the GCAP. They should also be encouraged to enjoy the natural environment.

4.1.3 SO3. Zenica will become an attractive and green place to visit, with adequate resilience measures to protect against climate change

SO3.A Improved resilience of the City to extreme weather events

The long-term vision is for Zenica to be resilient to future natural hazards, limiting the negative impact that potential hazards may have on the City. Zenica is highly exposed to risks from natural disasters. There is a very high risk of torrential flooding from heavy rainfall, flooding from sustained rain events, and earthquakes. There also is a high risk of exposure to reduced visibility due to fog and smog, storms and landslides. This has a number of consequences for Zenica including economic loss. For example, Zenica was estimated to have lost 8.4% of its GDP due to economic damage from the severe flood event in 2014. The findings from the technical assessment indicate that Zenica should undertake a comprehensive climate risk and hazard assessment and take necessary steps to build the City's resilience to future climate change and resulting natural hazard events.

SO3.B Protect green space within and around the City

The ultimate goal is to enhance and protect the existing green space in and around Zenica making the City visually appealing to residents and visitors and contributes to improved biodiversity and environmental quality. The aim will also be to enhance the protective

services of the green space, for using natural protection measures to protect the City from extreme flood events. Zenica has a good open green space ratio per 100,000 inhabitants, with 28,989 hectares per 100,000 inhabitants. Although the open green space area ratio per 100,000 inhabitants is good according to EBRD standards, illegal wood cutting has contributed to the deterioration of forested land and the endangerment of forests. Furthermore, the City Mayor has stated that he would like the centre of Zenica to become the 'green lungs' of the City. Environmentally, green spaces can help to mitigate the urban heat island effect, as well as contribute to carbon sequestration. Trees and shrubs can also improve air quality by removing both particles and gases from the air. Urban green spaces store and filter water, reducing the risk of flooding and improving water quality in streams, lakes and rivers. Finally, the level of biodiversity and contamination monitoring in the City is poor which will hinder the City's capacity to protect its ecosystems. Protecting green spaces will provide vital habitats within the City for flora and fauna, helping to increase biodiversity levels within its borders.

SO3.C Improve energy efficiency within buildings and the heating network

The long-term vision is to improve the energy efficiency across both City-owned and privately-owned buildings in Zenica, as well as improving energy efficiency in public lighting in order to reduce carbon emissions and overall energy consumption. Energy efficiency in buildings and industry is a major issue in Zenica. Improving energy efficiency in private buildings will result in energy savings for customers and improve comfort for residents. It will also reduce the maintenance for buildings and reduce air pollution in the City as less energy is required to heat homes. If energy efficiency measures are undertaken in public buildings, there will be savings for the City. Undertaking energy efficiency measures may also bring increased local employment as well as improve public health in the City.

Summary of actions

5

5 Summary of actions

5.1 Introduction

The baseline assessment has identified several challenge areas for Zenica. Eighteen short-term actions have been chosen to address these challenges areas and to achieve the medium and long-term vision of the GCAP. Each of the actions have been selected through the prioritisation process (Figure 6), whereby a long list of potential actions was identified across the five sectors and then scored according to three factors:

- **Scale of impact:** Each action in the longlist was then scored against its potential scale of environmental, social and economic impact. It was important to select actions that have a large scale environmental impact whilst delivering social and economic benefits.
- **Ease of implementation:** Each action was scored according to how easy the action will be for the City of Zenica to implement. This covered factors such as upfront capital investment, long-term operating costs, the power and capacity of the City authorities to implement. It was important to select those actions that were within the control of the City of Zenica to implement and those where realistic funding mechanisms could be established.
- **Stakeholder feedback:** Finally, the shortlist of actions has been reviewed with stakeholders to ensure that it meets their priority needs for the City of Zenica.

This chapter of the GCAP, first sets out the key challenges for each sector, before presenting the key actions which will address these challenges. The choice of actions has been supported by a financial assessment, a benefits assessment and a timeline for delivery of each action.



Figure 8. Steps within the prioritisation process for selecting a shortlist of actions

5.2 Energy and buildings

Main Challenges

The baseline analysis has highlighted that there are several challenges within the energy and buildings sector within Zenica:

- Air quality is a major environmental issue for the City due pollutant levels which are well above EU and WHO values. Poor air quality is driven by five main sources: the AMZ steelworks in close proximity to the City centre, emissions from the district heating energy centre, emissions from the Zenica Hospital, pollution coming from the burning of solid fuels and fuel oil within buildings outside of the district heating system, and air pollution from vehicle use.
- More than 80% of the energy consumed in Zenica is in the buildings sector. Almost 100% of the housing stock of the City consist of energy inefficient collective buildings and individual houses.
- The City will have a new, cleaner central heating source thanks to the Toplana Zenica project, but the City's district heating infrastructure is ageing and poorly insulated, has a rudimentary control system and lacks a proper metering system. These features result in high losses, underheating of buildings and poor customer experience.
- The current heating payment system does not incentivise a reduction in consumption or an improvement in energy efficiency and should be improved and calculated based on actual consumption.
- Current energy efficiency programme as a central focus (indicator) uses quantities of energy used for heating prior and after energy efficiency measures. However, the energy efficiency is to be considered in a broader context, embracing effects on improving the quality of life in insulated premises and facilities.
- The current system of public lighting is largely obsolete and mostly made of high-pressure sodium lamps. At 18%, energy consumption from street lighting is extremely high compared to other cities, and needs to be remedied.

What is already happening in Zenica?

Although the City of Zenica does not have any specific plans which are solely for the purpose of improving air quality, there is a newly released Sustainable Energy and Climate Action Plan of Zenica City which aims to have a reduction of emissions in the total amount of at least 40% for the period until 2030. In addition to this document, the *Integrated Development Strategy of the Municipality of Zenica 2012–2022* also makes reference to improvements in clean air. The adopted Sustainable Energy Action Plan 2011-2020 (SEAP) and the Local Environmental Action Plan (LEAP) also refer to the need to make improvements in air quality. Therefore, it can be concluded that awareness about environment issues exists in conjunction with formal plans and strategies. However, the City needs to have a comprehensive vision and coordinated implementation as well as monitoring and evaluation.

The City has already undertaken initiatives to improve energy efficiency within the network, including improving building efficiency. The Canton has also recently signed a contract with EBRD to make upgrades to the Zenica Hospital in order to improve the energy efficiency of the building and reduce energy consumption. The City is supporting this project and will work with the other parties to ensure a smooth process to implementation.

Actions to make Zenica a green City

Improving energy efficiency in private, public and industry buildings will result in energy savings for customers and improve comfort for residents. It will also reduce the maintenance for buildings and reduce air pollution in the City as less energy is required to heat homes. Undertaking energy efficiency measures in line with the principles of the circular economy and green procurement will increase local employment.

Table 4. Energy and buildings actions

ID	Action	Description	Status
E.01	Renewal of Zenica's heat network infrastructure	This action is to undertake the reconstruction and development of new infrastructure for the district heating network, including pipes, substations, controls and metering to reduce losses and outages in the system,	Investigations to renew the network have been made

<i>ID</i>	<i>Action</i>	<i>Description</i>	<i>Status</i>
		address underheating and attract more customers to re-join the system.	
E.02	Citywide heating strategy for Zenica	This action is to undertake a technical study and detailed strategy for the future of heating in Zenica, including a future pricing strategy.	New action
E.03	Energy Efficiency programmes in public and private buildings	This action is to undertake energy efficiency programmes within both public and private buildings within the City, building on Energy Efficiency measures that have already been initiated in the City. Ongoing support by the City for the successful delivery of the Cantonal Hospital is included in this action.	Planned action
E.04	Public lighting programme for energy efficiency and safety	This action is to undertake energy efficiency measures on public lighting. This is to deliver energy savings for the City and to improve lighting for villages.	Planned action

5.3 Blue-green infrastructure

Main Challenges

The baseline analysis has highlighted that there are several challenges within the blue-green infrastructure sector in Zenica:

- Zenica has a complete lack of wastewater treatment, and wastewater is currently discharged directly into the Bosna River.
- Zenica suffered from a large flooding event in the recent past and is vulnerable to further flooding due to the effects of climate change.
- The City is surrounded by a mountainous forested area which protects the City from natural flood events. However, recently illegal deforestation is occurring as people are chopping down the trees for solid fuel for heating and for commercial use.
- Zenica lacks data on the extent of green space in and around the City.

What is already happening in Zenica?

Protected areas: A designation of the Babino-Tvrtkovac Nature Park with an area of approximately 5.2 ha is suggested in the recently adopted Spatial Plan of the City of Zenica 2016-2036. Areas that are designated for nature protection that would be part of Babino-Tvrtkovac Nature Park are: Postojna above Puhovac, Markov kamen, Lastavica, Seočka river with karst spring and cave, Tvrtkovac, Pepelari, Babina river springs above Sebuje, Kraljevina, Mešanovo brdo and Smetovi. The plan suggests designation of this area within the category IIIa (Nature Park) or Va (Protected Landscape). The next step as recommended by the Plan is to form an expert team in the City of Zenica who will work closely with the Canton and relevant NGOs on necessary legal procedures for Babino Nature Park designation.

Recreational areas: The City of Zenica is investing efforts in maintaining the six green corridors, three parks as well as harmonising the green infrastructure within the traffic infrastructure, including the recently built main City highway (e.g. green islands on roundabouts and green corridors).

In regard to recreational areas outside the urban zone, the City has initiated the first activities related to cable car to Smetovi. The City management completed a field visit to cable car in Austria and is currently in the process of identifying the suitable cable car provider. The route should have a length of 4 km, with a possible starting point at the tunnel at the detour of Corridor Vc (above the City cemetery Prašnice) and possible final point at the Monument to the fallen Partisan Detachment from Zenica. Actual routing would be subject to a more detailed study. A cable car can provide a low impact means of transport to areas of natural beauty. Careful planning of zones to be protected and areas to be accessed can deliver both ecological benefits and achieve social value by enabling the quiet enjoyment of nature.

Forest management: The public company ŠPD of Zenica-Doboj Canton is undertaking regular tree planting activities. Some promotional activities were performed within specific projects or events to use biomass as a fuel in the forested areas. The City is planning to gather all relevant stakeholders from the forest sector to discuss the potential of forests in the City as a source of biomass.

Wastewater management: A tender has been released for the construction of the wastewater treatment plant (WWTP) being funded by KFW and SECO (Swiss Agency). The specification for the WWTP has not yet been defined and therefore there is no

information about the requested/selected WWTP sludge treatment technology. In the contract preparatory phase, the City has obtained written consent from ArcelorMittal and Coal Mine Zenica that the industrial wastewater from these companies will be treated prior to discharging into the River Bosna. With this consent both companies have undertaken to either treat their wastewater or provide payments to cover part of WWTP operational costs (financial sustainability, repayment of loan).

Actions to make Zenica a green City

The GCAP suggests implementing the following five actions within the blue-green infrastructure sector. Details of each action can be found in Appendix 1.

Table 5. Blue-Green infrastructure actions

<i>ID</i>	<i>Action</i>	<i>Description</i>	Status
BG.01	Wastewater collection and treatment for City centre and other community systems	Building on existing plans, Zenica will ensure that the whole City's wastewater is treated appropriately prior to being discharged into the Bosna River. This will improve aquatic ecology, local amenity and improve public health.	Under development by ViK
BG.02	Climate change risk assessment and sustainable urban drainage systems (SUDS)	This action is to prepare a local climate change risk assessment and to implement sustainable and resilient urban drainage systems for flood prevention. Support with awareness campaigns and emergency systems for businesses and communities.	New action
BG.03	Mountain protection, forest restoration and tree planting programme	Zenica will undertake a variety of activities with an aim of protecting mountainous areas and restoration of forested areas. The action includes commencing the legal procedure for the Babino Nature Park creation and designation of a research on nature value valorisation as one of the first steps in the process. This is to improve public health and recreation, increase tourism, and to enhance biodiversity for region.	New action
BG.04	Development of sustainable recreation areas with potential cable car access	This action has the aim of protecting and improving recreational areas around Zenica (Smetovi, Bistričak, Lisac). It also includes a study of options for the development of a cable car to Smetovi.	The City has initiated first activities

<i>ID</i>	<i>Action</i>	<i>Description</i>	Status
BG.05	Open Space Survey and GIS mapping	This action is to undertake a satellite land cover survey as well as a ground surveys to confirm key areas. This is to better manage data on land and improve their ability to interpret GIS results in order to make area action plans.	Partially implemented

5.4 Transport

Main Challenges

The baseline analysis has highlighted that there are several challenges within the transport sector in Zenica:

- The average age of all cars in the City of Zenica is high, with 56% of cars older than 15 years. This suggests that the majority of vehicles have low energy efficiency.
- The bus service is limited and infrequent, although patronage is good. A more frequent service with newer buses and better information could help increase ridership further.
- Cycling infrastructure has improved greatly in the past year in Zenica, moving from a provision of 60m² of cycle parking in 2017 to 210m² in 2018. There are now 10km of cycle lanes in the City, which corresponds to 9.1 kilometres per 100,000 population. This still isn't enough cycling infrastructure for the number of citizens, but the increased provision of cycle parking demonstrates a positive increase in cycling usage.
- In 2019 public procurement for bike sharing system was concluded and the contract signed. The system is expected to be launched later in 2019.

What is already happening in Zenica?

The new Sustainable Energy and Climate Action Plan (SECAP) sets out a plan to upgrade the 83% portion of the Zenicatrans transport fleet owned by the City, and to encourage the use of bicycles as a means of transport. Actions identified in the City's SECAP include: procurement of 20 new low-emission buses for City centre and suburban transport;

promotion of the use of public transport; optimisation of existing bus routes and introduction of new bus lines; improving passenger comfort and amenities of existing buses.

The City plans to introduce a bicycle rental system and continue to develop its cycling infrastructure including extending the cycle path system and building new bicycle storage areas close to strategically significant buildings, such as those frequented by the public for work and leisure purposes. New cycle parking locations have also been implemented, though the City lacks policies for new developments relating to this provision.

Draft Spatial Plan of the City of Zenica 2016-2036 also describes proposals for the reconstruction and development of the transport system, which is considered a facilitator of growth within the City. Upgrading of cars (the majority of which are older than 15 years) to more energy efficient vehicles, together with an increasing shift towards active transport modes (i.e. walking and cycling) could bring significant improvements in air pollution levels in the City. The SECAP indicates that car ownership is growing year by year, though exact numbers are lacking. Relevant measures in the SECAP include: introduction of a congestion charge to the most congested parts of the City for goods vehicles; expansion of paid parking zones and parking payment exclusions for low fuel and emission vehicles.

Actions to make Zenica a green City

Table 6. Transport actions

<i>ID</i>	<i>Action</i>	<i>Description</i>	<i>Status</i>
T.01	Real time bus information systems, bus route optimisation and better bus shelters	Zenica will secure investment in software to provide real time location information for buses. This will include software for public applications to track bus positioning online and countdown information at all bus shelters. The detailed bus system information will also enable refinements to bus routes based on actual travel and ridership data. Finally, the investment will include improvements to bus shelters to provide a more attractive and comfortable waiting environment for passengers.	New action
T.02	Expansion and replacement of bus fleet with transition	Building on activities in the SECAP, the next step is to test the business case for new buses and to purchase low emissions / better quality buses if the overall cost meets the City's affordability threshold. There are different technical performance requirements of buses serving for	Existing in SECAP

<i>ID</i>	<i>Action</i>	<i>Description</i>	<i>Status</i>
	towards low/zero emission buses	the City centre and the rural routes which should be taken into account in the bus requirements specification.	
T.03	Cycle lanes and cycling promotion	This action intends to move cycle lanes into the City centre onto streets (with separators from vehicle traffic) and signage and pavement painting to designate additional cycle routes (into / out of City). It also includes cycling promotion days which should be introduced and car free days and bike repair stations in City centre.	Partially ongoing
T.04	Sustainable Urban Mobility Plan (SUMP)	This action is to undertake a travel survey of Zenica – to include travel within the City and commuting patterns to Sarajevo (road and rail) – and technical studies to test sustainable mobility policy and investment options for the City	New action
T.05	Bus and rail station site redevelopment	This action aims for a new development on the bus and rail station sites, e.g. 4-5 story housing and mixed-use development. It will include re-provision of the bus depot within site and inclusion of gas or EV refuelling infrastructure.	New action

5.5 Waste management

Main Challenges

The baseline analysis has highlighted that there are several challenges within the waste sector in Zenica:

- Waste collection is only provided to 75% of residents within Zenica.
- Public recyclable collection facilities are available at fixed locations, but the number of deposit locations is considered to be insufficient for the number of residents in the City.
- Zenica suffers from a higher proportion of illegal waste dumping. Increased education and awareness is also needed to promote sorting and recycling and minimise illegal dumping.
- The City's landfill site has only one remaining year of service life and urgently needs to be extended.

What is already happening in Zenica?

Zenica has the expired Waste Management Plan of the Municipality of Zenica 2011-2016, which aims to expand the waste collection system coverage in the City of Zenica and gradually introduce selective collection and recycling of waste which align with this strategic objective. Public procurement has been concluded and the contract has been signed, the company working on new waste management will deliver the plan by end of the 2019.

On July 5, 2019, the City Council of Zenica adopted two draft contract agreements regarding the waste management in Zenica: between the City of Zenica and ALBA Zenica d.o.o. Zenica; between the City of Zenica and Alba Group. The duration for both of contracts is 20 years. The contract with ALBA Group encompasses: establishing the centre for waste management in the next 10 years. The first phase (mechanical treatment of waste into RDF/SRF) should be completed in 36 months from the contract signing. The second phase (biological treatment) should be completed within 10 years from the contract signing. The coverage of waste collection should be increased to 100% within 15 months from the contract signing. For selective waste collection establishment, the deadline is 36 months from the contract signing. Additionally, the Contracting parties will establish a GIS database containing the data about public green space, City roads, communal infrastructure and number of users. Both contracts are ready for signing by the Contracting parties.

The feasibility study for the mechanical-biological treatment performed for the landfill Moščanica in 2016¹¹⁰ provided an estimation that 46% of the waste collected could be used for the refuse-derived fuel (RDF) production.

Since the landfill Moščanica is nearing full capacity, they have initiated activities to seek funds for the construction of a new disposal cell (informing Cantonal government to allocate funds in 2019 for this purpose) as well as in resolving administrative issues. At time of writing, the management of the landfill has already received the necessary approval from the Federal Ministry of Tourism and Environment (amendments and update of the Decision on Environment Permit).

A considerable portion of landfill Moščanica revenue is generated through management of waste transported and treated from several municipalities in three cantons, operating as a regional landfill. Besides, as a legal entity under 100% City ownership, the landfill receives dedicated grants from the City for particular assignments relating to the waste

treatment in Zenica. The initial investment is financed through World Bank loan, agreed with the Federal Ministry of Tourism and Environment. By the date, the loan agreement has been respected. In order to ensure the construction of a new disposal cell, the landfill needs to ensure a sustainable source of revenue generation in the future.

Within specific donor related projects, the City facilitated educational activities for the citizens with the aim of awareness increasing when it comes to solid waste generation as well as solid waste, reuse and recycling.

Table 7. Waste actions

<i>ID</i>	<i>Action</i>	<i>Description</i>	<i>Status</i>
W.01	Extension of household waste collection and construction of new waste handling infrastructure	This action is to expand the waste collection service (and associated infrastructure) to 100% of the population to ensure waste is contained and treated safely.	Committed / planned
W.02	Sustainable waste treatment solution	This action is to undertake a study to decide upon the most sustainable way to treat waste.	New action
W.03	Selective waste collection supported by the waste awareness campaign	This action is to organize a selective waste collection system by strengthening the communal infrastructure as well as to launch awareness campaign to be timed with changes to the waste system – new collection, opening of Household Waste Recycling Centres (HWRC), changes to tariffs. It will also include an awareness campaign on hazardous waste.	Previously conceived action
W.04	Rača industrial landfill remediation	This action is concerned with the treatment of industrial waste and the management of Rača industrial waste landfill. It includes resolving land ownership uncertainty at Rača industrial waste landfill, and working with AMZ, Canton and FBiH to support remediation of Rača landfill.	Previously conceived action

Roadmap to delivery

6



6 Delivering the GCAP

6.1 Roadmap to a successful GCAP

6.1.1 Strategic objective 1

The following table shows the long-term, mid-term and short-term objectives and actions for the ‘green strategic objectives’ pillar. It also shows the owner responsible for managing each action under the strategic objective.

Table 8. Targets, actions and owners for Strategic Objective 1

GCAP Vision for Green Strategic Objectives (2019-2034):			
<i>Zenica will create a clean environment. This includes delivering clean air for a good quality of life.</i>			
<i>Mid-term targets (2019 – 2026)</i>	<i>ID</i>	<i>GCAP actions (2019 – 2022)</i>	<i>Owner/Responsibility</i>
SO1.A Improve air quality through action on industry, energy and transport: Reduce the average annual concentration of PM _{2.5} , PM ₁₀ , and SO ₂ to safe WHO levels.	E.01	Renewal of Zenica’s heat network infrastructure	City of Zenica / JP Grijanje
	E.02	Citywide heating strategy for Zenica	City of Zenica / JP Grijanje / Mittal Company
	E.03	Energy efficiency programmes for public and private buildings	City of Zenica / JP za prostorno planiranje i uređenje grada "Zenica" d.o.o
	E.04	Public lighting programme for energy efficiency and safety	City of Zenica
	T.01	Real time bus information systems, bus route optimisation and better bus shelters	City of Zenica / JKP “Zenicatrans-Prevoz putnika” d.d.
	T.02	Expansion and replacement of bus fleet, with transition towards low/zero emission buses	City of Zenica / JKP “Zenicatrans-Prevoz putnika” d.d.
	T.03	Cycle lanes and cycling promotion	City of Zenica / JP za prostorno planiranje i uređenje grada "Zenica" d.o.o
	T.04	Sustainable Urban Mobility Plan (SUMP)	City of Zenica
	W.02	Sustainable waste treatment solution	City of Zenica/ ALBA Zenica d.o.o. Zenica

GCAP Vision for Green Strategic Objectives (2019-2034):

Zenica will create a clean environment. This includes delivering clean air for a good quality of life.

<i>Mid-term targets (2019 – 2026)</i>	<i>ID</i>	<i>GCAP actions (2019 – 2022)</i>	<i>Owner/Responsibility</i>
SO1.B Encourage principles of the circular economy to divert waste from landfill: Increase the proportion of MSW that is sorted and recycled to >15% of total waste.	W.01	Extension of household waste collection and construction of new waste handling infrastructure	City of Zenica/ ALBA Zenica d.o.o. Zenica
	W.02	Sustainable waste treatment solution	City of Zenica / ALBA Zenica d.o.o. Zenica
	W.03	Waste awareness campaign	City of Zenica / NGOs
	W.04	Rača industrial landfill remediation	Cantonal ministry of urban planning, transportation, communication and environment protection/City of Zenica/Arcelor Mittal Zenica
SO1.C Ensure that the whole City has a fully services wastewater treatment service: Increase the percentage of residential and commercial wastewater that is treated according to applicable national standards to >40%	BG.01	Wastewater collection and treatment	City of Zenica / JP “Vodovod i kanalizacija” d.o.o.

6.1.2 Strategic objective 2

The following table shows the long-term, mid-term and short-term objectives and actions for the ‘green strategic objectives’ pillar. It also shows the owner responsible for managing each action under the strategic objective.

Table 9. Targets, actions and owners for Strategic Objective 2

<i>Mid-term targets (2019 – 2026)</i>	<i>ID</i>	<i>GCAP actions (2019 – 2022)</i>	<i>Owner/Responsibility</i>
SO2.A Increased proportions of people using active modes of transport: Increase the kilometres of bicycle path per 100,000 population to greater than 15km	T.03	Cycle lanes and cycling promotion	City of Zenica / JP za prostorno planiranje i uređenje grada “Zenica” d.o.o.
	T.04	Sustainable Urban Mobility Plan (SUMP)	City of Zenica
SO2.B Increased levels of sport participation and step closer to vision of becoming a sports City: Percentage of the population doing 30-149 minutes of exercise a week	E.01	Renewal of Zenica’s heat network infrastructure	City of Zenica / JP Grijanje d.o.o
	E.03	Energy efficiency programmes for public and private buildings	City of Zenica / JP za prostorno planiranje i uređenje grada “Zenica” d.o.o.
	E.04	Public lighting programme for energy efficiency and safety	City of Zenica
	T.04	Sustainable Urban Mobility Plan (SUMP)	City of Zenica
SO2.C Encourage citizens to enjoy and care for the natural environment: Awareness campaign run to promote a reduction in material consumption and a reduction in littering	T.03	Cycle lanes and cycling promotion	City of Zenica / JP za prostorno planiranje i uređenje grada “Zenica” d.o.o.
	T.05	Bus and rail station site redevelopment	JKP “Zenicatrans-Prevoz putnika” d.d.
	BG.01	Wastewater collection and treatment	JP “Vodovod i kanalizacija” d..o.o.
	BG.03	Mountain protection, forest restoration and tree planting programme	City of Zenica / NGOs / JP Šumsko-privredno društvo of Zenica-Doboj Canton
	BG.04	Development of sustainable recreation areas with potential cable car access	City of Zenica / JP za upravljanje i održavanje sportskih objekata d.o.o.
	W.03	Waste awareness campaign	City of Zenica / NGOs

6.1.3 Strategic objective 3

The following table shows the long-term, mid-term and short-term objectives and actions for the ‘green strategic objectives’ pillar. It also shows the owner responsible for managing each action under the strategic objective.

Table 10. Targets, actions and owners for Strategic Objective 3

GCAP Vision for Green Strategic Objectives (2019-2034):			
<i>Zenica will become an attractive and green place to visit, with adequate resilience measures to protect against future changes to the climate</i>			
<i>Mid-term targets (2019 – 2026)</i>	<i>ID</i>	<i>GCAP actions (2019 – 2022)</i>	<i>Owner/Responsibility</i>
SO3.A Improved resilience of the City to extreme weather events: Reduce estimated economic damage from natural disasters (floods, droughts, earthquakes etc.) as a share of GDP to be less than 1%	T.04	Climate change risk assessment and sustainable urban drainage systems (SUDS)	City of Zenica / JP Vodovod i kanalizacija Zenica
	BG.03	Mountain protection, forest restoration and tree planting programme	City of Zenica / NGOs / JP Šumsko-privredno društvo of Zenica-Doboj Canton
AND			
Improve awareness and preparedness to natural disasters			
SO3.B Protect green space within and around the City: Increase the open green space area ratio per 100,000 inhabitants to greater than 10%	BG.03	Mountain protection, forest restoration and tree planting programme	City of Zenica / NGOs / JP Šumsko-privredno društvo of Zenica-Doboj Canton
	BG.04	Development of sustainable recreation areas with potential cable car access	City of Zenica / JP za upravljanje i održavanje sportskih objekata d.o.o.
	BG.05	Open Space Survey and GIS mapping	City of Zenica / Cantonal office for Urbanism and Spatial Development
	W.01	Extend of household waste collection and construction of new waste handling infrastructure	City of Zenica / ALBA Zenica d.o.o. Zenica
SO3.C Improve energy efficiency within buildings and the heating network: Improve electricity consumption in buildings to <47 kWh/m ²	E.04	Public lighting programme for energy efficiency and safety	City of Zenica

Sector matrix

The following diagram summarises how each of the proposed actions will achieve the strategic objectives.

Table 11. Action within strategic objectives

Pillar	Strategic objective	Energy and building actions				Transport actions					Blue-green infrastructure actions				Waste management actions				
		Renewal of Zenica's heat network infrastructure	Public lighting programme for energy efficiency and safety	Energy efficiency programmes for public and private buildings	Citywide heating strategy for Zenica	Real time bus information systems, bus route optimisation and better bus shelters	Real time bus information systems, bus route optimisation and better bus shelters	Cycle lanes and cycling promotion	Bus and Rail Station Site Redevelopment	Sustainable Urban Mobility Plan	Wastewater collection and treatment for City centre and other community	Climate change risk assessment and sustainable urban drainage systems (SUDS)	Mountain protection, forest restoration and tree planting programme	Development of sustainable recreation areas with potential cable car access	Open Space Survey and GIS mapping	Extension of household waste collection and construction of new waste handling infrastructure	Sustainable waste treatment solution	Waste awareness campaign	Rača industrial Landfill remediation
Clean	SO1.A Improve air quality through action on industry, energy and transport																		
	SO1.B Encourage principles of the circular economy to divert waste from landfill																		
	SO1.C Ensure the whole City has a fully serviced wastewater treatment service																		
Active	SO2.A Increase the proportions of people using active modes of transport																		
	SO2.B Increase levels of sport participation and step closer to vision of becoming sports City																		
	SO2.C Encourage citizens to enjoy and care for the natural environment																		
Resilient	SO3.A Improve resilience of the City to extreme weather events																		
	SO3.B Protect green space within and around the City																		
	SO3.C Improve energy efficiency within buildings and industry																		

6.2 Action timeline

The sequencing for each of actions is set out on the page below. This is followed by a high level financial analysis of implementing each action and a summary of the benefits associated with undertaking the actions.

Each action is expected to start within the next three years, as is prescribed by the GCAP methodology. Each action will begin with a pre-planning phase, which typically includes activities such as feasibility studies, deciding upon financing and delivery mechanisms and procurement of the desired activities. The length of the pre-planning phase has been governed by the magnitude of the preparation work that will need to be undertaken and the amount of planning that has already been done by Zenica. This is followed by the implementation phase where the action is delivered. For most actions this will be one continuous delivery period. However, for other actions it is anticipated that they will be delivered in smaller parcels of work over the duration of the next 4-5 years. The start dates of the actions have been staggered to allow the implementation as a whole to be manageable for the City. Actions which are either a priority or have had pre-existing work undertaken are to be delivered first. An accompanying explanation to the phasing is given in Table 3.



Photo 6. View of Zenica city centre

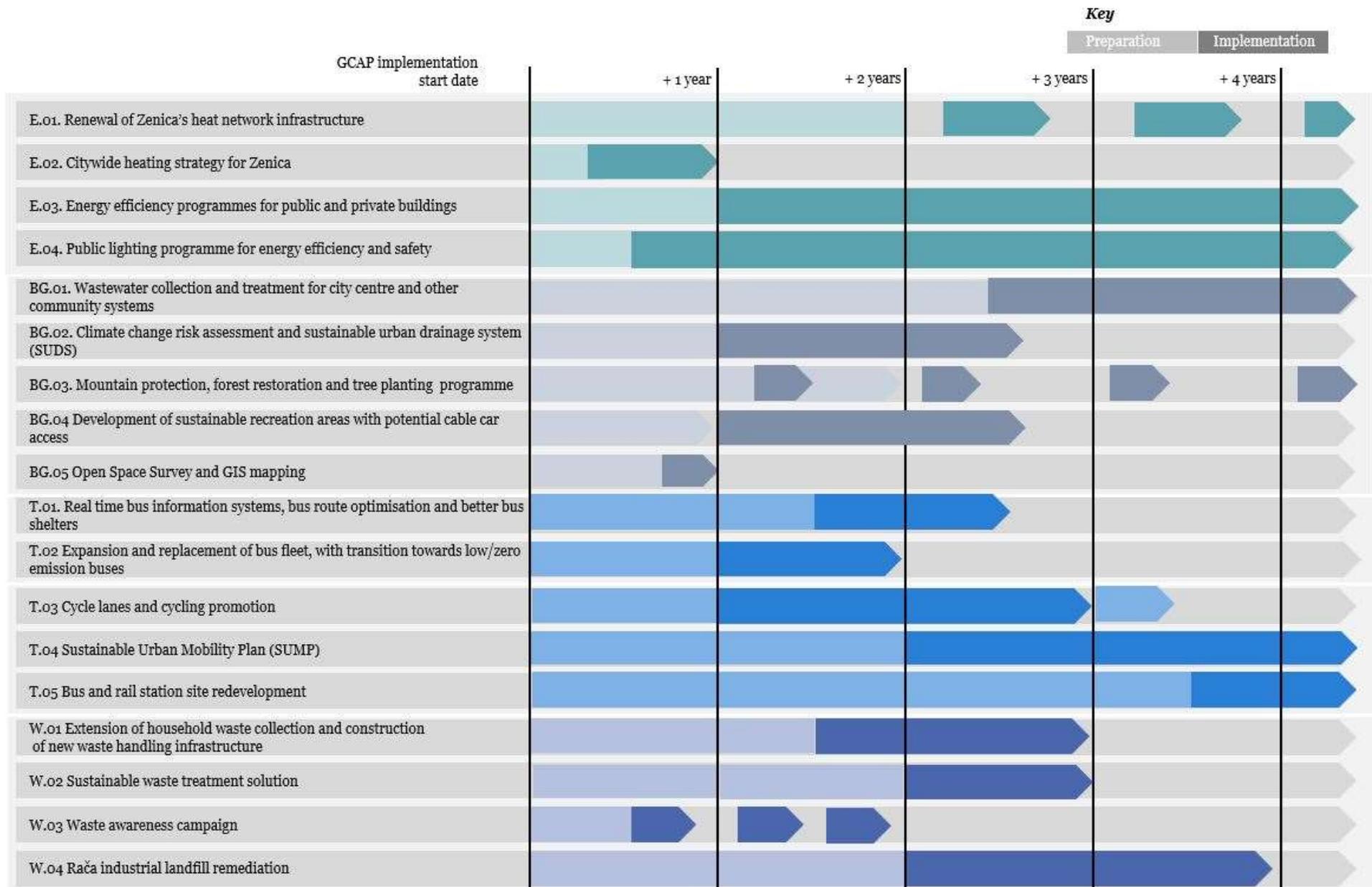


Figure 9. Roadmap to delivering the actions

Table 12. Phasing of actions

Action	Phasing explanation
E.01	Action is to commence immediately with a two-year pre-planning phase when design, technical studies, financing and procurement will be undertaken. A further ten years is allocated for the completion of the works which will likely be in a phased manner to account for the fact that major replacement can be done only outside the heating season (i.e. about May to September).
E.02	Action has been allocated 6 months for the technical study and pricing study, with a further 6 months for making a decision on the findings of the study. The study may lead to a variety of actions, which will be worked up in detail during that period.
E.03	Some projects are already underway, including the Cantonal Hospital project, which is led by the Cantonal Authority but which is actively supported at a political and practical level by the City. Future phases of public building programme will be funded and delivered in phases on a 1-2 year cycle. Each group of buildings being funded would be delivered within 12-18 months of securing the necessary funding and approvals for works. The private building programme would take the form of a fund to support private owners to deliver their own building retrofit projects. The fund is intended to run over a five year period, after which it would be reviewed.
E.04	Since the procurement process for the works have already commenced, the action should be implemented as soon as possible to start realising savings from more efficient lighting. The duration of the overall project lasts circa 5 years as existing lamps and columns will be replaced as they reach the end of their lifespan.
BG.01	The wastewater infrastructure works comprise three main components: <ul style="list-style-type: none"> • Delivery of the Zenica WWTW which has funding and a procurement process underway. This will commence in 2019-2020 • The smaller community WWTW facilities will be rolled out over the next 5-10 years, following an initial design study. • A central sludge treatment facility is also needed, and this will be subject to separate study and funding, with construction planned within the next 3-5 years.
BG.02	The timeline for this action is relatively short given that the actions are for low level civil engineering works which should be possible to complete within 1-2 years.
BG.03	This action has multiple components with multiple stakeholders and has therefore been staggered across the next 5 years acknowledging that different parts will happen

Action	Phasing explanation
	at different points. The staged periods of action will coincide with the annual winter tree planting season (November - February).
BG.04	Early actions are for a land and biodiversity study and marking of forest paths to provide access to some areas and protection for others. Later phasing for this action is to deliver the study of options for a cable car, with a three-year optional implementation period.
BG.05	This action is relatively short and could be completed in the first year given its simple nature. The implementation phase involves crowd sourcing of information as well as updates and maintenance.
T.01	The initial part of this action will require a large amount of planning, however the delivery of the systems themselves will be completed within 1 year.
T.02	The time for this action has been split between the planning and procurement of the buses and then the delivery of the buses to account of time in manufacturing.
T.03	The delivery of this action has been kept to 2.5 years assuming that the measures implemented will be softer touch. However, if the City wishes to introduce fully separated cycle lanes, the realisation of this action may take longer. Later area indicates ongoing efforts to promote cycling.
T.04	This action has a 2.5 year planning period, which consists of 6 months of procurement and 2 years of completing comprehensive travel surveys, modelling and reporting. This will be followed by a 5-10 year delivery period where the measures are implemented. This action has a delayed start to allow for other priority actions to commence first (e.g. the SUMP). The City has previously explored parking charge reform, and this may be able to be delivered sooner, following a public consultation on the proposed changes.
T.05	Given this action is a larger scale regeneration project it will span the whole duration of the GCAP and possibly beyond. A prerequisite to the redevelopment of the site is to agree the rezoning of the site within the City's Spatial Plan, which could take 1-2 years. Design studies will take place to support this process but full design and implementation would not commence until after rezoning was confirmed.
W.01	This action can be completed under the new waste management contract. Expansion of the waste collection service means additional sites for vehicle parking and for a new household recycling yard. Planning, design and approval for these are expected to require around 18 months, followed by procurement and delivery of the vehicles and sites.

Action Phasing explanation

- | | |
|------|--|
| W.02 | This action will complement the extension in waste collection. The study will be delivered within the first 2 years of the GCAP and will link with the energy study to identify a combined waste/energy solution for the City. |
| W.03 | The action has been split into three phases to show the roll out of three campaign areas over the next two years. Then a follow up campaign will be completed every two years following the initial round. |
| W.04 | A large planning phase has been allowed to account for the fact that it may take a long time to agree who owns the Rača landfill site and has responsibility for remediating it. Once agreed it will also take a long time (circa 10 years) to remediate the land. |

6.3 Financing the GCAP

Assessment approach

Alongside the roadmap to delivery, a financial assessment of each action has been undertaken. The following table sets out an initial estimate of capital and upfront development costs for each of the proposed interventions, alongside an assessment of which financial mechanisms are preferable for each intervention.

It is important to note that these estimates cover the full cost of the proposed intervention. In practice there are elements of financing for some actions which will do not need to be raised, as funds are already in place via a public body. For Action E.01, for example, the labour costs of district heating renewal will be covered by Zenica's district heating company; as such around 40 percent of the total capital expenditure will does not require further financing. Furthermore, project phasing will be used to stagger these total costs over time. For these reasons, actual short-term costs may be substantially lower than the overall costs presented here.

The following methods of financing have been analysed:

Table 13. Financing mechanisms

<i>Financing mechanism</i>	<i>Description</i>
Multinational development banks	Funding via large development banks (grant or loan funding). Development banks provide finance to cities either via national governments with sovereign loans or by lending directly to the city. Different development banks have different policies on lending practices.
Foreign government overseas aid budget	Funding via overseas government international development budgets. Grant funding is often used as a means to close funding gaps to enable loans and other investments to be viable.
National, Federal or Canton funds	Funding via central department or Zenica-Doboj Canton shared tax receipts or fiscal transfers. As noted above, funding from higher tiers of government can be from government funds or from sovereign lending by development banks.

<i>Financing mechanism</i>	<i>Description</i>
City	Funding via mechanisms such as future capital project budgets, land assets recycling, and in future years possibilities such as City bond issuance The City could also enter into joint ventures or public-private partnerships with private sector investors or other third parties. This can provide a means to reduce the financial liabilities and risk burden for the City while still allowing the City to retain a degree of control and influence over investment activities.
Corporate/ off balance sheet by a private operator	Smaller capital projects may be financed, built, controlled and operated by private organisations. This could include private companies working under services contracts with the city, such as a utility concession operating for a defined time period (e.g. 25 years).
Limited resource (project) finance via special purpose vehicle (SPV)	A SPV is separate legal entity created by the City to deliver a specific infrastructure project. SPV may be wholly owned by the City or owned jointly with third parties through shareholding agreements. SPVs can facilitate transfer of services or disposal of assets in the future.
Alternative finance	Encompasses sources of new finance and decentralised models of fundraising, including payment by service users.
Regulations and enforcement by private landowners/businesses	Not a funding source in its essence, but reduces the need for City investment by creating City-wide legal requirements

For more explanation of the financing approach listed under each column header, please refer to Appendix 2 'Approaches to Financing'. A RAG (Red Amber Green) rating assessment has been given for each action:

- **Green - Good fit: to be prioritised in further research.** This may be because the finance source is well matched to the scale of the intervention.
- **Amber - Possible fit: to be explored.** This may be because the scale of financing required is too large for this financing mechanism alone, or only some eligibility criteria are met under the current intervention. Viability may improve, if the intervention is amended to meet funding criteria.

- **Red - Poor fit.** This may be because the scale of the project is too large or small for this type of financing, or inapplicable (e.g. the funding is only available for capital projects and the intervention is development expenditure only).

Summary of assessment

Overall, this assessment demonstrates that every proposed intervention has at least one method of financing that is a possible fit, and aside from the cable car of intervention BG.04, at least one further method that is a good fit. This is based on recent precedent of projects completed within Zenica and appetite of relevant national and international funding bodies for supporting the suggested actions.

Of these financing mechanisms, multilateral development banks and foreign government overseas aid budgets have been identified as having strong potential for financing the actions. This encompasses a variety of potential funding structures, including grant funding and concessionary loan funding with different conditions. Different finance sources such as direct City funding is likely to be applicable for fewer projects has been identified. Overall, the City is currently constrained in its capacity to take on additional loans from any source, with a large proportion of capital budget already allocated to existing project repayments over the next 15+ years. However, there is some scope for modest further City borrowing, including from overseas sources. Additionally, options will be explored around the feasibility of intragovernmental transfers, whereby the national government takes on international loans and responsibility for their repayment, making a transfer of funds to Zenica without increasing the City's debt liabilities.

On this basis the above financing sources are still considered viable for some of the proposed actions despite Zenica's limited capacity for further borrowing. Some forms of financing, such as corporate/off balance sheet funding by a private operator or alternative finance, may be appropriate to the content of several of the interventions. These are, however, of limited use for some actions due to the large scale of upfront investment required, or the absence of future cost savings needed to justify private-sector involvement.

For each intervention an indicative capital cost has been provided, and also the net effect the intervention may have on current operating expenditure. Whilst these place-based urban enhancements will result in new operating expenses, some of them can be offset via energy efficiency cost savings from other interventions if introduced as part of a coordinated programme of investment. It should also be noted that many of these projects also have significant positive externalities which may improve economic growth and

wellbeing within Zenica. Sustainable Urban Drainage System, for instance, have high upfront capital costs but have the capacity to prevent major costs arising from flood damage in future years.

Table 14. Financial assessment of actions. Note that these costs are an initial estimation based on the limited information that has been provided. During the implementation of the GCAP, further financial analysis should be undertaken for each action.

GCAP Action		Scale of financing (EUR – 2019 cost – nearest thousand)		Methods of financing						
		Capital & upfront development expenditure	Net (increase)/decrease in operating expenditure annually	Multilateral development bank	Foreign government overseas aid budget	National / Canton	The City of Zenica	Corporate/ off balance sheet by a private operator	Limited resource (project) finance via SPV	Alternative finance
Energy and buildings	E.01 Renewal of Zenica's heat network infrastructure	(60,499,000)	7,057,000							
	E.02 Citywide heating strategy for Zenica	(160,000)	N/A							
	E.03 Energy efficiency in buildings programmes	(22,195,000)	674,000							
	E.04 Public lighting programme for energy efficiency and safety	(5,276,000)	(68,000)							
Blue-green infrastructure	BG.01 Wastewater collection and treatment for City centre and other community systems	(19,530,000)	(192,000)							
	BG.02 Climate change risk assessment and sustainable urban drainage systems (SUDS)	(6,880,000)	(86,000)							
	BG.03 Mountain protection, forest restoration and tree planting programme	(1,100,000)	(48,000)							
	BG.04 Designation of protected areas and development of sustainable recreation areas with potential cable car access	(40,721,000)	(818,000)							
	BG.05 Open Space Survey and GIS mapping	(110,000)	N/A							

Scale of financing (EUR – 2019 cost – nearest thousand)

GCAP Action

Methods of financing

		<i>Net (increase)/ decrease in operating expenditure annually</i>	<i>Multilateral development bank</i>	<i>Foreign government overseas aid budget</i>	<i>National / Canton</i>	<i>The City of Zenica</i>	<i>Corporate/ off balance sheet by a private operator</i>	<i>Limited resource (project) finance via SPV</i>	<i>Alternative finance</i>	<i>Regulations and enforcement for private landowners/ businesses</i>
Transport and urban planning	T.01 Real time bus information systems, bus route optimisation and better bus shelters	(119,000)	(34,000)							
	T.02 Expansion and replacement of bus fleet, with transition towards low/zero emission buses	(12,209,000)	997,000							
	T.03 Cycle lanes and cycling promotion	(1,576,000)	(22,000)							
	T.04 Sustainable Urban Mobility Plan (SUMP)	(260,000)	N/A							
	T.05 Bus and Rail Station Site Redevelopment	(63,026,000)	N/A							
Waste management	W.01 Extension of household waste collection and construction of new waste handling infrastructure	(8,898,000)	(1,136,000)							
	W.02 Sustainable waste treatment solution	(100,000)	N/A							
	W.03 Waste awareness campaign	N/A	(24,000)							
	W.04 Rača industrial landfill remediation	(20,325,000)	(17,000)							

6.4 Future benefits of the GCAP

6.4.1 Introduction

This chapter presents the assessment of potential environmental, social and economic benefits to Zenica from the implementation of the GCAP. The benefits were assessed for each action and are presented as an integrated assessment for each type of benefit. As

explained in the introduction (see Chapter 1), the assessment is indicative in nature and based on a range of assumptions about the scale and nature of effect of each action. Quantified estimates of benefits are provided where data and evidence made this possible; in other cases, the benefits are described on a qualitative basis.

Each action provides multiple benefits, and many aspects of the City – such as air quality or public health – will have cumulative benefits from several actions. The range of benefits from each action is summarised in the table below.

Table 15. Benefits summary for Zenica green City actions

Action	Environmental benefits				Social benefits			Economic benefits		
	Air	Water	Biodiversity	CO ₂ decrease	Resilience & adaptation	Public health	Mobility and access	Comfort and amenity	Consumer & business costs	Local economy
Energy and buildings										
E.01 Renewal of Zenica's heat network infrastructure	✓	✓		✓	✓	✓		✓	✓	✓
E.02 Citywide heating strategy for Zenica	✓			✓	✓	✓		✓	✓	✓
E.03 Energy efficiency programmes for public and private buildings	✓			✓	✓	✓		✓	✓	✓
E.04 Public lighting programme for energy efficiency and safety	✓			✓	✓	✓				
Blue-Green Infrastructure										
BG.01 Wastewater collection and treatment for City centre and other community systems		✓	✓		✓	✓				
BG.02 Climate change risk assessment and sustainable urban drainage systems (SUDS)		✓	✓		✓					
BG.03 Mountain protection, forest restoration and tree planting programme	✓	✓	✓	✓	✓	✓	✓	✓		✓
BG.04 Development of sustainable recreation areas with potential cable car access			✓			✓	✓	✓		✓

<i>Action</i>	<i>Environmental benefits</i>				<i>Social benefits</i>			<i>Economic benefits</i>		
	<i>Air</i>	<i>Water</i>	<i>Biodiversity</i>	<i>CO₂ decrease</i>	<i>Resilience & adaptation</i>	<i>Public health</i>	<i>Mobility and access</i>	<i>Comfort and amenity</i>	<i>Consumer & business costs</i>	<i>Local economy</i>
BG.05 Open Space Survey and GIS mapping			✓		✓			✓		
Transport and Urban Planning										
T.01 Real time bus information systems, bus route optimisation and better bus shelters	✓			✓		✓	✓		✓	✓
T.02 Expansion and replacement of bus fleet, with transition towards low/zero emission buses	✓			✓		✓	✓	✓	✓	✓
T.03 Cycle lanes and cycling promotion	✓			✓	✓	✓				
T.04 Sustainable Urban Mobility Plan (SUMP)	✓			✓		✓	✓	✓		
T.05 Bus and Rail Station Site Redevelopment							✓	✓		✓
Waste Management										
W.01 Extension of household waste collection and construction of new waste handling infrastructure		✓		✓	✓	✓		✓		
W.02 Sustainable waste treatment solution		✓		✓					✓	✓
W.03 Waste awareness campaign		✓		✓						✓
W.04 Rača industrial Landfill remediation	✓	✓		✓		✓			✓	

6.4.2 Environmental benefits

The GCAP actions have great potential to provide benefits to local air and water quality and improve biodiversity. The actions will also help address climate change through reduction in greenhouse gas emissions and increasing the City's resilience to future shocks and stresses from climate change and other factors.

Air quality

The proposed green City actions will contribute to improved air quality in Zenica. The air quality benefits are quantified in terms of source emissions reductions. The City is due to prepare a full dispersion model with committed funding from AMZ, which will enable to quantify the benefits in terms of the resulting concentrations of air pollutants, and to understand the City-wide impact of the actions and their contribution to Zenica's air quality improvements.

The renewal of the district heating network will reduce the energy losses on the district heating network by an expected 20%. This will lead to reductions in air pollution from the energy generated to power the district heating network (see Tables 16-17).¹¹¹

The building energy efficiency programmes will entail the retrofit of both residential and City-owned buildings, leading to reductions in energy demand. This in turn will lead to reductions in air pollution from the new cogeneration plant on the AMZ site supplying the district heating network for consumers connected to the network. By helping other consumers to limit or entirely switch away from the use of solid fuels for heating, the energy efficiency programmes will further contribute to improved air quality.

The residential building energy efficiency measures will be implemented in 10 buildings, representing approximately 1% of the surface area of residential buildings.¹¹² Based on a thermal energy mix of 22% coal, 38% wood and 41% district heating, the expected thermal energy savings are 800 MWh/year, assuming technical energy savings of 25% with a rebound effect of 25%, leading to air quality benefits (see Tables 16-17).¹¹³

The building energy efficiency measures in City-owned buildings will be implemented in 150 buildings, representing 60% of the total number of the public building stock.¹¹⁴ These buildings currently have an estimated thermal energy mix of 83% district heating, 10% coal, 7% wood and 1% heating oil.¹¹⁵ This is estimated to deliver thermal energy savings of 1,400 MWh/year once all the buildings have been retrofitted, assuming technical energy savings of 25% with a rebound effect of 25%, (see Tables 16-17).¹¹⁶

The benefits from the Zenica Cantonal Hospital energy efficiency project, which is included in the benefits assessment for action E.03, are very substantial. According to the feasibility assessment for the project, the project will improve comfort and performance while:

- saving over 3,40MWh of thermal energy demand;
- substantially reducing or eliminating emissions from the site of particulate matter, NO₂ and SO₂; and
- delivering significant savings in CO₂ emissions as well (Tables 16-19).

Meanwhile, the new energy plant at AMZ (delivered under the Toplana Zenica project) will have a similar capacity to the existing plant (60MW). Investment in renewing the existing network would achieve substantial loss reductions, which could deliver more of the generated heat to customer buildings and provide some of the additional capacity needed to facilitate the extension of the network. This will enable customers who have

disconnected from the network to reconnect and enable new consumers to connect and stop burning solid fuels, further contributing to air quality benefits for Zenica. (Note that the benefits from this project are not included in the figures, because this project is already being delivered.)

The transport actions are expected to facilitate a shift away from cars towards public and active transport, reducing the estimated proportion of trips travelled by cars by 7% by 2030.¹¹⁷ Over half of cars currently have a Euro standard below 4, and reducing the trips made by cars will give rise to substantial reduction in air pollution (see Tables 16-17).

Green spaces also provide natural cooling. The tree planting programme will entail the planting of 40,000 trees, bringing air quality benefits (see Tables 16-17).

Biodiversity and ecosystems

The wastewater collection and treatment project will greatly reduce water pollution and improve the quality of aquatic ecosystems.

The mountain protection, forest restoration and tree planting programme and extension of waste collection will reduce soil pollution and enhance biodiversity in the region by restoring natural habitats.

These actions will deliver enhanced ecosystem services, including urban cooling, amenity and recreation, support for pollinators and flood resilience.

Table 16. Particulate matter (PM_{2.5}) benefits

<i>ID</i>	<i>Action</i>	<i>PM_{2.5} benefit</i>	<i>Unit</i>
E01	Renewal of Zenica's heat network infrastructure	100	kgPM _{2.5} /year
E03	Energy efficiency programmes for public and private buildings	1,500	kgPM _{2.5} /year
BG03	Mountain protection, forest restoration and tree planting programme	700	kgPM _{2.5} /year
T01-03	Transport actions on bus and cycling	3,000	kgPM _{2.5} /year
	Total	5,300	kgPM _{2.5} /year

Table 17. Nitrogen dioxide (NO₂) benefits

<i>ID</i>	<i>Action</i>	<i>NO₂ benefit</i>	<i>Unit</i>
E01	Renewal of Zenica's heat network infrastructure	8,100	kgNO ₂ /year
E03	Energy efficiency programmes for public and private buildings	22,900	kgNO ₂ /year
BG03	Mountain protection, forest restoration and tree planting programme	2,000	kgNO ₂ /year
T01-03	Transport actions on bus and cycling	43,500	kgNO ₂ /year
	Total	76,500	kgNO ₂ /year

Table 18. Sulphur dioxide (SO₂) benefits

<i>ID</i>	<i>Action</i>	<i>SO₂ benefit</i>	<i>Unit</i>
E01	Renewal of Zenica's heat network infrastructure	<100*	kgSO ₂ /year
E03	Energy efficiency programmes for public and private buildings	256,500	kgSO ₂ /year
BG03	Mountain protection, forest restoration and tree planting programme	200	kgSO ₂ /year
	Total	256,800	kgSO ₂ /year

*The effect of the Toplana Zenica project is not included in the calculations because the project is already being delivered.

Table 19. Carbon dioxide (CO₂) benefits

<i>ID</i>	<i>Action</i>	<i>CO₂ benefit</i>	<i>Unit</i>
E01	Renewal of Zenica's heat network infrastructure	4,700	tCO ₂ /year
E03	Energy efficiency programmes for public and private buildings	6,400	tCO ₂ /year
E04	Public lighting programme for energy efficiency and safety	1,200	tCO ₂ /year
T01-03	Transport actions on bus and cycling	13,900	tCO ₂ /year
BG03	Mountain protection, forest restoration and tree planting programme	1,700	tCO ₂ /year
W01	Extension of household waste collection and construction of new waste handling infrastructure	400	tCO ₂ /year
	Total	28,300	tCO ₂ /year

Climate change mitigation and adaptation

The actions presented in the GCAP are expected to contribute to greenhouse gas emissions reductions across a number of sectors.

The energy and buildings actions will lead to emissions reductions of 6,300 tCO₂/year once they have been implemented.¹¹⁸ The City-wide heating strategy will set Zenica on a path for additional climate change mitigation through future building retrofits, green design codes for new buildings, expansion of the district heating network and renewable energy generation.

The public lighting programme would reduce existing street lighting electricity consumption by 2,000 MWh/year, or 50% of total consumption.¹¹⁹ This will reduce emissions by 1,000 tCO₂/year.

The transport actions on bus and cycling will reduce emissions by 13,900 tCO₂/year by switching modes of transport from cars to public and active transport.

Within the forest restoration and tree planting programme around 40,000 will be planted which will provide carbon benefits of 42,000 tCO₂/year. The sustainable waste treatment solution will reduce carbon emissions from waste disposed in unmanaged dumps by 400 tCO₂/year.¹²⁰ In addition the sustainable management of waste will prevent climate hazard risks related to waste such as fires.

The sustainable urban drainage system and tree planting programme will support Zenica in adapting to climate change by reducing the impact of future extreme rainfall and snowmelt events.

6.4.3 Social benefits

Fuel poverty

The energy efficiency programmes in City-owned and residential buildings will lead to improved thermal comfort and reduced energy consumption, and thus reduced fuel poverty and improved economic inclusion over time.

Public health and wellbeing

The energy and transport actions will contribute to air quality improvements in Zenica, which will provide health benefits to citizens.

The open space survey and GIS mapping action will promote a culture of protection of nature and will potentially bring about community actions to improve the quality of green spaces. Coupled with appropriate infrastructure provision, access to more green spaces can encourage more active behaviours such as walking and cycling, with associated benefits for health and wellbeing.

Improved access to public transport and improved bicycle infrastructure will also encourage active lifestyles, encouraging cycling, walking and other outdoor activities, with associated benefits for health and wellbeing. The mode share of cycling is expected to rise to 3% by 2030, which will facilitate significant health benefits to Zenica's citizens.

6.4.4 Economic benefits

Energy savings

The renewal of the Zenica's heat network will reduce the energy losses on the district heating network by an expected 20%, consequently leading to monetary savings for Grijanje, the heat network operator. In addition, the additional capacity means that users who have disconnected from the network will be reconnected, and additional users connected, bringing further revenues for the company.

The residential building block energy efficiency measures are estimated to deliver thermal energy savings of 800 MWh/year, assuming technical energy savings of 25% with a rebound effect of 25%.¹²¹

The heat and pricing strategy for Zenica will hopefully unlock opportunities to support residential building retrofits. The residential energy savings could be scaled up substantially with more residential building retrofits in the future.

The building energy efficiency measures in public buildings in the jurisdiction of the City are estimated to deliver thermal energy savings of 2,300 MWh/year once all the buildings have been retrofitted.¹²² On top of that, the proposed Cantonal Hospital project by itself will save an estimated 3,400 MWh/yr in thermal demand, even taking account of increased floorspace and improvements in comfort and operational performance.¹²³ Public buildings, such as schools, will be able to re-invest the savings into other measures such as human and physical resources, as well as recreational spaces, which may generate additional benefits over time.

The public lighting programme would reduce street lighting electricity consumption from existing lighting by 2,000 MWh/year, or 50% of total consumption (this includes new lighting which would provide additional safety, security and amenity for the City).¹²⁴ This will enable the City to invest the savings in other City projects, bringing further benefits to Zenica in the long run.

Table 20. Thermal energy savings

<i>ID</i>	<i>Action</i>	<i>Energy savings</i>	<i>Unit</i>
E01	Renewal of Zenica's heat network infrastructure	25,400	MWh _{th} /year

<i>ID</i>	<i>Action</i>	<i>Energy savings</i>	<i>Unit</i>
E03	Energy efficiency programmes for public and private buildings	5,700	MWh _{th} /year
	Total	31,100	MWh_{th}/year

Table 21. Electrical energy savings

<i>ID</i>	<i>Action</i>	<i>Energy savings</i>	<i>Unit</i>
E04	Public lighting programme for energy efficiency and safety	2,000	MWhe/year

Land value, tourism and local economy

The mountain protection, forest restoration and tree planting programme and the sustainable recreation areas with cable car access are expected to improve the quality and attractiveness of space for residents and visitors, providing opportunities to increase tourism in Zenica. Sustainable forestry practices will also positively contribute to the local economy.

The redevelopment of the bus and rail station site and new civic architecture is expected to provide opportunities to increase land and property values due to the added value of high quality spaces. In the long run, this could lead to increased revenues for the City and support the growth in tourism by making Zenica an attractive transport hub in the country.

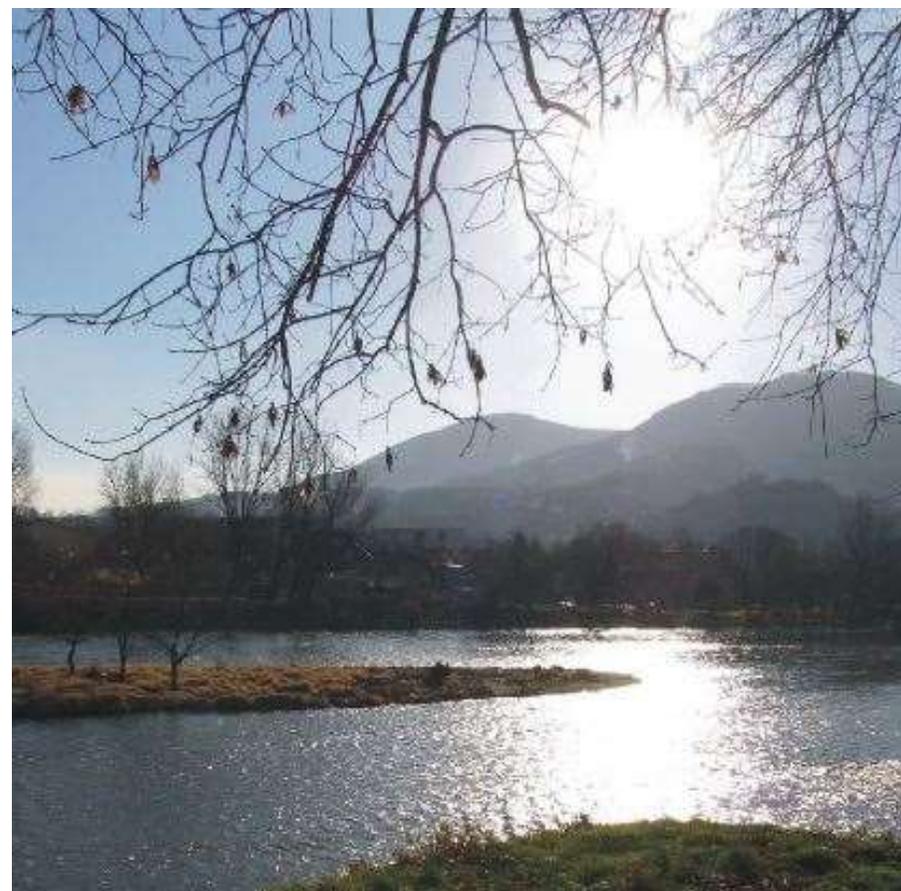


Photo 7. River Bosna in Zenica

Monitoring, Evaluation and Verification

7

7 Monitoring, Implementation, Evaluation and Verification

This chapter outlines the Monitoring, Implementation, Evaluation and Verification (MIEV) framework for the GCAP. It is important to monitor and evaluate both the progress of implementing the GCAP as well as the impact of its actions. This chapter sets out the governance and steps necessary to achieve both of these aspects, and to evaluate progress against the strategic objectives and vision for Zenica.

7.1.1 Monitoring the implementation of the GCAP

Implementation monitoring of the GCAP should be embedded in the core organisational structure and processes within relevant departments of the City of Zenica. As many of the GCAP actions are interlinked, this is necessary to ensure that a collaborative approach is taken.

- **Organisation:** An overall coordination body should be set up to monitor the implementation of the GCAP.
- **Scheduling and Resourcing:** The coordination body should assign each GCAP action to a responsible department. A Task Director within each department will define an action champion for each action. The action champions will be responsible for data collection on indicators and reporting on progress of each action.
- **Budgeting and Work Authorisation:** Each department will set the budgets and timescales for delivering the actions assigned to them, with guidance from the GCAP.
- **Reporting and Monitoring:** The action champions within each department will provide regular updates on the progress of each action (according to the set timescales and budget) to the coordination body.

- **Change management:** The results of the monitoring will inform the planning of the subsequent stages of each action. Amendments will be made to the timescales, resources and budget, as necessary.

7.1.2 Monitoring the impact of the GCAP

Purpose: The purpose of monitoring and evaluating the results of the actions is to understand whether they are achieving their intended medium-term outcomes, and longer-term impacts to ensure targets are met using adequate resources, and to draw lessons from the successes of the actions.

Actors: The coordination body will nominate an MIEV coordinator who will be responsible for overseeing the implementation of all GCAP actions. The Task Director within each department should identify an MIEV manager who will be responsible for monitoring the progress of relevant actions against their respective indicators within their department, determining appropriate action champions responsible for data collection and review of indicators for specific action, approving responses, and feeding back results to the MEV coordinator.

Baseline: The GCAP baseline analysis of indicators across the GCAP ‘state-pressure-response’ framework serves as a reference document for all monitoring activities related to the GCAP actions. Where data is missing or incorrect it is recommended that the City of Zenica seeks to collect this data.

Objectives and targets: For each action, the objectives and time-bound targets it aims to achieve for each indicator should be determined through a feasibility study. The targets should be defined for the following types of indicators:

- Input indicators: measuring resources spent on each action
- Output indicators: measuring interventions implemented under each action

- Outcome indicators: measuring results against mid-term targets for each action
- Impact indicators: measuring results against long-term strategic objectives

Set up monitoring scheme: The responsibility for monitoring of each action and for collection of its respective indicators should be assigned to the appropriate department or agency who will have responsibility for ensuring the implementation of that action.

The MEV manager should ultimately be responsible for reviewing the data collected, ensuring that it is complete, credible and traceable. At this review stage, the MIEV manager should consult with relevant departments in the City to fill any information gaps if necessary and gain a wider understanding of the data.

Implementation monitoring and evaluation: Progress of actions against indicators should be reported in a similar way to the baseline analysis as specified by EBRD. This plan should be re-evaluated at the end of year 1 and adjusted if necessary. Each action will be evaluated in relation to data collected on the indicators. The analysis will include reviewing the set targets for each action, analysing the data collected throughout the project and evaluating it against the set benchmarks for each project.

7.1.3 Monitoring framework

Achieving positive impact

Each of the actions has been designed to contribute to achieving one or more of the strategic objectives. This is expressed on the theory of change set out in Figure 10. This diagram shows how each of the actions will achieve the mid-term strategic objectives and then will ultimately achieve the long-term objectives for City of Zenica

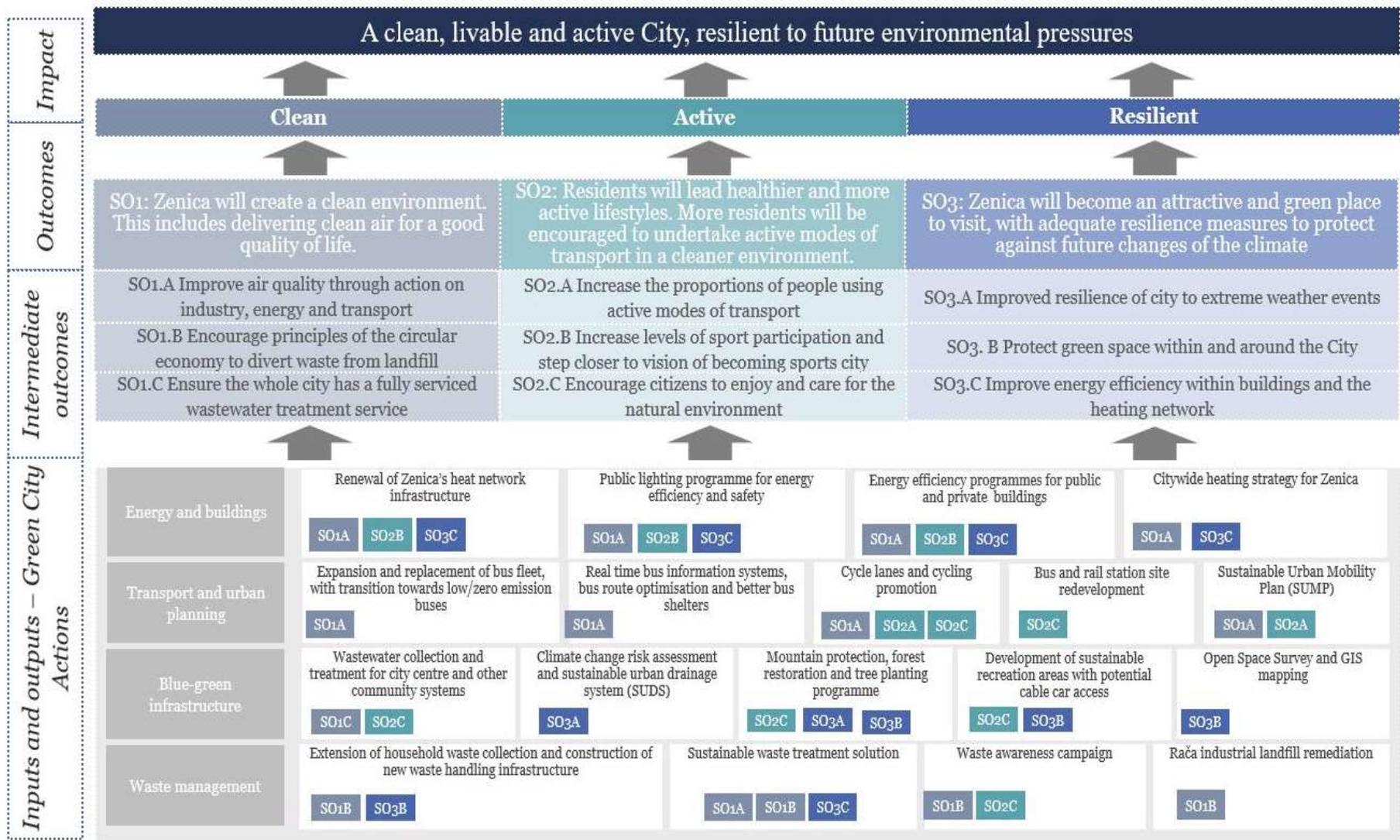


Figure 10. Theory of change for achieving impact

Guidance

This chapter gives examples of monitoring frameworks for several of the green City actions. The framework provides a guide for measuring both the implementation and the impact of the GCAP. This uses the Pressure-State-Response indicators of the GCAP. Note that some indicators are applicable to multiple actions, highlighting the importance of collaboration between the action champions responsible for their indicators to avoid data being collected twice. Following this framework, the implementation and impact indicators can be used to benchmark progress and successes against other Green Cities under the EBRD framework.

This chapter refers to Annex 5 of the GCAP Methodology which details the RAG ratings and benchmarking boundaries for pressure, state and response indicators.

Table 22. Example monitoring framework for Energy Action E.01

<i>E.01. Renewal of Zenica's heat network infrastructure</i>		<i>Indicator(s)</i>	<i>Target within GCAP timeframe</i>
Action	Renewal of Zenica's heat network infrastructure	Is the action delivered on time? Is the action delivered to budget?	Deliver action to budget & timeframe agreed by coordination body
Impacted strategic objectives	Improve air quality through action on industry, energy and transport	Average annual concentration of PM _{2.5} , PM ₁₀ , SO ₂ , and NO ₂ <i>GCAP Methodology State Indicators 1-1.3</i>	PM _{2.5} < 20 µg/m ³ (annual) PM ₁₀ < 50 µg/m ³ (annual) SO ₂ < 50 µg/m ³ (24 hour) NO ₂ < 80 µg/m ³ (annual)
	Increase levels of sport participation and step closer to vision of becoming sports City	Percentage of the population doing 30-149 minutes of exercise a week <i>External indicator</i>	TBC (to be appropriate for the City)
	Improve energy efficiency within buildings and the heating network	Electricity consumption in buildings <i>GCAP Methodology Pressure Indicator 14</i> AND Heating and cooling consumption in buildings fossil fuels <i>GCAP Methodology Pressure Indicator 15</i>	<47 kWh/m ² <148 kWh/m ²

Example monitoring frameworks

The tables below give an example of how each of the actions could be measured at an operational level (action indicators and targets) and how they can be measured at an impact level (strategic objective indicators and targets). This activity should be developed for the entire set of actions when implementing the actions.

Table 23. Example monitoring framework for Waste Action W.01

<i>W.01. Extension of household waste collection and construction of new waste handling infrastructure</i>		<i>Indicator(s)</i>	<i>Target within GCAP timeframe</i>
Action	Extension of household waste collection and construction of new waste handling infrastructure	Is the action delivered on time? Is the action delivered to budget?	Deliver action to budget & timeframe agreed by coordination body
Impacted strategic objectives	Encourage principles of the circular economy to divert waste from landfill	Proportion of MSW that is sorted and recycled (total and by type of waste e.g. paper, glass, batteries, PVC, bottles, metals)	>15% of total waste.
	Protect green space within and around the City	Share of green space areas within urban limits	>45%

Appendices

8



Appendix 1: Action prospectuses

E.01. Renewal of Zenica’s heat network infrastructure

Background and justification

The City’s district heating network supplies 45% of the City’s heating demand but the system is old and in need of investment, refurbishment and expansion. Large system losses have led to undersupply of heating during peak cold periods, exacerbated by poor thermal insulation in buildings and pipe networks. This action seeks to modernise Zenica’s heat network.

Benefits of this action include significant energy savings and reduced maintenance costs for JP Grijanje d.o.o Zenica, as well as increased comfort and reliability of heat for customers. This action will also allow the City to defer investment in new generation of assets while enabling the expansion of the network.

Description

The action involves the reconstruction of the existing and development of a new district heating network infrastructure. Specific components include:

- Replacement of 80% of the concrete channel pipe network (96km) with pre-insulated welded steel pipes;
- Replacement of all heat sub-stations (531), including the installation of a heat and flow meter for each location;
- Metering at sub-station level;
- Installation of smart meters in customers’ properties;
- Installation of advanced network control system software.

Key metrics

- Energy savings;
- Costs savings for Grijanje, customers and the City of Zenica;
- Number of heat and floor meters installed;
- Number of sub-station meters installed;
- Reduction in energy loss and number of outages;
- Number of customers connected to the network.



Photo 8. Installing new district heating pipes

Phasing of actions

<i>Stage</i>	<i>Description</i>	<i>Timeframe</i>
1	Design of a new district heating network	0-18 months
2	Completion of technical studies	0-18 months
3	Financing and procurement	18-24 months
4	Completion of the main works (phased each year from May to September)	24 months onwards

Stakeholders

Delivery body: City management, City specialized offices for communal affairs, public City heating company “Grijanje”

Wider stakeholders: ArcelorMittal as a Toplana Zenica project partner, public companies in energy, building companies, communal and heating sector, commercial banks, donors, residents/citizens

Key enabling policies

Federal level: Law on Energy Efficiency FBiH (“Federation BiH Official Gazette,” No. 22/17,) which was adopted on 01.04.2017 and represents core legislation for energy efficiency in FBiH. EU Energy Community requires adaptation of this Law as soon as possible in line with new EU directives in this sector more in line with circular economy and green measures and health.

Cantonal level:

- The Law on spatial planning and construction (Official Gazettes Ze Do Canton NO 1/14);
- The Law for Environment protection (Official Gazettes Ze Do Canton NO 1/00);
- The Law on Housing Management and Maintenance residential-business buildings (Official Gazettes Ze Do Canton NO 2/08);
- The Law of municipal activities (Official Gazettes Ze Do Canton NO 12/08).

City level:

- Spatial plan for the City of Zenica for 2016-2036, supports the area’s polycentric system of settlements and improvement of open spaces as well as for the reconstruction and development of transport, energy, buildings, water, waste and the reduction of adverse impacts on natural, urban and rural areas;
- Integrated Development Strategy of the Municipality of Zenica 2012–2022 also makes reference to environment protection measure and sustainable development;
- Sustainable Energy Action Plan 2011-2020 – SEAP 2011-2020;
- Local Environmental Action Plan (LEAP) also refers to this important issue of the environment protection;
- The City’s Sustainable Energy and Climate Action Plan (SECAP) provides data on Zenica’s CO₂ emissions. This document defines the vision and commitment for the decarbonisation as well as interventions in energy and building sector such as heat supply expansion, energy efficiency, landfill rehabilitation and sewerage system reconstruction.

Financing and delivery mechanism

Type of expenditure:	Capital costs for the advanced network control system software, metering at sub-stations and the pipe and substation renewals.
Capital & upfront development costs:	€62,924,639: comprised of the €150,000 for the advanced network control system software, €737,843 for metering at 531 sub-stations, €8,205,128 for replacement of 531 heat substations, €25,641,026 for the supply of pre-insulated district heating pipelines, €24,040,642 in labour costs for current pipe dismantling, restoration and new pipeline installation and €4,150,000 for the installation of heat metering for all district heating customers (thermostatic radiator valves and heat cost accumulators with wireless communications).
Changes in operating costs (net):	€1,788,450 cost savings annually: comprised of €942,044 in savings for customers from metering and €846,407 in savings from the pipe and substation renewals.
Suitable methods of financing:	Due to its large scale, high upfront investment and precedent of similar projects, multilateral development bank funds and alternative finance (where service users fund improvements) are suitable. Limited recourse project finance via a SPV is worth exploring as a secondary option, a potential fit due to its large scale and expected income via cost savings.

E.02. Citywide heating strategy for Zenica

Background and justification

While new buildings have a metered energy supply with thermostatic controls, older buildings typically have no controls, so energy consumption cannot be measured. Private residents also pay for energy based on the size of their apartment rather than the amount of energy they consume. Consequently, there is little incentive for residents to invest in energy efficiency measures and reduce their overall energy consumption. A new heat and pricing strategy is required.

Benefits of this action include increased clarity and consensus across the City regarding investments in the energy system. It will also enable the City to direct developers towards the right solution in each location and implement a package of supporting policy measures. Finally, it will ensure accurate district heating pricing for residential and commercial customers.

Description

There are two key elements of this action:

1) A technical study and detailed strategy for the future of heat in Zenica which will include the following activities:

- Survey and modelling of current and future energy use across the City, including Renewable Energy Sources (RES);
- Modelling of the range (max / min) of future energy use based on a “do nothing” scenario, energy efficiency retrofit, growth of the City, and climate change;
- Modelling of generation and energy carrier options;
- Economic modelling of costs and income/savings from different options;
- Mapping of areas to be served by district heating, gas, electricity (heat pumps) or solar thermal;
- Proposal of policy measures required to support energy efficiency and fuel switching in residential and commercial buildings;
- Incorporation of strategy into investment plans for Grijanje, urban plans and design codes for new buildings.

2) Implementation of the new payment system based on a more accurate measurement of energy used. Separate assessment to be undertaken to screen current service provision and billing system with its bottlenecks, as zero option.

Key metrics

- Energy consumption of individual apartments and buildings
- Heating consumption of individual apartments and buildings
- Cost savings to customers
- Number and location of buildings supplied by different energy options (district heat, gas etc.)



Photo 9. Housing in Zenica

Phasing of actions

Stage	Description	Timeframe
1	Technical study and pricing study	0-6 months
2	Identification of actions arising from the study	6-12 months

Stakeholders

Delivery body: City management, City specialized offices for communal affairs, public City heating company “Grijanje” Zenica d.o.o.

Wider stakeholders: ArcelorMittal as a Toplana Zenica project partner, public companies in energy, building companies, communal and heating sector, commercial banks, donors, residents/citizens,

Key enabling policies

The proposed action should be designed and implemented in accordance with national strategic documents which provide similar measures, including:

EU/regional: Several EU directives should be considered including EU Environmental Impact Assessment (EIA), EU Energy Efficiency Directive (2012/27/EU, Directive on energy end-use efficiency and energy services (2006/32/EC); Directive on the energy performance of buildings (2010/31/EC)

BiH level: Adopted documents on State level related the topic are: Energy Efficiency, this topic is a part of the State Energy strategy of BiH until 2035, The Strategy for climate change and low-emission development adoption for Bosnia and Herzegovina. Additionally, State Consumer protection legislation ("Službeni glasnik BiH", broj 45/04) needs to be consider to be harmonized on all government levels.

Federal level: Law on Energy Efficiency FBiH (“Federation BiH Official Gazette,” No. 22/17,) which was adopted on 01.04.2017 and represents core legislation for energy efficiency in FBiH.

Cantonal level: This action is in line with the Cantonal Plan for Environmental Protection of Zenica - Dobož Canton 2017-2025. Additionally, the City will need to consider several other laws:

- The Law on spatial planning and construction (Official Gazettes Ze Do Canton NO 1/14);
- The Law for Environment protection (Official Gazettes Ze Do Canton NO 1/00);
- The Law on Housing Management and Maintenance residential-business buildings (Official Gazettes Ze Do Canton NO 2/08);
- The Law of municipal activities (Official Gazettes Ze Do Canton NO 12/08).

City level: The City of Zenica adopted a number of regulations in buildings and energy sectors. The most important ones are:

- Spatial plan for the City of Zenica for 2016-2036, supports the area’s polycentric system of settlements and improvement of open spaces as well as for the reconstruction and development of transport, energy, buildings, water, waste and the reduction of adverse impacts on natural, urban and rural areas;
- Integrated Development Strategy of the Municipality of Zenica 2012–2022 also makes reference to environment protection measure and sustainable development;
- The adopted Sustainable Energy Action Plan 2011-2020 – SEAP 2011-2020;
- Local Environmental Action Plan (LEAP) also refers to this important issue of the environment protection;
- Data on Zenica’s CO₂ emissions is set out in the City’s Sustainable Energy and Climate Action Plan (SECAP) provides data on Zenica’s CO₂ emissions. This document defines the vision and commitment for the decarbonisation as well as interventions in energy and building sector such as heat supply expansion, energy efficiency, landfill rehabilitation and sewerage system reconstruction.

It is noted that the existing problem with pricing and calculation of the costs needs to be a part of the adaptation of the Consumer protection law on the State level as well as harmonization with other levels of the same legislation especially on Cantonal and City level.

Financing and delivery mechanism

Type of expenditure:	Development costs for the technical heat study and detailed strategy (including pricing strategy).
Capital & upfront development costs:	€ 160,000: comprised of €130,000 for the technical heat study and, the detailed strategy (including pricing strategy) and €30,000 for the assessment of service provision and billing (listing potential heating investments).
Changes in operating costs (net):	N/A
Suitable methods of financing:	The study budget could be funded from municipal budgets or there may be international donor or development bank funding available to support the study, given the study aim to identify appropriate actions to increase energy efficiency and reduce pollution and carbon emissions in the City. Financing options for actions identified by the study would be subject to other financing routes, which would be determined as part of the study.

E.03. Energy efficiency programmes in public and private buildings

Background and justification

Energy consumption is high in Zenica, yet energy management systems and green building certifications are lacking. Building energy efficiency programmes will bring several benefits including energy savings for consumers, improved comfort for residents; reduced maintenance for buildings; reduced air pollution; and increased local employment. Well designed and installed energy efficiency measures can provide benefits in both winter and summer. Increasing air tightness should go hand in hand with improving ventilation and the provision of better heating and cooling systems.

The Zenica Cantonal Hospital Energy Efficiency Project is an excellent demonstration of the potential beneficial impact of energy efficiency (EE) investments. The project – which will provide fabric EE measures, replace the ageing coal plant with a gas boiler system and renew the building heating system – is estimated to provide over 3,400MWh in savings against the thermal demand of the site today. This savings level is achieved even though the building floorspace will increase and the comfort and system performance levels will be substantially improved. Although the project is being led by the Cantonal Authority, the City is a party to the project agreement (due to its land interest in the site) and is committed to supporting the project partners to achieve a smooth implementation of the project.

Description

This action seeks to implement energy efficiency programmes in both public and private buildings e.g. thermal insulation and windows. Specifically, it includes the following components:

- Part A: Public building EE programme (City-led financing);
- Part B: Private building EE programme (City providing 45% funding) – this will need to be complemented by a change in billing where residents are invoiced based on their level of consumption, to incentivise residents to undertake energy efficiency measures (see actions E.01 and E.02);
- Advocacy with FBiH for changes to legislation to incentivise investment in retrofit, including building-integrated renewable energy;
- Retrofit works would include facades, windows, building HVAC systems (to improve indoor air quality and comfort in hot weather) and heat network metering (building or unit scale, depending on cost-benefit assessment);



Photo 10. A recently completed building retrofit project

Phasing of actions

<i>Stage</i>	<i>Description</i>	<i>Timeframe</i>
1	Part A: Explore further sources of financing and implement expansion of City-owned building energy efficiency programmes	0-12 months*, then cycles every 1-2 years to secure more funding
2	Part A: Procurement of public building works	3-month procurement process
3	Part A: Retrofit public buildings	12-18 months per package of works*
4	Part B: Co-finance private building energy efficiency measures	0-5 years

*completed in a phased nature with cycles each year, over the next 5-10 years

- Works to the unseen parts of the system – pipes, ventilation etc – are as important as the visible works to facades.

Key metrics

- Electricity consumption of buildings;
- Heating consumption of buildings;
- Number of buildings retrofitted;
- Energy and CO₂ savings from EE programmes;
- Building energy performance standards for new buildings;
- PM_{2.5}, PM₁₀, SO₂, NO₂ concentrations;
- Number of jobs created.

Stakeholders

Delivery body: City management, City specialized offices, public companies, commercial banks, donors

Wider stakeholders: Building industry, commercial and sales points for building materials, public companies in energy, communal and heating sector, residents/citizens

Key enabling policies

The proposed action must be designed and implemented in accordance with national strategic documents that provide similar measures, including:

EU/regional: Relevant EU directives should be considered including EU Environmental Impact Assessment (EIA), EU Energy Efficiency Directive (2012/27/EU, Directive on energy end-use efficiency and energy services (2006/32/EC); Directive on the energy performance of buildings (2010/31/EC)

This document is important to follow the instruction for low emission development in BiH which should be implemented in EE and RES sectors as well BiH Law on Public Procurement, without adaptation could be used on local level and to introduce green the energy-efficiency criteria through 'green public procurements.

State level: The grounds for the introduction of an energy-efficiency system in all sectors (buildings, public services, transport and industry) are found in an international treaty, namely the Energy Community Treaty signed by Bosnia and Herzegovina October 25, 2005, and ratified by state BiH Parliament in 2006.

The responsibility for the energy-efficiency sector in Bosnia and Herzegovina is split between different levels of government and there are no adequately coordinated country-wide energy-efficiency system, energy policies and energy sector development strategy. The following has been done at the Entity level:

- Amended Law on Spatial Planning and Land Use at the Level of the Federation of BiH ("Federation BiH Official Gazette," No. 2/06, 72/07, 32/08, 4/10, 13/10, 45/10);
- Law on Energy Efficiency FBiH ("Federation BiH Official Gazette," No. 22/17,) was adopted on 01.04.2017 and represents core legislation for energy efficiency in FBiH.

The Strategy for climate change and low-emission development adoption for Bosnia and Herzegovina was ratified by the Council of Ministers of Bosnia and Herzegovina on 08 October 2013. The instruction for low-emission development in BiH enclosed in this document is important to follow and should be implemented in EE and RES sectors as well.

The BiH National Energy Efficiency Action Plan 2016-2018 with a view to reduce the final energy consumption by 9% by 2018 as compared to the 2010 level was adopted on December 4th, 2017. There is urgent need to adopt the new one in line with all new directives and standards in EU.

City level: Data on Zenica's CO₂ emissions is set out in the City's Sustainable Energy and Climate Action Plan (SECAP). This document defines the vision and commitment for the decarbonisation as well as interventions in energy and building sector such as heat supply expansion, energy efficiency, landfill rehabilitation and sewerage system reconstruction. The action is in line with the draft Spatial Plan of the City of Zenica 2016-2036 which outlines the current activities in regards EE. Current practices of implementation need to be redefined in line with principles of circular economy and procurement criteria. Additionally, the City will need to consider the following laws for the implementation of this action:

- Integrated Development Strategy of the Municipality of Zenica 2012–2022 also makes reference to environment protection measure and sustainable development;
- The adopted Sustainable Energy Action Plan 2011-2020;
- Local Environmental Action Plan (LEAP) also referee to this important issue of the environment protection.

Financing and delivery mechanism

Type of expenditure:	Capital costs for the public energy efficiency programme and the private energy efficiency programme.
Capital & upfront development costs:	€22,195,456: comprised of €18,600,722 for the installation of energy efficiency measures in c. 150 public buildings, and €3,594,734 for the installation of energy efficiency measures to 10 private blocks of residential flats.
Changes in operating costs (net):	€673,803 in cost savings annually. Comprised of electricity savings from new lighting and increased appliance efficiency retrofit, and heating & hot water fuel saving from full retrofit.
Suitable methods of financing:	Due to its large scale, high upfront investment and precedent of similar projects, multilateral development bank and foreign government overseas budget financing are suitable. Limited recourse project finance via a SPV is worth exploring as a potential fit due to its large scale and reasonable expected income via cost savings.

E.04. Public lighting programme for energy efficiency and safety

Background and justification

The current system of public lighting is largely obsolete and mostly made of high-pressure sodium lamps. At 18%, energy consumption from street lighting is extremely high compared to other cities. LED lighting currently makes up only 1% of all street lights in the City.

In 2014, the City's local regional planning and development agency initiated a project to modernize public lighting in urban areas (24 streets) and suburban areas (65 villages and suburban areas of the City). The selection of locations was based on: analysis of the age of luminaires (over 20 years), and frequency of malfunction and electricity consumption. Around 60% of this project was completed in 2014; it generates annual electricity savings of 162,000 BAM and maintenance savings of 150,000 BAM. Return on investment is 5.5 years. The estimated reduction in CO₂ emissions after the implementation of the project is 1,000 tonnes CO₂/yr.

The City has plans to improve the energy efficiency of lighting by replacing existing infrastructure with more efficient LED light fixtures. This action will bring increased energy savings and improve safety and accessibility in the rural areas of Zenica.

Description

This action seeks to deliver and expand the installation of LED lighting, including the replacement of a total of 8,500 lights and installation of a further 4,000 new lights. This includes the following components:

- Implement planned procurement of a contractor to finance and carry out lighting renewal;
- Identify remaining lighting areas not included in contract;
- Investigate options to integrate other sensors and communications equipment (including fabric banners) within lighting columns;
- Install additional energy efficient lighting in poorly lit areas with a risk to public safety.

Key metrics

- Number of LEDs installed/high-pressure sodium lamps replaced;
- Energy and CO₂ savings;
- Street lighting electricity consumption.



Photo 11. Street lights

Phasing of actions

Since the procurement process for the works has already commenced, the action should be implemented as soon as possible to start realising savings from more efficient lighting.

<i>Stage</i>	<i>Description</i>	<i>Timeframe</i>
1	Explore contracting / delivery options for lighting, including Public-Private-Partnership (PPP) or concession contract.	0-6 months
2	Deliver smart lighting programme	6 months – 5 years

Stakeholders

Delivery body: City management, City specialized offices, commercial banks, donors

Wider stakeholders: Commercial and sales points for lighting materials, public companies in energy, renewable energy sector, residents/citizens

Key enabling policies

The proposed action should be designed and implemented in accordance with national strategic documents that provide similar measures, including:

EU/regional: A number of EU directives should be considered including EU Environmental Impact Assessment (EIA), EU Guide for energy efficient street lighting installations from 2008. In addition, it will be important to consult the Revision of the EU Green Public Procurement Criteria for Street Lighting and Traffic Signals, 2017.

Federation Level: Law on Energy Efficiency FBiH (“Federation BiH Official Gazette,” No. 22/17) was adopted on 01.04.2017 and represents core legislation for energy efficiency in FBiH, which covers this topic on the level of the Federation as well. The Law on Environmental Protection FBiH should be considered as well. Adaptation of this existing law is should be performed to align it with the new EU directive in EE.

Canton level:

- The Law for Environment protection (Official Gazettes Ze Do Canton NO 1/00);
- The Law on Housing Management and Maintenance residential-business buildings (Official Gazettes Ze Do Canton NO 2/08);
- The Law of municipal activities (Official Gazettes Ze Do Canton NO 12/08);
- The Law on trusting public attorneys in the field of environmental protection (Official Gazettes Ze Do Canton NO 12/13).

City level: The action is in line with the draft Spatial Plan of the City of Zenica 2016-203 which provides outline of the current activities in regards EE lighting. Additionally, the City will need to consider the following laws:

- Integrated Development Strategy of the Municipality of Zenica 2012–2022 also makes reference to environment protection measure and sustainable development;
- The adopted Sustainable Energy Action Plan 2011-2020 – SEAP 2011-2020;
- Local Environmental Action Plan (LEAP) also refers to this important issue of the environment protection;
- Data on Zenica’s CO₂ emissions is set out in the City’s Sustainable Energy and Climate Action Plan (SECAP). This document defines the vision and commitment for the decarbonisation as well as interventions in energy and building sector such as heat supply expansion, energy efficiency, landfill rehabilitation and sewerage system reconstruction.

Financing and delivery mechanism

Type of expenditure:	Capital costs for the lighting renewal programme; development costs for the procurement of the contractor, completing gaps in the provision of a local study and integrating lighting column sensors and communications integration into the feasibility study.
Capital & upfront development costs:	€5,276,455: comprised of €5,128,205 for the replacement of c.8,500 lights and the addition of c.4,100 more, €130,000 for the upgrades to current studies.
Changes in operating costs (net):	€67,509: in additional costs each year due to a net increase in electricity operating costs from an additional 4,171 bulbs to the infrastructure. This is a net cost and takes into account expected energy savings of 20 percent from replacement of existing bulbs.
Suitable methods of financing:	Due to its medium scale, high upfront investment and precedent of similar projects, multilateral development bank, foreign government overseas aid budget financing and alternative finance (where service users fund improvements) are suitable. City finance is worth exploring as a secondary option, although by itself it will not be sufficient to cover the full programme.

BG.01. Wastewater collection and treatment for City centre and other community systems

Background and justification

At present there is no provision for wastewater treatment in the City, and wastewater is discharged directly into the Bosna river untreated. A wastewater treatment project has received funding; construction is expected to commence in 2020. This action is expected to bring a reduction in water pollution and improvements in aquatic ecology. This could also lead to improvements in public health within the City.

Description

This action encompasses a number of elements. Firstly, there is an ongoing project related to the construction of the wastewater treatment plant which is included in the GCAP. This project would be delivered by the company for water and wastewater management (VIK Zenica) and the City of Zenica. Since this project does not cover rural areas, the action also includes the activity of designing a waste management solution outside urban Zenica. There are also wider issues relating to the treatment and disposal of sludge as described below. Specific components within this action include:

- Implementing Zenica City Wastewater Treatment Works (WWTW) project (funding confirmed by KfW and SECO). The project includes development of the design documentation for WWTW, development of EIA and other study documentation for issuing necessary permits, and construction of WWTW with extension of sewer network;
- Develop projects and secure funding for WWTW in smaller communities outside urban Zenica (rural areas);
- Develop a design document for sludge management (treatment and disposal). Including the separation of the wastewater from surface water into separate sewer systems.

Key metrics

- Biological oxygen demand (BOD) in River Bosna (mg/L);
- Ammonium (NH₄) concentration in River Bosna (µg/L);
- Percent of households with a sewer connection;
- Number of combined sewer overflow events per year;
- Volume of untreated wastewater discharged into watercourses (or percent of all wastewater discharged).



Photo 12. Wastewater infrastructure

Phasing of actions

Stage	Description	Timeframe
1	Planning of wastewater treatment works for smaller rural communities	0-18 months
2	Develop a design document for a central sludge management facility	0-12 months
3	Secure funding and procure sludge management facility	12-30 months
4	Sludge treatment facility construction	30-54 months
5	Delivery of Citywide Zenica WWTW	0-24 months
6	Delivery of other community WWTW facilities	Built out in phases over 10 years from 18 months



Stakeholders

Respective Federation BiH laws on self-governance stipulate that local governments are obliged to ensure access to drinkable water and manage wastewater for citizens residing on their territory. The City manages these tasks through public enterprise Vodovod i Kanalizacija (ViK) Zenica, water utility company under 100% ownership by the City. The enterprise generates substantial share of revenue through invoicing water supply and sewerage to households and legal persons. Besides that, the enterprise generates some revenue from energy production (small hydro-power plant installed), new connections to water supply and sewerage (additionally invoiced service) and dedicated grants from the City for particular assignments (transitory earnings). While the enterprise is to ensure repairs and maintenance of the existing network, the City and the Canton are to finance new infrastructures, such as in extending the network that increases public service coverage. The wastewater collection and treatment project includes the management and separation of wastewater from industrial wastewater, i.e. separating the City sewerage network from those serving the coal mines and the ArcelorMittal complex. Therefore, this project highly depends on the involvement of the ArcelorMittal and coal mine complex, as well as other institutions that are part of the Coordination unit for this project (Sava River Watershed Agency, Federal Ministry for Environment and Tourism, Federal Ministry of Agriculture, Water Management and Forestry, Federal Administration for Inspection Affairs).

Key enabling policies

The proposed action must be designed and implemented in accordance with national strategic documents that provide similar measures, including:

EU/regional: several EU directives should be considered including EU Environmental Impact Assessment (EIA) Directive, Urban Wastewater Treatment Directive and the Waste Framework Directive 2008. In addition, it will be important to consult the framework Agreement on the Sava River Basin.

BIH level: There is no water management policy /legislation so BG.01 will have to be supported by the EIA study in force at the state level.

FBiH level: This action is in line with strategy objective 8 of the Water Management Strategy of FBiH 2010-2022 which is to achieve and remain a good status of surface water and groundwater for the purpose of protection of aquatic flora and fauna and meet the needs of water user, and operative objective 16 - Reduction of pollution from urban/sanitary wastewaters. It is also in line with the Sava River Basin Management Plan 2016-2021. Several laws will need to be considered including the Law on Waters, the Law on Environmental Protection and the Law on Waste Management and the Law on Waters.

New policy measure: To strengthen inspection controls at Federal level for largest polluters and industrial waste producers: ArcelorMittal, Coal mine RMU, Prevent d.o.o. Zenica operating in Zenica and apply penalties to all subjects disobeying the Law on Water of FBiH; introduce and implement education programmes for largest polluters on responsible practices (reduction of pollution) apply financial instruments for organization of education and awareness raising programmes for industries aiming the reduction of industrial water consumption and maximization of re-circulation systems.

Cantonal Level: This action is in line with the Cantonal Plan for Environmental Protection of Zenica - Dobojski Canton 2017-2025. The City will need to consider the Law on Environmental Protection and the Law on Waters of Zenica-Dobojski Canton.

New policy measure: To increase and strengthen inspection controls at the cantonal level and apply penalties to all subjects who are disobeying the Law on Waters of Zenica-Dobojski Canton and Law on Water of FBiH; introduce and implement education programmes for SMEs on responsible practices (reduction of pollution).

City level: The action is in line with the draft Spatial Plan of the City of Zenica 2016-2036 which gives information about location of the WWTP as well as location of the decentralised local WWTPs. The WWTP is also listed as a priority project within the Local Environmental Action Plan (LEAP) of the Municipality of Zenica (2009).

New policy measure: Create and implement awareness campaigns for citizens that would contribute to the protection of surface and groundwater and responsible consumption; introduce and implement education programmes for farmers, butchers, caterers on responsible pollution (reduction of pollution).

Financing and delivery mechanism

Type of expenditure:	Capital costs for the implementation of the WWTW project, development costs for the design of the rural wastewater treatment works, and the design of a sludge management and sewage system.
Capital & upfront development costs:	€19,530,000: comprised of €19,300,000 for the implementation of the WWTW and €230,000 for design of a rural wastewater treatment works and sludge management design systems.
Changes in operating costs (net):	€192,000 annual costs for the operation of the wastewater treatment plan.
Suitable methods of financing:	Financing for most of this action is already secured. However, its large scale upfront capital costs, multilateral development bank, foreign government overseas aid budget, national/canton financing are the best fit for the remainder, with precedent from similar schemes supporting urban infrastructure. Alternative finance (where service users fund improvements) would also be a good fit with international precedent.



BG.02. Climate change risk assessment and sustainable urban drainage systems (SUDS)

Background and justification

Zenica is exposed to climate change impacts with a projected reduction in precipitation combined with an increasing frequency of extreme rainfall events, heat waves and droughts. Zenica experienced a major flood in 2014 and its greatest future climate risk is flooding. The City is also exposed to risks from earthquakes and landslides. Zenica lacks a comprehensive assessment of climate change and natural disaster risks. Moreover, it does not currently monitor the frequency and severity of past, current and future climate risks. Although the flood event of 2014 raised the awareness of the public, the community remains unprepared for climate and natural shocks and stresses.

Description

This action seeks to increase Zenica’s resilience to climate and natural hazards, and to manage the impacts of future extreme rainfall and snowmelt events through better control of floodwater. It will also reduce pressure on the wastewater treatment plant. This action will implement sustainable and resilient urban drainage system (SUDS) for flood prevention. This will be preceded by a comprehensive climate change risk assessment and followed by community awareness programmes and monitoring of climate and natural risk indicators.

The specific components include:

- Drafting of climate change risk assessment;
- Detailed 3D flood model of the City, including climate change and planned new development;
- Identification of areas within open spaces where flood water storage can be enhanced;
- Implementation of SUDS measures and designation of protected flood storage areas;
- Implementation of permeable paving in public paved land;
- Implementation of “floodable” public open spaces;
- Reform of new building design code to require offsite surface water flows to be no greater than “greenfield” runoff rates;
- Introduction of rainwater collection systems;
- Implementation of community awareness and preparedness initiatives.



Photo 13. Bosna River

Phasing of actions

Stage	Description	Timeframe
1	Conduct full climate change risk assessment	0-9 months
2	Detailed 3D flood model	0-9 months
3	Design studies for SUDS	0-9 months
4	Procurement of various SUDS measures	9-12 months
5	Delivery of physical works	12-30 months
6	Community awareness and preparedness campaign	12-30 months

Key metrics

- Flood risk projections e.g. expected total area at risk (under 1:100 year and 1:500 year flood events);
- Total volume of designated flood storage capacity within green/open spaces in the City;
- Number of rainwater collection systems;
- Area of permeable pavements and other SUDS measures installed;
- Area of “floodable” space introduced;
- Number of rainwater collection systems installed.



Stakeholders

The City is responsible for water and wastewater management, including also surface runoff water. This is managed by Vodovod i Kanalizacija (ViK) Zenica – a water utility company that is 100% owned by the City. The actions will generally reduce risk of the flooding and therefore have overall positive impact on the Zenica citizens, specifically those who reside close to flood storage areas and location of other SUDS actions.

Key enabling policies

EU/regional: the following international laws and directives should be considered:

- The United Nations Convention on Climate Change (UNFCCC) Paris Agreement should be considered during the development of 3D flood model of the City;
- Framework Agreement on the Sava River Basin –BG.02 action will have positive impact on water management and reduction and elimination of adverse consequences, including those from floods;
- EU Floods Directive 2007/60/EC – should be considered to map the flood extent and assets and humans at risk in these areas and to take adequate and coordinated measures to reduce the flood risk.

BiH level: The activities within this action should be aligned to the Action Plan for Flood Protection and Water Management in BiH 2014-2017, extended up to 2021.

FBiH level: The action is fully in line with Strategic objective 9 of the Water Management Strategy of FBiH 2010-2022 which is to reduce the risk at extreme hydrological phenomena, and Operative objective 24 which is concerned with the reconstruction and rehabilitation of existing, and construction and maintenance of new protection facilities for the purpose of increasing the safety level in terms of flood control. The Law on Waters should also be considered since the proposed action could be subject of issuing water acts, that have to be in line with this law and supporting sub laws.

Cantonal level: This action is aligned with the Cantonal Plan for Environmental Protection of Zenica - Dobož Canton 2017-2025 which has a set of the recommendations for reduction of the risks due to flooding.

New policy measure: To increase inspection controls over forest utilization meaning illegal wood cutting that increases the risk of landslides and torrent streams in rural areas and apply penalties to all subjects disobeying the regulations.

City level: Within the draft Spatial Plan of the City of Zenica 2016-2036 the risk assessment as well as construction of the flood reduction infrastructure is recognized as one of the preventive measures to be done in the future. The Spatial Plan also gives information about location and surface of the territory that is under the flooding risk. Therefore, these two documents should be consulted during the design of SUDS.

New policy measure: To introduce community co-design of cadastre for areas under threat of flooding and landslides.

Financing and delivery mechanism

Type of expenditure:	Capital costs for various SUDs measures including permeable paving, 'floodable' open spaces and rainwater collection systems. Development costs for a 3D digital model of Zenica, and a flood storage enhancement study.
Capital & upfront development costs:	€879,606 comprised of €100,000 for the climate risk assessment, €21162,253 for the feasibility studies and awareness campaign, €5,289,512 for 250 new green roofs, new flood storage for 0.5% of the metropolitan area, €196,501 for 2km of permeable paving, €701,788 for 4km of floodable open spaces, and €379,522 for 1000 buildings fitted with simple rainwater harvesting and 50 properties equipped with advanced rainwater harvesting.
Changes in operating costs (net):	€85,646 additional operating costs per annum due to costs associated with operating and maintaining each of the flood measures described.
Suitable methods of financing:	Due to the moderate upfront costs of the intervention, multilateral development bank, foreign government overseas aid budget and national/canton finance will be the most appropriate. Regulations and enforcement for private landowners/business may also be an option for some aspects of the intervention, one which would bypass the need to raise public funds, ensuring that the cost is borne by the private sector.



BG.03. Mountain protection, forest restoration and tree planting programme

Background and justification

This action covers a number of components which all have an aim of protecting the natural capital in and around Zenica which has a number of benefits including reducing the impact of future extreme rainfall and snowmelt events, enhancing biodiversity in the region, expanding sustainable forestry for the local economy, and reducing air pollution in the City.

Since the City has no nature protected areas within its boundaries, it would be highly beneficial for the City and its citizens to initiate the designation process as advised in the Draft Spatial Plan of Zenica 2016-2036. This project has not commenced yet due to delay with adopting the Draft Spatial Plan as well as due to lack of funds. Therefore, the GCAP aims to build on the work already undertaken to finalise the designation and protection of this land.

Description

This action is to undertake a variety of activities with a common aim of mountain protection and forest restoration. Specific actions include:

- Satellite-based land cover monitoring;
- Designate Babino-Tvrtkovac protected area (specific areas include Postojna above Puhovac, Markov kamen, Lastavica, Seočka river with karst spring and cave, Vrandučka river basin Tvrtkovac, Pepelari, Babina river springs above Sebuje, Kraljevina, Mešanovo brdo, Smetovi with estimated surface of 5,225 ha.). Suggested category is IIIa (Nature Park) or Va. (Protected Landscape 125);
- A study to identify who owns the land for suggested protected areas should be performed as well as;
- A study on the value of natural values will need to be completed which will identify the biodiversity value of the area in order to justify its protection (legal obligation according to the Law on Nature Protection);
- Launch a public tree planting campaign, e.g. “One million new trees for Zenica!” A crowd funding approach can help deliver at scale without a cost burden for the City, but a certification process may be needed to verify and protect the planted trees;
- Explore Clean Development Mechanism (CDM) or other carbon credits to finance investment;
- Convene conference to secure public commitments from Federation and Cantonal officials on how the cities and different tiers of government can work together to protect mountain forests and therefore provide greater flood resilience to each of the cities. The action could potentially be a joint initiative with Sarajevo and Banja Luka GCAP cities.

Key metrics

- Number of trees planted;
- Total green area of City;
- Green area inventory.

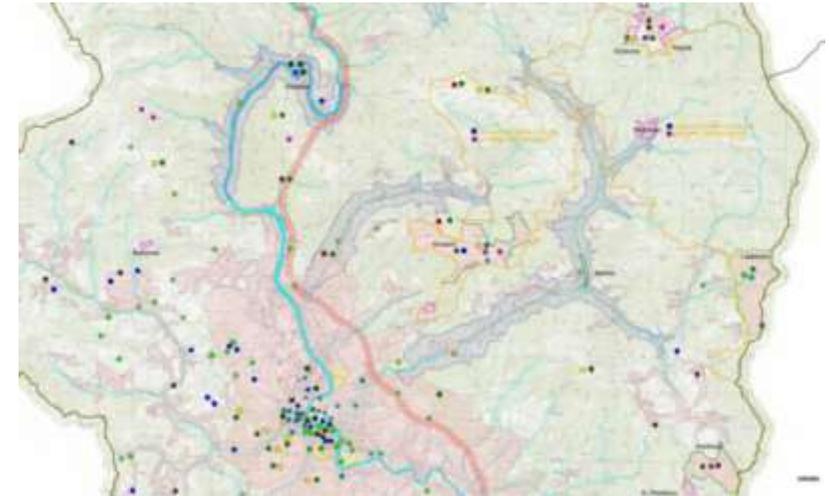


Photo 14. Nature park Babino (borderline marked with yellow) as suggested in the Draft Spatial Plan of the City of Zenica 2016-2036

Phasing of actions

Stage	Description	Timeframe
1	Land monitoring programme	0-6 months
2	Annual tree planting	3 months (annual over next 5 years)
3	Designate protected areas	0-24 months
4	Convene conference	One off event in year 2



Stakeholders

Designation of Babino-Tvrtkovac nature protected area (Nature park or Protected Landscape) – the initiator of the action should be the City of Zenica that should establish an expert team that will confirm a detailed description of the area, the name, suitable category of nature protection, natural values assessment, nature elements for the protection and precise borderlines. The initiating activities could be performed in collaboration with NGOs that would contribute to the process of elaborating. Nature park is proclaimed by the decision of the Cantonal Assembly or Federal Parliament (in case of protected area that stretches to other cantons).

Annual tree planting programme – the main implementing bodies should be the City of Zenica, public company ŠPD of Zenica-Doboj Canton and relevant NGOs.

Fuel switching for homes in forested area – the main implementing bodies should be the City of Zenica (promotion) and the potential providers of micro district heating systems (providers of the solution). The action must be incentivized by the Ministry of Spatial Development, transport and communication and environment protection or supported by the Environment Protection Fund projects, considering the socio-economic background of inhabitants in forested areas.

Key enabling policies

By establishing the first nature protected area in the City of Zenica a contribution to the principles of United Nations Convention on Biological Diversity will be achieved. This action will also highly contribute to objectives of EU Habitats Directive 92/43/EEC as well as EU Wild Birds Directive 2009/147/EC. The action is strongly in line with the Draft Spatial Plan of the City of Zenica 2016-2036 and Local Environmental Action Plan of the Municipality of Zenica. Annual tree planting programme is in line with the Law on Forests (Official Gazette of Zenica-Doboj Canton.No 8/13 and 1/15). Fuel switching for homes in forested area is backed by the Integrated Development Strategy of the Municipality of Zenica 2012-2022 as well as by the Sustainable Energy Action Plan of the Municipality of Zenica. All actions within BG.03 contribute to the achievement of national targets and biodiversity indicators and action plan for 2015-2020 as specified in Strategy and Action Plan for Protection of Biological Diversity 2015-2020 (NBSAP BiH).

New policy measures: Establishing the Expert team by the City of Zenica for leading the process of nature protected area designation; creation of valorisation study for the suggested scope of nature protected area as advised in the Draft Spatial Plan of Zenica 2016-2036; implementation of awareness campaigns on nature protection and sustainable local development backed by nature protected areas and pro-biodiversity activities; incentives for development of pro-biodiversity businesses that will contribute to the development of local communities and attractiveness of nature protected area; increase cooperation with schools and universities with the aim of successful implementation of Tree planting programme and awareness raising.

New policy measures: To ensure intensified and frequent inspection controls to prevent illegal wood cutting and deforestation, incentivise alternative fuel options for socially deprived categories of society in order to decrease the pressure on forest resources; implement awareness campaigns for citizens on the significance of forest and ecosystem services they provide.

New policy measures: Cantonal level/Federal level: Development of the Law on Babino-Tvrtkovac Nature Protected Areas proclamation.

Financing and delivery mechanism

Type of expenditure:	Capital costs for the tree planting programme and the fuel switching promotion, development costs for the LIDAR survey, feasibility study and conference.
Capital & upfront development costs:	€1,100,060 comprising of €526,341 for the planting of an initial 40,000 trees over the next 10 years, and €476,484 for the installation of solar, thermal and air source heat pumps for 100 rural homes. Further €97,235 for development costs including the feasibility study and conference.
Changes in operating costs (net):	€47,823 in annual operating costs, comprising of the designation of protected green spaces and the inspection and enforcement of those spaces.
Suitable methods of financing:	Due to the combination of activities within this action, using multiple financing sources is recommended, including multilateral development bank, foreign government overseas aid budget, national/canton and City financing. Alternative finance mechanisms such as crowdfunding may also be explored for activities such as tree planting where there is a direct social benefit to residents.



BG.04. Development of sustainable recreation areas with potential cable car access

Background and justification

Mountain areas around the City are notable for their beauty and ecological value. In the past, such areas had a specific role to provide relief for citizens living down in the City when air quality was poor. Today such areas can provide a similar function and with careful planning a balance can be struck between securing the protection of natural areas while also providing better access to some areas for low-impact activities such as walking, cycling and horse riding.

A part of the opportunity is to provide access via a cable car to a designated area. A cable car can be self-financing and will enable access for residents and visitors while avoiding the damage which would be associated with both road and parking area construction and the use of cars to access recreation areas.

Benefits:

- Public health and recreation;
- Increased tourism;
- Enhanced biodiversity for the region.

Description

This action consists of two parts:

The first is the completion of the designation of protected areas which includes:

- A study to identify who owns the land for suggested protected areas. A study on the value of natural values will need to be completed which will identify the biodiversity value of the area in order to justify its protection (legal obligation according to the Law on Nature Protection).

The second aspect is to develop a sustainable recreational area within one of these zones:

- Marking and maintenance of forest trails. To include a development study on the possibilities for development of touristic infrastructure e.g. mountain biking, horse riding etc.;
- The design of the areas will need to strike a balance between areas which are designated for the most ecological protection and where paths will not be provided, and those areas which are more



Photo 15. Parkland in Zenica

Phasing of actions

Stage	Description	Timeframe
1	Land and biodiversity study	0-9 months
2	Options appraisal for cable car	6-12 months
3	Procurement of cable car	12-18 months Subject to appraisal and access to finance
4	Implementation of cable car	18-36 months
5	Marking of new forest trails	6-12 months

suitable for access in balance with natural protection, and where paths will be provided. Access should be limited to non-motorised transport modes;

- Deliver a study of options for cable car to mountain areas – Smetovi, Lisac or Bistričák. The preferred option is Smetovi which has been costed (existing plans for a cable car to Smetovi were created in 1984). However, the options study will also consider Lisac and Bistričák;
- Development of cable car project;
- Development of a detailed plan on needed investments and maintenance of areas and explore options to administer and finance management of remote sites. These options may embrace prospective management by the City, public enterprise for management of sport and recreational areas or private-public partnerships. Currently no actor is directly designated to the management of recreational areas Bisticak and Smetovi.

Key metrics

- Area of designated protected areas;
- Area of forest trails marked.



Stakeholders

The initiating body should be the City of Zenica and implementing body should be a new or existing company that would manage the cable car. Crucial stakeholders are potential investors (domestic or foreign) interested in establishing the cable car from the City to Smetovi.

Key enabling policies

The action is in line with the Draft Spatial Plan of the City of Zenica 2016-2036 and Local Environmental Action Plan of the Municipality of Zenica and Integrated Development Strategy of the Municipality of Zenica 2012-2022 as well as by the Sustainable Energy Action Plan of the Municipality of Zenica. The action also contributes to the achievement of national targets and biodiversity indicators and action plan for 2015-2020 as specified in Strategy and Action Plan for Protection of Biological Diversity 2015-2020 (NBSAP BiH).

New policy measures: The City could consider a development of publications for foreign investors and diaspora investors with the aim of financing the cable car and recreational zones improvement; organization of forum for investors interested in investing for recreational zones with holiday villages, agritourism offer etc. with the aim of using untapped potential for tourism in Zenica; Introduction of the Pocket park strategy that will enable a multi-stakeholder approach to engage the public in the renovation and/or creation of public spaces. The strategy could serve as a baseline for the funding programme that will support communities to develop new green spaces or improve existing ones that are in poor condition.

New policy measure: Cantonal level – The Canton should establish a public expert institution for protection of biodiversity and landscape diversity in Zenica-Doboj Canton that would be in charge of nature valorisation, conducting surveys of flora, fauna and habitats, monitoring, management of nature protected areas and other activities as suggested in Cantonal Ecological Action Plan 2017-2025; the City should consider suggesting this action to the Ministry of Spatial Development, Traffic and Communication and Environment Protection; establishing an effective system and mechanisms for sustainable nature management using a holistic approach and cooperation of environment protection department with all relevant departments (forestry, agriculture, tourism, traffic, education etc)

Financing and delivery mechanism

Type of expenditure:	Capital costs for the construction of the cable car and the development of forest trails; development costs for a land and biodiversity study, a cable car feasibility study.
Capital & upfront development costs:	€40,720,636 comprising of €40,460,733 for the construction of a 10-person cable car running to Smetovi, €113,679 for the development of 5km of forest trails and €146,224 for the feasibility studies, designation of protected areas and a development and management plan.
Changes in operating costs (net):	€817,583 in operating costs per annum to operate the cable car and to upkeep the forest trails.
Suitable methods of financing:	There has been no precedent for similar projects in size and scale in Zenica previously and therefore none of the main financial instruments have been identified as a good fit for developing and building the cable car. However, national/cantonal funding should be explored due to the potential national prestige benefits of such a project.



BG.05. Open space survey and GIS mapping

Background and justification

Benefits:

- Better information from the results of the survey to inform protection and monitoring of natural areas and urban tree cover;
- Engagement with citizens and enhanced culture of protection of nature;
- Maintain and improve biodiversity levels.

Description

The City is currently procuring GIS software, for this project additional software needs to be developed/installed to extract the data from GIS into new database. This action is to undertake a satellite land cover survey as well as ground surveys to confirm key areas. It will also include publishing online dynamic maps to allow residents and the NGOs to add information on species and biodiversity.

- Satellite land cover survey;
- Ground surveys to confirm key areas;
- Publish online dynamic maps to allow residents and NGOs to add information on species and biodiversity (e.g. Melbourne tree survey or iNaturalist app).

Key metrics

- Area of land cover surveyed.



Photo 16.

Phasing of actions

<i>Stage</i>	<i>Description</i>	<i>Timeframe</i>
1	Satellite land cover survey	0-9 months
2	Ground survey	0-9 months
3	Publish online dynamic maps	9-12 months



Stakeholders

Cantonal Office for Urbanism and Spatial Development should be the main implementing body with the support of the Federal Administration of Geodetic and Property Affairs. The City of Zenica and its relevant departments should also support the action. The citizens might provide their contribution in case of developing of online dynamic maps.

Key enabling policies

By identifying and recognizing the key areas using open space survey and GIS mapping, a contribution to the principles of United Nations Convention on Biological Diversity will be achieved. This action will also highly contribute to objectives of EU Habitats Directive 92/43/EEC as well as EU Wild Birds Directive 2009/147/EC. The action is in line with Local Environmental Action Plan of the Municipality of Zenica. The action contributes to the achievement of national targets and biodiversity indicators and action plan for 2015-2020 as specified in Strategy and Action Plan for Protection of Biological Diversity 2015-2020 (NBSAP BiH).

New policy measure: Cantonal level – the Canton should establish a public expert institution for protection of biodiversity and landscape diversity in Zenica-Doboj Canton that would be in charge for nature valorisation, conducting surveys of flora, fauna and habitats, monitoring, management of nature protected areas and other activities as suggested in Cantonal Ecological Action Plan 2017-2025; the City should consider suggesting this action to the Ministry of Spatial Development, Traffic and Communication and Environment Protection; establishing an effective system and mechanisms for sustainable nature management using a holistic approach and cooperation of environment protection department with all relevant departments (forestry, agriculture, tourism, traffic, education etc).

Financing and delivery mechanism

Type of expenditure:	Development costs for the LIDAR survey, grounds survey and design of dynamic map methodology.
Capital & upfront development costs:	€109,861 comprised of €49,861 for the total surveying costs, €30,000 for the grounds survey and €30,000 for the online dynamic biodiversity map.
Changes in operating costs (net):	N/A
Suitable methods of financing:	Given its low upfront costs and specific use to local government, City financing will be the best fit. Multinational development bank and foreign overseas aid budget financing may be a secondary option, but there is less local precedent for financing this type of intervention.



T.01. Real time bus information systems, bus route optimisation and better bus shelters

Background and justification

Benefits:

- Increased ridership;
- Increased income for the public bus company;
- Reduced pollution (displaced cars trips).

Description

Components:

- Invest in on-vehicle and back office equipment and software to track vehicle position – both for fleet management purposes and to provide real time information online and at stops;
- Bus route optimisation to create a high frequency core network – based on demographics, lane use, ridership, operating costs, and following good practice principles; Countdown information at all bus shelters (using data fed from above)
- Invest in enhanced shelters with seating, schedules and advertising.

Key metrics

- Frequency of buses;
- Ridership numbers;
- Number of real time systems installed;
- Number of bus shelters renovated.



Photo 17. Zenica bus station

Phasing of actions

<i>Stage</i>	<i>Description</i>	<i>Timeframe</i>
1	Design of tracking software and enhancements to shelters	6-18 months
2	Design of new bus routes	0-12 months
3	Procurement for tracking software and enhancements to shelters	6-18 months
4	Implementation of physical works	18-30 months



Stakeholders

The main stakeholders for this action are City and Zenicatrans. This action will affect citizens through increased quality of service and reduced pollution. Also, bus route refinement based on data will help Zenicatrans optimize business and increase effectiveness.

Key enabling policies

National Implementation Plan (NIP) for the Stockholm Convention in BiH 2015-2020 represents measures and activities to be undertaken for the reduction of emissions of unintentionally produced POPs, ensuring adequate management of hazardous wastes and contaminated areas, and establishing control over the traffic and use of persistent organic pollutants.

Law on Roads of FBiH (Official Gazette of FBiH, No. 12/10, 16/10 and 66/13) represents a legal framework for conducting all activities in the domain of road infrastructure. It defines management, construction and roads protection requirements, as well as conditions for performing the transport.

Proposed Spatial Plan of the City of Zenica should be consulted as its implementation will have significant environmental impacts on the City. One of the main proposals of this plan include improvement of the quality of public transport services.

Financing and delivery mechanism

Type of expenditure:	Capital costs for additional software associated with real time bus information system, physical improvements to bus shelters; development costs associated with a bus route refinement.
Capital & upfront development costs:	€199,406 comprised of €169,406 for the installation of real time location tracking software, the development of a public tracking app, live arrival boards installed to 25 shelters and enhancements made to 50 shelters. An additional €30,000 covers bus route analysis and optimisation.
Changes in operating costs (net):	€34,404 total net operating expenditure increase due to the additional tracking service fees and the operation of the live arrival boards.
Suitable methods of financing:	Given its low upfront costs and specific use to local government, City financing will be the best fit. Other options also include corporate / off balance sheet by a private operator due to the fairly small scale and potential to commercialise via advertising. Alternative financing mechanisms such as crowdsourcing may also be a good fit. Multilateral development bank financing may be a secondary option, but there is less local precedent for financing this type of intervention.

T.02. Expansion and replacement of bus fleet, with transition towards low/zero emission buses

Background and justification

Current diesel buses are known to be a source of air pollution within the City and therefore this action is to replace diesel buses with a new fleet of low / zero emission buses, with better amenities for passengers. It will include testing the affordability of new buses and purchasing low emissions / better quality buses. Different technical requirements of buses will be considered for central and rural routes.

Description

The action contains the following specific components:

- Test affordability of new buses; purchase low emissions / better quality buses if the overall cost meets threshold:
 - Consider different technical requirements of buses for central and rural routes.
- For retained buses, invest in reconditioning, to include:
 - More comfortable seats;
 - Better heating and cooling;
 - Onboard Wi-Fi and USB chargers;
 - Bicycle rack in front of the bus.

Key metrics

- Mode split of bus use;
- Number of new buses procured;
- Number of Wi-Fi/USB chargers installed;
- Bicycle racks installed.



Photo 18. Buses at the bus depot

Phasing of actions

<i>Stage</i>	<i>Description</i>	<i>Timeframe</i>
1	Planning of new bus requirements	0-9 months
2	Securing finance and procurement of new buses	9-18 months
3	Manufacturing of buses	12-18 months
4	Roll out of new bus fleet	18-24 months



Stakeholders

Main stakeholders for this action are the City of Zenica and Zenicatrans. Zenica citizens would benefit from new bus purchases as it would increase quality of service and reduce pollution.

Key enabling policies

According to **Clean and Energy Efficient Road Transport Vehicles Directive 2009/33/EEC**, when purchasing the buses it is necessary to take into account their energy consumption, emissions of CO₂, emissions of NO₂, NMHC and particulate matter.

Combined Transport Directive 92/106/EEC aims to reduce the negative side-effects of goods transport on environment (such as CO₂ or other emissions) and on society (such as congestion, accidents, noise etc.) by reducing road transport towards less polluting and energy efficient modes of transport and shifting more freight traffic off the roads and onto railways and waterways.

Strategy for Environmental Protection of FBiH 2008-2018 supports this initiative as it states in document that transport infrastructure has to be developed and modernised.

Law on Roads of FBiH (Official Gazette of FBiH, No. 12/10, 16/10 and 66/13) represents a legal framework for conducting all activities in the domain of road infrastructure. It defines management, construction and roads protection requirements, as well as conditions for performing the transport.

Federation of Bosnia and Herzegovina transport strategy supports this action through proposed actions in strategy.

Sustainable Energy and Climate Action Plan of Zenica City - key element in the development of the Action Plan was to set the objective of reducing CO₂ emissions at the City level until 2030.

Draft Spatial Plan of the City of Zenica should be consulted as its implementation will have significant environmental impacts on the City. One of the main proposals of this plan includes improvement of the quality of public transport services.

Financing and delivery mechanism

Type of expenditure:	Capital costs for the purchase of low emissions buses and reconditioning of existing buses; development costs for a technical and pre-procurement study for the buses.
Capital & upfront development costs:	€12,208,937 comprised of €11,949,217 for the replacement of 50 new buses, and €229,620 for the reconditioning of 60 buses. €30,000 has been allocated for the bus technical and pre-procurement study.
Changes in operating costs (net):	€977,161 annual cost saving due to the increased efficiency of the buses.
Suitable methods of financing:	The large scale and upfront costs of this project make it a good fit for multilateral development bank and foreign government overseas aid budget financing. Both sources have precedent in allocating funds to transport infrastructure, and a combination will likely be necessary to achieve the full project. National government funding may also be a secondary option to explore, although is unlikely to cover the full upfront costs.

T.03. Cycle lanes and cycling promotion

Background and justification

Benefits:

- Increased cycling and walking and reduced pollution (displacement of car trips);
- Improved health of citizens;
- Safer streets and sidewalks.

Description

This action is to improve the bicycle path network and cycle storage facilities. It will include the following components:

- Undertake analytical study on air quality monitoring data and related GIS infrastructure mapping to inform transport planning;
- Move cycle lanes in City centre onto streets (with separators from vehicle traffic);
- Signage and pavement painting to designate additional cycle routes (into / out of the City);
- Cycle promotion days and car free days;
- Introduce bike repair stations in City centre;
- Bicycle sharing – build on existing plans by the City of Zenica made in April 2019 to establish this system.

Key metrics

- Number of and distance covered by new cycles routes;
- Bicycle ridership numbers/mode share of cycling;
- Number and location of new cycle storage facilities.



Photo 19.

Phasing of actions

<i>Stage</i>	<i>Description</i>	<i>Timeframe</i>
1	Design of new cycle routes	0-9 months
2	Procurement of works	3-12 months
3	Implementation of new cycle routes	12-36 months
4	Planning for cycle promotion days	0-6 months



Stakeholders

Development and implementation of transportation infrastructure is on multiple levels, such as City, Cantonal and Federal. In the past, the City of Zenica has budgeted and implemented cycling projects through third party companies and with supervision of Public company for spatial planning and City planning in Zenica.

Key enabling policies

Cantonal Plan for Environmental Protection of Zenica-Doboj Canton 2017-2025 suggests subventions for cycling lanes implementation. Development and adoption of this Plan is foreseen by the federal Law on Environmental Protection.

Sustainable Energy and Climate Action Plan of Zenica City - key element in the development of the Action Plan was to set the objective of reducing CO₂ emissions at the City level until 2030.

Law on Physical Planning and Land Use (Official Gazette of FBiH, No. No. 2/06, 72/07, 32/08, 4/10, 13/10 and 45/10) regulates land use planning on the territory of FBiH through the preparation and adoption of plans and their implementation, the type and content of planning documents, land use at the entity level. This Law contains also the procedures for obtaining Urban Permit, Construction Permit and Use Permit.

Financing and delivery mechanism

Type of expenditure:	Capital costs for the cycleway construction including route signage and road marking, and bike repair stations.
Capital & upfront development costs:	€1,576,472 comprised of €940,396 for the installation of 2km of new cycle routes, €100,000 for an air quality study and GIS infrastructure mapping, and €526,342 for the installation of new route signage along 50km of routes. A further €9,735 has been allocated for 50 bike repair stations with stools and integrated pumps.
Changes in operating costs (net):	€21,667 additional costs per annum due to the introduction of 4 cycle promotion and car free days and 5 sites across the City.
Suitable methods of financing:	Given its large-scale City infrastructure focus, multilateral development bank, foreign government overseas aid budget financing are the best fit, with precedent from similar schemes. National / cantonal and City financing is a secondary option to explore, although there is less precedent for funding this type of project.

T.04. Sustainable Urban Mobility Plan (SUMP)

Background and justification

A survey will be carried out to identify and map urban mobility user behaviour followed by technical studies and transport system modelling to test sustainable mobility policy and investment options. This research will inform wider City transport studies and delivery plans and serve as the basis for further regulation of traffic in the City, as well as changes to be made in the number of routes, public transport interval planning, cycling route expansion and other urban transport plans.

Benefits:

- Better information to improve highway and parking policy decision making and public transport decision making (e.g. bus network redevelopment).

Description

This action includes conducting a survey of travel patterns and needs in the City to provide the City with information on the reasons for the use, intensity and interval of using bicycles, motorcycles, cars, public transport etc. Specifically, it will include:

- Travel survey of Zenica – to include travel within the City and commuting patterns to Sarajevo (road and rail);
- Model expected impact of completion of Corridor Vc (likely to reduce traffic in the City);
- Technical study of streets and parking to identify needs and options to increase parking without increasing land used for parking/streets (e.g. one-way streets);
- Implement proposed changes to streets;
- Increase car tax and parking charges, following public consultation and information process.

Key metrics

- Modal share of all transport;
- Number and area of parking streets and locations;
- Percentage increase in parking charges/car tax.



Photo 20. View of the City magistrale road (GGM)

Phasing of actions

Stage	Description	Timeframe
1	SUMP including travel surveys and technical studies	0-24 months
2	Implement proposed changes to streets	24-48 months
3	Reform car tax and parking charges to encourage non-car modes of transport	Potentially within 12 months with political support; otherwise following Stage 1



Stakeholders

City of Zenica is the main stakeholder for this action as technical studies would help optimize parking use that combined with increases in parking charges and car taxes would increase City's revenue.

Key enabling policies

Law on Roads of FBiH (Official Gazette of FBiH, No. 12/10, 16/10 and 66/13) represents a legal framework for conducting all activities in the domain of road infrastructure. It defines management, construction and roads protection requirements, as well as conditions for performing the transport.

Law on Physical Planning and Land Use (Official Gazette of FBiH, No. No. 2/06, 72/07, 32/08, 4/10, 13/10 and 45/10) regulates land use planning on the territory of FBiH through the preparation and adoption of plans and their implementation, the type and content of planning documents, land use at the entity level. This Law contains also the procedures for obtaining Urban Permit, Construction Permit and Use Permit.

Integrated development strategy of the Municipality of Zenica 2012-2022 is a key strategic planning document of the City of Zenica aimed at fostering future community growth and development. The Strategy includes social, economic, environment and spatial aspects.

Draft Spatial Plan of the City of Zenica contains proposals for the reconstruction and development of transport, energy, water management and telecommunication infrastructure, as well as rational use and exploitation of waters, reduction of adverse impacts on natural, urban and rural areas, and other proposals for the spatial development of the City.

Financing and delivery mechanism

Type of expenditure:	Development costs for a travel survey, Corridor Vc modelling, the Sustainable Urban Mobility Plan and an assessment of taxes and charges.
Capital & upfront development costs:	€260,000 comprised of, €100,000 for the Zenica travel survey, €30,000 for the corridor Vc modelling, €100,000 for the SUMP and €30,000 for the taxes/charges assessment.
Changes in operating costs (net):	N/A
Suitable methods of financing:	Due to its low upfront costs and local focus, City financing will be the best fit. Multilateral development bank financing may also be a suitable option, and national / cantonal financing are a secondary options to explore, although there is less precedent for a non-capital intervention such as this.

T.05. Bus and rail station site redevelopment

Background and justification

The bus and rail station combined site occupies a strategic location in Zenica along the River Bosna. The land is underutilised and neglected but has great potential to serve as an anchor for regeneration of this part of the city. Redevelopment of the site with a new mixed-use development can also provide the land value uplift to enable renewal of the bus and train stations to be renewed to increase the attractiveness of public transport.

Benefits:

- Land value release to fund new transport infrastructure;
- New civic architecture shows high quality design;
- Central urban location created for new housing, offices and retail;
- Flagship project attracts new investment and national and international attention.

Description

This action is for a new development across 50 percent of the current bus and rail station site e.g. 4-5 story housing and mixed-use development. It will also include the re-provision of bus and rail station within the site on the remaining 50 percent. Part of the action will be to include gas refuelling or EV charging infrastructure For the bus fleet.

Components:

- Prepare a concept plan for the site and conduct the process to rezone the site in the Spatial Plan needs to happen before you can redevelop the rail station site – 1-2 years to make that change;
- New development on bus and rail station site, e.g. 4-5 story housing and mixed-use development;
- Re-provision of bus and rail station within site, with the bus station built above the rail station (unless the study indicates that bus interchange should be somewhere else);
- Inclusion of gas refuelling or EV charging infrastructure on the site for public use.

Note, the City does not own the rail station site. Therefore, a regeneration project across the two sites would need a multi-stakeholder agreement. The City can promote the project through its Spatial plan and work with the federal authority to develop the rail station under conditions dictated by the City.



Photo 21. A modern bus interchange

Phasing of actions

Stage	Description	Timeframe
1	Site concept planning and Spatial Plan rezoning process	12-24 months
2	Full design and assessment of redevelopment, with development of business case	24-36 months
3	Procurement of works	36-42 months
4	Delivery of redevelopment	42 months onwards (2-3 year construction period)

Key metrics

- Approval of changes to the spatial plan;
- Completion of approvals for project development
- Completion of new development on the site.
- Level of interest from inward investors
- Change in property values in local area



Stakeholders

Main stakeholder for this action in case of railways is Railways of the Federation of Bosnia and Herzegovina and changes in bus infrastructure fall on City with Cantonal permissions. The City does not own the rail station, however it can regenerate the site and influence (e.g. via the Spatial Plan) the federal authority to develop the rail station under the City's conditions.

Key enabling policies

Law on Roads of FBiH (Official Gazette of FBiH, No. 12/10, 16/10 and 66/13) represents a legal framework for conducting all activities in the domain of road infrastructure. It defines management, construction and roads protection requirements, as well as conditions for performing the transport.

Law on Railways of Bosnia and Herzegovina represents legal framework for total structural and exploitation railway transportation area in Bosnia and Herzegovina, conditions and ways of managing railway infrastructure and all other issues related to work of railway transportation system.

Law on Railways of Federation of Bosnia and Herzegovina manages railway traffic in Federation of Bosnia and Herzegovina.

Financing and delivery mechanism

Type of expenditure:	Capital costs for the redevelopment of the bus and rail station site, the re-provision of the bus and rail station within the site, and the provision of gas/EV charging infrastructure.
Capital & upfront development costs:	€63,026,420 comprised of €31,506,007 for the mixed-purpose redevelopment costs. €31,452,614 for the re-provision of bus and rail station within the site and €67,800 for EV charging infrastructure for 30 vehicles within a new car park.
Changes in operating costs (net):	N/A
Suitable methods of financing:	Due to the very large upfront costs required and the scale of this action, multilateral development banks and foreign government overseas aid budget are the most suitable financing mechanisms available to the City. Limited resource (project) finance via SPV may also be a good option to explore given the high potential for large returns on investment. National / cantonal and corporate / off balance sheet funding by a private operator may also be worth exploring as secondary options due to the revenue generating potential of the project.



W.01. Extension of household waste collection and construction of new waste handling infrastructure

Background and justification

The objective of this action is to deliver 100% coverage of waste collection across the City and stop illegal dumping of waste. Not all of the population benefit from weekly City waste collection. This action would be to expand waste collection to 100% of the population to ensure waste is collected, processed and treated safely.

Benefits:

- Reduced illegal waste dumping;
- Reduced littering;
- Increased recycling.

Description

Components:

- City of Zenica gets two collection streams: dry recyclables and residual waste. Food/green waste collection is provided upon request;
- Other areas get 100% household collection of a single stream;
- New waste transfer stations (if necessary);
- New refuse collection vehicles to match waste streams and accessibility requirements of urban and remote communities;
- New household recycle yards (or transfer stations) for residents to bring bulky and special categories of recyclable waste (solid waste collecting company and City joint investment);
- Tariff reform for waste customers (potential to reward reduced waste generation).

Key metrics

- Share of the population with weekly municipal solid waste (MSW) collection;
- Total solid waste generation per capita;
- Number of new refuse collection vehicles;
- Proportion of MSW that is sorted and recycled.



Photo 22. View of Zenica

Phasing of actions

Stage	Description	Timeframe
1	Planning and design for extension to waste collection system, including planning and design of additional sites for waste fleet and household recycle yards, plus procurement of additional waste vehicles.	0-18 months
2	Procurement for delivery of extended waste collection vehicles and infrastructure	18-24 months
3	Extension to waste collection system	18-36 months



Stakeholders

The main stakeholders that will be covered by this action are: City of Zenica, ALBA Group, Mošćanica landfill and citizens. The main implementing body will be ALBA Group under the supervisory of the City of Zenica within the new contract they sign after April 2019. The action will affect the citizens by providing them the opportunity to recycle their waste and lower their costs by reducing the waste generation. It will also affect the landfill Mošćanica by decreasing the total amount of waste disposed at the landfill.

Key enabling policies

On the international level, the action contributes to Waste Framework Directive 2008/98/EC since extending the waste collection system will enable waste management with lower risk of endangering human health and harming the environment (reducing illegal waste dumping). The action is in line with the action and objectives proposed in the Environmental Protection Strategy of FBiH 2008-2018. It also follows the waste management hierarchy prescribed by the Law on Waste Management (Official Gazette of FBiH, No. 33/03, 72/09 and 92/17). By extending the waste collection system, a contribution to achievements of objectives and targets as set in the Cantonal Plan for Environmental Protection of Zenica-Doboj Canton 2017-2025 will be made. This action contributes to achieving target actions as set out in the Cantonal Waste Management Plan of Zenica-Doboj Canton 2009-2018, specifically: (a) Increase the coverage of the waste collection service, (b) Establish waste recycling. The action is in line with the requirements of the Law on Environmental Protection (Official Gazette of Zenica-Doboj Canton, No. 1/00) and Law on Public Utilities (Official Gazette of Zenica-Doboj Canton, No. 17/08). Implementation of this action will contribute to achievements of targets set out in the Waste Management Plan of the Municipality of Zenica 2011-2016, namely: (a) extend the waste collection system, (b) establish separate waste collection system and recycling. The action will contribute to the achievement of objective related to waste recycling as specified in the Local Environmental Action Plan (LEAP) of the Municipality of Zenica (2009) and is aligned with the Integrated Development Strategy of the Municipality of Zenica 2012–2022.

New policy measures: FBiH and Cantonal level – consider introducing deposit return systems for plastic, glass and metal packaging waste; introduce changes in the Law on Waste Management that will enable taking indirect proofs (such as photos) in the process of proving subject's liability for illegal waste dumping (City to submit the initiative); introduce pay as you throw scheme; consider establishing of communal police that would be able to charge fees on the spot.

New policy measures: City level – consider banning of single-use plastics in all City owned public institutions including the City of Zenica; consider incentivising for system of decentralised composting by providing bio-degradable bags for households in sub-urban and rural areas; consider incentivising and introducing door to door collection of separate waste (plastic, paper/cardboard, metal and glass) by engaging informal waste collectors in formal waste collection in sub-urban and rural areas.

Financing and delivery mechanism

Type of expenditure:	Capital costs for the new waste transfer station, additional refuse collection vehicles and a household recycling centre; development costs for a customer tariff reform study.
Capital & upfront development costs:	€8,898,337 comprised of €2,507,135 for a 65000 tones p.a. new waste transfer station, €3,484,051 for 24 new refuse vehicles, €2,807,152 for a new household waste recycling centre and €100,000 for the new customer tariff reform study.
Changes in operating costs (net):	€1,136,462 increase in operating expenditure per annum for the recyclables & residual waste segregated collection, running of the waste transfer station, operation of additional refuse collection vehicles, and the additional operating costs for the household waste recycling centre.
Suitable methods of financing:	Due to its large scale and fairly high upfront costs, multilateral development bank financing would be a good option, but due to existing arrangements with the City government corporate / off balance sheet financing by a private operator is expected to be the best fit. Foreign government overseas aid budgets, national / cantonal financing, corporate / off balance sheet by a private operator financing and alternative finance (where service users fund improvements) would also be good secondary options to explore, including as sources for ongoing funding of operations.



W.02. Sustainable waste treatment solution

Background and justification

The objective of this action is to convert waste to energy to release burden of waste going to landfill.

Benefits:

- Reduced landfilling (extends life of landfill by many years);
- Increased recycling;
- Increased energy independence for Zenica;
- Reduced carbon emissions.

Description

Components:

Study to evaluate waste treatment options, including:

- Option A: Mechanical treatment + Energy from waste (EfW) + Landfill;
- Option B: Mechanical & Biological Treatment + EfW + Landfill;
- Option C: Mechanical & Biological Treatment + RDF + biogas injection + Landfill;

Notes: “EfW” means heat and power for Zenica heat network. “RDF” means fuel sale to a third party (e.g. Kakanj Cement).

Key metrics

- Energy produced from waste;
- CO2 savings;
- Proportion of MSW that is sorted and recycled;
- Percentage of MSW sent to landfill.



Photo 23. Waste transfer station

Phasing of actions

Stage	Description	Timeframe
1	Completion of study	0-18 months
2	Implementation of best value option (not costed in GCAP)	18-36 months



Stakeholders

The main implementing body will be the newly established company or the existing company that will invest in sustainable waste treatment solution (ALBA Group). The City has already started negotiations on this topic through the contract renewal with ALBA Group. Other relevant stakeholders include potential third party (Kakanj Cement company) and potential foreign investor in case that ALBA Group decides not to take part in this agreement.

Key enabling policies

The action is in line with the Waste Framework Directive 2008/98/EC and Strategy for Environmental Protection of FBiH 2008-2018. Law on Waste Management (Official Gazette of FBiH, No. 33/03, 72/09 and 92/17) encourages use of waste for energy generation, meaning the action is fully aligned with the Law. By implementing this action, targets as set out in the Cantonal Waste Management Plan of Zenica-Doboj Canton 2009-2018 will be achieved, specifically those referring to waste disposal reduction and waste recycling. The action contributes to the achievement of objective related to separate waste collection in the Local Environmental Action Plan (LEAP) of the Municipality of Zenica (2009) and is in line with the Integrated Development Strategy of the Municipality of Zenica 2012–2022 (objective related to waste recycling and processing).

Financing and delivery mechanism

Type of expenditure:	Development costs for the waste treatment study.
Capital & upfront development costs:	€100,000 for a feasibility study of three waste treatment options.
Changes in operating costs (net):	N/A
Suitable methods of financing:	Given its low upfront costs and specific use to local government, City financing will be the best fit for this study. Multinational development bank may be a secondary option, but there is less local precedent for financing this type of intervention.



W.03. Waste awareness campaign

Background and justification

The objective of this action is to ensure that citizens know how to safely dispose of waste to protect the environment and stop illegal waste dumping.

Benefits:

- Increased customer satisfaction with waste system;
- Reduced rate of illegal dumping;
- Improved quality of waste separation at source.

Description

Components:

- Launch awareness campaign to be timed with changes to the waste system – new collection, opening of Household Waste Recycling Centres (HWRC), changes to tariffs;
- Extend awareness campaign for dealing with hazardous waste.

Key metrics

- Percentage of MSW disposed of in illegal dumps;
- Proportion of MSW that is sorted and recycled.



Phasing of actions

<i>Stage</i>	<i>Description</i>	<i>Timeframe</i>
1	Launch awareness campaign	6 months (year one) and two follow up campaigns in year two for 3 months each



Stakeholders

The main implementing body is the City of Zenica in cooperation with the relevant non-governmental organizations. The action will affect citizens, by increasing their awareness on changes in the waste management system and benefits they would receive through this action.

Key enabling policies

The action is in line with the Waste Framework Directive 2008/98/EC, Strategy for Environmental Protection of FBiH 2008-2018, Law on Waste Management (Official Gazette of FBiH, No. 33/03, 72/09 and 92/17), Cantonal Plan for Environmental Protection of Zenica-Doboj Canton 2017-2025 and Law on Environmental Protection (Official Gazette of Zenica-Doboj Canton, No. 1/00). The implementation of the action contributes to the achievement of targets set out in the Cantonal Waste Management Plan of Zenica-Doboj Canton 2009-2018. This action will help to achieve objectives as set out in the Waste Management Plan of the Municipality of Zenica 2011-2016, Local Environmental Action Plan (LEAP) of the Municipality of Zenica (2009) and is in line with the Integrated Development Strategy of the Municipality of Zenica 2012–2022.

Financing and delivery mechanism

Type of expenditure:	N/A
Capital & upfront development costs:	N/A
Changes in operating costs (net):	€24,107 per annum for two years of campaigns (six month campaign and 2x3 month campaigns in subsequent years).
Suitable methods of financing:	Given its low upfront costs and specific use to local government, City financing will be the best fit. Multinational development bank and national / cantonal financing may be a secondary option, but there is less local precedent for financing this type of intervention.



W.04. Rača industrial landfill remediation

Background and justification

The objective of this action is to reduce soil and water pollution, and to improve air quality in the City.

Benefits:

- Reduced soil and water pollution;
- Improved air quality in the City.

Description

- This action is concerned with the treatment of industrial waste and the management of Rača industrial waste landfill. It includes resolving land ownership uncertainty at Rača industrial waste landfill, and working with AMZ, Canton and FBiH to support remediation of Rača landfill. Specific components include:
 - Resolve land ownership uncertainty at Rača industrial waste landfill;
 - Work with AMZ, Canton and FBiH to support remediation of Rača landfill.

Key metrics

- Percentage of waste sent to landfill.



Photo 24. Landfill cover

Phasing of actions

<i>Stage</i>	<i>Description</i>	<i>Timeframe</i>
1	Resolve land ownership uncertainty at Rača industrial waste landfill	0-24 months
2	Work with AMZ, Canton and FBiH to support remediation of Rača landfill	24-48 months



Stakeholders

The implementation requires involvement of stakeholders at Federal, Cantonal and City level. The initiating body for resolving the issue will be the City of Zenica, but the implementing body should be the Cantonal ministry that would cooperate with the only user of the landfill – ArcelorMittal Zenica in resolving the ownership issue first as well as on environmental protection measures and liability for the rehabilitation.

Key enabling policies

By resolving special waste management issue in the City of Zenica, a significant contribution to the Stockholm Convention on Persistent Organic Pollutants (POPs) will be made. The action will help to achieve objectives set out in the National Implementation Plan (NIP) for the Stockholm Convention in BiH 2015-2020. The action is in line with the Waste Framework Directive 2008/98/EC, Strategy for Environmental Protection of FBiH 2008-2018, Cantonal Plan for Environmental Protection of Zenica-Doboj Canton 2017-2025, Law on Waste Management (Official Gazette of FBiH, No. 33/03, 72/09 and 92/17), Cantonal Plan for Environmental Protection of Zenica-Doboj Canton 2017-2025 and Cantonal Waste Management Plan of Zenica-Doboj Canton 2009-2018. Implementation of the action will contribute to achievement of the objective related to the rehabilitation of the Rača landfill, as specified in the Local Environmental Action Plan (LEAP) of the Municipality of Zenica (2009).

Financing and delivery mechanism

Type of expenditure:	Capital costs for the remediation of the Rača landfill; development costs for the land ownership study.
Capital & upfront development costs:	€20,324,670 comprised of €20,294,670 for the remediation of the Rača landfill and €30,000 for the land ownership study.
Changes in operating costs (net):	€17,000 additional costs annually for the continuation of the land ownership study.
Suitable methods of financing:	Due to the large scale and high upfront costs of this action, multilateral development bank financing would be a good option to explore. Regulations and enforcement for private landowners and businesses would also be a good option given the current negotiations concerned with land ownership of the site. Foreign government overseas aid budget, national / cantonal and limited resource finance via SPV may also be good secondary options to explore, given some potential for future revenue streams from usage charges.

Appendix 2: Approaches to financing

For funding the proposed interventions of the GCAP, the following finance mechanisms are considered to be most viable:

Multinational development bank

Funding via a large development bank, many of which have infrastructure funds (including grants) for lower-income nations, either as grants or concessionary loans.

Candidates for Zenica include Council of Europe Development Bank, the International Bank for Reconstruction & Development (IBRD), the West Balkans Investment Framework, KfW, the EIB and the EBRD.

Foreign government aid budgets

Funding via overseas government international development budgets; recent partners for Zenica have included grant and/or loan financing from Switzerland, Finland, Sweden and Saudi Arabia.

National or Canton

Funding via central department or Zenica-Doboj Canton shared tax receipts or fiscal transfers, such as from infrastructure budgets.

City

Funding via existing capital project budgets or intragovernmental transfers based on national government taking on additional development loans. Asset recycling is also a possibility via sale, lease, or sale and leaseback of public assets for additional revenue and to avoid increasing public debt. Future options include issuance of City bonds.

Due to existing debts and current revenues the City has limited recourse to borrowing, but could explore public-private partnerships to reduce the financial liabilities and risk exposure for the city while still retaining some control and influence over the projects being financed.

Corporate / on balance sheet by a private operator

Smaller capital projects may be financed, built, controlled and operated by private organisations using public land, avoiding budgetary restrictions by keeping financial liabilities off the public balance sheet.

Limited recourse project finance via a special purpose vehicle (SPV)

A SPV is created by the City to deliver a specific infrastructure project. Limited resource financing of the SPV helps to isolate financial risk for the City and free up fiscal space for other projects.

Alternative finance

Alternative finance encompasses new finance and decentralised models of fundraising. This includes ESCo or RAB, whereby service users fund infrastructure improvements. Another relevant approach is crowdfunding, via which funds are raised from a large number of local donors for a popular public-use capital project, such as a restored woodland park.

Regulations and enforcement for private landowners and businesses

Not a funding source in its essence, but reduces the need for City investment by creating City-wide legal requirements for improvements by private landowners and businesses, e.g. vehicle/building eco standards.

Endnotes

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