

Split Green City Action Plan

Final | September 2023



Photo: City of Split



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Abbreviations and Definitions

Abbreviations

CO₂	Carbon dioxide
EBRD	European Bank for Reconstruction and Development
GCAP	Green City Action Plan
GDB	Gross domestic product
IT	Information Technology
ITS	Intelligent Transportation Systems
KWh	Kilowatt hourf
KWp	Kilowatt peak
MW	Megawatt
MWh	Megawatt hour
NH₄⁺	Ammoniacal nitrogen
PM₁₀	Particulate matter less than 10 µm in size
PM_{2,5}	Particulate matter less than 2,5 µm in size
PV	Photovoltaics
RES	Renewable energy sources
SCADA	Supervisory Control and Data Acquisition
UE	European Union
UN	United Nations
UNCBD	United Nations Convention on Biological Diversity

Definitions

Adaptation to climate change	Adaptation to current or expected climatic conditions and their effects.
Active mobility	Individual mobility conducted on foot or by bicycle, but also with the help of other non-motorised means of transport or ways of moving in space (on rollerblades, scooters).
Biodiversity	The diversity of living organisms within ecosystems, within and between species, and the diversity of ecosystems.
Biologically active area	Native soil covered with vegetation and surface water on the building plot, and 50% of the sum of the surfaces of terraces and flat roofs, arranged as permanent lawns or flowerbeds on a substrate ensuring their natural vegetation, with an area of not less than 10 m ² .
Blue-green infrastructure	A network of natural and semi-natural solutions that fulfil many functions. Blue-green infrastructure includes many forms of retention: ponds, basins – hollows of the area, reservoirs, rain gardens (performing on the one hand the function of rainwater management, on the other – their purification), green and wetland areas, etc.
Climate neutrality	The (zero) balance between greenhouse gases emitted and their storage or absorption by water bodies, forests or soils.

Circular economy	A regenerative economic system that minimises the consumption of raw materials and the volume of waste, as well as emissions and energy losses, by creating a closed loop of processes in which waste from one process is used as raw material for another, thus reducing production waste as much as possible.
Decarbonisation	A process that involves the systematic reduction of carbon dioxide (CO ₂) emissions into the atmosphere, with the aim of eventually ceasing emissions altogether.
Digital transformation	Using technology to transform analogue processes into digital ones.
Energy efficiency	It is the ratio between the achieved performance of a facility, appliance or installation, under typical conditions of use or operation, and the amount of energy consumption required by that facility, appliance or installation to achieve that performance. Energy efficiency measures consist of changes or improvements to a facility, equipment or installation, resulting in lower operating costs and reduced primary energy consumption.
Environment	All natural elements, including those transformed as a result of human activity, in particular the surface of the earth, minerals, water, air, landscape, climate and other elements of biodiversity, as well as the interaction between these elements.
Green areas	Areas with technical infrastructure and buildings functionally related to them, covered with vegetation, performing public functions, in particular parks, greens, promenades, boulevards, botanical gardens, zoological gardens, historic gardens, cemeteries, greenery accompanying roads in the development area, squares, historic

	fortifications, buildings, storage yards, airports, railway stations and industrial facilities.
Green/clean electricity	Electricity that is generated from renewable energy sources or nuclear energy.
Inclusivity	An approach based on equality, acceptance of diversity, leading to social inclusion, ensuring equal opportunities for people from diverse backgrounds. The main objectives of inclusivity and diversity involve: ensuring gender equality, eliminating all prejudice and discrimination, considering the needs of people with disabilities (Council of the European Union).
Innovative technologies	Implementation of a new or significantly improved technology in business practice, workplace organisation or relations with the environment.
Landscape	A space perceived by people, containing natural elements or products of civilisation, shaped because of natural factors or human activity.
Low emissions	Emissions of dust and harmful gases at heights of up to 40 m. These pollutants come from domestic heating cookers and local coal fired generation units, where coal is burned inefficiently, and from combustion transport.
Low-emission transport	Vehicle powered by alternative fuels, allowing to reduce the emission of transport, which include, among others: hybrid buses, buses powered by: liquid biofuels, synthetic fuels, paraffin fuels, compressed natural gas (CNG), liquefied natural gas (LNG), gas from biomethane, liquefied petroleum gas (LPG).
Modernisation	Upgrading, modernisation of a product, permanent improvement, e.g., of an existing building leading to an increase in its use value.

Pocket Park	Publicly accessible park of small size.
Public transport	Publicly available regular passenger transport performed at specified intervals and along a specified transport line, transport lines or transport network.
Public-private partnership	Joint implementation of a project based on the sharing of tasks and risks between the public entity and the private partner.
Reference range	Benchmarks, defined by the European Bank for Reconstruction and Development, developed from published international norms and standards set by global organisations such as the World Organisation (WHO), the European Environment Agency (EEA), the Organisation for Economic Co-operation and Development (OECD), and Local Governments for Sustainability (ICLEI).
Revitalisation	The process of taking degraded areas of the city out of crisis and adding new functions to them (through holistic measures, i.e., interrelated undertakings covering social and economic, spatial-functional, technical or environmental issues).
Selective waste collection	It consists of collecting municipal waste in separate containers directly at the place of generation. In the context of separate collection, a given waste stream comprises only waste with the same properties and the same characteristics, i.e., plastic, glass, paper, bio.
Smart City	Creative, sustainable city in which the quality of life is improved, the environment becomes friendlier and the prospects for economic development are stronger. Its distinguishing feature is “smartness”, which can be understood as the sum of various improvements regarding the functioning

	of urban infrastructure and city resources, as well as public services (Lee, Gong Hancock and Hu, 2014).
Smart Meter	A meter to optimise electricity consumption for own consumption purposes.
Spatial order	The way in which a space is arranged to form a harmonious whole. Spatial order considers in orderly relations the following conditions and requirements: functional, socio-economic, environmental, cultural, compositional and aesthetic.
Sustainable development	Socio-economic development, in which a process of integrating political, economic and social activities takes place, with preservation of natural balance and sustainability of basic natural processes, in order to guarantee the possibility of satisfying the basic needs of particular communities or citizens both present generation and of future generations.
Sustainable Development Goals – SDGs	An action plan for the transformation and reshaping of the world in which the needs of the present generation can be met in a sustainable manner, respecting the environment and respecting the needs of future generations.
Thermomodernisation	A set of measures aimed at reducing the demand and consumption of energy supplied for heating and hot water in a facility and the costs incurred for it.
Urban heat island	A meteorological phenomenon involving the thermal preference of urban spaces over surrounding undeveloped areas.
Waste management	Collection, transport, recovery and disposal of waste, including supervision of operations and disposal sites.

Wastewater management	Wastewater management and water status and distribution, together with water treatment to reduce water losses and wastewater generation.
Water resources of the city	Surface and groundwater resources found within the city.
Water retention	Storage of rainwater on the ground surface, in the ground and in natural and artificial reservoirs.
Zero-emission transport	Vehicle that uses electricity for propulsion, including energy generated from hydrogen in fuel cells installed in them, or an engine whose duty cycle does not emit greenhouse gases or other substances covered by the emission management system for greenhouse gases and other substances.

Definitions – Actions descriptions

Action benefits	Benefits related to improving the quality of environment and life in the city and strengthening the city's climate resilience.
Action owner	The unit responsible for the preparation, implementation and monitoring of actions under the Green City Action Plan of Split.
Capital expenditure (CAPEX)	Expenditure related to the cost of constructing the facility, purchasing equipment, making the investment.
Financing mechanisms	The way in which a company, organisation or programme receives the funding it needs to continue operating.
Main stakeholders	Organisations or individuals with a direct interest in consulting on the implementation of the action and the results of its implementation.
Operating expenditure (OPEX)	Expenses associated with maintaining a product, business or system.
Performance indicators	Measurable impact resulting from the implementation of the action.
Potential for inclusiveness of action and improvement of social conditions	Opportunities to implement solutions to increase inclusivity, social diversity and accessibility in the implementation of the action.
Pre-investment costs	Expenditure relating to pre-investment work, e.g., the preparation of an investment feasibility study, a study of the development of a legal framework, a technical or locational analysis, a plan or directions for development, a multi-variant concept.
Risk mapping	Risks or challenge from which the action needs to be conducted in order to minimise them.
Smart potential	Opportunities to implement digital technologies, oriented towards smart, innovative solutions in the implementation of the action.
Timeline	Range of years in which the action will be implemented.
Type of action	Specification of the type/scope of action, broken down into capital investments, operational actions, and enabling actions.

Foreword from the Mayor of the City of Split

Climate change is a global issue, thus, to mitigate negative consequences, global climate policy calls for dedication to change at all levels of society. However, the change must primarily ensue from the particular needs of local communities. Over 50% of the world's population lives in cities, and due to their economic and social importance, as well as environmental impact, cities must be hotspots of significant interventions directed to mitigation, and even reversal of negative effects of their activities.

Split is located on a peninsula, and even though the sea is only one aspect of the title “najlipši grad na svitu” [*“The most beautiful city in the world”*], it is a significant factor that makes the city particularly sensitive to the effects of high tides, and risks of sea level rise. We also face many issues related to the high seasonality of tourism, with massive traffic inflows, urban sprawl, and consequences of uncontrolled building practices from decades ago, which have left many eastern parts of the city with scarce green areas, and therefore no natural shade.

To combat these and many other issues, Split formalised its intention to positively contribute to fighting climate change by joining EBRD's Green Cities programme. Green City Action Plan strives to build a better and more sustainable future for cities and their residents by tailoring measures and interventions drawn on baseline analysis and specific needs of the city of Split.

Hereby, I am happy to present you a joint product of cooperation between EBRD and the City of Split, which is this participatory document, that will guide us through the decade ahead. The document proposes measures and interventions which aim at improving the urban environment with the intention to adapt to or mitigate climate change.

With this document and other local policies we are currently planning and implementing, our ambition for the city of Split is to be a Croatian leader in the adoption of green, digital, and innovative solutions that will help us overcome the challenges we face and bring about a much more comfortable urban environment for every citizen.



Photo: City of Split

Mayor of the City of Split

Ivica Puljak

Executive summary

Photo: City of Split



1. Executive summary

1.1 Introduction

The Green City Action Plan (GCAP) aims to support the sustainable development of a city focused on improving the quality of the environment, increasing resilience to climate change, improving the living conditions of residents, and supporting diversity and social inclusivity. Split is the first city in Croatia to join the European Bank for Reconstruction and Development's (EBRD) "Green Cities" framework programme. The framework programme supports the city in identifying and prioritising and investing resources to improve the city's environmental performance.

1.2 Methodology

As part of the development of the Green City Action Plan, the methodology developed by the European Bank for Reconstruction and Development (EBRD) was applied. The preparation of the document consisted of six main stages, including:

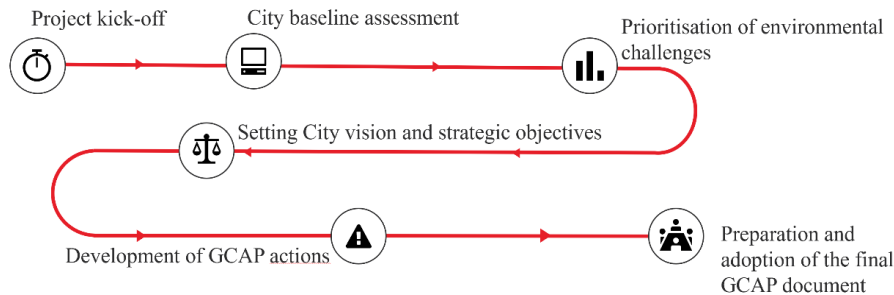


Figure 1 Stages of Split GCAP preparation

The Green City Action Plan was based on data obtained during many meetings, consultations, workshops with city representatives and external stakeholders, in order to consider, the current and future needs of various social groups - city residents, non-governmental organisations, scientific circles, social organisations as well as city companies and entities.

1.3 Assumptions of the Green City Action Plan










Crucial to the development of the vision, goals and direction of the Green City Action Plan was to identify and prioritise the challenges faced by the city. As a result of the analysis and workshop work, the identified priority environmental challenges of Split include:

- Climate change risk and adaptation
- Green spaces, coastline, sea and biodiversity protection and enrichment
- Climate change mitigation (GHG reduction)
- Quality of public spaces and improvement of accessibility
- Water and wastewater management and system energy efficiency
- Adaptation and resilience to extreme weather events: seismic risk, sea level rises

1.4 Priority challenges

To support the city's development, sectors have been selected where measures should be implemented to help meet the identified challenges:

Table 1 Priority challenges identified in the City of Split

	<p>Biodiversity and Green areas</p> <p>The limited availability of green spaces within the city contributes to escalating temperatures and diminished air quality, leading to compromised well-being and deteriorating health among residents. Despite a need to protect vulnerable areas such as Marjan Forest Park, the city lacks an institution that is responsible for biodiversity protection and enrichment. Increasing green spaces and biodiversity will contribute to the resilience of the city.</p>
	<p>Traffic</p> <p>The city is struggling with traffic jams, mainly during the tourist season, which are a major cause of air pollution in the city. There is poor accessibility to the area of historic city center due to insufficient pedestrian pathways and a lack of bicycle roads. At the same time, there is a growing trend of citizens and tourists opting for alternative modes of transportation such as cycling for their daily commute.</p>
	<p>Water Supply</p> <p>The water supply network strain in some areas has resulted in water losses due to pipe ruptures and continuing leakages. Some areas have a capacity problem during the tourist season and some peripheral settlements have no connection to the water supply system. The data analysis has shown a high energy usage for the production, storage and distribution of water per cubic meter. Upgrading the process to be more energy efficient is needed.</p>
	<p>Energy</p> <p>The city's energy system is not resilient against extreme weather events. In addition, there is a rising demand for energy to cool in the city (especially in summer). Split has great unrealized potential for renewable energy generation e.g., for installation of solar panels on city owned buildings and city enterprises. The city needs to focus on implementing a Renewable Energy Source to supply both buildings and infrastructure.</p>
	<p>Arrangement of the coastal belt</p> <p>With climate change, there is a risk of sea levels rising and the city should consider actions to mitigate sea level rises and protection of coastal ecosystems. The city need to ensure implementation of coastal areas monitoring, and standards on nature based solutions and climate adaptive measures for this areas.</p>
	<p>Rainwater drainage system</p> <p>As impervious surfaces increase, a city experiences flash floods due to heavy rainfall. The city should implement a stormwater management system.</p>
	<p>Instruments for urbanisation and development: plans, bodies, policies</p> <p>A framework is required for a more joined-up approach with consistent implementation of plans and regulations together with more tools for city development monitoring. There are many areas which require redevelopment, and this should be done with the use of green infrastructure and sustainable solutions.</p>
	<p>Sports and recreational infrastructure</p> <p>The city's sports infrastructure needs development and new investments, especially in the eastern parts. The new infrastructure should be accessible to the citizens, to help build social inclusion, create community spaces, and support increased economic activity and productivity.</p>
	<p>Waste</p> <p>The city has a low level of recycling and sustainable waste treatment, with most waste being disposed of by landfill. There is a need for further citizens' awareness raising on the benefits of waste segregation and education to minimize waste generation "at source". There is a need to establish a domestic waste collection and build a city waste management center to sort and process waste.</p>

1.5 Vision, objectives, actions

A thorough analysis of the current state of the city, the identification of priority challenges together with the analysis of existing City and County core documents allowed for the strategic objective's development. A public survey and workshops discussions on the GCAP vision and objectives enabled the formulation of a final GCAP Vision and set of Strategic Objectives. The assumption of the developed vision of the city of Split is that:

*“Split implements **blue-green solutions** to ensure provision of green spaces and being **biodiverse** and climate adaptive. It is an **intelligent** city, which uses technology to provide services and help solve city problems. It improves transportation and accessibility, social services, promotes **sustainability**, and gives its citizens a voice.”*

The strategic objectives list was checked against the Priority Statement for GCAP Split and narrowed down to ensure alignment with the results of prioritisation. Strategic Goals were determined in key areas that should be achieved in the next 10 years.

As part of the Green City Action Plan, it was proposed to develop 20 actions that fit into the objectives, in seven areas covering the following sectors:

- » Urban planning and Blue- green Infrastructure
- » Water
- » Transport
- » Energy
- » Building
- » Solid Waste
- » Cross-sectoral actions.







These actions will be implemented in the perspective of 2030 and include both capital investments, operational actions and inclusive actions.

It is estimated that the total capital cost (the sum of pre-investment costs and CAPEX) of the developed actions will amount to over EUR 409 million. The complete implementation of the proposed actions will entail operating annual costs (OPEX) in the amount of over EUR 12 million.¹ The following sections summarize the actions developed under the Green City Action Plan, which will be the inspiration and basis for the city's development and future investments. The actions proposed by the Split GCAP are presented below.

¹ In the document, an average annual exchange rate of 1 EUR= 7.53 HRK was adopted (also related to Croatia's adoption of the euro from 1st January 2023). Insignificant discrepancies in values may

result from the adopted roundings. The estimated values were based on a set of more than 150 indicators and relatively similar investments undertaken domestically and internationally.

Table 2 Summary of GCAP Split Actions

Sector	ID	Action	Timeframe (2023-2030)							tCO _{2e} reduction	Job creation potential	Pre investment (EUR)	Capex (EUR)	Opex per year (EUR)	
			2023	2024	2025	2026	2027	2028	2029						2030
Urban planning and blue-green infrastructure 	U1	Development of an environmental management using smart technologies									-	3 ~ 15	328,900	396,800	117,800
	U2	Publicly available and green coastal areas									-	16 ~ 30	829,000	37,130,800	446,200
	U3	Greening of the City with nature-based solutions									30.35	25 ~ 35	-	9,961,000	4,183,500
	U4	Interconnected system of local green markets									122.25	23 ~ 55	797,000	26,680,300	1,061,600
	U5	Sustainable sports and recreation areas in the city									-	20 ~ 40	-	40,235,000	-
Water 	V3	Improvement of wastewater infrastructure								-	22 ~ 50	717,300	41,310,900	206,600	
	V5	Water-sensitive urban design (WSUD) implementation in public and private spaces								257.87	11 ~ 25	139,200	8,192,800	9,600	
	V7	Improving and monitoring of water supply system energy efficiency								0.41	3 ~ 15	-	53,442,800	267,200	
Transport 	T2	Carbon-neutral and intelligent public transport fleet								1,892	37 ~ 80	1,062,500	82,787,600	608,100	
	T4	Streets redevelopment for more convenient public and bicycle transport								-	19 ~ 50	-	15,823,800	651,000	
	T5	Creation of environment and passenger-friendly transport hubs								1,921	4 ~ 20	727,000	32,027,600	-	
	T6	Electrical waterborne transport								-	-	500,000	-	-	
Energy 	E1	Increasing the energy efficiency of buildings								3,742.48	3 ~ 15	1,752,800	30,614,500	-	
	E2	Smart and modern public lighting								2,461.65	1 ~ 5	-	4,566,000	132,800	
Solid Waste 	O1	Construction of facilities for circular waste management								-	21 ~ 45	460,000	6,626,600	198,800	
	O2	Local waste recycling points								-	30 ~ 60	-	4,368,000	10,000	
Cross-sectoral 	M1	Green City awareness and education campaigns								-	31 ~ 60	-	2,627,600	4,409,300	
	M2	Accessible buildings and public spaces: inclusive design in action								-	10 ~ 15	-	1,218,400	243,700	
	M4	Developing a disaster prevention, monitoring and management system								-	6 ~ 30	-	4,359,200	61,400	
	Z3	City core earthquake adaptation and complex protection								-	1 ~ 5	675,500	-	-	
Total:										10,428	286~650	7,262,900	402,369,700	12,607,600	

Introduction



Photo: City of Split

2. Introduction

2.1 Structure of Split Green City Action Plan

The Green City Action Plan is divided into six sections:

Chapter 1. Introduction identifies and defines the main aims and objectives of the document.

Chapter 2. Split Green City Action Plan Preparation Approach presents the methodological assumptions, describes the process of preparing the document and stakeholder involvement.

Chapter 3. Assessment of the existing state of the city presents a characterisation of the city's conditions, a socio-economic assessment, a description of the environment and urban sectors.

Chapter 4. Green City Vision and Objectives presents an elaborate vision and a list of goals to support the city in its quest to become a zero-emission, sustainable city, attractive to its citizens.

Chapter 5. Summary of actions provides a summary of the actions developed under the Action Plan, covering the sectors of energy, buildings, transport, waste land use, water and sewage management as well as a number of cross-sectoral actions targeting social issues, education development and tourism.

Chapter 6. Monitoring and reporting implements methods for monitoring the effects and effectiveness of the implementation of the document's objectives.

and one appendix:

Appendix 1. Description of Split Green City Action Plans actions

2.2 Context

The City of Split joined the EBRD Green Cities programme on 16 Oct 2020, launched and run by the European Bank for Reconstruction and Development (EBRD), and currently includes more than 50 cities. A key part of programme participation is to prepare a Green City Action Plan (GCAP). A GCAP is a bespoke plan for cities to tackle a broad set of environmental challenges, including water, air, soil, and climate change issues. The GCAP considers projects and policy actions to make changes to water, energy and waste infrastructure, transport system, buildings, and green spaces to improve the quality of the local environment and the resilience of the city.

GCAP is coordinated by representatives of the City of Split and the Development Agency Split - RaST d.o.o. EBRD has appointed a team of international and local consultants to support the City's preparation of the GCAP. The team is comprised of the companies Arup, Dvokut ECRO and ARP d.o.o. The development of the GCAP is funded by TaiwanBusiness – EBRD TC Fund.

The document is in line with the documents programming the development of the city and the region, such as:

- » Development Strategy of the City of Split until 2030
- » Sustainable urban mobility plan of the City of Split until 2030
- » Split urban agglomerations until 2027
- » Development Plan of the Split-Dalmatia County 2022-2027
- » Local Plan for Implementation of Agenda 2030 for Sustainable Development of the City of Split
- » Strategy for the development of the system of green areas of the city of Split 2017- 2025
- » Annual energy efficiency plan of the City of Split for 2017-2019
- » Feasibility study for introduction project of intelligent transport system in the city's functional traffic area Split
- » Marine and Coastal Zone Management Plan Split-Dalmatia County

**Split Green City Action Plan
preparation approach**



3. Split Green City Action Plan Preparation Approach

3.1 GCAP process stages

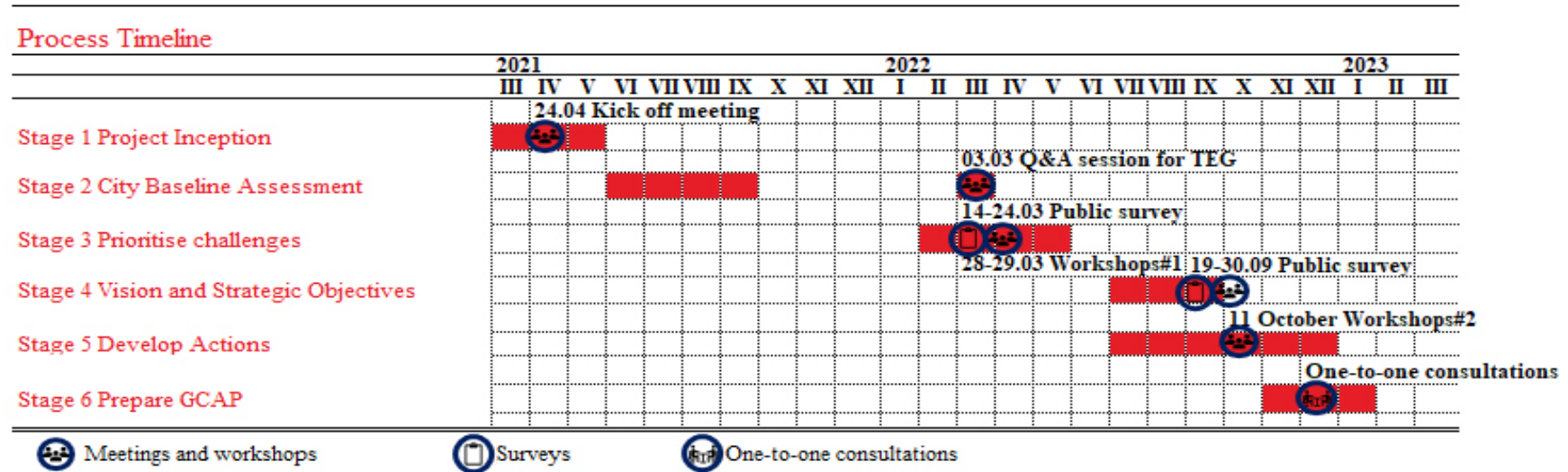


Figure 2 GCAP process timeline

The process of preparation of the Split Green City Action Plan included the following stages:

Table 3 Stages of Split GCAP preparations

Stage 1	▼
Inception including kick off meeting	
<ul style="list-style-type: none"> » Setting up the GCAP process governess » Kick-off event presenting the process of project preparation (26 April 2021) 	
Stage 2	▼
City baseline assessment	
Analysis of the state of the city, consisting of:	
<ul style="list-style-type: none"> » Analysis of the performance of the City’s environment against international benchmarks » Review and analysis of existing policies, plans and other evidence 	

- » Analysis of city sectors vulnerability and existing risks
- » Analysis of the city smart solutions, policies and regulation and smart and digital implementation
- » Q&A session for the Technical Expert Group (**03 March 2022**)

Stage 3

Prioritisation of environmental challenges

Establishment of priorities, consisting of:

- » Public survey on the priority challenges in the city (**14-24 March 2022**)
- » Prioritisation Workshop#1 (**28-29 March 2022**)- Consultation with the Technical Expert Group, City representatives and city utilities companies, academia representatives, 3rd parties, NGOs. Workshop were aimed to present and discuss the emerging findings of the technical baseline and to reach consensus on the priority challenges for the GCAP.

Stage 4

Green City vision and Strategic Objectives

- » Analysis and extraction of strategic objective from the core strategies and programs for the City of Split and County
- » Public survey to identify Vision and agree the defined Strategic Objectives (**19-30 September 2022**)
- » Confirming the prioritisation, Vision and Strategic Objectives on action development Workshops#2 (**11 October 2022**). Goal of the workshop was to provide forum for presenting and discussing the results of vision and strategic objectives survey.

Stage 5

Development of GCAP actions

The process of developing short-term actions was conducted in 5 steps:

- » Working list preparation
- » Preparing a list of actions (proposal of 50 actions) and assessment against multicriteria analysis to help reduce the list and select the action to be included in the GCAP
- » Action development Workshop#2 (**11 October 2022**) that aimed to review of the list of actions and define the shortlist of actions for the GCAP
- » Preparing a shortlist of actions
- » Detailing the actions descriptions and calculations

Stage 6

Final Green City Action Plan

- » Preparation of the GCAP document.

3.2 Inception stage

This Inception stage sets out the delivery plan for the Green City Action Plan for the city of Split. This includes setting up the engagement principles and tools to be applied throughout the project and the official kick-off event to initiate the project process.

3.3 Baseline analysis

The first stage of the city analysis was assessment of the performance of the city's environment against international benchmarks. The analysis also looked at the factors that put pressure on the city's infrastructure and environment, and the city's response and strategies to address these pressures. This was done through the collection of indicators and other contextual technical information.

Split has a well-developed policy framework and is currently finalising the Development Strategy of the City of Split until 2030. This assessment used the indicators and other city baseline data to assess whether the evidence is consistent with the key challenges and priority areas of action already identified by the city.

The results from the assessment were a draft of findings. Further discussions with the city were conducted during the workshops. This led to additional information important which helped in defining the priority challenges.

The EBRD's GCAP methodology defines 74 "Core" indicators and 61 "Optional" indicators. The indicators are divided into three groups:

- » **State indicators** describe the quality of environmental assets, the availability of natural resources, and the City's exposure to climate change
- » **Pressure indicators** describe the City's infrastructure and other physical systems and their effect on the environment
- » **Response indicators** describe the presence and effectiveness of relevant City and other government action (policy, regulation etc.) to reduce or mitigate the effect of the City's pressures on its environment.

Most State and Pressure indicators are built from measured, quantitative data, whereas the Response indicators are all qualitative. All indicators are accompanied by defined benchmark values which allow comparison against a "traffic light" system of **green**, **yellow** and **red** levels of concern for each of the indicator values collected for Split.

Quantitative benchmarks are derived from published international sources such as the World Health Organisation, European Environment Agency and Inter-American Development Bank. Full details of the benchmark sources can be found in the GCAP methodology document.

Where possible, data would be collected across multiple years to enable an understanding of the trend in the indicator (i.e., improving, stable or worsening).

This assessment was combined with a further research and analysis of the city, including:

- » Review and analysis of existing policies, plans and other evidence,
- » Analysis of city sectors vulnerability and existing risks,
- » Analysis of the city smart solutions, policies and regulation and smart and digital implementation.

3.4 Establishment of priorities

The experts evaluated the result of the baseline assessment. To understand the public opinion on priority challenges an online survey was held. The results for data evaluation together with the results from the survey were discussed during the prioritisation workshops with stakeholders. The Technical Expert Group, City representatives and city utilities companies, academia representatives, 3rd parties, NGOs were attending the workshops. The workshops resulted in a set of defined city **priority challenges**.

3.5 Developing the GCAP vision and goals

The development of the vision and objectives took place through a process of extensive consultation with municipal and external stakeholders. First the consultant analysed and extracted strategic objectives from the core strategies and programs for the City of Split and County, which are in line with the priority areas defined for GCAP Split. The second stage was the public survey on the vision and confirmation of strategic objectives, the results of which were discussed and accepted with the participants of the action workshops.

3.6 Developing the GCAP actions

Identification and development of a long list of actions

The actions development was based on the priority challenges identified for key sectors of the city. First the working list of actions was prepared, to then select actions to be discussed as the long list of actions, which included more than 50 actions in the sectors:

- » Energy
- » Buildings
- » Transport
- » Water and sewage management
- » Land use
- » Waste
- » Industry
- » Cross-sectoral solutions.

Descriptions of each action have been prepared, considering: the local context, key benefits, links to existing and planned activities in the city.

Multi-criteria evaluation

The actions developed were subjected to multi-criteria analysis using three categories assessing whether the actions address the identified environmental problems, allow for inclusivity and social diversity, and contribute to the development of the city's smart potential. The criteria for evaluating the actions are shown in Figure 4.

Environmental potential	50%	Potential to address Risk and Vulnerability	20%
<ul style="list-style-type: none"> • Improving climate change risk adaptation. • More and better protected green spaces, coastline, sea and biodiversity. • Increasing adaptation and resilience to extreme weather events: seismic risk, sea level rises. • Improving water and wastewater management. • Ensuring city sustainable development. • Improving quality and accessibility of public spaces (incl. buildings and transport). • Improving local waste treatment • Secure and diverse energy supplies. • Increasing smart mobility. 		<ul style="list-style-type: none"> • Potential to address the climatic pressures. • Potential to build adaptive capacity. 	
Potential for Gender & Social	20%	Smart/Digital Potential	10%
<ul style="list-style-type: none"> • Socio-economic inclusion • Gender equality • Accessibility solutions 		<ul style="list-style-type: none"> • Potential to implement new digital solutions and smart technologies. 	

Figure 3 The criteria for evaluating the actions

Actions with the lowest scores were excluded from the long list, while those with the highest scores were developed and described in more detail, to create creating a short list of actions. The actions on the new list were thoroughly discussed in stakeholder workshops, meetings with municipal companies and external stakeholders.

Development and evaluation of a shortlist of actions

As a result of the work, 20 actions were selected, which were evaluated and described taking considering the following elements:

- » Description and purpose of action,
- » Type of action,
- » Context and justification for action,
- » Objectives/priorities it pursues,
- » Timeline and implementation steps,
- » Action owner and main Stakeholders,
- » Action benefits,
- » Enabling policies, strategies and actions,
- » Performance indicators for outputs/results,
- » Potential for developing inclusivity and improving social conditions,
- » Potential to implement innovative and smart technologies,
- » Mapping of risks, challenges,
- » Financial appraisal of the actions considering: pre-investment costs, capital expenditure, operating costs, potential forms of savings, funding mechanisms/sources,
- » Impact on the achievement of the Sustainable Development Goals.

Review and agreement of selected actions

The final important step in the development of the Green City Action Plan is the holding of a formal public consultation, where all citizens will be able to submit their comments and observations and the formal adoption of the document at a City Council session.

In the future, the city will involve stakeholders in further development actions. The cooperation of the city with the citizens is important for the next stages of the implementation of the Split Green City Action Plan.

Definition of steps and timetable for implementation

As part of the work on the Green City Action Plan, short-term actions were selected that could be implemented in the 2030 timeframe. Within these actions, appropriate investments, capital programmes and operational solutions have been identified, and the implementation steps and timeline for their application is made.

3.7 Development of monitoring requirements

The final element of the Green City Action Plan is to set out the principles for monitoring and evaluating the progress of implementation. The aim of this process is to check whether the implemented actions and solutions are producing the expected results. To make this possible, the following were defined:

- » Reporting and monitoring framework,
- » Units responsible for preparation and implementation, responsibilities,
- » Budgeting,
- » Review and evaluation principles.

3.8 Stakeholder engagement

Stakeholders played an extremely important role in the development of the Split Green City Action Plan document. They were identified by the Consultant in discussion with the city.

Consultations and workshop meetings were held, targeting public participants and urban stakeholders. This included surveys to include the voices of diverse community groups, workshops, panel discussions in thematic groups, and additional dedicated meetings with municipal entities. Different sectors, representing varying interests and social groups at local and national level were considered. Social diversity and the inclusion of vulnerable groups played an important role in the selection of stakeholders.

Engagement consisted of stakeholder participation through city meetings, workshops, online meetings and surveys at the following stages of the projects:

- » Commencement of work
- » Assessment of the existing state
- » Prioritisation of challenges
- » Setting vision, goals and actions
- » Defining final list of action for GCAP.

Groups that participated in the Stakeholders engagement are presented on a figure below:

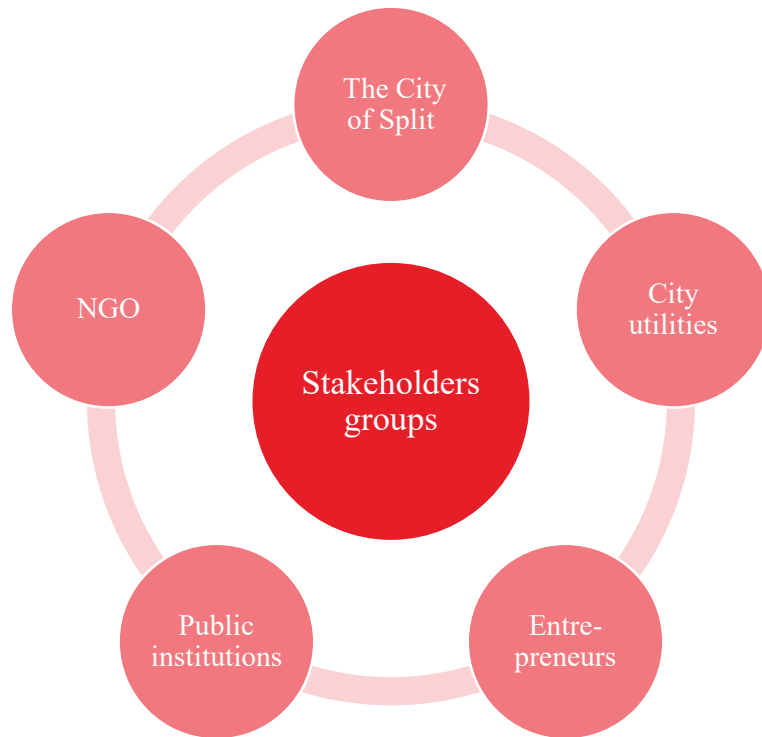


Figure 4 Stakeholders engagement groups

Which were represented by, among others:

- » **The City of Split-** Representatives of the City and various city departments such as, inter alia: Mayor, Deputy Mayor, Head of Sector for International and EU Projects, Head of Department for Communal Affairs and local self-government, Head of the Office

for Construction and Management of Development Projects, representative of Administrative Department for Spatial Planning and Development and Environmental Protection, representative of Department for controlling, business processes and informatics, representative of Split Department of Smart city.

- » **City, regional and national companies-** Parkovi i nasadi d.o.o. Split, Vodovod i kanalizacija d.o.o. Split, Žnjan d.o.o., Splitska obala d.o.o., Čistoća Split d.o.o., Promet d.o.o Split, Split parking d.o.o, STANO-UPRAVA d.o.o., Hrvatske vode (Croatian waters), HEP, Elektrodalmacija Split HEP ODS, Lučka uprava Split (Split Port Authority),
- » **NGO-** Udruga Zeleni Dalmacije (Green Dalmatia), Udruga za prirodu, okoliš i održivi razvoj Sunce, Udruga za zaštitu okoliša “Zasadi stablo, ne budi panj!” Društvo arhitekata Split (DAS – Split Architects' Association), Ronilački klub “Nautilus” (SCUBA diving club "Nautilus"), Društvo Marjan (Marjan Society), Splitski skautski zbor (Split scout choir)
- » **Public institutions and bodies-** Javna ustanova za upravljanje park šumom “Marjan”, Institut za jadranske kulture i melioraciju krša (Institute for Adriatic Cultures and Karst Reclamation), Hrvatski hidrografski institut (Croatian Hydrographic Institute), Javna ustanova Sportski objekti Split (Public institution Sports facilities Split), PAP/RAC-centar za regionalne aktivnosti mediteranskog akcijskog plana (PAP/RAC Priority Actions Programme/Regional Activity Centre), Splitsko-dalmatinska županija - Upravni odjel za zaštitu okoliša, komunalne poslove, infrastrukturu i investicije (SDŽ - Department for environmental protection, communal affairs, infrastructure and investments), Turistička zajednica Split (Split Tourist Board), Splitsko-dalmatinska županija - Upravni odjel za turizam i pomorstvo (SDŽ-Department for Tourism and Maritime Affairs), Fakultet građevinarstva, arhitekture i geodezije u Splitu (Faculty of Civil Engineering, Architecture and Geodesy in Split), JU RERA S.D. for coordination and development of Split-Dalmatia County, Institute of Oceanography and Fisheries, Prirodoslovni muzej i zoološki vrt (Natural History Museum – Split).

Table 4 Stakeholder engagement process

Engagement	Term	Participants	Results	link
Kick-off event	26 April 2021	49 participants (45% male, 55% female): 23 (43,5% male, 56,5% female) in-person participants 26 (46% male, 54% female) on-line joining participants	The meeting aimed to present City’s Mayor vision and key issues/priorities, EBRD project’s background and introduce to the GCAP methodology and project timeline. Meeting ended with Q&A and Press conference. Media were invited and delivered articles promoting GCAP.	-
Q&A session for the Technical Expert Group	03 March 2022	50 participants, including EBRD representatives, Arup and local consultants. 33 participants from the city (58% male, 42% female)	The Q&A session marked the end of data collection and baseline assessment and the start of action development. The purpose of the workshop was to start broader engagement with the City and present the GCAP process to the TEG group.	link
Public survey on the priority’s challenges in the city	14-24 March 2022	792 responses (46% male, 51% female, 3% other or preferred not to say)	The survey was seeking the views of Split citizens to help identify what are the city’s most important challenges and areas for action. The survey results were a part of prioritisation process.	link
Prioritisation Workshop#1	28-29 March 2022	Day 1: Workshop session 1: 24 participants (75% male, 25% female) Workshop session 2: 17 participants (59% male, 41% female) Arup and local consultant’s staff Day 2: 10 participants (100% male) Arup and local consultants’ staff	Consultation with the Technical Expert Group, City representatives and city utilities companies, academia representatives, 3rd parties, NGOs. Workshop presented and discussed the emerging findings of the technical baseline and reached consensus on the priority challenges for the GCAP. The output of the 1st day workshop was an in-depth discussion about the challenges of each sector and an agreed set of priority challenges. The 2nd day meeting resulted in the list of action areas potential to include in the GCAP.	-
Public survey to identify Vision and agree the	19-30 September 2022	133 responses (34,5% male, 63% female, 2,5% other or preferred not to say):	The purpose of the survey was seeking the views of Split citizens to help identify GCAP Split Vision and agree the defined Strategic Objectives.	link

Engagement	Term	Participants	Results	link
defined Strategic Objectives		The total number of open-ended responses was 71.	The survey also aimed at harmonizing the vision and strategic objectives of the Split GCAP.	
Action development Workshop#2	11 October 2022	40 participants (5% male, 37,5% female): 23 out of 40 participants were the city and city utility companies' representatives (57.5%) The rest of the participants represented National Government companies, NGO's, Institutes, and academia.	The Workshop aimed to confirm the prioritisation, Vision and Strategic Objectives for GCAP. Workshops provided forum for presenting and discussing the results of vision and strategic objectives survey, review the list of actions and define the short-list of actions for the GCAP. Based on the voting and discussions the Consultant updated the list of actions and the action cards, adding or deleting information, depending on the participants comments.	-
Present GCAP to City officials	December 2022	Ongoing process		-

Assessment of the existing state of the city



4. City Characteristics

Split is the second largest city in the Republic of Croatia. It is the economic and cultural centre of the Split-Dalmatia County, county seat and the largest city in the area. The Urban agglomeration of Split consists of 8 settlements, as shown in Figure 5. The Split settlement Split is further divided into 27 city districts.

The area of the city is 79.92 km², which makes up 2% of the Split-Dalmatia County, i.e., 0.1% of the Republic of Croatia. The population density in the city is 2,235.2 inhabitants/km². The settlement of Split occupies the largest share in the total area of the City of Split (23.49 km²), followed by the settlements Gornje Sitno (14.25 km²), Srinjine (11.62 km²) and Slatine (10.61 km²).

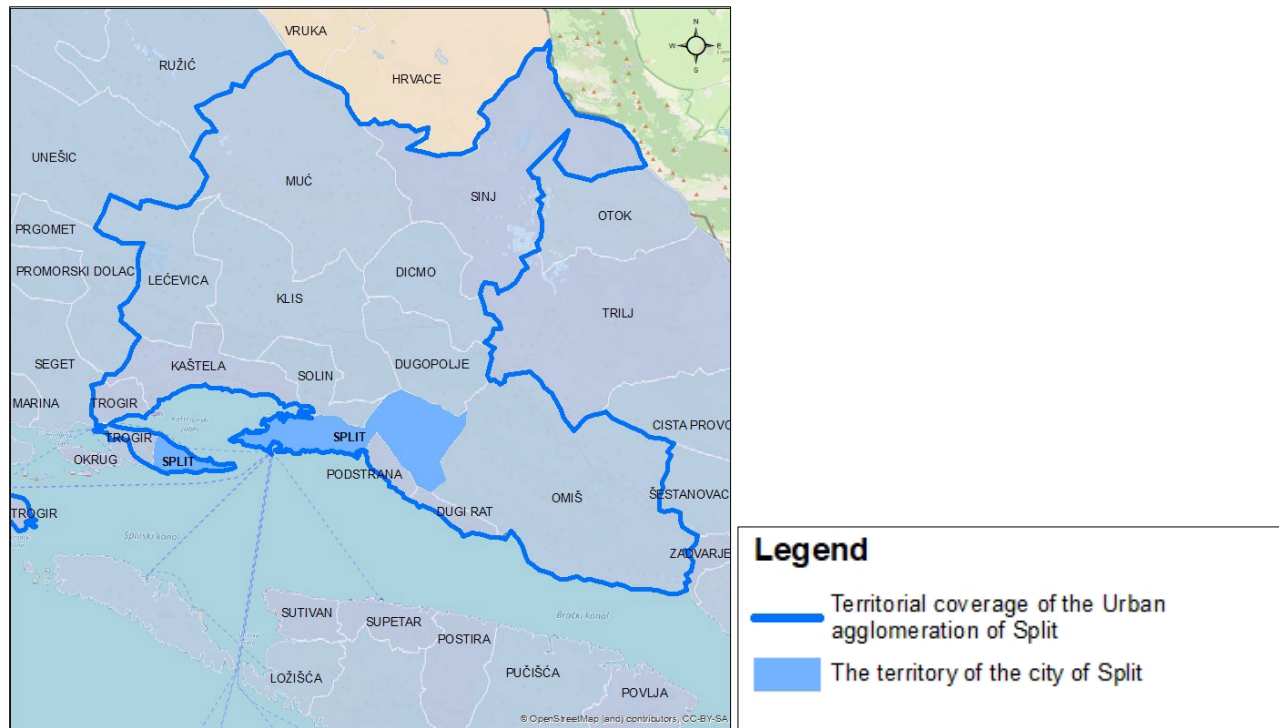


Figure 5 Territorial coverage of the Urban agglomeration of Split (Source: Own study based on Master Study on the development of Split and Urban agglomeration – 2019)

4.1 Paris Agreement

The Republic of Croatia has committed to reducing greenhouse gas emissions by at least 40% by 2030 compared to 1990. As set out in the Effort Sharing Regulation (ESR), under Regulation (EU) 2018/842, the Republic of Croatia will reduce its emissions by 7% by 2030 compared to 2005 levels from sectors outside the European Union Emissions Trading System (EU ETS).²

The city does not have a set goal for its own GHG reductions. Considering the goal of COP26 for countries to set emission reduction targets to reach net zero by 2050, it is important for the city to create a vision and set realistic but ambitious targets in emission reduction. The city is implementing actions to reduce its emissions, such as the modernisation of public lighting and renovation of public buildings.

4.2 Policy context

The city of Split is preparing the Development Strategy of the City of Split until 2030.³ The environmental framework of this document supported defining the GCAP strategic goals and actions in various sectors, including water and wastewater, urban transport, energy production and consumption, buildings, energy, solid waste, climate resilience, urban regeneration, and natural capital. Other core documents which the project was aligned with are presented below:

- » Sustainable urban mobility plan of the City of Split until 2030
- » Split urban agglomerations until 2027
- » Development Plan of the Split-Dalmatia County 2022-2027
- » Local Plan for Implementation of Agenda 2030 for Sustainable Development of the City of Split

- » Strategy for the development of the system of green areas of the city of Split 2017- 2025
- » Annual energy efficiency plan of the City of Split for 2017-2019
- » Feasibility study for introduction project of intelligent transport system in the city's functional traffic area Split
- » Marine and Coastal Zone Management Plan Split-Dalmatia County

4.3 Economic context

The location of Split is of strategic importance to its economy, as evidenced by the fact that Split is the second largest Croatian seaport, and the second largest airport by number of passengers.

The economy of Split relies on tourism services (almost a quarter of total GDP), retail and wholesale, construction, sports, recreation, and entertainment, the real estate market and, to a lesser extent, maritime, shipbuilding, manufacturing and information technology.

- » According to Croatian Bureau of Statistics the number of overnight stays of the Split-Dalmatia County has been continually growing from 9 million in 2010 to around 18 million in 2020. The Covid-19 pandemic had a huge influence on the number of tourists visiting the city in 2020.
- » In 2018 there were 14k businesses operating in the Split-Dalmatia County, employing 78k workers, which represents 8.3% of the total number of employees in the Republic of Croatia.
- » The average monthly salary (gross value) as of March 2021 for the Split-Dalmatia County was HRK 8,945 (~EUR 1,194).
- » In the city of Split, approximately 63k inhabitants were employed in 2020. The number of unemployed people has fallen from 51k in 2014 to 24k in 2020.

² Council of the European Union (2020) Draft submission to the UNFCCC on behalf of the European Union and its Member States on the update of the nationally determined contribution of the European Union and its Member States – Approval, Brussels:
<https://data.consilium.europa.eu/doc/document/ST-14005-2020-INIT/en/pdf>

³ Development Strategy of the City of Split until 2030

4.4 City finances

The following chart presents an overview of Split's financial situation in the period between 2016 and 2023. According to the official numbers⁴, both the revenues and expenditures of the city increased over the last few years. Since 2017, the surplus of revenues over total expenditures decreased and finally became a deficit of €13,097 million in 2020; the negative effects of COVID-19 were already visible.

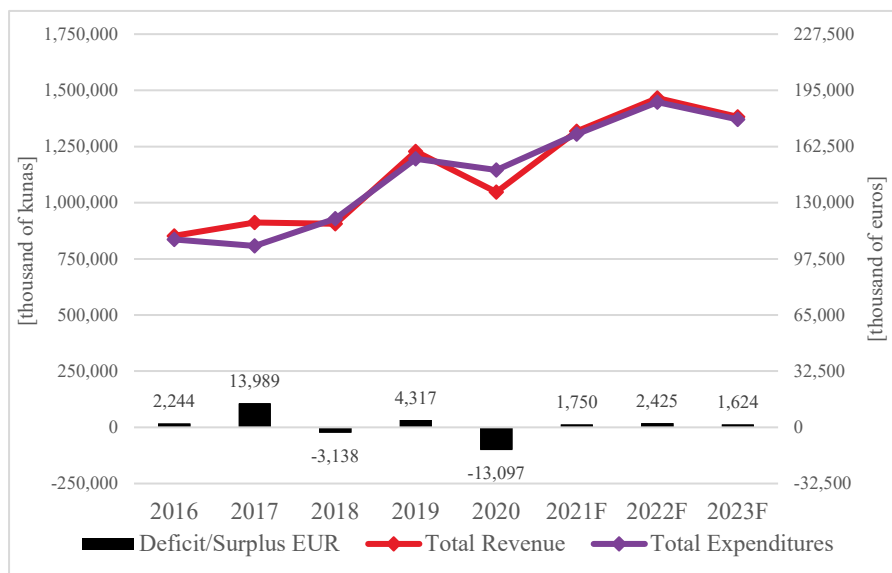


Figure 6 Split's total revenues and expenditures between 2016 and 2023 (HRK thousand, EUR thousands)

The City finances investments come from a multitude of sources, with each source of funds having its own limitations. Most investments are funded through the Budget of the city of Split (€32 million will be spent on city

⁴ <https://www.split.hr/gradska-uprava/proracun>

investments in 2021). The city also funds capital investments from EU funds, which is the second largest source of finance. The biggest project recently valued at €12 million is the Municipal Waste Landfill Karepovac located in the city of Split with the capacity of 6.2 million m³.

The city has a very limited budget for directly funding future green city actions, unless the action is associated with revenues or savings that can deliver short payback periods. There is an argument, thus, for privately financed and non-investment actions to be part of the mix of actions.

4.5 Demographics

According to the last census conducted in 2021, 160,577 people are living in the city of Split, with the majority living in the settlement Split (151,790). The ratio of women to men is 52.9%: 47.1% respectively. Until 1991, the City of Split recorded an increasing population. Since then, the population has been in decline. This negative trend is in line with the rest of the Republic of Croatia and is a direct consequence of the reduced birth rate, but also the outflow of the population through emigration.

In the period between 2011 and 2017, the City of Split experienced net emigration of 4,954 inhabitants (with 22,086 emigrants and 17,132 immigrants). The age analysis of immigrants and emigrants indicates that the most migration is in the age group of 20 to 39 years, which make up 49% of all immigrants and 40% of all emigrants. In terms of gender structure, the share of the female population is 57% of immigrants and 55% of emigrants.⁵ The high emigration trend is an existing problem in the Republic of Croatia, particularly after the country joined the European Union and its workers gained the right of free movement in most EU countries. The relatively high immigration to the city can be explained by the more diverse opportunities for education and employment that regional centres, such as Split, offer.

⁵ Territorial registry 2011-2017, Croatian Bureau of Statistics, Zagreb

According to the 2021 Census, around 3.6% of the total population of the city of Split are members of national minorities, with the largest national minority being Serbs, followed by Bosnians, Albanians, Montenegrins, and Slovenians.

4.6 Inclusivity

As part of the preparation of the Green City Action Plan of Split, a gender equality assessment was carried out, which considers the needs of the city and its residents, the current state and areas for improvement, in relation to:

- » Access to urban infrastructure, with particular emphasis on the safety and accessibility of services for women and mothers with children, persons with disabilities, persons with reduced mobility, the elderly.
- » Competences and employment of people in urban service sectors.

According to the European Institute for Gender Equality, the Republic of Croatia ranks 20th in the European Union on Gender Equality Index (please see A.2 for more information), with 57.9 out of 100 points. This number is lower by 10 points than the EU's overall score and indicates that the Republic of Croatia is lagging in achieving gender equality when compared to European Union standards. Nevertheless, the gender equality score in the Republic of Croatia has increased by 5.6 points since 2010, increasing the Country's ranking by five places. The country has the highest scores in the domains of health (83.7 points) and money (72.6 points), while domains of power (41.4 points) and time (51.0 point) record the most notable gender inequalities.

5. Environmental baseline

The section provides an overview of the assessment of the existing state of the city, a summary of the indicator data collected in the city and the main findings of the priority environmental challenges and the functioning of urban systems and sectors.

Key environmental findings

The technical assessment identified the following key challenges for Split environment:

- » Climate change: multiple hazards including severe weather and sea levels rising increase the risk of the city to climate change.
- » Seismic risk: Split is assessed as a high-risk area due to probability of earthquakes and the vulnerability of its historic building stock
- » Green space provision is low, and the lack of biodiversity data might mean losses are occurring that are not recognised.
- » Air pollution: concentration of PM_{2.5} in the air is of moderate concern.
- » Greenhouse gas (GHG) emissions which contribute to global climate change need to be reduced in line with national and EU commitments.
- » Soil: the city does not currently monitor the status of its soil.

The technical assessment also found the following notable positive conditions:

- » Other aspects of air quality – NO₂ and SO_x – in the city are generally good
- » The quality of water bodies and drinking water is good, mostly falling in the “green” zone.

5.1 Air pollution

Data was collected for airborne SO₂, nOx₂, PM₁₀ and PM_{2.5} over the last ten years. The air quality in Split is in good condition overall, but more efforts should be put to:

- » Reducing the emissions of PM_{2.5} as they are currently in the range of 10-20 µg/m³, and it is preferable that they are below 10 µg/m³
- » Upgrading the existing measurement approach for PM₁₀ and PM_{2.5} to automatic collection

The city currently has one air quality measuring station but could benefit from further measuring stations for a more accurate assessment of air quality changes.

5.2 Soil

No data on soil quality was available. Although the recommended monitoring procedures and appropriate indicators for permanent soil monitoring exist in Croatia, no systematic monitoring soil has been carried out.

5.3 Climate Mitigation (GHG emissions)

Data was collected for CO₂ emissions per capita and per unit of GDP. The city is performing well on these measures but there is still room for to do better. This is because potentially high level of emissions is generated by individual transport and tourism, and measures such as encouraging cycling and other forms of public transport sharing would help.

5.4 Water bodies

Water quality data was collected for Biochemical Oxygen Demand (BOD) and NH₄ in lakes and rivers, as well as assessing whether bathing water met EU standards. Overall, the quality of water bodies in Split is high and there are no immediate challenges to address.

5.5 Drinking water / Water use

Water consumption data included the rate of water samples that comply with national potable water quality standards and the water exploitation index. Overall, water quality is high and has shown recent improvement over the past three years.

5.6 Green spaces

Green space data includes open green space per capita and the share of green space areas within urban limits. The data point for Split which indicates a good provision of open green space area per capita in the city, which is 10.28m² per capita is only slightly above the green threshold and may overestimate provision due to use of 2011 population data. Taking account of Split's large visitor population would indicate a much lower provision of green space per capita. The share of green space areas within urban limits managed by public company Parkovi i nasadi d.o.o for 2021 is only 6%. This is a priority area for the city to introduce more greenery into the urban fabric and develop green networks.

5.7 Biodiversity and ecosystems

Croatia is member of Natura 2000. In Split, however, data on abundance of bird species and other species is not available. The city has plans for the redevelopment of park areas (Marjan, Žnjan, Poljud, Turska kula, River Žrnovnica area) and the improvement of city green areas. Under the GCAP, such actions could be further developed to more specific, concrete actions.

5.8 Adaptation

Climate risk and adaptation data includes the percentage of public infrastructure and households that at risk from climate change. The available data suggests a high vulnerability of the infrastructure to climate and other shock events. The most important climatic pressures include: an increase in average air temperatures and an increase in the frequency of recording extremely high and extremely low temperatures, increase in the risk of heat stress (which can be exacerbated by the urban heat island effect), decrease in the amount of precipitation and lengthening of periods without rainfall,

greater likelihood of sudden rainfall and rainstorm, and increase of maximum wind speeds. These risks could be translated into damaging heat waves, water shortages, wildfires, occasional floods on streets, and long-term threat of sea level rise.

6. Sectoral determinants of the city state

The technical assessment identified the following key challenges for Split sectors:

- » **Transport:** Despite a high motorization rate in Split, there has been a notable evolution in the utilization of transportation modes. Public transport and cycling faced challenges in gaining popularity historically, but significant change has taken place. Public transportation, in particular, has experienced a transformative shift due to dedicated modernization initiatives and the implementation of a strategic pricing policy. Additionally, cycling is also witnessing a burgeoning prominence within the city (data from Promet d.o.o.).
- » **Water and wastewater:** the water supply system in Split is currently inefficient with high percentages of non-revenue water.
- » **Energy** (including buildings and industries): the electricity system in Split is not resilient to climate extremes.
- » **Solid waste:** there is a need for separate waste collection of organic waste. Additionally, there is a need for treatment and processing plants as the city lacks local treatment facilities
- » **Land use:** data on land use is limited for the City of Split.

The technical assessment also found the following notable positive conditions:

- » The share of cars with alternative drive is high in Split.
- » The water supply service is of superior quality in Split with minimum interruptions.
- » Share of households with weekly municipal solid waste (MSW) collection is high in Split.

- » Share of renewables in total energy consumption is high in Split (and Croatia as a whole).

Table 5 Key underlying factors and risk vulnerability context of the city state

Key underlying factors	Risk and vulnerability context
<ul style="list-style-type: none"> • Rapid transport development: decrease in railway transport demand and high car usage in the coastal areas during summer which is influenced by tourism and higher intensity of port usage. • The regional waste management centre for Split-Dalmatia County is in its early development stage, while the landfill ‘Karepovac’ in Split is being reconstructed. • The regional water supply system is characterised by limited resources, seasonal demand changes due to tourism activities, occasional water quality problems and substantial water losses. • Covid-19 dramatically disrupted the local economy in 2020, with effects which are not yet fully understood. • Major part of the building stock in the City district and Varoš area were constructed before 1920, which implies that they were not designed to comply with earthquake protection standards. 	<ul style="list-style-type: none"> • Existence of illegal untreated landfills. • Reduced rainfall and changes in distribution in precipitation across Croatia could affect the aquifer that supplies Split’s water. • High intensity rainfall events affecting the turbidity of the aquifer. • Inefficiency of the electricity distribution network and energy losses. • Electricity connections are through air-cable connection. • Landslides.

6.1 Transport

The city has an important network of ports, railways and connecting roads. Planning and construction of any significant mobility infrastructure needs to include national, county, and local responsible authorities.

As a tourist destination, with a significant role as a transit port connecting surrounding areas and islands with national and international networks, transport demand is influenced by tourist seasonality. Most of traffic congestions occur during summer transit peaks.

The Sustainable Urban Mobility Plan (SUMP) of the City of Split until 2030 defines specific objectives, activities and indicators related to integrated traffic planning, public transport, development of bicycle lanes, construction of garage parking capacities, smart traffic management, increasing use of alternative fuels in transport and increasing traffic safety.

The key transport focus for the GCAP will be to build on the SUMP and to develop actions to address challenges of traffic congestion in busy times of year and the lack of good quality infrastructure to provide alternatives to private vehicles for mobility in and around the city.

Croatia follows EU regulation for fuel standards for light and commercial vehicles (Euro VI). Additionally, the data shows that around 4% of total passenger cars are run by alternative energy such as hydrogen and LPG. In comparison with international standards, this is considered a good proportion – but with great potential to support the transition from fossil fuels to electric vehicles and other zero emission vehicle technologies.

The collected data shows that residents are mostly reliant on private cars for transportation. Although public transport and cycling weren't widely embraced in the recent past, the city is now experiencing an increasing emphasis on the popularity of both modes of transportation.

6.2 Water

The Split Water and Sewage Company manages water and wastewater utilities for the city and surrounding area. The main source of water in Split is the Jadro River. The company has adopted a business strategy for 2019-2030 with goals to reform and strengthen the utility's service and financial sustainability. Although at an early stage of implementation, the company has delivered significant improvements of water and sewage infrastructure being done or in progress throughout the conurbation area. A new potable water purification facility is currently under construction. The new potable purification facility is still in pre-construction phase that should start hopefully soon after completion of the public procurement process.

A key objective of the company's strategy is to address system losses (referred to as non-revenue water). The company has adopted several rules and decisions regarding the improvement of management and use of water supply and wastewater discharge for consumers.

Notably the city's water system is relatively energy intense, with energy consumption for water supply falling into the red benchmark zone.

Climate change is expected to put pressure on water systems in the city, with potentially significant measures needed in the medium to long term to maintain a reliable high-quality system while also sustaining a healthy local environment.

There is no data on the state of stormwater management in the city. As climate change progresses, and urbanisation influences the natural rainwater flow and drainage, the city should consider a rainwater-centric management approach.

6.3 Solid waste

Utility company Čistoća d.o.o. Split provides a citywide waste collection service, despite the network of narrow streets. Citizens are getting used to separating their waste but the city's performance on recycling and sustainable treatment is still not satisfactory, with most waste being disposed of by landfill.

The local landfill Karepovac is in the process of remediation. It will be in use until the construction of a regional centre for waste management.

The local plan defines measures for the reduction of varying types of waste, improving recycling and management of special waste categories, reducing biodegradable waste on landfills, remediation of illegal landfills and other locations and construction of regional centre for waste management. However, the city lacks the necessary facilities to enable more sustainable waste management including recycling and diversion away from landfill. With future EU standards for recycling and treatment becoming increasingly stringent, investment in waste infrastructure is even more urgent.

Improving the waste management system is one of the key goals of sustainable development. The city has identified the need for a faster and more efficient waste management system. A key priority is to create a system of incentives to segregate municipal waste along with the development of waste management infrastructure. In the city, it is crucial to raise citizens' awareness of the benefits of waste segregation and education to minimize waste generation 'at source'.

6.4 Energy

The city has universal access to energy with the electricity system providing most of the energy requirements for both power and heating. The Croatian grid contains a reasonably high proportion of renewable energy but locally there is great unrealised potential for renewable energy generation in the city.

Key energy issues include:

- » Rising energy demand for cooling
- » Poor energy efficiency of old buildings in the old city center that is difficult to renovate
- » The opportunity for installation of solar and photovoltaic panels on city owned buildings (solar potential)
- » The opportunity for development of the smart public lighting and modernisation of public lights

The City has prepared a draft of the strategic objectives and goals it wants to achieve. The city plans to increase energy efficiency and the transition to clean energy with the use of renewable energy sources (RES). Identified actions include reduction of losses in the electricity distribution network and introduction of advanced networks and energy renovation of public sector buildings.

Recent evidence indicate that the city's energy system is vulnerable to extreme weather events, which are expected to become more severe and frequent because of climate change. Investment in system resilience would be a key measure to avoid more severe effects in the future.

Cooperation with the energy utilities will be necessary to deliver the changes identified by the City.

6.5 Land use and buildings

The city has experienced varying patterns of development and urban regeneration in different parts of the city. The old city core and parts of the port and waterfront have been significantly renovated in the last decade, for tourism and heritage protection. Renovation of the historic buildings was an important part of the actions undertaken, but this has been stagnated during the global COVID-19 pandemic. In other parts of the city only small improvements have been carried out. The eastern part of the city is poorly planned, with uncontrolled development taking place without provision of good quality transport and social infrastructure, which reduces the quality of life for residents in this part of the city.

Pressure on property prices remains high due to the tourism sector, resulting in the emigration of residents from the city. An extreme scenario for Split is that it could become a “museum city” completely dominated by tourism with no other local economic activity.

The General Urban Plan is the key document that sets out the directions of city spatial development and its regeneration. It has defined grand urban projects, which are to be the key areas for development, but these projects did not start. Strategies, plans and projects include redevelopment of park areas (Marjan, Žnjan, Poljud, Turska kula, River Žrnovnica area) and the improvement of city green areas. The planting of trees in different locations, connected to various city functions, is also planned.

Adaptation of buildings to climate change will be an important long-term measure for maintaining the resilience and overall energy efficiency of the city.

Earthquake hazard is especially high for houses located in the old city center. Working on the creation of a program for ensuring this building's protection is an important area of action for the city. Energy efficiency and climate adaptation for buildings are key areas of improvement. Smart and integrated solution implementation should be used in these fields for better results. The City does not have its own support for green investments that would enable private owners to replace facade cladding, etc.

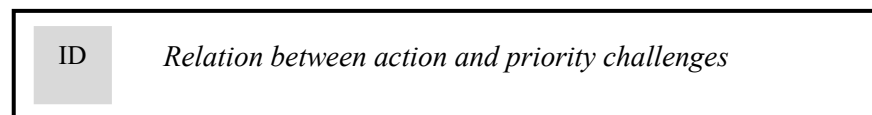
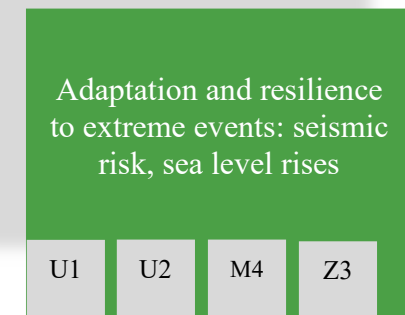
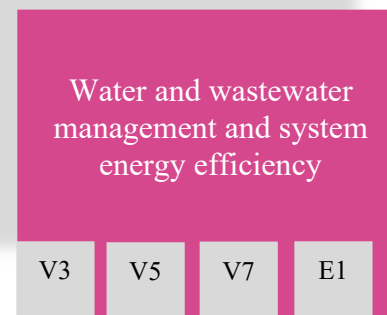
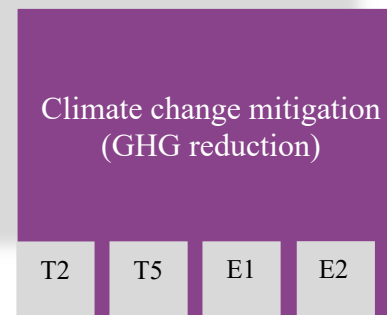
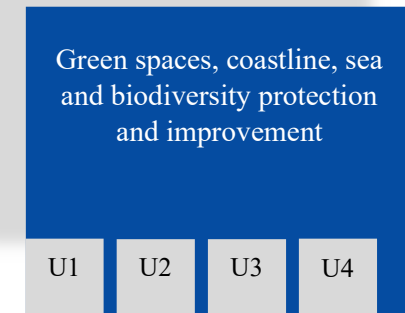
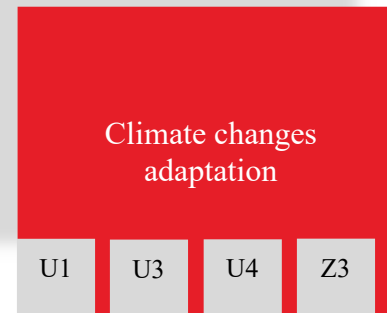
Similarly, the lack of national incentives (EU funds) for more active participation of local self-governments (cities/municipalities) has contributed to the lack of investment in exploiting the city's great potential for solar energy integrated into buildings.

7. Prioritisation of challenges

The final environmental challenges were coordinated and adopted based on the discussion with stakeholders and citizens survey results.

Challenges identified in individual sectors make it possible to select priority areas, the implementation of which will help improve state of the environment, the life of residents as well as the quality and efficiency of the city's infrastructure.

The key challenges identified on the basis of the analyses and workshop discussions include:



Detailed description of sectoral priorities for each priority areas are presented in the table below.

Table 6 Detailed descriptions of sectoral priorities

Priority area	Priority Statment
Rainwater drainage system	Climate change and urban development, coupled with the expansion of impermeable surfaces, significantly impact water runoff, filtration, and drainage. Currently, the city lacks a comprehensive approach to stormwater management, evident in the absence of a dedicated entity responsible for overseeing the rainwater infrastructure. There is a pressing need to establish a rainwater drainage system, implement green infrastructure, and overhaul the existing combined sewer systems within the city.
Water supply	Due to the configuration of the terrain itself and the pumping in the three main directions of Visoka, Marjan, and Gripe, most of the urban Split area has too high working pressure in the system, which favours the creation of large losses due to pipe rupture and water leakage. The consumption of el. energy pumping stations requires a systematic approach, with room for optimisation especially outside the tourist season.
Arrangement of the coastal belt	The city has no jurisdiction over the management of the entire coastal area in its territory. The coast is one of the most valuable resources in the city, which needs to be professionally managed, monitored, and protected due to coastal floods posing a significant threat influenced by climate change. A coastal zone, beach protection aind maritime ecosystem monitoring and protection should be implemented. It is important to introduce green infrastructure and nature based solutions with any investment introduced in the area of the coast line. The coastal area and marine environment are pivotal elements of the city, making it attractive not only for residents but also for tourism visits.
Traffic	Traffic congestion is a major challenge in the city. The largest Croatian port for passengers and car transport in Croatia is in the city of Split close to the historic centre which greatly burdens traffic during the tourist season. In the eastern part of the city, there are insufficiencies in road infrastructure development. There is lack of infrastructure for cycling, due to near non-existent bike paths. To help to solve the traffic and public transport problems the city has developed a SUMP document, which implementation should be further supported to ensure comfortable bicycle use, better public transport and less traffic.
Instruments for urbanisation and development: plans, bodies, policies	The recently established Public Institution, the Institute for Spatial Planning of the City of Split, represents a step forward towards integrated and sustainable development of the city. The city is in varying stages of development in various parts of the city. The eastern part has grown rapidly, but there is a lack of adequate infrastructure and services to accommodate this growth. There is an area for improvement in the city to prepare local plans and regulations that will be implemented consistently and determinedly in all areas of the city. Additional tools to monitor city environment and development, and to support decision-making should be implemented. New investment and redevelopment investments should be made with the use of green infrastructures and the implementation of sustainable solutions.
Green areas	Green space provision is restricted within the city's urban limits, which has a negative impact on the quality of life of citizens due to high temperatures and air quality. There is a need to implement and give priority to green infrastructure development which will also address problems in relation to drainage and climate change. Moreover, greenery has wide scope of positive impact on quality of life and health of citizens. The loss of green areas in the city, particularly on private land, can be

Priority area	Priority Statment
	<p>attributed to the absence of follow-up inspections following the issuance of use permits, as well as arbitrary interpretations of the plan and weak mechanisms for control and sanctions. Elevating the protection of green spaces involves establishing a framework for sanctioning violators, while concurrently facilitating the continual advancement and methodical surveillance of these areas. This strategic approach not only deters violations but also fosters the enduring development of green spaces, thus bolstering the city's resilience against the impacts of climate change. There is a need to create more shadow and cooling in public spaces by planting more trees and implementing green infrastructure solutions, improve a city market places system to enrich public spaces and give easy access to superior quality spaces and food to the citizens. The smart solutions could be useful tools to coordinate these types of actions.</p>
Sports and recreational infrastructure	<p>The city's sports and recreational infrastructure needs development and new investment. The sports and recreational infrastructure development should be done with the use of smart solutions and green infrastructure elements, and with the implementation of Renewable Energy Solutions.</p>
Energy	<p>Due to climate change, it is predicted that temperatures will continue to rise and summer precipitation will continue to drop. Subsequently, the energy needs for cooling will increase followed by the GHG emissions. Growing energy consumption is connected to the increase in tourism and services for tourism, as well as increased use of air conditioning. Changing the trend of increasing energy consumption should be one of the city's primary concerns moving forward. An important challenge for the city should be the implementation of Renewable Energy Solution on the city and city companies' buildings and infrastructure. The city should work on the transition toward smart energy by, installing and popularising the use of solar and photovoltaic panels (ensuring equal access and distribution of this energy to all residents), achieving nZEB standards for public buildings, investing in transport solutions that are based on low-emission sources, and developing smart public lighting and modernisation public lights.</p>
Waste	<p>A big challenge, yet difficult to influence at the city level, is the short remaining life (3.5 years) of the currently serving the city – Karepovac landfill. The Regional Centre for solid waste is supposed to replace Karepovac. The city should take up actions to invest in its mini sorting and composting plant.</p>
Biodiversity	<p>In the east and west part of the city there are, as yet, unconnected landscapes of significance, which has an influence on biodiversity migration. Located in the west part of the city, Marjan Forest Park is a public space of special natural, cultural, historical, and recreational values. Landscaping and construction in the contact area of the forest should be regulated in the function of landscape protection of the area. One of the threats to biodiversity and green area quality is the invasive species in the city. Measures to limit its spread and amount should be addressed.</p>

Green City Vision and Objectives



Photo: City of Split

8. Green City Vision and Objectives

8.1 City Vision

“Split implements blue-green solutions to ensure provision of green spaces and being biodiverse and climate adaptive. It is an intelligent city, which uses technology to provide services to citizens and help solve city problems. It improves transportation and accessibility, social services, promotes sustainability, and gives its citizens a voice.”

The graphic presents results from public survey seeking the views of Split citizens to help identify GCAP Split Vision and agree the defined Strategic Objectives (conducted between 19 and 30 of September 2022). Based on responses given to the question regarding vision of GCAP Split, the majority of respondents (36%) chose green and intelligent themes (168 selection). These are followed by blue, protecting and promoting heritage, sustainable, comfortable and biodiverse themes.

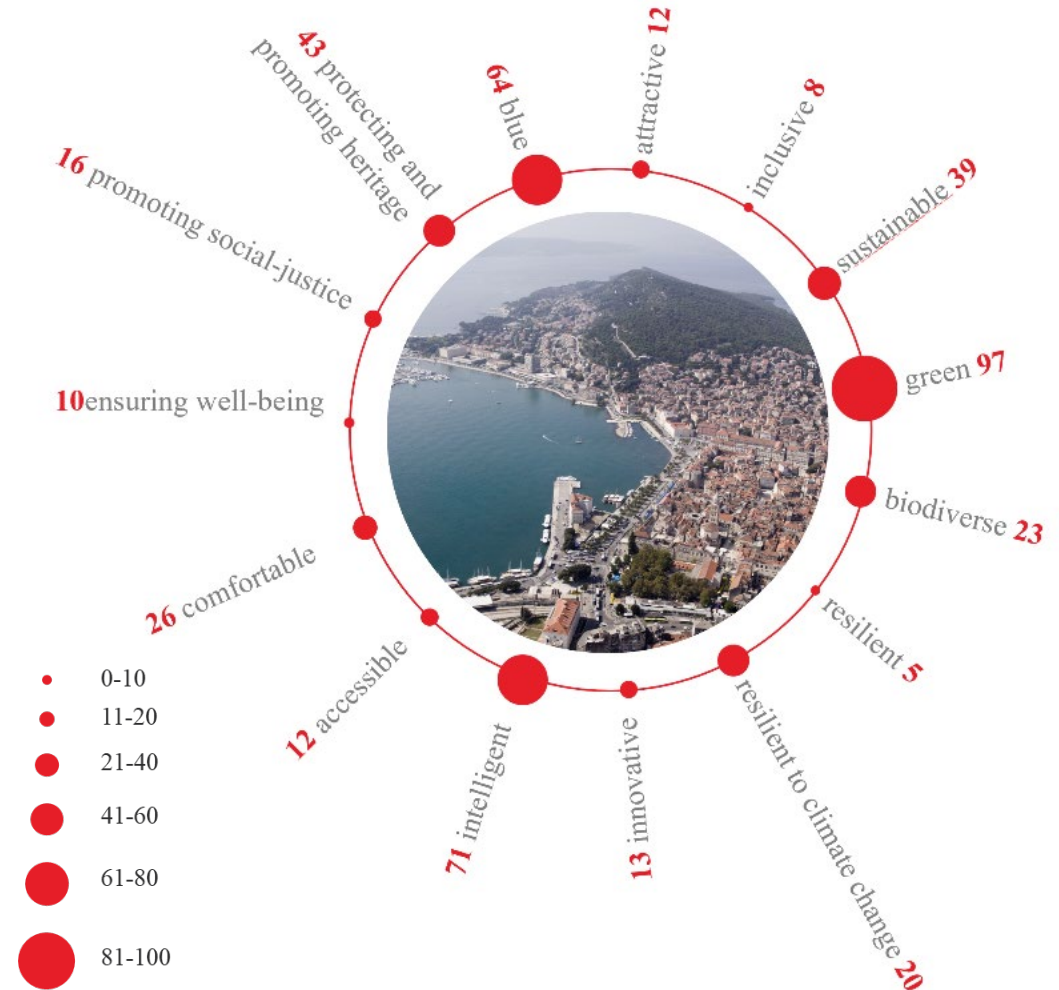


Figure 7 Results from public survey for identification of Vision

8.2 Objectives of Green City Action Plan

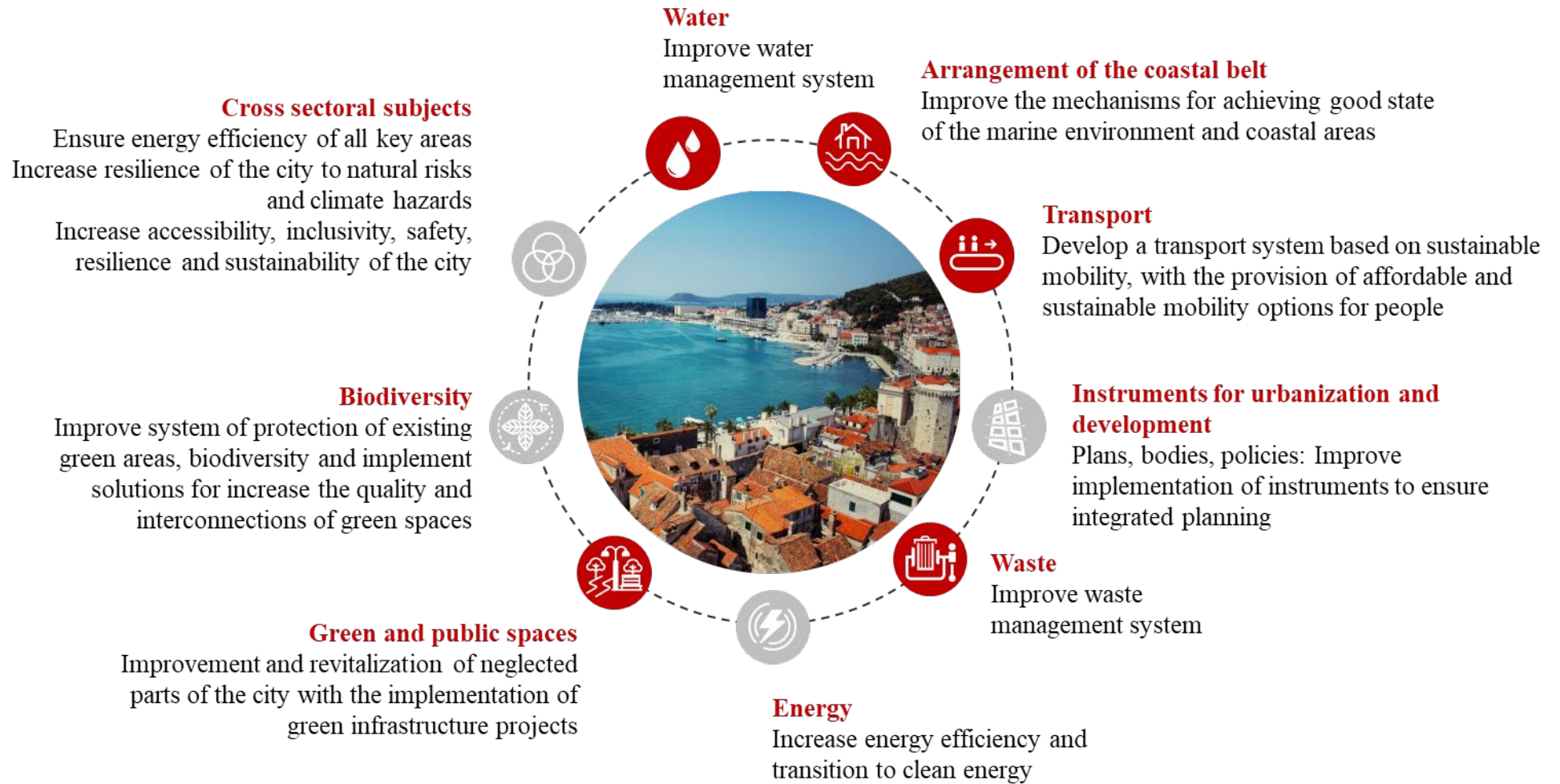













Figure 8 Objectives of Split GCAP diagram

Table 7 Objectives of Split GCAP

Objective	Acronym
 <p>Water Improve water management system</p>	W1
 <p>Arrangement of the coastal belt Improve the mechanisms for achieving good state of the marine environment and coastal areas</p>	A1
 <p>Transport Develop a transport system based on sustainable mobility, with the provision of affordable and sustainable mobility options for people</p>	TR1
 <p>Instruments for urbanisation and development Plans, bodies, policies: Improve implementation of instruments to ensure integrated planning</p>	I1
 <p>Waste Improve waste management system</p>	W1
 <p>Energy Increase energy efficiency and transition to clean energy</p>	EN1
 <p>Green and public spaces Improvement and revitalisation of neglected parts of the city with the implementation of green infrastructure projects</p>	G1
 <p>Biodiversity Improve system of protection of existing green areas, biodiversity and increase the quality and interconnections of green spaces</p>	B1
 <p>Cross sectoral subjects Ensure energy efficiency of all key areas</p>	C1
 <p>Cross sectoral subjects Increase resilience of the city to natural risks and climate hazards</p>	C2
 <p>Cross sectoral subjects Increase accessibility, inclusivity, safety, resilience and sustainability of the city</p>	C3

Summary of actions



Photo: City of Split

9. Split Green City Action Plan actions

List of actions



Figure 9 GCAP Split action diagram

Urban planning and blue-green infrastructure

- U1 Development of an environmental management using smart technologies
- U2 Publicly available and green coastal areas
- U3 Greening of the City with nature-based solutions
- U4 Interconnected system of local green markets
- U5 Sustainable sports and recreation areas in the city

Water

- V3 Improvement of wastewater infrastructure
- V5 Water-sensitive urban design (WSUD) implementation in public and private spaces
- V7 Improving and monitoring of water supply system energy efficiency

Transport

- T2 Carbon-neutral and intelligent public transport fleet
- T4 Streets redevelopment for more convenient public and bicycle transport
- T5 Creation of environment and passenger-friendly transport hubs
- T6 Electrical waterborne transport

Energy

- E1 Increasing the energy efficiency of buildings
- E2 Smart and modern public lighting

Solid Waste

- O1 Construction of facilities for circular waste management
- O2 Local waste recycling points

Cross-sectoral actions

- M1 Green City awareness and education campaigns
- M2 Accessible buildings and public spaces: inclusive design in action
- M4 Developing a disaster prevention, monitoring and management system
- Z3 City core earthquake adaptation and complex protection

INDICATIVE LOCATION OF PROPOSED ACTIONS

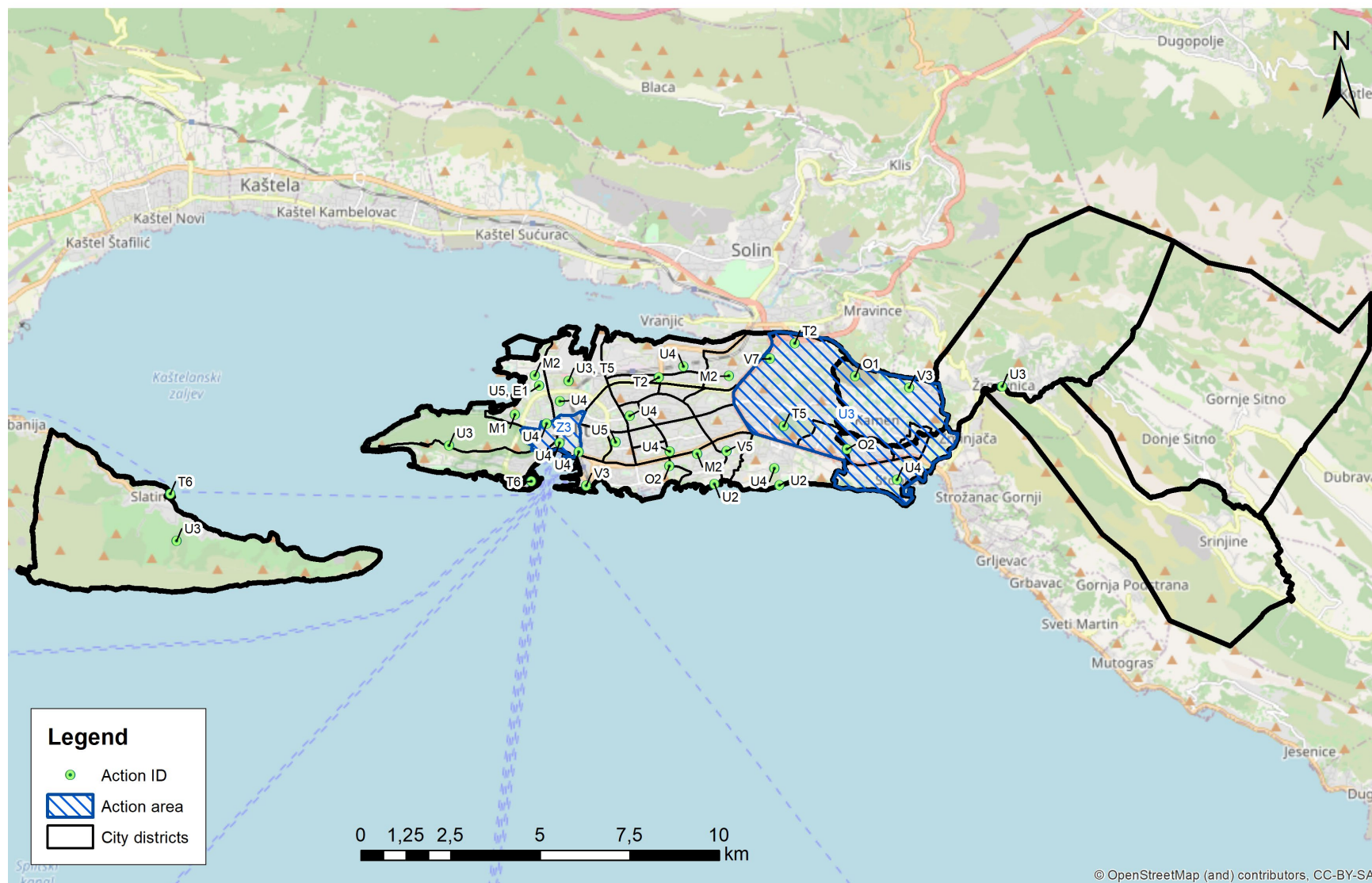


Figure 10 Indicative location of proposed actions



Actions in Urban planning and blue-green infrastructure Sector

Key conditions

The city of Split is under urbanisation and touristic pressure. The eastern parts of the city have grown rapidly, however, there is a lack of adequate infrastructure and services to accommodate this growth. A significant number of residential units are used for tourist accommodation. Property prices push citizens out of the city towards neighbouring municipalities and poorly urbanized eastern parts of the city. Land use interests are primarily focused on tourist development and the construction of residential units. There is a lack of new areas prepared for new businesses and public facilities.

There is need to improve the quality of life for citizens by using an urban development management instruments and establishing more public recreational spaces. A coherent urbanisation framework for the entire city would allow proper, equal and fair development in all parts of the city. Moreover, provisions of biodiversity and guidelines in spatial planning should be implemented to ensure sustainable development. The city's coastline should be redeveloped to make it more accessible for citizens, ensuring easy access for people with disabilities, while implementing the protection of the most valuable natural parts in line with needs to adapt to climate change. There is a need to implement planting of more trees and to provide elements of green infrastructure for shading public spaces, which can help create better local microclimate and be a tool for rainwater gathering.

Implemented activities

The city has green and protected areas like city, forest, public and memorial parks, landscape greenery, protective greenery, and valuable landscape greenery with existing buildings. There is a need to include specific indicators to calculate the quality and number of green spaces and adequate schedules to make it fair to use green areas for all citizens. Biodiversity indicators should track various aspects: including scale (m² of natural area), improvements in biodiversity from the baseline (species richness, abundance, community composition, ecological connectivity), and the longer-term

improvement of biodiversity or ecosystem services. There is a need to introduce this at the city level for the development of biodiversity through new investments.

The General Urban Plan (GUP) that is in force in the city of Split includes measures to protect identified forests, parks and environmental landscape of the city. Moreover, the city has a Strategy for the development of the system of green areas of the city of Split until 2025, and Development strategy of the City of Split until 2030. It is also important to keep coherence and connection between all strategic documents, including this one. Strategies, plans and projects include redevelopment of park areas and the improvement of city green areas. The belt Žnjan Plateau is a brownfield area which requires redevelopment. This can be done with the use of green infrastructure, storm water management, renewable energy, and sustainable solutions. The Žnjan area redevelopment should be a best practice design to show how it should be done for the rest of the Split coastline, where nature based solutions and climate adaptive measures are being introduced. The arrangement of the waterfront Duilovo Stobreč involves a balanced redevelopment of the area, to make it more accessible for citizens, and at the same time protect the most valuable natural parts in line with recommendation on needs to adapt to climate change: based on future scenarios for sea-level rise, the hydrological cycle, and guidelines for the management of vulnerable site with use of nature based solutions and blue-green infrastructure elements.

The planting of trees in different locations according to various city functions, is also planned. The rise in temperatures and decrease in summer precipitation because of climate change will impact the need for cooling in the city. There is a need to focus on planting of more trees in order to provide elements of green infrastructure for shading public spaces, which can help create better local microclimate and be a tool for rainwater retention. All stakeholders agreed that systemic 'greening' of the city is necessary.

A large area of the city is within the boundaries of four Natura 2000 protected areas: Three Sites of Conservation Interest (SCI) areas (under Habitat Directive) and one Special Protection Area (SPA) safeguarded in accordance with Bird Directive.

The Farm to Fork EU strategic goal aims to direct food systems on a sustainable path using shorter supply chains. Revitalising local markets mean that farmers can sell products directly to consumers, providing fresh, seasonal products, reducing environmental impact, and meeting the EU Farm to Fork strategy. Markets also contribute to the local economy, urban agriculture, preserve cultural heritage, environment, and provide an elevated level of food supplies security.

There is a need to invest in new sport facilities and to redevelop the existing ones. It creates a great opportunity to implement new smart solutions, implement renewable energy sources (installation of heat pumps to provide heat for the facility, installation of photovoltaic panels on the roof of the facility and on the ground around), upgrade infrastructure energy efficiency and implement green infrastructure such as: green roof, walls, retention roofs, systems for using precipitation in non-residential buildings.

Split Green City Action Plans actions

The actions described in this sector aim to ensure integrated urban planning, achieve good improving the state of the marine environment and coastal areas, protection of existing green and biodiverse areas, and revitalising neglected parts of the city with the implementation of green infrastructure projects. It is also necessary to focus on strengthening care and maintenance for existing greenery including the public cadastre of greenery and strengthening partnerships with citizens for the care of greenery.

The summary below presents planned actions for the urban planning and blue-green infrastructure sector. A detailed description of the actions can be found in **Appendix 1. Description of Split Green City Action Plans actions.**

Table 8 Summary of actions in the urban planning and blue-green infrastructure sector

ID	Action	Type	Description	Action owner
U1	Development of an environmental management using smart technologies	Enabling action	Development of guidelines, standards and procedures for nature-based solutions and green-blue systems implementation in urban planning and public projects for city departments and local companies. This involves the installation of additional air pollution monitoring devices in the city, periodical nature monitoring in selected areas and update of the GIS portal with the new database created and risk mapping.	City of Split - Administrative Department for Spatial Planning and Construction, Department of Environmental Protection
U2	Publicly available and green coastal areas	Capital investment	Developing a Comprehensive Coastal Management and Adaptation Plan for Split City. Redevelopment of two coastal areas: the Žnjan Plateau beach and the waterfront Duilovo Stobreč with preparation works for construction of promenade.	Žnjan d.o.o. Vodovod i kanalizacija d.o.o. Split Administrative Department for Spatial Planning and Construction, Department of Environmental Protection

ID	Action	Type	Description	Action owner
U3	Greening of the City with nature-based solutions	Capital investment	Development of 10 pocket parks and revitalization of 5 parks with associated infrastructure, greening of areas in the city of Split, reconstruction of green areas and/or greening new areas, planting of 5000 trees by 2025 and improvement of capacity for maintenance and management.	Parkovi i nasadi d.o.o.
U4	Interconnected system of local green markets	Capital investment	Revitalization of existing green markets and creation of new ones. Promotion and support for local market and healthy lifestyle by setting up food exchange points.	Parkovi i nasadi d.o.o.
U5	Sustainable sports and recreation areas in the city	Capital investment	Development of projects for recreation areas in the city, like: East recreation area multi-sport complex with swimming pool, new sports field, Gripe and Poljud sports centre redevelopment.	City of Split JU Športski objekti HNK Hajduk Split

Financing route

Pre-investment costs:

- » EUR 1,954,900

CAPEX:

- » EUR 114,403,900

OPEX:

- » EUR 5,809,100

Financing mechanisms / source:

- » EU Recovery and Resilience Facility (RRF) Grants and Funding
- » Environmental Protection and Energy Efficiency Fund (EPEEF)
- » Local budget
- » European Regional Development Fund (ERDF) / Cohesion Fund (CF)
- » Just Transition Fund



Actions in Water Sector

Key conditions

The city's water supply network covers 99%, while the system for collection, treatment and disposal of wastewater covers 89% of the city's territory.

Currently, two central wastewater treatment facilities are not effective enough (pollution exceeds limit values), hence the need for and that is the reason for their reconstruction and expansion. Existing wastewater plants are currently performing primary mechanical treatment, and wastewater is discharged into the Brač Channel. Given the sensitivity of the recipient (Adriatic Sea), the current state of wastewater treatment is not at a satisfactory level. There is a lack of sufficient data to fully understand the percentage of domestic/commercial wastewater that is treated or disposed of safely. The data on sludge disposal shows that the percentage treated or safely used is 0%. The problem of sludge disposal is presently at the national level.

The regional water supply system is characterised by limited resources, seasonal demand changes due to tourism activities, occasional water quality problems and substantial water losses. Hourly consumption of drinking water during the tourist season is higher than the rest of the year. Seasonal fluctuations in the number of users due to tourist arrivals put great pressure on the water supply system during the summer months when the yield of springs is lower. More than 60% of the area Split peninsula has too high working pressure in the system, which favours the creation of large losses caused by burst pipes and water leaks. The consumption of el. energy pumping stations requires a systematic approach, with room for optimisation especially outside the tourist season. The reconstruction of the distributive water network has become a priority and it is currently in progress. With the realisation of the planned projects, the eastern part of the city of Split will be connected to the regional water supply system.

The risk and related damages from floods in Split are relatively low due to the topography and drainage of excess water to the sea. The risk of floods

has increased in recent years due to growing urbanisation and changes in the natural water runoff. The flood risks in the city are also connected to climate change, causing extreme, heavy rainfalls. Considering the climate changes and the fact the city of Split is a coastal city with low average elevation, even relatively minor sea level rises could have coastal flooding impacts, especially when combined with the increased intensity of extreme weather.

Implemented activities

The Split Water and Sewage Company manages water and wastewater utilities for the city and surrounding area. The company has adopted a business strategy for 2019-2030 with goals to reform and strengthen the utility's service and financial sustainability. Although at an early stage of implementation, the company has delivered significant improvements of water and sewage infrastructure being done or in progress throughout the conurbation area. The construction of a new potable water purification facility is currently planned.

A key objective of the company's strategy is to address system losses (referred to as non-revenue water) in a structured and continuous manner; securing funds, development of hydraulic and mathematical model of current and future condition, formation of DMA zones, locating problematic parts of the system and rehabilitation works. The company has adopted several rules and decisions regarding improvement of the management and use of water supply and wastewater discharge for consumers. However, further measures are needed to encourage or incentivise more water efficiency behaviour among residents and businesses. With the realisation of the agglomeration project ("Improvement of water-utility infrastructure of the Split-Solin agglomeration") activities aimed at reducing losses in the system will be carried out. Notably the city's water system is relatively energy intense, with energy consumption for water supply falling into the red benchmark zone.

Wastewater is currently treated at a primary mechanical level and the wastewater is discharged into the Brač Channel. Additionally, it was assessed that the sludge is not safely disposed of or used in the city. Considering the need for protection of the maritime ecosystem, water treatment upgrade and the implementation of the biological treatment of water is a key area for development.

Improvement of water sewage infrastructure is in progress, including wastewater purifier construction. It is important to reduce mixed sewage discharges from combined sewer systems to the sea and raw sewage discharges into the sea.

Climate change and the increase in impermeable surfaces due to city development will have an impact on the water runoff, filtration, and drainage systems. The city currently lacks a holistic approach to stormwater management and a legal entity responsible for stormwater drainage management. The city must prioritise implementing stormwater infrastructure especially in the eastern parts of the city, green infrastructure solutions and rainwater harvesting facilities in public spaces, to use the rainwater to water green areas. The support for investors should be implemented brought in, to encourage the building of retention systems, thereby reducing the impact of extreme precipitation. Continuation and expansion of city actions.

Improvement of the water supply system using modern technological solutions – concepts. Leak analysis, measurements, pipe system reconstruction works as well as leak protection works are required to reduce water losses related to its supply and storage.

Implementation of leak detection systems along water infrastructure.

The data analysis has shown a high energy usage for the production, storage and distribution of water per cubic meter. Upgrading the process to be more energy efficient is needed.

Split Green City Action Plans actions

Two capital investments and one enabling action have been prepared to monitor and modernise wastewater infrastructure, use of the rain/stormwater for green spaces and elimination of losses and proper maintenance of the water supply network.

Below is a summary of the planned actions for the energy sector. A detailed description of the actions can be found in **Appendix 1. Description of Split Green City Action Plans actions.**

Table 9 Summary of actions in the water sector

ID	Action	Type	Description	Action owner
V3	Improvement of wastewater treatment infrastructure	Capital investment	Monitoring and modernisation of wastewater infrastructure	Vodovod i kanalizacija d.o.o.
V5	Water-sensitive urban design (WSUD) implementation in public and private areas	Capital investment	Solutions for the use of the rain/ stormwater for green spaces. Subsidy programs for domestic rainwater retention tanks	Vodovod i kanalizacija d.o.o.
V7	Improving and monitoring of water supply system energy efficiency	Enabling action	Energy efficiency improvement. Elimination of losses and proper network maintenance	Vodovod i kanalizacija d.o.o.

Financing route

Pre-investment costs:

- » EUR 856,500

CAPEX:

- » EUR 102,946,500

OPEX:

- » EUR 483,400

Financing mechanisms / source:

- » EU Recovery and Resilience Facility (RRF) Grants and Funding
- » Environmental Protection and Energy Efficiency Fund (EPEEF)
- » Local budget
- » European Regional Development Fund (ERDF) / Cohesion Fund (CF)



Actions in Transport Sector

Key conditions

Transport in Croatia has experienced rapid development, in particular the construction of highways connecting the north and south. Comparatively, other modes of transport such as railways are facing a substantial decrease in demand and importance. As the most significant share of tourists come to Dalmatia by car, there is a lot of pressure from the influx of cars on the entire coast during the summer months. The city of Split is the largest Croatian port for passengers and car transport; the port is located close to the historic city center - added to UNESCO World Heritage Sites, which greatly burdens traffic during the tourist season. As a tourist destination, with a significant role as a transit port connecting surrounding areas and islands with national and international networks, transport demand is influenced by tourist seasonality. Most traffic congestions occur during summer transit peaks.

As the transport infrastructure existing capacity has reached its maximum, urgent strategic actions connected with proper planning of the city traffic area is needed (according to the Sustainable Urban Mobility Plan project [SUMP] of the City of Split until 2030's). The collected data shows that residents are mostly reliant on private cars for transportation. Thus, the development of sustainable transport systems, proper systems management and sufficient transport infrastructure planning are the main challenge areas in this sector.

The city of Split is grappling with a pressing issue concerning cargo transportation through its central area. This challenge is primarily linked to the utilization of outdated cargo vehicles, which emit harmful exhaust gases and acids. In response, there is an urgent need to transition to a modernized cargo transport system employing newer vehicles. The objective is to safeguard the historic streets and city center from the corrosive impact of these emissions. The deterioration of the ancient stone slabs that form the core of the city has been observed over the years due to the damaging effects of these emissions, underscoring the imperative of adopting a more sustainable transportation approach.

Implemented activities

Although the SUMP has not yet been submitted to the city council for adoption, it shows that the city authorities plan to take actions to improve the quality, functionality, and structure of the communication system. One of the goals of the SUMP project is the development of a transport system based on sustainable mobility, incl. the promotion of cleaner vehicles. The city recently procured 48 low-emission buses (soon to be 100 new) through EU projects. In addition, the city aims to establish an environmentally friendly and energy-efficient transport system and increase traffic safety in the city.

Within the SUMP project there are plans to revitalise the railway network, which includes electrification and construction of additional stations and development of infrastructure for alternative fuels (including electric vehicle charging stations). In line with the SUMP project, traffic lanes for public transport (yellow lanes) will be provided, determining corridors through which only public transport vehicles will operate, strengthening the role of rail transport in the function of urban transport etc. Lately, e-ticketing project with aim of real-time tracking of vehicles, new ticket sales system, passenger counting system, were implemented in the city to increase passenger awareness.

To increase the level of efficiency and functionality of the transport system, especially during the increased load of the tourist season, introducing the services in the field of Intelligent Transport Systems (ITS) may be the key point to achieve.

Another important issue within the SUMP project is the promotion of public and active mobility. There is the analytical basis - studies of the development potential of bicycle roads for the establishment of an integrated system of bicycle roads in the area of UAS. In fact, many new terminals of the public city bicycle system (42 terminals) are currently being implemented.

The city is developing policies addressing management of access by private means of transport and lack of parking places, however exact actions their application are still in the early stages. City is also analysing the potential to introduce electric ships in maritime transport, when it comes to local waterborne transport.

Continuation of city program: Charging stations for electric vehicles, including creation of multimodal hubs (for 3-4 types of transport: electric cars, bicycles and scooters) integrating multi-mobility, micro-mobility and sharing and charging services. There is a potential opportunity for this action to be implemented as a PPP if a new transport hub is built.

Actions proposed in GCAP for the City of Split are a continuation of those that were started by the city authorities in the transport sector, complemented by the latest proposals in the field of sustainable transport, such as: 1) implementation of a sustainable Park&Ride system with car-sharing or car-pooling possibilities; 2) implementation of Renewable Energy Sources and green infrastructure elements on redeveloped transport infrastructure, incl. green and retention roofs on garages, implementation of water retention basins and green infrastructure in case of redevelopment of concrete parking spaces. Moreover, there are plans to improve existing parking by integrating it with the newly planned Smart City application by adding new contents and possibilities to connect it with the Public Bicycle System (continuation of a currently running EU project “Choose a bicycle!”).

Split Green City Action Plans actions

The primary goal of these actions with the transport system development based on sustainable mobility, with the provision of affordable and sustainable mobility options for people. Main three actions were defined within this sector which are concerned with the procurement of electric buses, with the installation of charging bus infrastructure; developing road bus lanes dedicated for public transport and bicycle routes; creating the multimodal hubs allowing for a change of means of transport to more economical (and ecological) one; and implementing Park&Ride systems with car-sharing or car-pooling.

However, to ensure the development of sustainable transport in the city, it is necessary to supplement the infrastructure needed to charge the electric cars, bicycles and scooters, as well as to increase parking spaces and to make services for such vehicles available. In addition, further development of the bike sharing system is needed, including the purchase of bicycles and the creation of new bicycle terminals. The electrical waterbone transport is

planned to be developed with installation of charging points and pilot projects.

Moreover, further implementation of an Intelligent Transport System (ITS) across the entire City will improve the quality, comfort, and efficiency of journeys by individual and public transport. A more optimal use of the transport network through guidance on alternative routes and constant access to traffic data will provide the opportunity for efficient traffic management.

Below is a summary of the planned actions for the transport sector. A detailed description of the actions can be found in **Appendix 1. Description of Split Green City Action Plans actions.**

Table 10 Summary of actions in the transport sector

ID	Action	Type	Description	Action owner
T2	Carbon-neutral and intelligent public transport fleet	Capital investment	Providing a sustainable and high-quality transport service to citizens in the city of Split through incorporating new electric buses with the proper charging stations and by adding multilanguage real-time timetables and passenger information boards on bus stops.	Promet d.o.o., Split
T4	Streets redevelopment for more convenient public and bicycle transport	Capital investment	Implementation of an Intelligent Transport System allowing optimization of traffic flows. Construction of new cycle routes with the additional electric bicycle charging stations and bicycle repair and parking stations.	City of Split Split parking d.o.o.

ID	Action	Type	Description	Action owner
T5	Creation of environment and passenger-friendly transport hubs	Capital investment	Building micro multimodal transport hubs where various shared mobility vehicles are available to short-term rental and implementing sustainable P&R zones.	Split parking d.o.o. Promet d.o.o., Split
T6	Electrical waterborne transport	Capital investment	Feasibility study to develop urban waterborne public transport systems and technical studies on a power supply to the city port.	City of Split-Development Department

Financing route

Pre-investment costs:

- » EUR 1,563,300

CAPEX:

- » EUR 130,639,000

OPEX:

- » EUR 1,259,100

Financing mechanisms / source:

- » EU Recovery and Resilience Facility (RRF) Grants and Funding
- » European Regional Development Fund (ERDF) / Cohesion Fund (CF)
- » Environmental Protection and Energy Efficiency Fund (EPEEF)
- » Local budget
- » Just Transition Fund



Actions in Energy Sector

Key conditions

The city has universal access to energy with the electricity system providing most of the energy requirements for both power and heating. The Croatian grid contains a reasonably high proportion of renewable energy but locally there is great unrealized potential for renewable energy generation in the city. The city plans to increase energy efficiency and the transition to clean energy with the use of renewable energy sources (RES).

Recent evidence indicate that the city's energy system is vulnerable to extreme weather events, which may pose a significant problem due to climate change and the occurrence of extreme weather events. Investment in system resilience would be a key measure to avoid more severe effects in the future.

However, the city boasts favorable weather conditions for solar energy utilization. Solar panels situated within the city have the potential to generate electricity at an annual mean capacity factor of approximately 16%. As of the conclusion of 2019, the aggregate installed capacity in solar power plants remained below 400 kW. Nevertheless, roughly 18 integrated solar power plants, with a combined capacity of 1,137 kW, were either being prepared for construction or were already under construction. Furthermore, new installations are in the planning stages.

Implemented activities

The City supports and encourages participation in national programmes that improve the energy efficiency.

The city takes part in the Intelligent City Challenge program, where the city has presented the idea to create a mapping system, showing the potential of solar panels used for each building in the city. The City is in the process of preparation and implementing of smart public lighting (retrofitting of lighting with LED and smart lighting in parks, city squares, streets, seashores and roads).

The city of Split is implementing the project "SuSTainable - Increasing the capacity for solar energy production", which plans to install photovoltaic power plants on 14 public buildings owned by the City of Split (10 elementary schools, 2 kindergartens and the basketball hall of KK Split). The project was financed within the Financial Mechanism of the European Economic Area 2014-2021. through the call "Increasing the capacity for the production of solar energy".

Currently the "Development Strategy of the City of Split until 2030" is underway. The document defines strategic goals according to which the city plans to increase energy efficiency and the transition to clean energy with the use of renewable energy sources (RES). Suggested actions include the reduction of losses in the electricity distribution network and the introduction of advanced networks and energy renovation of public sector buildings.

Split Green City Action Plans actions

Three capital investments have been prepared to increase energy efficiency, transition to clean energy and increase resilience and sustainability of the city.

Below is a summary of the planned actions for the energy sector. A detailed description of the actions can be found in **Appendix 1. Description of Split Green City Action Plans actions.**

Table 11 Summary of actions in the energy sector

ID	Action	Type	Description	Action owner
E1	Increasing the energy efficiency of buildings	Capital investment	Installation of photovoltaic panels on public buildings, co-financing solar collectors on family households, mapping energy consumption and solar potential of Split, thermomodernisation of private and public buildings including developing a framework of standard/ good practices	City of Split - Urban Planning and Construction Department Stanouprava d.o.o.
E2	Smart and modern public lighting	Capital investment	Modernisation of public lighting with the application of smart and energy-efficient solutions and minimisation of light pollution.	Parkovi i nasadi d.o.o. City of Split - Urban Planning and Construction Department

Financing route

Pre-investment costs:

- » EUR 1,752,800

CAPEX:

- » EUR 35,180,500

OPEX:

- » EUR 132,800

Financing mechanisms / source:

- » EU Recovery and Resilience Facility (*RRF*) Grants and Funding
- » Environmental Protection and Energy Efficiency Fund (EPEEF)
- » Local budget
- » European Regional Development Fund (ERDF) / Cohesion Fund (CF)
- » Croatian Bank for Reconstruction and Development (HBOR)
- » Just Transition Fund



Actions in Solid Waste Sector

Key conditions

The City of Split generates about 65,000 tons of mixed municipal waste per year (362 kg/year/inhabitant in 2020), of which 30% is biowaste. How some local self-government units in the vicinity of the City of Split do not have the capacity or sustainability to build a sorting plant (Dugopolje, Podstrana and Klis municipalities and the City of Solin), the joint use of a sorting plant has been imposed. Therefore, the capacity of the composting plant for the City of Split alone should be a minimum of 18,000 tons.

Čistoća d.o.o. is responsible for the collection, processing, and disposal of municipal waste. In As of 2022, Split has a total of ten mobile recycling yards. Čistoća d.o.o. provides a regular citywide waste collection service and bulky waste collection on demand. Citizens are getting used to separating their waste but there is a need to ensure growth of performance on recycling and sustainable treatment.

The city lacks the necessary facilities to enable more sustainable waste management including recycling and diversion away from landfill. With future EU standards for recycling and treatment becoming increasingly stringent, investment in waste infrastructure is even more urgent. In the city, it is important to raise citizens' awareness of the benefits of waste segregation and education to minimize waste generation 'at source'. The amount of collected separated waste has been growing for years, and it is related to the new recycling yards in Split. But in general, Croatia (and the city of Split) is far from the set goals for waste recycling (50%).

Implemented activities

The city has Waste Management Plan, which defines the measures for reducing the disposal of municipal waste generated in Split for 2020: through the procurement of facilities for processing and sorting of municipal waste and biodegradable waste. Activities such as remediation of the landfill

Karepovac (landfill is in the final modernisation phase) and establishment of recycling yards are fulfilled.

The Act on Sustainable Waste Management is the law that defines the obligations for cities and municipalities to ensure sufficient recycling yards for citizens. Split built three recycling yards (on the site of the Karepovac landfill, opened in 2021 recycling yard Orišac and opened in 2023 recycling yard Pujanke) and secured the use of ten mobile recycling yards. Four additional recycling yards are in different development phases, from project documentation preparation to issuing building permits or construction works.

Split Green City Action Plans actions

Actions in the waste sector will include capital investments, such as the construction of small waste management facilities and construction recycling yards for sorted waste disposal. The solution will help to substantially increase recycling and solid waste separation at origin, reducing the sorting that occurs at a later stage. To support and underpin the current infrastructure, actions will include the development of municipal waste management system analysis with feasibility study for the construction of a new waste treatment and recovery facility, concept development and business case for municipal waste treatment in a biogas or composting facility and a feasibility study for photovoltaic plant in Karepovac. The use of waste for biogas production under controlled conditions allows to reduce transport and storage costs. As part of the promotion of the innovations undertaken by the City and in order to raise the awareness of the population about circular waste management (separate collection, processing and recovery), it is recommended to carry out a series of public campaigns and workshops.

Below is a summary of the planned actions for the solid waste sector. A detailed description of the actions can be found in **Appendix 1. Description of Split Green City Action Plans actions.**

Table 12 Summary of actions in the solid waste sector

ID	Action	Type	Description	Action owner
O1	Construction of facilities for circular waste management	Capital investment	Construction of small waste management facilities with associated infrastructure (sorting plant, treatment plant). Development of a municipal waste management system analysis with feasibility study for the construction of a new waste treatment and recovery facility, concept development and business case for municipal waste treatment in a biogas or composting facility and a feasibility study for photovoltaic plant in Karepovac.	Čistoća d.o.o.
O2	Local waste recycling points	Capital investment	Construction of two recycling yards for sorted waste disposal (Trstenik, Sirobuja) and waste sorting promotion. Installation of underground waste disposal containers.	Čistoća d.o.o.

Financing route

Pre-investment costs:

- » EUR 460,000

CAPEX:

- » EUR 10,994,600

OPEX:

- » EUR 208,800

Financing mechanisms / source:

- » EU Recovery and Resilience Facility Grants and Funding
- » Environmental Protection and Energy Efficiency Fund
- » European Regional Development Fund/Cohesion Fund
- » Just Transition Fund
- » Local budget.



Cross- Sectoral Actions

Key conditions

This sector includes cross-sectoral actions, addressing the challenges of several sectors. There are actions including the field of social, educational, environmental and innovation development. The actions were created in connection with the need to increase residents' awareness of energy saving practices, solutions and accessible environmental education. The analysis of the city indicates it is desirable to adapt kindergartens, schools and accessibility infrastructure for people with disabilities and develop smart city application features. The City needs a "disaster management" action supported by smart solutions to increase the capacity to adapt to Climate Change. The City of Split is in the earthquake zone intensity VII and VIII of the MSK scale. Given the age of the buildings (especially in the city centre), Split is regarded as an area of high seismic risk. As climate changes and extreme weather events occur more frequently, there is a need for detailed examination of the City in terms of natural disasters resilience.

Implemented activities

The City of Split has recognized the need for the environmental education among the residents, especially raising awareness and motivation to achieve lower waste generation and improved waste segregation at source. There are intentions to create a Web page allowing the citizens to access information on demand and receiving free SMS reminders of the waste collection schedule, monitor collection costs and update their services (communication with the local waste management company - Čistoća d.o.o.).

As the lack of accessibility to public spaces for people with limited mobility was identified, the City aims to increase accessibility for all (people with physical disabilities, children and seniors) to public buildings and public spaces: parks, squares, pavements, roads.

The city uses several systems and databases in its daily work. The biggest challenge is ensuring transparency, consistency, accuracy, unambiguous interpretation, retrieval and use of records from heterogeneous systems. Ensuring data consistency requires a methodological framework,

organisational changes, and constant work on data maintenance and alignment with sources. The action on establishing a data-based will enable measurement and monitoring of the effects of other actions as a cross-section.

The City supports the implementation of smart solutions to increase the city's capacity to adapt to climate change. Split will be able to protect and develop its existing natural habitats and continue its urban life uninterrupted in case of critical situations. Considering the Split is regarded as an area of high seismic risk, detailed documentation on the possible impact of seismic events is important for decision makers.

Split Green City Action Plans actions

Two capital investments and inclusion actions have been prepared to improve the City's condition in terms of education activities about city sustainable development, improving quality and accessibility of public spaces and increasing adaptation and resilience to extreme weather events: seismic risk, sea level rises.

A summary of the planned cross-sectoral actions is presented below. A detailed description of the actions can be found in **Appendix 1. Description of Split Green City Action Plans actions.**

Table 13 Summary of actions in the cross- sectoral sector

ID	Action	Type	Description	Action owner
M1	Green City awareness and education campaigns	Enabling action	An Energy Innovation Lab – the initiative supporting ideas and solutions that help to optimize energy production and consumption. Public awareness campaigns will be focus on ensuring supporting actions conducted under the GCAP in individual thematic areas.	City of Split

ID	Action	Type	Description	Action owner
M2	Accessible buildings and public spaces: inclusive design in action	Enabling action	Spatial adaptation of kindergartens and schools for the disabled including installation of ramps at the entrances, increasing accessibility of toilets and implementation of elevators, information boards and symbols with Braille signage, audio readers, overlays for intercoms. Investments in accessibility infrastructure maintenance programme including spatial adaptation of pavements, roads and curbs.	City of Split: -Department for Communal Affairs -Department for Social Services
M4	Developing a disaster prevention, monitoring and management system	Capital investment	Developing "disaster management" solutions supported by smart solutions to increase the city's capacity to adapt to climate change, increasing the quality of public services and the transparency of administration.	City of Split City of Split - Development Department Javna vatrogasna postrojba Split

ID	Action	Type	Description	Action owner
Z3	City core earthquake adaptation and complex protection	Capital investment	Complete site examination, mapping and city core protection phased plan development. Strengthening against liquefaction, sliding, rock cracking and for selected objects, along the actions phasing plan.	City of Split- Department for Social Services City of Split - Administrative Department for Spatial Planning and Construction

Financing route

Pre-investment costs:

- » EUR 675,500

CAPEX:

- » EUR 8,205,200

OPEX

- » EUR 4,714,400

Financing mechanisms / source:

- » EU Recovery and Resilience Facility (RRF) Grants and Funding
- » Environmental Protection and Energy Efficiency Fund (EPEEF)
- » Local budget
- » European Regional Development Fund (ERDF) / Cohesion Fund (CF)
- » Just Transition Fund
- » European Social Fund Plus

Monitoring and reporting



10. Monitoring and reporting

10.1 Monitoring implementation and results

The monitoring process will include two components:

- » **Monitoring the implementation progress**, reviewing the progress of the implementation of actions developed under the Split Green City Action Plan.
- » **Monitoring the results**, which is checking whether the implemented actions and the steps undertaken implementation steps bring the expected positive changes in the city and whether they will translate into the achievement of the vision and objectives of the document.

The city will be responsible for the process of monitoring and preparing evaluation reports.

10.2 Components of implementation progress monitoring

To ensure consistency and cooperation, the four main components that determine the effectiveness of the process are presented below.

Table 14 Main components of the monitoring process

Components of the monitoring process	
Reporting and monitoring framework	The unit responsible for the monitoring process will define the reporting framework and will supervise the implementation of the Green City Action Plan which include actions taken by other entities identified as responsible for the action and cooperation with stakeholders.
Scope of responsibility of coordinating entities and cooperating stakeholders	In Appendix 1. Description of Split Green City Action Plans actions, entities responsible for a given action are specified. These units will be responsible for coordinating the work in cooperation with stakeholders cooperating working together in the implementation of actions in accordance with the schedule and supervising their implementation.
Financing of actions	Entities responsible for actions in cooperation with the City of Split, create a budget for planned activities from external and/or internal funds. In order to optimize this process, Appendix 1. provides estimates of pre-investment costs, capital expenditure and operating costs, and identifies possible sources of funding for the actions.
Review and evaluation	The entities responsible for the implementation of the actions will collect data on the progress in their implementation application. The collected information will be regularly (at least once a year) forwarded to the unit coordinating the monitoring process. This unit, together with the entities responsible for a given action, will be able to adjust the time frame and steps for the implementation of the action to enable an efficient process of their implementation in the city.

10.3 Components of results monitoring

An important element of the observation will be the ongoing monitoring of the results of actions implemented in the city. This will allow for an objective assessment of the Green City Action Plan and to potentially verify the original expectations, if the observed progress is unsatisfactory. The action tables in Appendix 1 define the action implementation indicators, which will enable the progress of the developed actions to be measured. As a tool supporting the monitoring process, it is recommended to use the database of indicators created under the GCAP Split project, containing assessments of pressure-state-response indicators, used to analyze the condition of the existing city. Data for indicators related to a given action should be collected and updated on a regular basis. The unit responsible for the monitoring process will supervise the process of collecting data in this regard and cooperation with entities responsible for the actions. The actions of these units will include maintaining contacts with stakeholders, collecting and reviewing data and providing information that includes an actual assessment of the impact of actions, resources and budget on their implementation. This information should be regularly provided to the unit responsible for monitoring in accordance with the agreed reporting periods. It is

recommended that the method and indicators of results monitoring should be reviewed annually and corrected if necessary.

The framework of the monitoring and evaluation process of the assumptions of the Split Green City Action Plan is presented below.

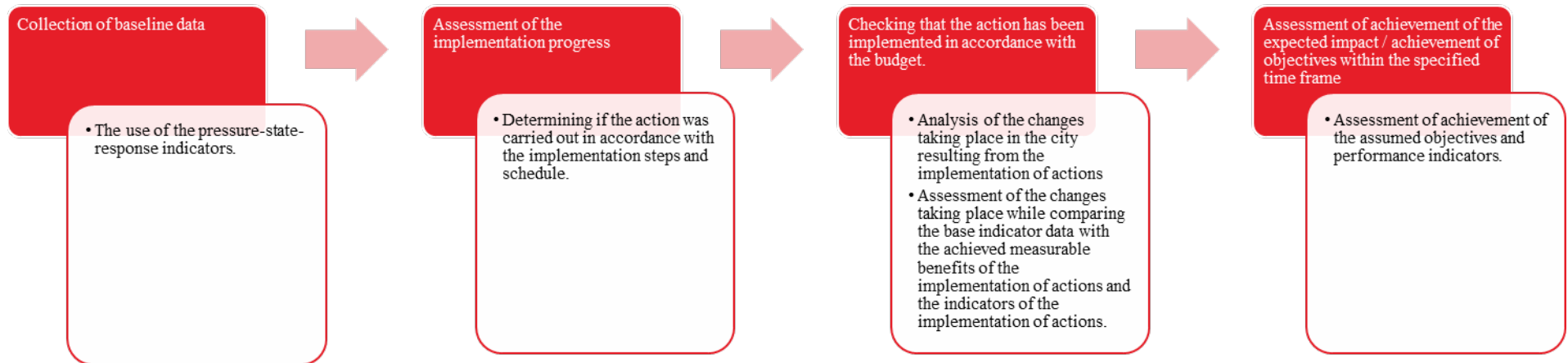


Figure 11 Diagram of the monitoring and evaluation framework

The way to achieve a positive impact

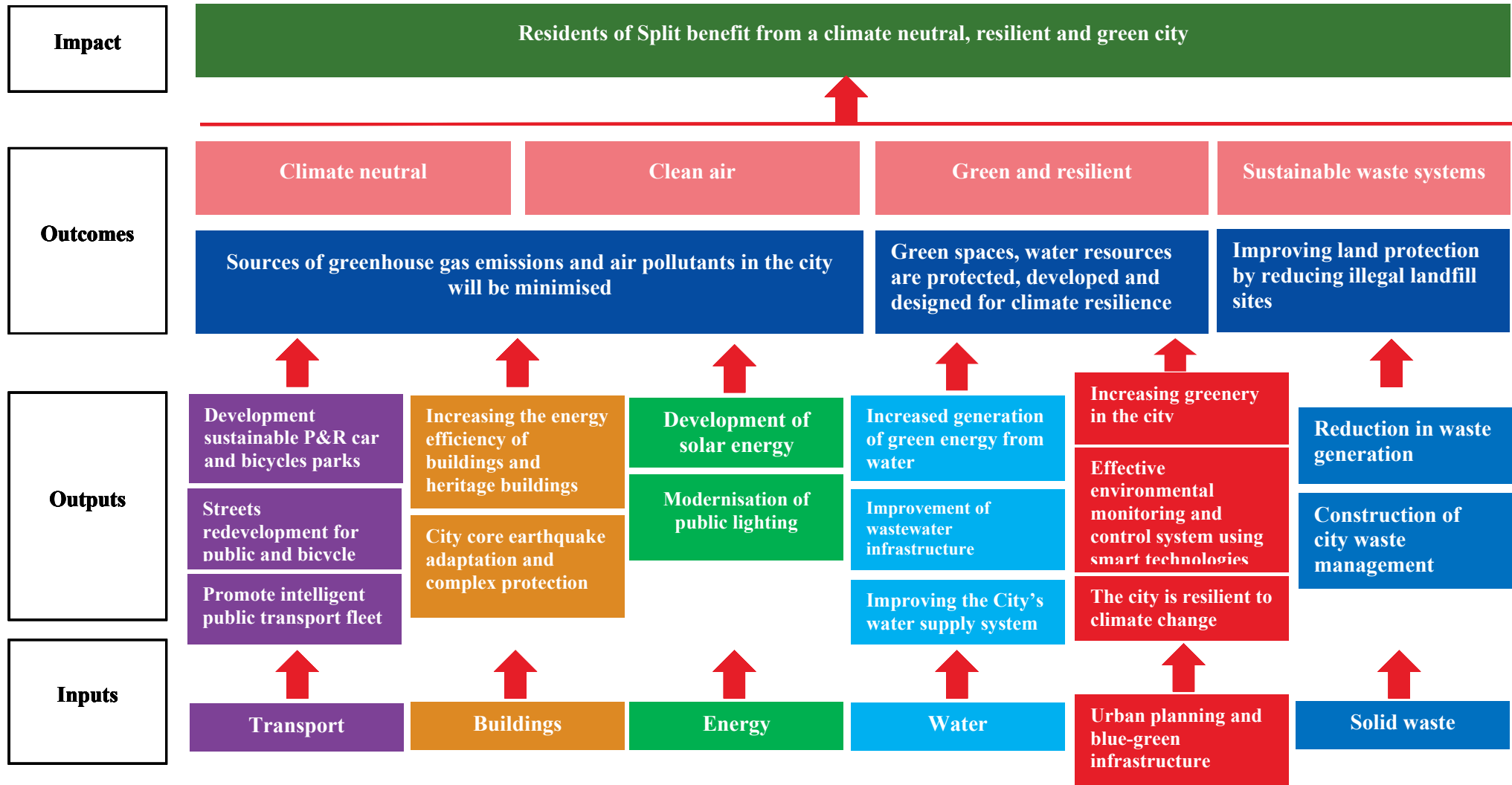


Figure 12 Diagram of creating positive impact from GCAP actions

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Appendix 1. Description of Split Green City Action Plan actions



SECTOR: URBAN PLANNING AND BLUE-GREEN INFRASTRUCTURE





U1 - DEVELOPMENT OF AN ENVIRONMENTAL MANAGEMENT USING SMART TECHNOLOGIES

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2027	Enabling action	I1 - Plans, bodies, policies: Improve implementation of instruments to ensure integrated planning	City of Split - Administrative Department for Spatial Planning and Construction, Department of Environmental Protection



MEASURES / INVESTMENTS COSTS [EUR]

Development of guidelines, standards and procedures for nature-based solutions and green-blue systems implementation in urban planning and public projects for city departments and local companies.	32,100
Additional documentation for city's urban planning.	296,800
Update the GIS portal with a new environmental database and risk mapping.	396,800
SUM	725,700



TARGETED RESULTS

Technical catalogue of nature-based solutions developed	The area of green areas covered by periodical nature monitoring
1 pcs.	3,5 km²
New database of environmentally valuable areas developed	
1 pcs.	



MEASURABLE BENEFITS

Job creation potential
3~15



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



<p>ACTION BENEFITS</p>	<ul style="list-style-type: none"> • More effective nature protection. • Practical implementation of sustainable development. • More thorough monitoring of the environment (including biomonitoring). • Increasing awareness of stakeholders about ecosystem services in the city. • Faster response to potential contamination. 	<p>Main stakeholders</p> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="border: 1px solid black; background-color: #e91e63; color: white; padding: 5px; text-align: center;">Parkovi i nasadi d.o.o.</div> <div style="border: 1px solid black; background-color: #e91e63; color: white; padding: 5px; text-align: center;">Javna ustanova za upravljanje Park šumom Marjan</div> </div>						
<p>DESCRIPTION AND SCALE OF ACTION</p>	<p>1. Development of guidelines, standards and procedures for nature-based solutions and green-blue systems implementation in urban planning and public projects for city departments and local companies.</p> <p>A proposal to prepare a set of guidelines, standards and procedures which will help the city organisational units (as well as non-governmental organisations and any involved stakeholders) to design and implement nature-based solutions and green-blue infrastructure in the urban space. One of the planned tasks will be the development of a document addressing a wide range of these solutions along with the technical guidelines on how to implement them, their climate change adaptation and resilience potential and economic efficiency. Another task is the development of strategic policy tools; these will include urban planning regulations (e.g., requirements for rainwater infiltration, green space factors and points systems), programmes (integrated stormwater management), strategies dedicated to urban green planning, financial incentives (tax and fees reliefs, subsidies) and action plans (action plans for the protection of biodiversity, climate adaptation plan). The supporting instruments would be monitoring and research, social participation, awareness-raising and various forms of cooperation.</p> <p>Achieving the potential benefits this action depends on a meticulously planned system of monitoring and periodic control of the level of achievement of their goals at appropriate stages of implementation. Monitoring and evaluation make it possible to adjust and adapt the concepts to later challenges. There is a need to develop a management system to monitor quality, costs and geoinformation data. It should also involve observation of the function and utilisation of the open blue-green areas and contributions to water management. Monitoring will be linked to a geoinformation portal to show the results and the benefits that come from implementation of all the above actions.</p>	<p>Related actions</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">U2</td> <td style="padding: 5px;">U3</td> <td style="padding: 5px;">U4</td> </tr> <tr> <td style="padding: 5px;">T4</td> <td style="padding: 5px;">T5</td> <td style="padding: 5px;">E1</td> </tr> </table>	U2	U3	U4	T4	T5	E1
U2	U3	U4						
T4	T5	E1						

2. Periodical nature monitoring in selected areas with installation of additional air pollution monitoring sensors in the city.

It is important to monitor the quality of the selected areas on a regular basis. The monitoring will include data on air, water and soil quality, fauna (habitats and existence of mammals, amphibians, reptiles, birds) and flora (plants, fungi, lichens, plant communities, and area/number of areas of natural value). In case of green areas, the collected data will include: shrubs, lawn and flowered areas, number of trees and shrubs by genus, species, variety, the height of trees, diameter of trunks and crowns; the substrate on which the plant grew; the presence of nests and nesting boxes; number and types of natural monuments. As part of the monitoring, specialists will conduct field studies covering biodiversity refuges and report on the surveys were conducted.

The city of Split is developing an interactive air quality monitoring map. This task will include the implementation of measuring stations in different districts (their exact location will be determined at a later stage). Also, the upgrade of the Split-1 measuring station where currently only two parameters are measured (NO₂ and SO₂) is planned; the measurements PM₁₀ and PM_{2.5} parameters will be added. The implementation of the action should also consider suitable connections, power supply and a high-quality network to integrate the sensors, into one consistent system. The exact locations for installing the sensors will be determined at a later stage. It is important to be aware that sensors should be distributed more densely around industrial centres. In future, these devices should also be extended to include additional functionalities, such as monitoring, noise, soil moisture, flood levels, and meteorological data in the city.

Furthermore, it is advisable to expand the range of parameters monitored for sea quality within the water sector, particularly with regard to the contamination of seawater following heavy rainfall, the discharge of waste oils and other pollutants from urban areas such as streets, car parks, and other public spaces, which are carried untreated into the sea by stormwater.

3. Upgrade of the GIS portal with a new environmental database and risk mapping.

The existing geoinformation system - GIS portal - will be updated with a newly developed database of environmentally valuable areas as well as risk mapping. This is intended to support urban planning in taking appropriate actions, primarily in establishing better regulations for important natural areas and green spaces to protect, manage and monitor them.

The database will be populated with the continuous and periodic monitoring of sensors located around the city, together with data from surveys and third-party information.

This action will include the use of specialized software to record data and create a database about environmentally valuable areas as well as the use of spatial information systems with spatial planning and

cadastral data and other databases maintained in offices. As a part of that, the preparation of a coastal area infrastructure cadaster is planned, which will help to further develop and protect them.

It is also important to highlight that, due to the development and integration of the GIS platform, it will be much easier to implement the provisions of the Intelligent Cities Challenge including digitalization of energy systems, digitalization of government services, green mobility and enhancing the bicycle network, intelligent transport systems, traffic security video surveillance systems, modernization and management of public lightning system, energy renovation of publicly owned buildings, modernization of the municipal waste management. Improving the public green spaces is a project that consists of activities that can also include citizens to directly participate in greening and cultivating.

SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
	Development of guidelines, standards and procedures for nature-based solutions								
	Amendment of the general urban								
	Amendment of chosen spatial plan of the city of Split								
	Development of the concept of urban security of historic cities (analysis of the security situation and policy, development of guidelines, learning outcomes (round tables, lifelong learning)								
	Upgrade of a Split-1 measuring station								
	Implementation of new measuring stations								
	Development of a database of environmentally valuable areas								
	Upgrade of the existing geoinformation system (GIS)								
ENABLING POLICIES,	<ul style="list-style-type: none"> • Development Strategy of the City of Split until 2030 • Development Strategy of Split urban agglomeration for the period until the end of 2027 • Strategy for the development of the system of green areas of the city of Split 2017 - 2025 								

STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Program for mitigating climate change, adapting to climate changes and protecting the ozone layer of the City of Split, 2022 							
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring a balanced participation of all genders in the process of the developing guidelines, standards and procedures for nature-based solutions and green-blue systems implementation in urban planning. • Ensuring equal access for women to green jobs – those related to development of database of environmentally valuable areas, GIS portal updating, and air quality and nature monitoring. • Increased quality of life and health benefits due to the positive effects of increased quality of green spaces. 							
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Development of a city-specific communications infrastructure. • Preparation of the GIS platform, the infrastructure of the city for the future development of digital twin. • Preparation with LoraWan including remote sensor reading infrastructure. Supporting the Gateways to be installed with sensors when the city needs any instant measurement in the future. • Taking quick and immediate remedial actions according to regular air quality measurement. • For a disaster scenario, it can be ensured that the city has an independent and cloud-based sensor infrastructure. <p>Upgrade of the GIS should be an occasion to capture, integrate, and make available data that go beyond blue-green infrastructure and nature-based solutions. This should integrate cadastral information in order to facilitate the identification and requirements of actions and opportunity to integrate data generated from other actions i.e., data from systems proposed in the water and transport sector and those for emergency warning.</p>							
MAPPING OF RISKS, CHALLENGES	<p>There is a risk of sea pollution connected to maritime transport, associated with the discharges of ship ballast water and sludge. There can be a potential transfer of harmful aquatic organisms and pathogens, pollution of the sea with oils and hazardous and harmful substances from maritime facilities. In order to react early to such events and prevent them from affecting the marine or terrestrial ecosystem or human life, sensors will be installed to detect potential contamination and systematic biomonitoring will be conducted to detect potentially harmful organisms.</p>							
COSTS	<table border="1"> <thead> <tr> <th data-bbox="380 1303 936 1342">Pre-investment</th> <th data-bbox="936 1303 1375 1342">CAPEX</th> <th data-bbox="1375 1303 1675 1342">OPEX</th> </tr> </thead> <tbody> <tr> <td data-bbox="380 1342 936 1372">EUR 328,900</td> <td data-bbox="936 1342 1375 1372">EUR 396,800</td> <td data-bbox="1375 1342 1675 1372">EUR 117,800</td> </tr> </tbody> </table>	Pre-investment	CAPEX	OPEX	EUR 328,900	EUR 396,800	EUR 117,800	
Pre-investment	CAPEX	OPEX						
EUR 328,900	EUR 396,800	EUR 117,800						

**COST
CALCULATION**

Costs for the development of guidelines, standards and procedures for nature-based solutions have been estimated on the basis of previous experience and projects conducted by the Consultant, at an estimated cost of EUR 32,100.

Within the framework of this action and the implementation of the objectives of the newly planned document, we recommend combining and implementing the actions with those included in the Development Strategy of the City of Split until 2030 (total EUR 296,800):

- Amendment of the general urban plan EUR 186,200.
- Amendment of spatial plan of the city of Split EUR 102,000.
- Development of the concept of urban security of historic cities (analysis of the security situation and policy, development of guidelines, learning outcomes (round tables, lifelong learning) EUR 8,600.

Total pre-investment costs were estimated at EUR 328,900.

Capital expenditure associated with the upgrade of the existing geoinformation system (GIS), and subsystems of the City of Split was estimated at EUR 396,800.

Operational costs represent annual expenses related to environmental monitoring of Split's green areas EUR 117,800.

Estimated savings

Standards and procedures will reduce the development costs of nature-based solutions as they will be able to follow the same procedure.

Nature monitoring will help prevent green spaces from falling into disrepair or becoming contaminated and needing large scale, costly repair.

An up-to-date GIS map will reduce costs associated with urban planning.

The city has identified risks related to the generation of air pollution from the transport sector. The development of additional air pollution monitoring system will allow the implementation of action to minimize negative impacts.

Data source: Development Strategy of the City of Split until 2030 and based on the previous experience of the Consultant (projects realized by Arup).

**FINANCING
MECHANISMS /
SOURCE**

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*
 - C2.1. R2-I1 Preparation of project technical documentation for green and digital transition projects
 - C2.3. R4-I2 - Construction of passive electronic communication infrastructure
2. *Environmental Protection and Energy Efficiency Fund (EPEEF)*
 - Environmental protection
3. Local budget
4. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*
 - reaping the benefits of digitisation for citizens, companies, research organisations and public authorities,
 - enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution,
 - fostering the integrated and inclusive social, economic and environmental development, culture, natural heritage, sustainable tourism and security in urban areas.
5. *Just Transition Fund*
 - investments in digitalisation, digital innovation and digital connectivity.



U2 – PUBLICLY AVAILABLE AND GREEN COASTAL AREAS

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2030	Capital investment	A1 - Improve the mechanisms for achieving good state of the marine environment and coastal areas	Žnjan d.o.o. Vodovod i kanalizacija d.o.o. Split City of Split - Administrative Department for Spatial Planning and Construction, Department of Environmental Protection



MEASURES / INVESTMENTS COSTS [EUR]

Developing a Comprehensive Coastal Management and Adaptation Plan for Split City	150,000
Design documentation, permits and supervision of the redevelopment of the Žnjan Plateau beach area	679,000
Redevelopment of Žnjan Plateau beach	35,000,000
Redevelopment of the waterfront Duilovo Stobreč	2,130,800
SUM	37,959,800



TARGETED RESULTS

Revitalized brownfield location area	Kilometers of promenade built
16 ha	1,7 km



MEASURABLE BENEFITS

Job creation potential

16~30



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

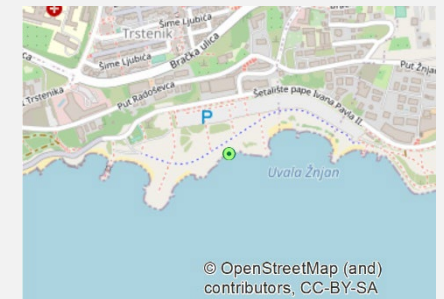
- Climate change resilience and adaptation.
- Coastal ecosystem restoration.
- Greater accessibility of the coastline.
- Adaptation of the coastline to the forecast changes in climate.
- Increasing the attractiveness of the eastern part of the city thanks to the construction of a beach and a large park.

DESCRIPTION AND SCALE OF ACTION

There is a concept of connecting pieces of coastal promenade Lungomare into a continuous pedestrian and cycling path which will connect beaches, ports and marinas and historical core waterfront. It could be done through a chain of different projects. It is crucial to emphasize the use of nature-based solutions in all new projects constructed along the coastline. These solutions promote biodiversity support, sustainable development, and the creation of natural structures to ensure that the coastlines remain resilient and adaptive to climate changes. Nature-based solutions include the use of natural materials and processes to help protect and restore coastal ecosystems. This can include the planting of vegetation to stabilize the shoreline, the creation of other natural structures to provide habitat for marine life, and the restoration of coastal habitats. During project preparation for the coastal areas the guidelines, standards and procedures for nature-based solutions and green-blue systems implementation in urban planning and public projects for city departments and local companies should be introduced (U1).

1. Developing a Comprehensive Coastal Management and Adaptation Plan for Split City

This initiative is propelled by the overarching goal of formulating a robust and forward-looking plan to sustainably manage and adapt Split's coastal area. The primary objective is to seamlessly integrate strategies for environmental conservation, urban development, and climate resilience within a unified framework. This integration is aimed at ensuring the enduring prosperity of the city's coastline, even in the face of evolving



The Žrnjan beach area location



The waterfront Duilovo Stobreč location

challenges. The initiative will tactfully balance collaborative synergy with the Regional authority and the city's autonomy in shaping protective and mitigative actions. By crafting a dynamic adaptation roadmap, the plan will bolster Split's adaptive capacities, reinforcing the intricate relationship between the city and its coastal environs.

2. Redevelopment of the Žnjan Plateau beach area

The redevelopment of the Žnjan beach area is a project which has already begun. A feasibility study of the development of beaches area in the region of Žnjan has been prepared. The planned investment will create a major park and the beach in the eastern part of the city, an additional attraction for tourists (a part of Lungomare) with a large parking area, which will give the city a representative recreation area attractive to both citizens and visitors to the city. The project documentation has been prepared, the Concession Agreement has been signed, and the financing plans are being planned. The undeveloped 16ha area of the Žnjan Plateau has been zoned – with plans for a beach, public park, a plan-shaped promenade, and a promenade that delimits the areas for recreational purposes. There are plans to construct a catering facility, a catering-commercial-recreational facility, sports grounds (football, tennis, basketball, etc.), above ground and underground garages for public use, facilities with showers and changing rooms and a zone of lounge chairs and umbrellas with an outdoor bar. All actions are in connection with the Detailed Plan for the Development of the Coastal Area Trstenik - Radoševac.

3. Redevelopment of the waterfront Duilovo Stobreč and preparation works for construction of promenade.

The project envisages the preparation of project documentation and redevelopment of the 300m waterfront in Stobreč, including the investment in the beach and the promenade along with lighting and urban equipment (benches and baskets).

Preparation of the beach for the eastern part of the city with the construction of a promenade from Stobreč to Žnjan. The promenade will connect two previously redeveloped areas with a length of 1,7 km. The promenade will incorporate a horticultural belt with trees to ensure its functionality even during periods of intense sun exposure.

All of the projects included in this action should ensure a balance between the development of recreational areas and the protection and enrichment of areas for the coastal ecosystem. These projects should provide a basis for creating standards for any future investment around coastal areas, ensuring the implementation of nature-based solutions and the introduction of climate change adaptation solutions.

Main stakeholders

City of Split -
Administrative Department
for Spatial Planning and
Construction, Department of
Environmental Protection

University
of Split

Žnjan
d.o.o.

Vodovod i
kanalizacija
d.o.o. Split

Related actions



SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
	Developing a Comprehensive Coastal Management and Adaptation Plan for Split City								
	Redevelopment of the Žnjan beach area								
	Redevelopment of the waterfront Duilovo Stobreč								
	Preparation of the beach for the eastern part of the city with the construction of a promenade from Stobreč to Žnjan								
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Marine and Coastal Zone Management Plan of Split Dalmatia County • Development Strategy of the City of Split until 2030 • Development strategy of the Split urban agglomeration for the period until the end of 2027 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring equal access for women to green jobs related to publicly available and green coastal areas. • Ensuring principles of universal design are applied in publicly available and green coastal areas. • Ensuring the safe use of the waterfront areas by the residents (e.g., through appropriate lighting, monitoring system, etc.) considering the perspective of potentially vulnerable groups (e.g., women, minors, minorities, etc.). 								
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Digital measurement of pollution in the port, sudden rise of water level, dramatic change of water temperature to take immediate actions. • With pollution measurements at various times of the year, if the limit increases, warning system can be developed. • The reducing discharge of sewage into the sea can be observed through monitoring of water quality. • The number of Blue Flag (Blue Flag is a certification by the Foundation for Environmental Education (FEE) that a beach, marina, or sustainable boating tourism operator meets its standards) beaches of the city can be increased. 								

MAPPING OF RISKS, CHALLENGES	<p>Given that Split is a coastal city with low average elevation, even relatively minor sea level rises could have coastal flooding impacts, especially when combined with the increased intensity of extreme weather. There is also projected increase in Mediterranean cyclones which, together with increasing sea levels, could exacerbate the risk of storm surges and other impacts. Therefore, redevelopment of waterfront areas and implementation of nature based solutions and adaptive measures in the coast areas is required, to make it more adaptable to climate change based on future scenarios for sea-level rise and the hydrological cycle, and guidelines for the management of vulnerable site.</p>		
COSTS	<p>Pre-investment</p> <p>EUR 829,000</p>	<p>CAPEX</p> <p>EUR 37,130,800</p>	<p>OPEX</p> <p>EUR 446,200</p>
COST CALCULATION	<p>The estimated investment costs were indicated on the basis of the city's documents indicated in the data source and Consultant's internal benchmarks.</p> <p>Developing a Comprehensive Coastal Management and Adaptation Plan for Split City is estimated at EUR 150,000. Pre-investment costs represent estimated expenses for design documentation, permits and supervision of the redevelopment of the Žnjan beach area EUR 679,000. Total pre-investment costs amount to EUR 829,000.</p> <p>Capital expenditure related to the redevelopment of Žnjan beach area includes:</p> <ul style="list-style-type: none"> • Construction of garage and parking, • Construction of beach, roads and promenade, • Development of horticulture belt along the promenade or the coast, • Works related to service areas, • Works related to recreational and other spaces, • Works related to sanitary facilities. <p>Total estimated capital expenditure associated with the redevelopment of Žnjan beach area is EUR 35,000,000.</p> <p>The capital expenditure associated with the work on the redevelopment of the waterfront Duilovo Stobreč involves:</p> <ul style="list-style-type: none"> • Installation of lighting on the service road/promenade, • Construction of AB "tub" for horticulture on the south side of the promenade, • Gravel and geotextile for drainage in the AB "bath" and total filling of fertile land for horticulture, • installation of an automatic irrigation system of horticulture, 		

- Purchase of urban equipment (benches and baskets),
- Installation of protective facilities of beach area (2 piers and an underwater threshold).

Total estimated capital expenditure associated with the redevelopment of the waterfront Duilovo Stobreč is EUR 2,130,800.

The estimated annual operational cost of horticulture and phytosanitary care of redeveloped Žnjan beach area was estimated at EUR 446,200.

Estimated savings

The improvement of Žnjan beach will contribute to increased economic activity, an increase in the number of jobs in the city of Split, and a higher quality of life for residents and visitors. The investment is expected to bring a positive net receipt after the 23rd year of operation according to Justification studies for granting the concession on the maritime property for the purpose of construction and economic use of the beach for the area of Žnjan, City of Split.

Data source: Justification studies for granting the concession on the maritime property for the purpose of construction and economic use of the beach for the area of Žnjan, City of Split

FINANCING MECHANISMS / SOURCE

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*
 - C1.6. R1-I3 Strengthening the capacity of the system for resilient and sustainable tourism
2. *Environmental Protection and Energy Efficiency Fund (EPEEF)*
 - Environmental protection
3. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*
 - enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution,
 - fostering the integrated and inclusive social, economic and environmental development, culture, natural heritage, sustainable tourism and security in urban areas.
4. *Just Transition Fund*
 - investments in regeneration and decontamination of brownfield sites, land restoration and including, where necessary, green infrastructure and repurposing projects, considering the ‘polluter pays’ principle.
5. *Local budget*



U3 – GREENING OF THE CITY WITH NATURE-BASED SOLUTIONS

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2030	Capital investment	B1 - Improve system of protection of existing green areas, biodiversity and increase the quality and interconnections of green spaces	Parkovi i nasadi d.o.o.



MEASURES / INVESTMENTS COSTS [EUR]

Strengthening green corridors around the city of Split.	2,908,100
Greening of areas in the city of Split	861,300
Creating 10 pocket parks and revitalization of 5 parks	6,191,600
SUM	9,960,100



TARGETED RESULTS

Number of trees planted	Number of new pocket parks implemented
5,000 pcs.	10 pcs.
Number of parks revitalized	Increase in green areas in the city in m ²
5 pcs.	6,200 m²



MEASURABLE BENEFITS

Estimate emission reduction (tCO₂ per year)
30.35

Job creation potential
25~35

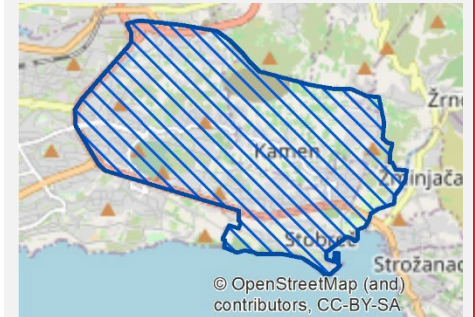


IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Improving the city's microclimate (green areas will reduce the urban heat island effect).
- Improvement of water conditions thanks to the ability of trees to retain water (preventing droughts and floods).
- Climate change mitigation - trees bind CO₂.
- Prevention of habitat fragmentation.
- Increasing of biodiversity.
- Improving the comfort and quality of life of residents.
- Improving the spatial, aesthetic and tourist attractiveness of the city.
- Possibility of reducing noise pollution with green corridors.
- Possibility of reducing local temperatures through increased areas of greenery.



Potential locations for pocket parks

Main stakeholders

City of Split -
City Development
Department

City of Split -
Department for
Communal Affairs

Javna
ustanova
Park-šuma
Marjan

University
of Split

Split
parking
d.o.o.

DESCRIPTION AND SCALE OF ACTION

1. **Development of 10 pocket parks with associated infrastructure in selected areas of the city.**
2. **Revitalisation of 5 parks in selected areas of the city.**

A pocket park is a small-size open space usually located in an urban area surrounded by residential or commercial buildings. It's a place that allows people to engage in activities, relax and socialise. This task will include creating a green area development plan to determine sites where pocket parks can be introduced and what kind of improvements are needed. The next step is to make a site plan with the help of a landscape architect and to prepare project documentation. The application process involves the following actions: planting trees, bushes and other plants, construction of park pedestrian and bike paths, monitoring, water retention solutions (e.g., rain gardens), children's playgrounds, recreations areas, places for street workouts and comfortable and accessible small architecture (benches ensuring accessibility for all, waste bins, lighting, bicycle stands). The pocket parks should be located mainly in the eastern part of the city, to ensure equal access to green and recreational spaces for the citizens.

In addition, it is necessary to create green corridors and ensuring green spaces and natural areas connectivity. Creating an inventory of pedestrian paths within parks and green areas is also planned with the aim of better management, improving the need for maintenance, renovation, expansion, etc.

There are proposals to create green spots in the city: pocket parks and urban gardens around historical city core and on the coastline and green areas in city quarters – including children's and/or sports playgrounds (e.g., outdoor gyms), recreational zones – adjusted for disabled people.

Related action

U1	U2	U3
T4	T5	M1

Parkovi i Nasadi d.o.o. manages the register of green spaces (Cadastre of greenery of the city of Split), and the outcomes of this can be seen on the publicly accessible GIS portal. As a part of this action, there is an expansion of the register of green spaces planned, which will map all of the areas owned by the City, not just those maintained by Parkovi i Nasadi d.o.o. This will provide information on locations where strategic planning may be beneficial, such as potential land purchases for public green spaces like parks, tree lines, woodlands, public gardens, etc.

The aim of parks renovation is to preserve and restore near-natural vegetation in the urbanized area, to increase biodiversity and natural water retention and to provide a public space for recreation and social interaction. Planned actions will include new greenery (planting new trees, shrubs, a meadow), restoration of existing vegetation, construction of an educational path, open-air gym, implementation of new water retention solutions, improving infrastructure for the disabled (removal of architectural barriers - e.g. replacing stairs with a ramp), installation of small architecture elements (e.g. benches, lighting items e.g. lanterns, rubbish bins, flower pots, water ponds, gazebos), installation of a water tanks and a watering systems for the needs of watering during the summer.

4. Planting of 5,000 trees by 2025.

The task is about increasing the green areas in the city with the use of blue-green infrastructure. This green spaces, as important natural habitats, should be more interconnected with each other, thus the green corridors in the city of Split will be strengthened by planting 5,000 trees by 2025 (the continuation of the current practice of Parks and Plantations Ltd., but with the goal to include wider community).

Some of the trees will be planted as part of the implementation of four projects: "For a Green Split," "Renovation of the City of Split's Green Infrastructure," "Urban Forest," and "Green Urban Ecosystem." The remaining trees of the project will be planted in the Marjan Park-Forest (reafforestation with forest saplings), along the Žrnovnica River, within the Turka Kula Park area, and on the Čiovo Peninsula. Planting of trees together with shrubs will also take place along streets and in car parks, children's playgrounds, roofs and facades. These actions will be taken to increase the shaded area and achieve more favorable microclimatic conditions. In addition, this will create future potential for the establishment of a local forest and plant nursery where residents can increase their knowledge and awareness of proper green space management. It is important to ensure that the newly planted tree species will support the ecosystem climate changes adaptation and resilience. The proposal is to connect the greening of the city with the existing parking zones, and to replace every 4th parking space with a tree.

5. Capacity building on good maintenance practice and monitoring of the investment's maintenance.

This part of the action correlates with the planned initiative included in action *UI Development of an environmental management using smart technologies* - "Development of guidelines, standards and procedures for nature-based solutions and green-blue systems implementation in urban planning and public projects for city departments and local companies." The development of this document will be used for further

analysis. A financial analysis related to the maintenance of green spaces in the city should be conducted in order to plan and optimise the financing of green space maintenance in an appropriate way.

There is a need to compile a document with greenery maintenance standards with a scope of works related to the maintenance and care of green areas and the frequency of their performance and the guidelines about: the selection of vegetation depending on the conditions and location of planting; the size and age of plants, tree planting and care, protection and care of plants during construction work, arrangement of unkempt green areas, suppression of invasive species according to international norms.

As part of this task, an entity responsible for conducting inspections of the completed green investments should be an independent body. The inspections will be conducted during and at final acceptance of development works and within the inhabitants' interventions. There will be also tree inspections with the use of specialized equipment like tomography. The results of the inspections will be included in the inspection reports and should be available to the scientific research organisations and all interested parties.

SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
		Development of a landscape study for planting trees (with use of the Cadaster of green areas)							
Development of greenery maintenance standards									
Development of pocket parks (with use of the Cadaster of green areas)									
Planting of 5,000 trees									
Parks revitalization									

ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Strategy for the development of the system of green areas of the city of Split 2017 - 2025 • Marine and Coastal Zone Management Plan of Split Dalmatia County • Development Strategy of the City of Split until 2030 • Climate change adaptation strategy of the Republic of Croatia for the period up to 2040 with a view to 2070
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POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring a balanced participation of all genders in the process of creating green area development plans, site plans and project documentation. • Ensuring equal access for women to green jobs related to development, reconstruction and revitalisation of parks, and capacity building on maintenance and monitoring. • Ensuring principles of universal design are applied in development, reconstruction, and revitalisation of parks. • Ensuring the safe use of the parks and green areas by the residents (e.g., through appropriate lighting, monitoring system, etc.) considering the perspective of potentially vulnerable groups (e.g., women, minors, minorities, etc.). • Increased quality of life and health benefits due to the positive effects of increased green areas, inclusive areas for recreation and social interactions. 							
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • The use of technology (sensors) to monitor new green spaces and the potential to create a database regarding their condition. • Data capture and data sharing on green areas with the use of the GIS platform and other technologies included in another dedicated action. • Integration of captured data and information on the city's open platform. 							
MAPPING OF RISKS, CHALLENGES	<ul style="list-style-type: none"> • Due to global warming, the number of hot days per year and maximum daily temperatures will increase, so the risk of heat stress and related diseases, such as heat stroke, will increase. Increasing the number of parks and additional planting of trees will counteract this phenomenon. On hot days, people and animals will be able to find shelter in the shade of trees. In addition, vegetation will reduce the urban heat island phenomenon and increase air humidity due to transpiration. • Reduced annual rainfall may cause drought and weaken soil permeability. A projected increase in maximum daily rainfall could mean the occurrence of torrential downpours, increasing the risk of flooding. Reduced soil permeability will lead to reduced infiltration, increasing the scale of potential flooding. More trees in the city will reduce the scale of these problems. Trees will improve the quality of the soil, making it more permeable. In addition, trees have a retention function, so they minimize the risk of drought and reduce the scale of flooding. 							
COSTS	<table border="1"> <thead> <tr> <th data-bbox="383 1230 696 1267">Pre-investment</th> <th data-bbox="696 1230 1122 1267">CAPEX</th> <th data-bbox="1122 1230 1675 1267">OPEX</th> </tr> </thead> <tbody> <tr> <td data-bbox="383 1267 696 1318">-</td> <td data-bbox="696 1267 1122 1318">EUR 9,961,000</td> <td data-bbox="1122 1267 1675 1318">EUR 4,183,500</td> </tr> </tbody> </table>	Pre-investment	CAPEX	OPEX	-	EUR 9,961,000	EUR 4,183,500	
Pre-investment	CAPEX	OPEX						
-	EUR 9,961,000	EUR 4,183,500						
<p>The cost of development of 10 pocket parks and revitalize of 5 existing parks has been based on the project Arrangement of an educational park in the Antička luka area included in Development Strategy of the City</p>								

**COST
CALCULATION**

of Split until 2030. The estimated cost rate of a pocket park and park is EUR 413/m². The assumed area of one pocket park is 1,000m². The total estimated cost of creating 15 such parks is EUR 6,191,600.

The estimated cost of greening areas (i.e., creating urban gardens, green corridors) in the city of Split is EUR 861,300.

Implementation of the projects about strengthening green corridors around the city of Split (planting 5,000 trees by 2025) will cost an estimated EUR 2,908,100.

Total capital expenditure was estimated at EUR 9,961,000.

The annual costs of maintaining the green space have been estimated on the basis of the Split city budget for 2022-2024 and amount to EUR 4,183,500. These costs are higher than for the sites identified in the document, due to the need for increased funding to maintain and care for the remaining green spaces in the city (based on the city budget).

Estimated savings

Nature based solutions will prevent future costs that might be incurred to capture carbon and cool the urban heat island effect.

GHG savings:

A carbon sequestration rate for parks of 1.95 kgCO₂/m²/year and 0.21 kgCO₂/tree/year for tree was used to estimate reductions.

Data source: Development Strategy of the City of Split until 2030, Proračun Grada Splita za 2022-2024.

**FINANCING
MECHANISMS /
SOURCE**

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*

- C1.6. R1-I3 Strengthening the capacity of the system for resilient and sustainable tourism

2. *Environmental Protection and Energy Efficiency Fund (EPEEF)*

- Environmental protection

3. *Local budget*

4. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*

- enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution,
- fostering the integrated and inclusive social, economic and environmental development, culture, natural heritage, sustainable tourism and security in urban areas.

5. *Just Transition Fund*

- investments in regeneration and decontamination of brownfield sites, land restoration and including, where necessary, green infrastructure and repurposing projects, considering the ‘polluter pays’ principle.



U4 – INTERCONNECTED SYSTEM OF LOCAL GREEN MARKETS

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2030	Capital investment	B1 – Improve system of protection of existing green areas, biodiversity and increase the quality and interconnections of green spaces	Parkovi i nasadi d.o.o.



MEASURES / INVESTMENTS COSTS (CAPEX) [EUR]

Preparing technical and design documentation of markets refurbishment	797,000
Markets refurbishment and new markets construction	26,560,000
Setting up food exchange waste prevention points	120,300
SUM	27,477,300



TARGETED RESULTS

Number of revitalised markets	7 pcs.
Number of new markets	3 pcs.



MEASURABLE BENEFITS

Estimate emission reduction (tCO₂ per year)

122.25

Job creation potential

23~55



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Overall increase in biodiversity. Green roofs attract birds and insects.
- Better availability of fresh food and other products in every settlement.
- More benches and public toilets.
- Support for local food producers.
- Promoting a healthy diet, high-quality lifestyle and social interaction.
- Food waste prevention.

DESCRIPTION AND SCALE OF ACTION

1. **Revitalisation and construction of markets** The market network of the city of Split is a public infrastructure for the supply of citizens with healthy food, social cohesion, urban regeneration and support for small businesses in agriculture, trade and services.

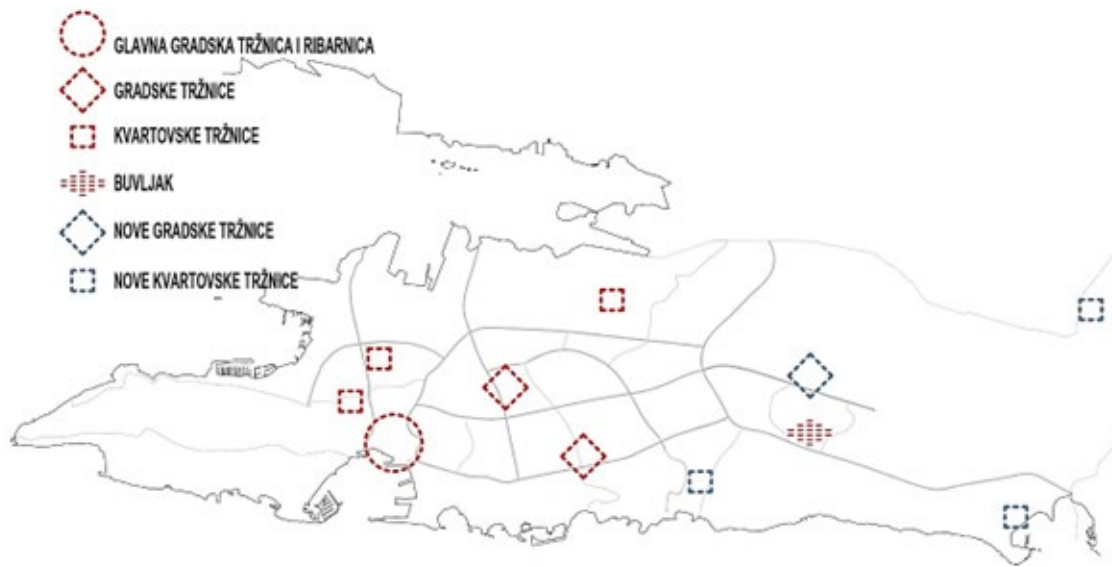
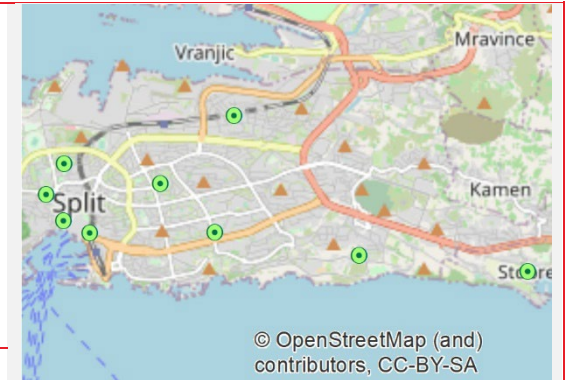


Figure 1 Localization of existing and new markets



Locations where markets will be revitalised

Main stakeholders

City of Split -
City
Development
Department

City of Split -
Department for
Communal
Affairs

Related actions

U1

U2

U3

E2

	<p>The city needs to develop a system of city markets to raise the quality of public spaces, improve living conditions for residents and facilitate the availability of products and fresh food in every settlement. “Smart solutions” like digital platform, could be a useful tool for coordinating these types of actions. Markets within the historical centre of Split need revitalising in a sustainable way. This key project is focused on improving the quality of the environment and climate resistance, through the shading and protection of public spaces with tall trees and canopies that control the temperature in the urban space. Key markets are Pazar (16,352 m²), Peškarija (1000 m²), Plokite (5,056 m²), Split-3 (3,835 m²), Stari plac (937 m²), Skalice (1,792m²), Brda (1,080m²).</p> <p>The restoration needs to come after careful re-design and consideration of the type of market, type of sales points and arrangement of pedestrian routes around the market as well as the preservation of any culturally significant buildings. It should also implement green infrastructure such as: green roof, walls, retention roofs, systems for using precipitation.</p> <p>2. Promotion and support for local food production, processing and trade, by reconstructing markets, it could become multi-purpose spaces, with implementation of retention areas, benches accessible for all, water points, public toilets. It could function as food exchange points to reduce food waste by allowing shops to give people food that would otherwise go out of date in a more sustainable way than simply throwing it away. This could also help relieve some financial burdens.</p>																																																	
SCHEDULE	<p style="text-align: center;">Action implementation steps</p>	<table border="1"> <thead> <tr> <th data-bbox="1173 804 1285 916">2023</th> <th data-bbox="1285 804 1397 916">2024</th> <th data-bbox="1397 804 1509 916">2025</th> <th data-bbox="1509 804 1621 916">2026</th> <th data-bbox="1621 804 1733 916">2027</th> <th data-bbox="1733 804 1845 916">2028</th> <th data-bbox="1845 804 1957 916">2029</th> <th data-bbox="1957 804 2069 916">2030</th> </tr> </thead> <tbody> <tr> <td data-bbox="1173 916 1285 1011"></td> <td data-bbox="1285 916 1397 1011"></td> <td data-bbox="1397 916 1509 1011"></td> <td data-bbox="1509 916 1621 1011"></td> <td data-bbox="1621 916 1733 1011"></td> <td data-bbox="1733 916 1845 1011"></td> <td data-bbox="1845 916 1957 1011"></td> <td data-bbox="1957 916 2069 1011"></td> </tr> <tr> <td data-bbox="1173 1011 1285 1051">Preparation of the architectural competitions and development of project documentation for markets renovation</td> <td data-bbox="1285 1011 1397 1051"></td> <td data-bbox="1397 1011 1509 1051"></td> <td data-bbox="1509 1011 1621 1051"></td> <td data-bbox="1621 1011 1733 1051"></td> <td data-bbox="1733 1011 1845 1051"></td> <td data-bbox="1845 1011 1957 1051"></td> <td data-bbox="1957 1011 2069 1051"></td> </tr> <tr> <td data-bbox="1173 1051 1285 1091">Renovation and construction of markets</td> <td data-bbox="1285 1051 1397 1091"></td> <td data-bbox="1397 1051 1509 1091"></td> <td data-bbox="1509 1051 1621 1091"></td> <td data-bbox="1621 1051 1733 1091"></td> <td data-bbox="1733 1051 1845 1091"></td> <td data-bbox="1845 1051 1957 1091"></td> <td data-bbox="1957 1051 2069 1091"></td> </tr> <tr> <td data-bbox="1173 1091 1285 1134">Design and analysis of food waste point locations</td> <td data-bbox="1285 1091 1397 1134"></td> <td data-bbox="1397 1091 1509 1134"></td> <td data-bbox="1509 1091 1621 1134"></td> <td data-bbox="1621 1091 1733 1134"></td> <td data-bbox="1733 1091 1845 1134"></td> <td data-bbox="1845 1091 1957 1134"></td> <td data-bbox="1957 1091 2069 1134"></td> </tr> <tr> <td data-bbox="1173 1134 1285 1134">Construction of food waste points</td> <td data-bbox="1285 1134 1397 1134"></td> <td data-bbox="1397 1134 1509 1134"></td> <td data-bbox="1509 1134 1621 1134"></td> <td data-bbox="1621 1134 1733 1134"></td> <td data-bbox="1733 1134 1845 1134"></td> <td data-bbox="1845 1134 1957 1134"></td> <td data-bbox="1957 1134 2069 1134"></td> </tr> </tbody> </table>	2023	2024	2025	2026	2027	2028	2029	2030									Preparation of the architectural competitions and development of project documentation for markets renovation								Renovation and construction of markets								Design and analysis of food waste point locations								Construction of food waste points							
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ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Strategy for the development of the system of green areas of the city of Split 2017 - 2025 • Development strategy of the Split urban agglomeration for the period until the end of 2027 																																																	
POTENTIAL TO DEVELOP INCLUSIVITY AND	<ul style="list-style-type: none"> • Ensuring the inclusiveness of the recruitment process and equal access for women to any new jobs generated (including managerial positions in the newly formed entity for market management). 																																																	

IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring the principles of universal design are applied in the redevelopment of the markets (including public toilets). • Potential to provide sales tables under favourable conditions to vulnerable producers, female-owned small businesses, etc. • Organizing food donation programs for economically vulnerable households. 		
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Smart technology could be used to re-design and manage the market sites in a connected way. • The products that are close to the end of their usage period should be placed in exceptionally low quantities at points where cold chain tracking is also possible in a fast buy, fast consume format, and the participation of restaurants in this chain is ensured for mass and rapid use. 		
MAPPING OF RISKS, CHALLENGES	<ul style="list-style-type: none"> • Due to extreme weather changes, there is a risk of reduced yield of crops, which results in reduced yields, availability, and price of food. Developing the capacity of local markets will balance these risks by increasing availability and countering food waste. 		
COSTS	Pre-investment	CAPEX	OPEX
	EUR 797,000	EUR 26,680,300	EUR 1,061,600
COST CALCULATION	<p>It is recommended that technical documentation and design should be prepared for the indicated locations. The estimated cost of developing the documentation is approximately 3% of capex. For the identified locations this cost will be approximately EUR 797,000.</p> <p>Capital expenditure for market refurbishment includes preparation of architectural competitions for new locations, project-technical documentation, construction and equipping of the following existing markets: Pazar (16,352m²), Peškarija (740 m²), Plokite (5,056 m²), Split-3 (3,835 m²), Stari plac (937 m²), Skalice (1,792m²), Brda (1,080m²), construction of the new markets (Eastern part of the city, Žnjan-Mertojak, Stobreč) and the costs of service areas. The costs have been estimated on the basis of the city's green markets refurbishment project, which consists of the refurbishment of 62,580 m² of markets, for a total of EUR 26,560,000.</p> <p>Capital expenditure for setting up food exchange waste prevention points – EUR 120,300. Total capital expenditure costs are estimated at EUR 26,680,300.</p> <p>Operating costs for the market renovation include equipment renewal and employees to manage the markets – EUR 1,059,800.</p> <p>Operating cost for the food exchange waste prevention points is based of encouraging use – EUR 1,800. Total operating costs are estimated at EUR 1,061,600.</p>		

Estimated savings

Green markets will provide a direct source of income to local farmers, allowing them to make more money by cutting out any middle purchasers or distributors.

The reduction of waste food through food sharing points will reduce food poverty.

GHG savings:

A carbon sequestration rate for parks of 1.95 kgCO₂/m²/year was used to estimate reductions.

Data source: Costs for the reconstruction and redesign of green markets are taken from a study for the City of Split on ‘Economic and investment study of the retail market management model in the City of Split for the period 2021-2030’ by Deloitte. The capital and operational costs to set up and run food exchange points is based on the costs for a similar food bank scheme planned by the Republic of Croatia.

FINANCING MECHANISMS / SOURCE

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*

- C1.5. R1-I1 Construction and equipping of logistics distribution centers for fruits and vegetables
- C1.6. R1-I2 Strengthening sustainability and encouraging the green and digital transition of entrepreneurs in tourism sector

2. *Environmental Protection and Energy Efficiency Fund (EPEEF)*

- Environmental protection

3. *Local budget*

4. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*

- enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution,
- fostering the integrated and inclusive social, economic and environmental development, culture, natural heritage, sustainable tourism and security in urban areas.

5. *Just Transition Fund*

investments in regeneration and decontamination of brownfield sites, land restoration and including, where necessary, green infrastructure and repurposing projects, considering the ‘polluter pays’ principle.



U5 – SUSTAINABLE SPORTS AND RECREATION AREAS IN THE CITY

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2026	Capital investment	C3 - Increase accessibility, inclusivity, safety, resilience and sustainability of the city	City of Split JU Športski objekti – Split HNK Hajduk Split



MEASURES / INVESTMENTS COSTS [EUR]

The project to replace the parquet flooring in the ŠC Gripe Great Hall	235,000
Renovation of the Poljud stadium, Gripe sports centre redevelopment and construction of a new swimming pool in Split	40,000,000
SUM	40,235,000



TARGETED RESULTS

The number of renovated spaces in existing sports centres	The increased number of people using the sports recreation infrastructure
2 pcs.	



MEASURABLE BENEFITS

Job creation potential

20~40



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Improving the city's microclimate (greenery around the new facilities will make it possible to reduce the urban heat island effect).
- Promoting sport and a healthy lifestyle in the community.
- Creating a place that is residents and tourist friendly for active leisure and recreation.

DESCRIPTION AND SCALE OF ACTION

1. Gripe sports centre redevelopment

One of the actions within this task will be the arrangement of the Basketball Club “Split” hall at Gripe. The project envisages the interior design, namely rooms for accommodation units, toilets, office space, club gym, referee's room, fan shop and point of sale. The establishment of the thematic museum of the BC “Split” is also planned. The interior design and cost estimate for the works have been prepared, and the project is in a high phase of readiness.

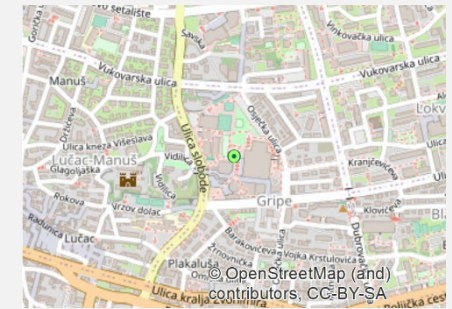
2. Renovation of the Poljud stadium

This task will envisage the renovation of the recreational and sports area that includes football and athletic stadium with additional football pitches, indoor swimming pool and sports centre, marina with rowing club and undeveloped recreational areas. The Poljud sports centre connects Marjan with Turska Kula park. Project documentation and financing is already done for a small part of the park, and it is being prepared for the construction. Renovation of the stadium is a large project with strong media visibility. One of the actions is the renovation of its roof.

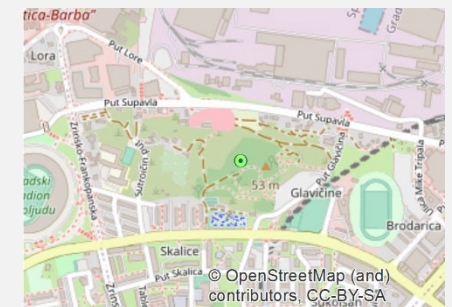
Also planned for the future:

Construction of a multi-sports complex with a swimming pool

- Implementation of the public architectural urban planning competition.
- Preparation of project-technical documentation for the sports infrastructure of the City of Split.
- Revitalization and renovation of the city's sports infrastructure and recreational facilities based on the existing spatial planning documentation.



Gripe sports centre location



Turska Kula location

SCHEDULE	Action implementation steps		2023	2024	2025	2026	2027	2028	2029	2030	
	Gripe sports center renovation										
	Renovation of the Poljud stadium										
	Construction of multi-sport complex with a swimming pool										
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> Development Strategy of the City of Split until 2030 Development Plan of the Split-Dalmatia County 2022-2027 Local Plan for Implementation of Agenda 2030 for Sustainable Development of the City of Split Strategy for the development of the system of green areas of the city of Split 2017 - 2025 					<p>Main stakeholders</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; background-color: #c00000; color: white; padding: 5px; text-align: center;">City of Split</div> <div style="border: 1px solid black; background-color: #c00000; color: white; padding: 5px; text-align: center;">JU Športski objekti</div> </div> <p>Related actions</p> <div style="display: flex; flex-wrap: wrap; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; margin: 2px;">U1</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">U3</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">T2</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">T4</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">E1</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">M2</div> </div>					
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> Ensuring principles of universal design are applied in the development of multi sports complexes (including toilets, garages, etc.). Ensuring the safe use of the sports complexes and areas around them (e.g., through appropriate lighting, monitoring system, alarm system, etc.) considering the perspective of potentially vulnerable groups (e.g., women, minors, etc.). 										
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> Tournaments involving city dwellers to be guided by an online app. Organising online sports competitions among city residents. The city residents who visit sports areas the most and walk the most will receive some services of the City as a bonus. Reporting problems related to the design and use of these areas to the city administration via an online hotline. 										
MAPPING OF RISKS, CHALLENGES	The city faces risks associated with rising temperatures and falling summer precipitation due to projected climate change. Implementation of blue-green infrastructure and water retention solutions will minimize these risks.										
COSTS	Pre-investment		CAPEX			OPEX					
	EUR 235,000		EUR 40,000,000			-					

<p>COST CALCULATION</p>	<p>The project to replace the parquet flooring in the ŠC Gripe Great Hall, costing EUR 235,000 for the works. The capital expenditure associated with the work on Poljud stadium redevelopment, Gripe sports centre redevelopment and construction of a new swimming pool in Split were estimated on the basis of Development Strategy of the City of Split until 2030 and additional information available. The total cost is approximately 40,000,000 EUR.</p> <hr/> <p style="text-align: center;">Estimated savings</p> <hr/> <p>The development of new sports centres and the redevelopment of existing ones will provide new jobs and a source of income to residents, reducing unemployment.</p> <hr/> <p>Data source: City of Split</p>	
<p>FINANCING MECHANISMS / SOURCE</p>	<ol style="list-style-type: none"> 1. <i>EU Recovery and Resilience Facility (RRF) Grants and Funding</i> <ul style="list-style-type: none"> • C1.1.2 R2-I5 Commercialisation of innovation projects • C2.1. R2-I1 Preparation of project technical documentation for green and digital transition projects • C2.3. R3-I16 Digitisation of processes in sports and recreation at the local and regional level • C1.6. R1-I2 Strengthening sustainability and encouraging the green and digital transition of entrepreneurs in tourism sector 2. <i>European Regional Development Fund (ERDF) / Cohesion Fund (CF)</i> <ul style="list-style-type: none"> • enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution, • fostering the integrated and inclusive social, economic and environmental development, culture, natural heritage, sustainable tourism and security in urban areas. 3. <i>Just Transition Fund</i> <ul style="list-style-type: none"> • investments in regeneration and decontamination of brownfield sites, land restoration and including, where necessary, green infrastructure and repurposing projects, considering the ‘polluter pays’ principle. 4. <i>Local budget</i> 5. <i>State budget</i> 	

SECTOR: WATER





V3 - IMPROVEMENT OF WASTEWATER INFRASTRUCTURE

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2028	Capital investment	W1 - Improve water management system	Vodovod i kanalizacija d.o.o.



MEASURES / INVESTMENTS COSTS [EUR]



TARGETED RESULTS

Installation of inverters	16,100	Number of pump inverters installed	Number of flow and water level monitoring units installed
Installation of 20 monitoring points measuring flow and water level	214,100	5	30
Reconstruction of collectors	8,565,200	Number of monitoring units installed on combined sewer overflows	Feasibility study of alternative methods of sludge disposal and utilisation
Geodetic inventory of the network	64,200	20	1
Installation of 30 monitoring points measuring flow and water level and SCADA system	331,900	Length of repaired old pipes	Development of UPOV Stupe
Feasibility study of alternative methods of sludge disposal and utilisation	74,900	25 km	1
Feasibility study and detailed design for decommissioning of UPOV Katalinića Brig and expansion of UPOV Stupe	642,400	Number of objects inventoried geodetically	
Decommissioning of UPOV Katalinića Brig and expansion of UPOV Stupe	32,119,400	2 000	
SUM	42,028,200		



MEASURABLE BENEFITS

Job creation potential

22~50



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Improvement of wastewater treatment.
- Reducing the negative impact on the marine ecosystem.
- Control of wastewater discharged into the sewage system
- Implementation of alternative methods of sludge disposal and utilisation.
- Improving climate change risk adaptation.

DESCRIPTION AND SCALE OF ACTION

Improvement of wastewater infrastructure:

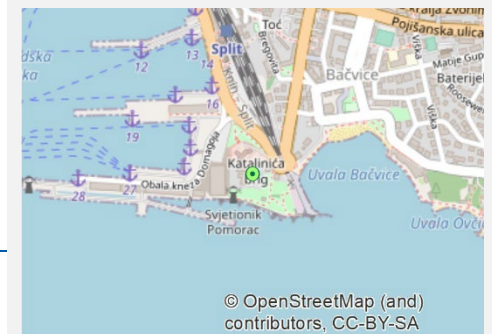
- Monitoring of wastewater infrastructure,
- Modernisation of wastewater infrastructure.

1. Installation of inverters (pump inverter).

Varying the speed of the pump motor significantly reduces energy consumption / costs and allows pumping pressure to be controlled. Installation of inverters at 5 pumping stations was assumed.

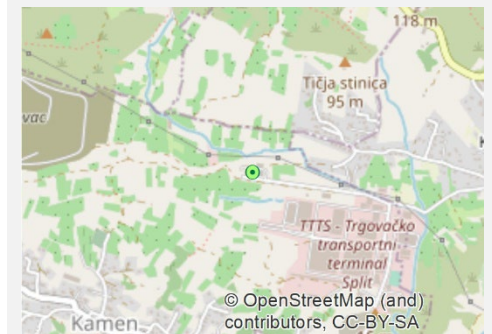
2. Monitoring and control facilities on combined sewer overflows.

The installation of 20 monitoring points measuring flow and water level is assumed. Implementation of monitoring at combined sewer overflows will allow development of solutions to reduce mixed sewage discharges to the sea. Measuring the level of wastewater at the overflow will allow to estimate the dilution of wastewater and verify whether the level of the overflow crest is correct or not. If not, it will be possible to adjust the optimal level of the overflow crest based on the measurements collected previously. This task will therefore have a positive impact on reducing the negative impact on the marine ecosystem.



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UPOV Katalinića Brig location



© OpenStreetMap (and) contributors, CC-BY-SA

UPOV Stupe location

3. Technical condition improvement of the system (repair of old pipes, improvement of network quality).

Currently, the city has approx. 500 km of collectors. Some sections were built many years ago. Their technical condition is poor – they have leaks and cracks. An analysis of the technical condition of the sewerage network showed that approx. 5% of the sewers are in the worst technical condition and need to be replaced. This task therefore assumes the replacement of 25 km of collectors. Replacement of sections of the sewerage network in a poor technical condition reduces the exfiltration of sewage into the soil and groundwater.

4. Geodetic inventory of the network.

In order to manage the infrastructure effectively, it is necessary to have a detailed knowledge of the networks. A geodetic inventory of the networks is also essential for proper planning of network renovations and extensions. It was assumed that a geodetic inventory of 2,000 manholes would be necessary.

5. Installation of flow and water level monitoring units and development of the SCADA systems.

Monitoring on the sewer network allows better management of the network, quicker detection of failures and better planning of repairs and extensions. Monitoring is an essential part of modern sewerage systems. The installation of 30 monitoring points measuring flow and water level is assumed. Currently only a basic SCADA system is in operation. Due to the new monitoring points, it is necessary to upgrade the SCADA system.

6. Feasibility study of alternative methods of sludge disposal and utilisation.

At this stage, the optimal sludge disposal and utilisation method is not known due to insufficient data. A feasibility study needs to be carried out, looking at different sludge utilisation methods, including:

- a) Use for agricultural purposes,
- b) Land rehabilitation,
- c) Thermal application,
- d) Thermal application along with the extraction of phosphorus from the sludge.

In the feasibility study, the various methods of sludge disposal will be analysed from an environmental, technical and economic perspective. For each method, the benefits and difficulties of using it will be described. Based on a comparative analysis, the best option will be identified.

7. Development of UPOV Stupe.

The Split Solin Agglomeration project plans to abolish UPOV Katalinića Brig (122,000 p.e.) in terms of wastewater treatment. Wastewater from UPOV Katalinića Brig will be transported by pressure and gravity

Main stakeholders

Vodovod
i kanalizacija
d.o.o.

City of
Split

University
of Split

Related actions

U1

U2

V5

V7

M4

pipelines over a distance of 8 km to UPOV Stupe. This necessitates the expansion of the Stupe treatment plant from 138,000 p.e. to 275,000 p.e. Currently, only basic mechanical treatment is in operation at this wastewater treatment plant. This type of wastewater treatment does not remove all pollutants and does not comply with EU directives. Mechanical treatment should be considered as pre-treatment of incoming wastewater preparing it for secondary treatment which remove the organic matter present. Details of secondary wastewater treatment technology depends on the pollutants contained in the wastewater, so it is necessary to commission feasibility study and detailed designs. Wastewater treatment technology will be designed to meet the requirements of European Union Directive 91/271/EEC for wastewater treatment plant for more than 100,000 p.e.

The development of UPOV Stupe will have a very positive impact on the marine ecosystem.

This task assumes:

- feasibility study and detailed design for decommissioning of UPOV Katalinića Brig, transfer of wastewater to UPOV Stupe, expansion of UPOV Stupe with selection of technology to meet EU directives
- decommissioning of UPOV Katalinića Brig with the construction of pumping stations, pressure pipelines and gravity sewers and extension of UPOV Stupe to meet EU directives.

SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
		Feasibility study and detailed design for decommissioning of UPOV Katalinića Brig and expansion of UPOV Stupe							
Decommissioning of UPOV Katalinića Brig and expansion of UPOV Stupe									
Development of system of combined sewer overflows as well as necessary monitoring and control facilities									
Geodetic inventory of the network									
Installation of inverters (pump inverter)									
Installation of flow and water level monitoring units and development of the SCADA systems									
Feasibility study of alternative methods of sludge disposal and utilisation									
Technical condition improvement of the system									

ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Development Strategy of the City of Split until 2030 • Local Plan for Implementation of Agenda 2030 for Sustainable Development of the City of Split 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring the inclusiveness of the recruitment process and equal access for women in any new jobs created. • Improved living conditions of the citizens due to shortened time for identification and repairs of failures, affecting the reliability of the sewage network for the residents. 								
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Opportunity to upgrade and feed further the GIS platform of the wastewater system, which would constitute a stable basis towards a digital twin of the system. • Preparation of a digital twin of the wastewater system. • Giving input to the design of the city as a sponge city. 								
MAPPING OF RISKS, CHALLENGES	<ul style="list-style-type: none"> • One of the existing risks to address is the discharge of the wastewater overflow from the Trstenik area directly to the sea. To address this threat, the sewage infrastructure will be modernized, and monitoring will be installed, which will facilitate the management of the municipal sewage system during heavy rainfall. This will prevent untreated sewage from entering ecosystems, making the sea and other waters less vulnerable to eutrophication and its consequences, and reducing the risk of harmful microbes entering the environment. • For the area of Žrnovnica, Sitno Gornje, Sitno Donje, Srinjine there is no wastewater drainage system, and septic tanks are used. Some of these are water-permeable, so the wastewater of these settlements pollutes the local groundwater. Geodetic inventory will help identify areas for proper planning of renovations and network expansion. 								
COSTS	<table border="1"> <tr> <td>Pre-investment</td> </tr> <tr> <td>EUR 717,300</td> </tr> </table>	Pre-investment	EUR 717,300	<table border="1"> <tr> <td>CAPEX</td> </tr> <tr> <td>EUR 41,310,900</td> </tr> </table>	CAPEX	EUR 41,310,900	<table border="1"> <tr> <td>OPEX</td> </tr> <tr> <td>EUR 206,600</td> </tr> </table>	OPEX	EUR 206,600
Pre-investment									
EUR 717,300									
CAPEX									
EUR 41,310,900									
OPEX									
EUR 206,600									
COST CALCULATION	<p>Cost of installing inverters has been estimated based on benchmarking of prices obtained from manufacturers - EUR 16,100.</p> <p>Cost of installation of 20 monitoring points measuring flow and water level on combined sewer overflows has been estimated based on benchmarking of prices obtained from measurement devices manufacturers - EUR 214,100.</p>								

Cost of reconstruction of collectors has been estimated based on similar projects in Europe – EUR 8,565,200.

Cost of geodetic inventory of the network has been estimated on the basis of information obtained from surveying companies – EUR 64,200.

Cost of installation of 30 monitoring points measuring flow and water level and SCADA system has been estimated based on benchmarking of prices obtained from measurement devices and software producers – EUR 331,900.

Cost of feasibility study of alternative methods of sludge disposal and utilisation has been estimated based on other similar studies undertaken by Arup – EUR 74,900.

Cost of feasibility study and detailed designs of development of UPOV Stupe has been established based on similar project undertaken by Arup – EUR 642,400.

Cost of decommissioning of UPOV Katalinića Brig and expansion of UPOV Stupe has been established based on similar projects in Europe – EUR 32,119,400.

Operating costs represent the annual expenditure associated with the operation and maintenance of the built infrastructure (i.e., repairs, maintenance) and the cost of licences and subscriptions for the use of software. In total, this is estimated to be approximately 0.5% of the initial investment outlay – EUR 206,600.

Estimated savings

Installation of pump inverters will reduce energy consumption/cost.

Modernising the wastewater network will reduce future maintenance and repair costs and monitoring will allow any damage to be fixed quickly and cheaply.

The alternative methods for sludge disposal include re-utilisation for agricultural and thermal purposes which will provide low-cost alternatives to products used before. Development of a biological treatment plant in Split will reduce costs of treating water elsewhere.

Data source: Development Strategy of the City of Split until 2030, Projects realized by Arup, benchmarking of prices obtained from manufacturers

FINANCING MECHANISMS / SOURCE

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*
 - C1.3. R1-I1 Program for the development of public wastewater drainage
 - C1.3. R1-I2 Public water supply development program
 - C1.3. R1-I3 Disaster risk reduction program in the water management sector
 - C2.2. R4-I1 Further optimisation and decentralisation of local and regional units self-government through support for functional merger

2. *Environmental Protection and Energy Efficiency Fund (EPEEF)*

- Environmental protection

3. *Local budget*

4. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*

- reaping the benefits of digitisation for citizens, companies, research organisations and public authorities,
- promoting energy efficiency and reducing greenhouse gas emissions,
- promoting climate change adaptation and disaster risk prevention and resilience, considering ecosystem-based approaches,
- promoting access to water and sustainable water management,
- enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.

5. *Just Transition Fund*

- investments in digitalisation, digital innovation and digital connectivity.



V5 - WATER-SENSITIVE URBAN DESIGN (WSUD) IMPLEMENTATION IN PUBLIC AND PRIVATE SPACES

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2027	Capital investment	W1 - Improve water management system	Vodovod i kanalizacija d.o.o.



MEASURES / INVESTMENTS COSTS [EUR]

Feasibility study for retention tanks at all municipal facilities	75,000
Pilot project - Implementation of retention tanks at 10 city-owned facilities	85,700
Retention tank subsidy programme	8,000,000
Feasibility study and technical design for green space using rainwater to water green areas	64,200
Pilot project - green space using rainwater to water green areas	107,100
SUM	8,332,000



TARGETED RESULTS

Retention tanks at city-owned facilities	Area of green space using rainwater to water green areas
10	0,5 ha
Number of domestic rainwater retention tanks installed due to subsidy programmes	
approx. 8,000	



MEASURABLE BENEFITS

Estimate emission reduction (tCO₂ per year)
257.87

Estimated savings (EUR per year)
248,976

Job creation potential
11~25



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Reduction of the costs of maintaining green areas.
- Increased water retention.
- Reducing the risk of the occurred of drought and flood.
- Increasing the aesthetic attractiveness of public spaces.
- Increase adaptation to climate change.

DESCRIPTION AND SCALE OF ACTION

The rainwater drainage infrastructure system in the city of Split is insufficiently capacitated to meet the challenges posed by intense rainfall events in recent years, primarily driven by climate change and more frequent weather-related disasters. In accordance with legal provisions, investments in the reconstruction and construction of the rainwater drainage system are the responsibility of local government units. Therefore, it is imperative for the City of Split to promptly develop an Investment Plan for rainwater drainage infrastructure and initiate significant investments in it, while fully regulating the authority and responsibilities for its maintenance (regular cleaning, preparation for impending weather disasters, etc.). This activity is planned as an initial step in implementing urban design and Water-Sensitive Urban Design (WSUD) projects, laying the groundwork for larger investments.

Water-Sensitive Urban Design (WSUD) implementation:

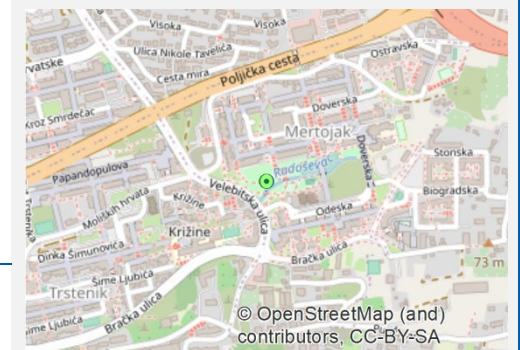
- solutions for the use of the rain/stormwater for green spaces,
- subsidy programs for domestic rainwater retention tanks.

1. Analysis of all municipal facilities regarding retention and management of rainwater for domestic use (a water tank at each school, kindergarten).

A feasibility study will be conducted to identify municipal facilities where the construction of retention tanks is technically and economically justified. Following the feasibility study, 10 city-owned schools and kindergartens will be selected to implement retention tanks as a pilot project.

2. Implementation of subsidy programmes for domestic rainwater retention tanks.

The subsidies will encourage residents to install rainwater retention tanks. This will have a positive impact on the city's resilience to climate change. In addition, the water stored in the retention tanks will be used to water the green spaces, reducing consumption from water supply network. The planned programme



Park Mertojak location

Main stakeholders

Vodovod
i kanalizacija
d.o.o.

City of
Split

University
of Split

Related actions

U1

V3

V7

M4

	<p>would target housing communities and single-family house owners. It is estimated that up to 10% of households and private owners of business space will be subsidised.</p> <p>3. Green space selected for pilot project to implement solutions using rainwater to water green areas.</p> <p>Within this task, traditional green areas will be transformed into multifunctional green infrastructure which provides water treatment, water recirculation, and extra storage. Green area of approximately 0,5 hectare in Park Mertojak have been planned. A feasibility study and technical design will need to be conducted before implementation of the pilot project can begin.</p>								
SCHEDULE	<p style="text-align: center;">Action implementation steps</p>	2023	2024	2025	2026	2027	2028	2029	2030
	Analysis of rainwater tanks at all municipal facilities – feasibility study								
	Pilot project - Implementation of retention tanks at 10 city-owned facilities								
	Implementation of subsidy programmes for domestic rainwater retention tanks								
	Feasibility study and technical design for green space using rainwater to water green areas								
	Pilot project - green space using rainwater to water green areas								
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Development Strategy of the City of Split until 2030 • Local Plan for Implementation of Agenda 2030 for Sustainable Development of the City of Split 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring a balanced participation of all genders in the process of the development of feasibility study for using rainwater for maintaining green areas. • Ensuring the inclusiveness of the recruitment process and equal access for women in any new jobs created. • Reduced costs of the water supply for the households with installed rainwater retention tanks. 								

	<ul style="list-style-type: none"> • Prioritizing vulnerable households when providing subsidies for installing rainwater tanks. 		
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Giving input to the design of the city as a sponge city. • Possibility of reusing rainwater collected in rainwater tanks on a larger scale. 		
MAPPING OF RISKS, CHALLENGES	<ul style="list-style-type: none"> • The risk of floods has increased in recent years due to growing urbanisation and change in the natural water runoff. The risk of flood in the city is also connected to climate change, which projects an increase of extreme heavy rainfalls. In order to prevent flooding, small water reservoirs will be built to perform retention functions. Blue-green infrastructure, tree planting and development of green areas will also perform retention functions and improve the quality and permeability of the soil. This will reduce the risk of occurrence and potential effects of floods and droughts. 		
COSTS	Pre-investment	CAPEX	OPEX
	EUR 139,200	EUR 8,192,800	EUR 9,600
COST CALCULATION	<p>The cost of the feasibility study for retention tanks at all city facilities has been estimated based on previous experience and other similar studies undertaken by Arup – EUR 75,000.</p> <p>The cost of implementation of retention tanks for 10 city-owned facilities has been estimated based on similar projects realized by Arup – EUR 85,700.</p> <p>The cost of the retention tank subsidy programme has been estimated assuming a subsidy per household of EUR 1,000 – total cost EUR 8,000,000.</p> <p>The cost of the feasibility study and technical design for green space using rainwater to water green areas has been estimated based on other similar studies undertaken by Arup – EUR 64,200.</p> <p>The cost of constructing green space using rainwater to water green areas has been estimated based on other similar projects in Europe – EUR 107,100</p> <p>The total estimated investment expenditure under this action will be around EUR 8,192,800.</p> <p>Operating costs represent the annual expenditure associated with the operation and maintenance of the built infrastructure on green spaces (i.e., repairs, maintenance). In total, this is estimated to be approximately 5% of the initial outlay – EUR 9,600.</p>		

Estimated savings

The use of collected rainwater for watering green spaces will reduce significantly the drinking water usage for green space irrigation, therefore the water bills will be reduced as well as protecting the water resources that could be utilized for drinking water supply purposes.

GHG savings:

The irrigation area was assumed to be 240 hectares, resulting in a total water demand of 2,736,000 m³ (average irrigation per area of 150 m³/hectares). Electricity consumption for water production was estimated at 0.65 kWh/m³, resulting in a total of 1,778.4 MWh of electricity savings.

Electricity emission intensity was set at 0.145 tCO₂/MWh.

The unit cost of electricity was assumed to be 0.14 EUR/kWh.

Data source: Projects realized by Arup

FINANCING MECHANISMS / SOURCE

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*
 - C1.3. R1-I2 Public water supply development program
 - C1.3. R1-I3 Disaster risk reduction program in the water management sector
2. *Environmental Protection and Energy Efficiency Fund (EPEEF)*
 - Environmental protection
3. *Local budget*
4. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*
 - promoting climate change adaptation and disaster risk prevention and resilience, considering ecosystem-based approaches,
 - promoting access to water and sustainable water management,
 - enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution.



V7 - IMPROVING AND MONITORING OF WATER SUPPLY SYSTEM ENERGY EFFICIENCY

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2027	Capital investment	W1 - Improve water management system	Vodovod i kanalizacija d.o.o.



MEASURES / INVESTMENTS COSTS [EUR]

50 monitoring points and SCADA system	511,800
Reconstruction and rehabilitation of water supply pipelines in the City of Split	1,859,300
Rehabilitation and restoration of Diocletian's aqueduct in Mostine	557,800
Construction of hydrotechnical tunnel	50,000,000
Replacing meters with smart ones	513,900
SUM	53,442,800



TARGETED RESULTS

Number of flow and pressure monitors installed	50	Number of smart meters installed	approx. 8 000
Length of reconstructed and rehabilitated pipelines in the City of Split	7 km	Construction of hydrotechnical tunnel	1
Rehabilitation and restoration of Diocletian's aqueduct in Mostine	1		



MEASURABLE BENEFITS

Estimate emission reduction (tCO₂ per year)

0.41

Estimated savings (EUR per year)

393.12

Job creation potential

3~15



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS

6 CLEAN WATER AND SANITATION



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE



11 SUSTAINABLE CITIES AND COMMUNITIES



12 RESPONSIBLE CONSUMPTION AND PRODUCTION



ACTION BENEFITS

- Limiting water losses.
- Energy-saving water treatment, storage and distribution of water.
- Less energy consumption.
- Effective, smart and accurate monitoring systems of water consumption.
- Improving water and wastewater management.

DESCRIPTION AND SCALE OF ACTION

Improvement of water supply infrastructure:

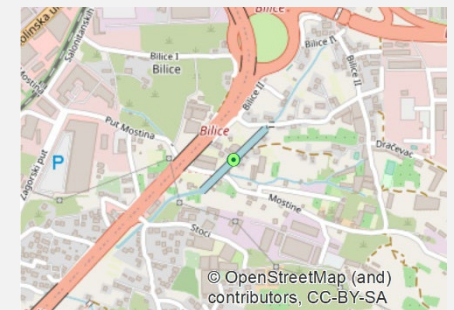
- energy efficiency improvement
- elimination of losses and proper network maintenance

1. Leakage elimination: monitoring, control and elimination of leaks, flow and pressure monitors, point detection with RF technology and SCADA

Monitoring on the water supply network allows better management of the network, quicker detection of failures, cost reduction and better planning of repairs and extensions. Monitoring is an essential part of modern water supply systems. The installation of 50 monitoring points measuring flow and pressure is assumed. The monitors will be connected to a SCADA system that will collect and archive measurements.

The task also involves reconstructing sections of the water supply network that have already been identified as having leaks:

- Water supply system of the City of Split - Reconstruction and extension. Reconstruction and rehabilitation of water supply pipelines in the City of Split for which a building permit was obtained within the Project for Improving Water and Communal Infrastructure of the Split-Solin



Diocletian's aqueduct in Mostine location

Main stakeholders

Vodovod i kanalizacija d.o.o.

City of Split

University of Split

Agglomeration. The project plans 7 km long pipelines in the following streets: Vatroslav Lisinski, Hatze Park, Obala kneza Branimira, Šetalište Bačvice, Palmina, Njegoševa, Bregovita, Marasovićeva and Bakotićeva streets, Šetalište Ivana Meštrovića, obala kneza Domagoja. The goal of the project is to improve the water supply system by increasing flow, pressure and reducing losses.

- Rehabilitation and restoration of Diocletian's aqueduct in Mostine. The goal is the rehabilitation of the aqueduct as a monument of zero category and as a water structure which to this day brings the water of the Jadro spring to the city of Split. A detailed survey and study of the existing condition revealed an extremely poor condition in the form of cracks, fractures, and separation of stone parts from the whole, which makes the building potentially dangerous to the environment. The task involves detailed design, obtaining building permit and then construction.

2. Construction of hydrotechnical tunnel with connecting water supply pipeline Jadro-Ravne njive.

The hydrotechnical tunnel starts at 0+000.00 in the area of Majdan in Solin. The tunnel ends in the immediate vicinity of the Ravne njiva pumping station. The station at the end of the tunnel is 3+993.59. The basic task of the tunnel is to enable the installation and normal functioning of two water pipes DN1200 mm. The hydrotechnical tunnel will also allow water supply connection between the water supply hydrotechnical tunnel "Izvor Jadra - CS Ravne njive" and the hydrotechnical sewage tunnel Stupe. For this purpose, a connecting tunnel between these two tunnels was designed. The connecting tunnel starts on the left side of the water supply tunnel "Izvor Jadra - CS Ravne njive" at 2+531,785 and ends on the right side of the Stupe sewage tunnel at 0+566,890. The length of the connecting tunnel is 50.58 m. A DN700 mm water pipe will be installed in the connecting tunnel.

3. Smart metering: Replacing meters with smart and time-consumption sensitive ones and remote monitoring (In industrial facilities that consume a lot of water, meter conversion should be a priority).

Users of the water supply network are billed on the basis of water meter measurements. Old water meters can under-measure. Consumed water that has not been metered is an economic loss for the water company. There are around 80,000 connections to the water supply network. Replacing all water meters will therefore be costly and time-consuming. It was assumed that 10% of all water meters (8000) would be replaced within 5 years (1500-2000 each year).

Related actions

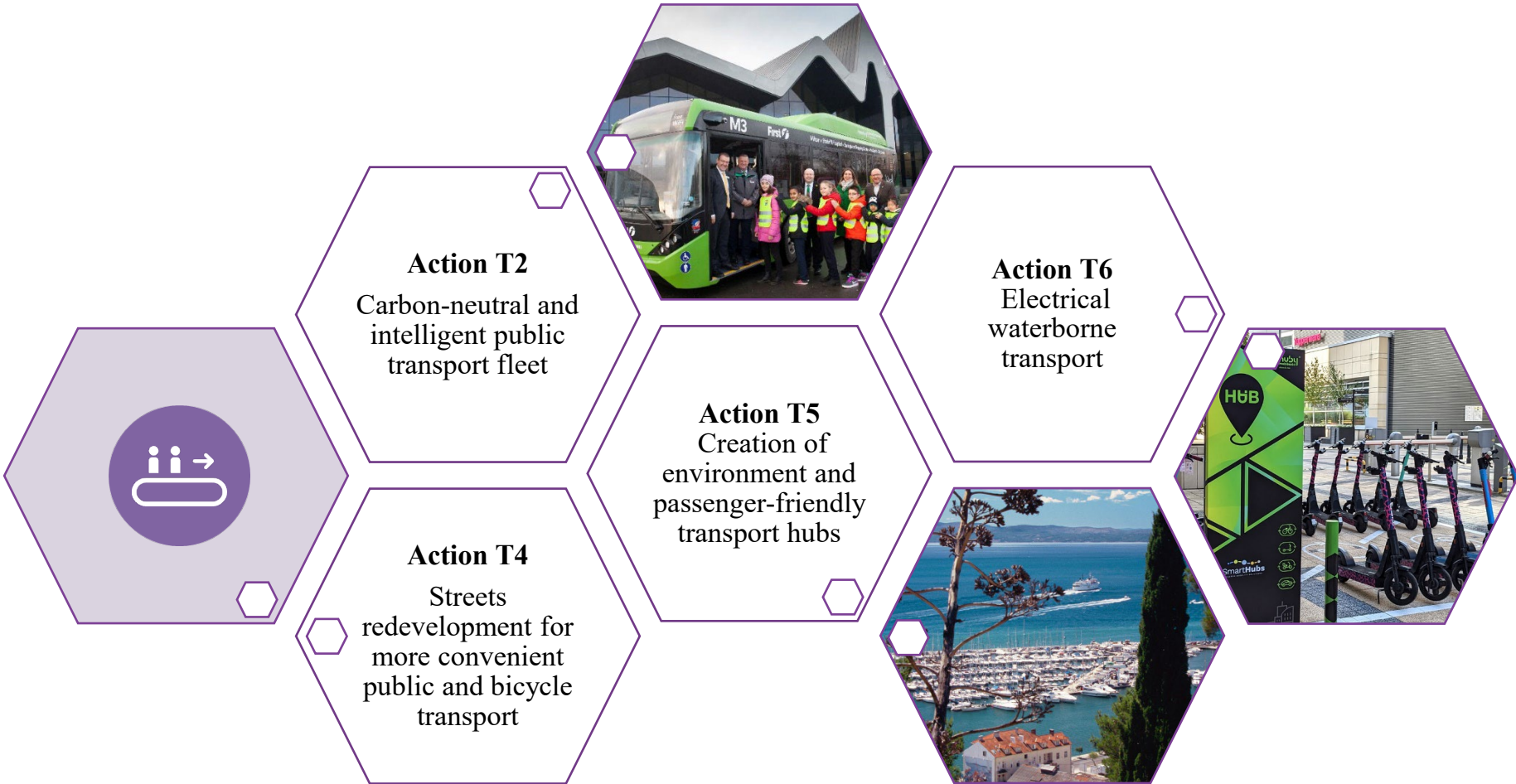
U1	V5
V7	M4

SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
	Installation of monitoring points and implementation of SCADA system								
	Water supply system of the City of Split - Reconstruction and extension								
	Rehabilitation and restoration of Diocletian's aqueduct in Mostine								
	Construction of hydrotechnical tunnel								
	Replacing water meters								
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Development Strategy of the City of Split until 2030 • Local Plan for Implementation of Agenda 2030 for Sustainable Development of the City of Split 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring the inclusiveness of the recruitment process and equal access for women in any new jobs created. • Improved living conditions of the citizens due to shortened time for identification and repairs of failures, affecting the reliability of the water supply network for the residents, as well as reducing the costs. 								
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Opportunity to upgrade and feed further the GIS platform of the water supply and distribution system, which would constitute a stable basis towards a digital twin of the system. • Preparation of a digital twin of the water supply and distribution system. • Giving input to the design of the city as a sponge city. • Preparation of rainwater weirs ready for the reuse of the city. • Use of flow and pressure monitors and SCADA system to minimise loss and leakage rates on the city water network. • Upgrade SCADA system to be input digital twin of the city. • Minimising operational costs by remote meter reading. • Increasing water savings by allowing city dwellers to observe their own usage via online platform. 								

	<ul style="list-style-type: none"> Encouraging the use of water faucets of individual users with the use of water saving apparatus to be attached to the tap faucets in order to increase water saving. 		
MAPPING OF RISKS, CHALLENGES	<ul style="list-style-type: none"> The water supply system is under stress due to water losses in the main water supply network. Water losses in the water supply network will be limited by its modernisation and sealing. Effective monitoring with the use of modern technologies, RF technology and SCADA, will enable quick response to water losses and their prevention by liquidation of leaks. 		
COSTS	Pre-investment	CAPEX	OPEX
	-	EUR 53,442,800	EUR 267,200
COST CALCULATION	<p>Cost of 50 monitoring points and SCADA system has been estimated based on benchmarking of prices obtained from measurement devices and software producers - EUR 511,800.</p> <p>Cost for reconstruction and rehabilitation of water supply pipelines in the City of Split and rehabilitation and restoration of Diocletian's aqueduct in Mostine has been estimated based on Development Strategy of the City of Split until 2030:</p> <ul style="list-style-type: none"> Reconstruction and rehabilitation of water supply pipelines in the City of Split – EUR 1,859,300. Rehabilitation and restoration of Diocletian's aqueduct in Mostine – EUR 557,800. <p>Cost of hydrotechnical tunnel with connecting water supply pipeline Jadro-Ravne njive – EUR 50,000,000.</p> <p>Cost of replacing meters with smart ones has been estimated based on a benchmarking of prices obtained from water meter producers – EUR 513,900.</p> <p>The total estimated investment expenditure under this action will be around EUR 53,442,800.</p> <p>Operating costs represent the annual expenditure associated with the operation and maintenance of the built infrastructure (i.e., repairs, maintenance and network flushing water) and the cost of licences and subscriptions for the use of software. In total, this is estimated to be approximately 0.5% of the initial investment outlay – EUR 267,200.</p>		
	Estimated savings		
	<p>Monitoring the water system will prevent leakages form developing therefore reducing money lost due to loss of water and enable early detection. Any damage or need for repairs will also be detected earlier so it can be fixed before developing into larger, more costly problems. It is estimated that the implementation of monitoring on the water supply network will reduce water losses by approx.. 4,300 m³/year.</p> <p>Previously unmetered water will be able to be charged for and smart meters will ensure that it is not under-metered.</p>		

	<p>GHG savings: The total number of failures is estimated at 360 per year (1 per km of water mains). Average failure detection time with and without monitoring adopted at 12 and 2 hours respectively. Average time to remove failure 4 hours. Flow through failure: 20 l/min. In total, water savings due to early detection were estimated at 4,320 m³, leading to energy savings (avoided water production) of 2.81 MWh. Electricity emission intensity was set at 0.145 tCO₂/MWh. The unit cost of electricity was assumed to be 0.14 EUR/kWh.</p> <hr/> <p>Data source: Development Strategy of the City of Split until 2030, Projects realized by Arup, benchmarking of prices obtained from manufacturers</p>	
<p>FINANCING MECHANISMS / SOURCE</p>	<ol style="list-style-type: none"> 1. <i>EU Recovery and Resilience Facility (RRF) Grants and Funding</i> <ul style="list-style-type: none"> • C1.3. R1-I1 Program for the development of public wastewater drainage • C1.3. R1-I2 Public water supply development program • C1.3. R1-I3 Disaster risk reduction program in the water management sector • C2.2. R4-I1 Further optimisation and decentralisation of local and regional units self-government through support for functional merger • C2.3. R4-I2 Construction of passive electronic communication infrastructure 2. <i>Environmental Protection and Energy Efficiency Fund (EPEEF)</i> <ul style="list-style-type: none"> • Environmental protection 3. <i>Local budget</i> 4. <i>European Regional Development Fund (ERDF) / Cohesion Fund (CF)</i> <ul style="list-style-type: none"> • reaping the benefits of digitisation for citizens, companies, research organisations and public authorities, • enhancing digital connectivity, • promoting energy efficiency and reducing greenhouse gas emissions, • promoting climate change adaptation and disaster risk prevention and resilience, considering ecosystem-based approaches, • promoting access to water and sustainable water management, • enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution. 5. <i>Just Transition Fund</i> <ul style="list-style-type: none"> • investments in digitalisation, digital innovation and digital connectivity. 	

SECTOR: TRANSPORT





T2 CARBON-NEUTRAL AND INTELLIGENT PUBLIC TRANSPORT FLEET

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2030	Capital investment	TR1 - Develop a transport system based on sustainable mobility, with the provision of affordable and sustainable mobility options for people	Promet d.o.o., Split



MEASURES / INVESTMENTS COSTS [EUR]

Project and technical documentation for Garage Dračevac	1,062,500
Purchase of 25 new electric buses with auxiliary infrastructure (charging station)	14,905,800
Purchase and install a video surveillance system in new and remaining buses (approx.. 200 buses)	1,062,500
Purchase and install 50 information solar-boards at bus stops in the city	415,000
Building a „Garage-service center of PROMET d.o.o.“ in Dračevac	66,404,300
SUM	83,850,100



TARGETED RESULTS

New electric buses	Video surveillance system
25 buses	200 buses
Real-time passenger information boards	Capacity of the underground garages
At 50 bus stops	190 new places for buses



MEASURABLE BENEFITS

Estimate emission reduction (tCO₂ per year)

1,892

Job creation potential

37~80

Estimated savings (EUR per year)

239,000



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Improving quality and accessibility of public spaces, increasing personal safety in public transport.
- New fleet of public transport will reduce the harmful impact on the environment due to the outdated buses. The new fleet will increase the availability and comfort of public transport services for all citizens, ensure city sustainable development and reduce the harmful impact on the environment because of the release of excessive amounts of CO₂, HC, NO_x, PM and reduce vehicle maintenance costs.
- Reduced air pollution - an electric bus produces 62% less air pollution than the average diesel bus.
- Reduced noise pollution compared to the diesel engines of buses.
- Increased in the number of travelers using public transport.
- Decrease in the number of private cars moving around the city.
- Increasing the role of public transport and low- and zero-emission mobility measures, including shared mobility and reducing the use of passenger cars.
- Creating favorable conditions for interchanging between different types of transport.



(Promet d.o.o., Split buses, source: <https://www.sustainable-bus.com/>)

DESCRIPTION AND SCALE OF ACTION

1. Purchase of new 25 electric buses with installation of electric vehicle charging stations.

Currently there is only one electric bus in the city, all others are diesel powered. Providing a sustainable and quality transport service to citizens in the City of Split through the procurement of 25 new electric buses with installation of electric vehicle charging stations at the location of the existing headquarters at Hercegovska ulica 20 on the bus parking plateau and at the location of the future Garage Service Center Promet d.o.o. in Dračevac. The new buses will expand the current fleet and increase accessibility and convenience for residents and tourists. The new buses will increase the availability and comfort of public transport services for all

citizens, reduce the harmful impact on the environment because of the release of excessive amounts of CO₂, HC, NO_x, PM, reducing vehicle maintenance costs, increasing personal safety in public transport and reducing noise.

In addition, it is recommended to implement a video surveillance system in new and remaining 200 buses. The goal is to ensure the safety of passengers and buses, i.e., to prevent vandalism and control the behaviour of drivers and passengers, while reducing the number of false reports, etc.

2. An increase in the number of boards set up to inform passengers in real time (GPS system with buses).

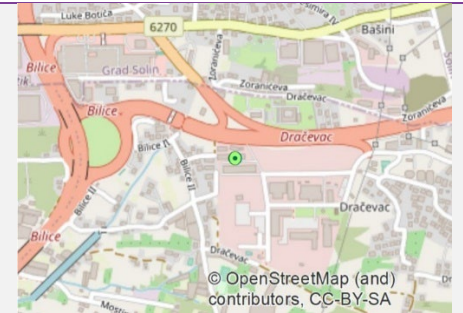
An increase in the number of boards set up to inform passengers in real time (GPS system with buses) for 50 bus stops. The action is already in action, but it can still be expanded. The information boards will be equipped with small solar installations that will allow to power supply with the necessary electrical energy to operate.

It is important to ensure that the system is available in multiple foreign languages to facilitate travel for tourists and includes audio information to help visually impaired people find their way around the network independently.

3. Building a „Bus depot for public transport of PROMET d.o.o.“ in Dračevac

Creation of project and technical documentation for a bus depot - service center Dračevac hub. Comprehensive construction of the planned facility (two underground floors with a total usable area of approximately 35,000 m² will be used for parking buses). This action will optimise public transport traffic in the city and create additional opportunities for convenient transfers for travelling residents and tourists.

The total capacity of the underground garages is planned to accommodate over 190 buses and other vehicles. In addition to the entrance, at zero level there is space for traffic offices, a station for technical inspection, service for inspection and minor repairs of vehicles, paint shops, special workshops for buses and space for management and other employees. The sustainability of the project will be achieved as it will be created as an energy-independent islands. These energy islands could comprise photovoltaic panels (car park roofs), energy storage, electric car charging stations or energy management systems. The depot will be also the hub for charging the electric busses for the city. The buses will be charged from renewable energy acquired by the PV installation in the facility.



Dračevac location



(Project of new Promet investment in Garage service center, source: “Garage-service center of PROMET d.o.o.” in Dračevac)



Hercegovačka 20 street

SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
	Purchase of new 25 electric buses with installation of electric vehicle charging stations								
	Installation of real-time timetable passenger information boards								
	Building a „Garage-service center of PROMET d.o.o.“ in Dračevac								
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Feasibility study for introduction project of intelligent transport system in the city's functional traffic area Split • Sustainable urban mobility plan of the City of Split until 2030 • Development Strategy of the City of Split until 2030 • Development Plan of the Split-Dalmatia County 2022-2027 	<p style="text-align: center;">Main stakeholders</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; background-color: #4a4a8a; color: white; padding: 5px; text-align: center;">Promet Split d.o.o.</div> <div style="border: 1px solid black; background-color: #4a4a8a; color: white; padding: 5px; text-align: center;">Grad Split – Department for Communal Affairs</div> </div> <div style="display: flex; justify-content: center; align-items: center; margin: 10px 0;"> <div style="border: 1px solid black; background-color: #4a4a8a; color: white; padding: 5px; text-align: center;">Grad Split- Urban Planning and Construction Department</div> </div> <p style="text-align: center;">Related actions</p> <div style="display: flex; flex-wrap: wrap; justify-content: center; gap: 10px;"> <div style="border: 1px solid black; padding: 5px; margin: 2px;">U1</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">U2</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">T4</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">T5</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">M1</div> <div style="border: 1px solid black; padding: 5px; margin: 2px;">M2</div> </div>							
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring a balanced participation of all genders in the process of the development of feasibility study for urban waterborne public transport. • Ensuring that the buses are procured considering universal design and accessibility needs of all passengers, and especially the elderly, people with young children, persons with disabilities, passengers with luggage, etc. (e.g., low-floor vehicles). • Ensuring that the mobile app “Travel planning” and information boards will provide information to travelers includes audio features, to help visually impaired people find their way around the network independently, as well as information in multiple foreign languages. • Increased passengers’ safety due to video surveillance systems installed in buses, particularly for potentially vulnerable groups (e.g., women, minors, minorities, etc.). • Ensuring that the principles of universal design are applied in developing urban waterborne public transport. • Potential to use some of the procured buses to improve the coverage of night time public transport. 								


<p>POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES</p>	<ul style="list-style-type: none"> • The presented solutions will also be compatible and complementary to the ITS system presented in another dedicated action (i.e., prioritisation of public transport in road traffic). • The development of the public transport infrastructure will enable the introduction of an integrated application facilitating travel around the city by public transport. Further development of a travel planning application to encourage residents to use public transport. The app could provide real-time information on which connections to choose to make the journey the most efficient for travelers. Additionally, the app could include functionality related to the purchase of tickets. 							
<p>MAPPING OF RISKS, CHALLENGES</p>	<p>PM pollution in the city is most likely due to the high proportion of diesel cars, traffic congestion, lack of parking space and popularity of use of private cars are the biggest problems in the city. By constructing buildings with a garage service and implementing low-emission vehicles, the action can reduce these pressures and meet all the needs of Promet d.o.o., Split One solution would be to make public transport more attractive and thus reduce the pressure from private cars.</p> <p>Preparing the city for the grid infrastructure required for the use of e-vehicles, thus accelerating the transformation for the widespread use of e-vehicles throughout the city.</p>							
<p>COSTS</p>	<table border="1"> <thead> <tr> <th data-bbox="376 718 810 758">Pre-investment</th> <th data-bbox="810 718 1245 758">CAPEX</th> <th data-bbox="1245 718 1675 758">OPEX</th> </tr> </thead> <tbody> <tr> <td data-bbox="376 758 810 805">EUR 1,062,500</td> <td data-bbox="810 758 1245 805">EUR 82,787,600</td> <td data-bbox="1245 758 1675 805">EUR 608,100</td> </tr> </tbody> </table>	Pre-investment	CAPEX	OPEX	EUR 1,062,500	EUR 82,787,600	EUR 608,100	
Pre-investment	CAPEX	OPEX						
EUR 1,062,500	EUR 82,787,600	EUR 608,100						
<p>COST CALCULATION</p>	<p>Pre-investment costs are related to expenses that need to be incurred for the creation of project and technical documentation for Garage Dračevac – EUR 1,062,500.</p> <p>Capital expenditure has been estimated based on the Development Strategy of the City of Split until 2030 and Idejnog tehničkog rješenja elektrifikacije javnog autobusnog prijevoza. The costs associated with the purchase of 25 new electric buses and auxiliary infrastructure (charging station) amount to EUR 14,905,800.</p> <p>In addition, the action plans to purchase and install a video surveillance system in all buses (approx. 200 buses) – EUR 1,062,500.</p> <p>To enhance the public transport infrastructure, it is also planned to purchase and install 50 information solar-boards at bus stops in the city – EUR 415,000.</p> <p>However, the largest investment will be the building of a "Garage-service centre of PROMET d.o.o." in Dračevac – EUR 66,404,300.</p> <p>The total estimated investment expenditure under this action will be around EUR 82,787,600.</p>							


	<p>The estimated operating costs are related to the cost of purchasing electricity for the new 25 electric buses. Costs are estimated based on Idejnog tehničkog rješenja elektrifikacije javnog autobusnog prijevoza and the average price of electricity from 2022. The estimated operating cost is approximately EUR 608,100.</p> <hr/> <p style="text-align: center;">Estimated savings</p> <hr/> <p>Photovoltaic power plant will alleviate the cost of the electricity.</p> <p>Converting bus fleets to electric will provide a low-cost fuel alternative to carbon-intensive fuels which may be more expensive in the future. It is also expected that they will have a lower maintenance cost associated with them. The planned savings of electric buses compared to diesel fuel will amount to around EUR 239,000 yearly.</p> <p>GHG savings: Taking into account the average distance traveled, the estimated reduction in CO₂ emissions was approx. 1,892 tons yearly.</p> <hr/> <p>Data source: Nova Garaža Prometa - Idejno rješenje - available plans and documents, Development Strategy of the City of Split until 2030, Idejnog tehničkog rješenja elektrifikacije javnog autobusnog prijevoza</p>	
<p>FINANCING MECHANISMS / SOURCE</p>	<ol style="list-style-type: none"> 1. <i>EU Recovery and Resilience Facility (RRF) Grants and Funding</i> <ul style="list-style-type: none"> • C1.4. R4-I1 Procurement of alternative-fuel powered vehicles for public urban and suburban regular transport • C1.4. R5-I2 - Research, development and production of new mobility vehicles and supporting infrastructure • C1.4. R5-I3 Co-financing programme for the purchase of new alternative fuel vehicles and the development of alternative fuel infrastructures in road transport 2. <i>European Regional Development Fund (ERDF) / Cohesion Fund (CF)</i> <ul style="list-style-type: none"> • reaping the benefits of digitisation for citizens, companies, research organisations and public authorities, • promoting sustainable multimodal urban mobility, as part of transition to a net zero carbon economy, 3. <i>Just Transition Fund</i> <ul style="list-style-type: none"> • investments in digitalisation, digital innovation and digital connectivity, • investments in smart and sustainable local mobility, including decarbonisation of the local transport sector and its infrastructure. 4. <i>Local budget</i> 	



T4 STREETS REDEVELOPMENT FOR MORE CONVINENT PUBLIC AND BICYCLE TRANSPORT

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2026	Capital investment	TR1 - Develop a transport system based on sustainable mobility, with the provision of affordable and sustainable mobility options for people	City of Split Split parking d.o.o.

 MEASURES / INVESTMENTS COSTS [EUR]	✓ TARGETED RESULTS
Implementation of the Intelligent Transport System	Number of new elements developed within the ITS system pcs.
Creation of 20 km of new cycle lanes within carriageway	New cycle routes 20 km
Purchasing and installing 20 battery charging points	Number of streets/crossroads covered by ITS pcs.
Purchase and installation of 20 green bicycle shelter	New green bicycle shelters 20
SUM	Reduction rates of time spent in traffic %
12,763,900	
2,801,000	
128,500	
130,400	
15,823,800	

 MEASURABLE BENEFITS
Job creation potential
19~50



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Improving the convenience and safety of cycling roads and increasing active mobility, using environmentally friendly means of transport
- Increasing the use of public transport.
- Reduced number of traffic jams (prioritization of public transport, improvement of the parking system)

DESCRIPTION AND SCALE OF ACTION

1. Implementation of an Intelligent Transport System in the city.

This action will be aimed at achieving the objectives of the document “Idejna Studija Uvodenja Inteligentnih Transportnih Sustava u Gradu Splitu”, which sets out, solutions for the city's transport infrastructure, public bicycle transport system, parking, and a system of prioritisation of public and emergency transport.

The implementation of these provisions will make it possible to:

- A full upgrade of the traffic management system based on the existing infrastructure with the possibility of further updating it with newly planned projects in the city.
- Extension of the scope for operating the currently existing urban telecommunications infrastructure, in particular the fibre optic tele transmission network: extension of the existing backbone network and the design and construction of a fibre optic access network to enable electronic communication between the system components installed within the city with the ITS central system, ensuring the transmission of all digital data between these elements, including: camera images, data collected by signal controllers, traveler information, location of public transport means.
- Developing a traffic prioritisation system for buses to speed up public transport, the system will be based on actual public transport traffic data on information about deviations from the assumed timetable.

Main stakeholders

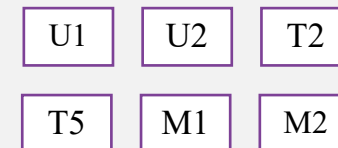
Promet d.o.o., Split

Split parking d.o.o.

Grad Split – Department for Communal Affairs

Grad Split- Urban Planning and Construction Department

Related actions



- Development and implementation of a traffic model for the street network to enable short-term traffic condition prediction and incorporation of this element into the traffic management and traveler information system.
- Connecting this system to other planned projects within the framework of the Study On The Introduction of Intelligent Transport Systems In The city of Split.
- Installing a system of signs (including mobile signs) and changeable content signs that provide vehicle drivers with relevant information (about incidents, hazards, recommended detours, parking).
- Supply and installation of traffic safety system components: video event detection and extension of video surveillance system.

The development of this system will also make it possible to integrate functionality with other applications in the transport sector (display of free parking spaces, information on the traffic situation in the city, etc.).

2. Construction of new pedestrian and cycle routes (cycle paths) – separation of lanes on the road for bicycles. Installation of new charging stations for electric bicycles, bicycle repair and parking stations.

Planning the construction of bicycle and pedestrian paths considering the needs and commuting patterns of residents, enabling them to switch to cycling or mixed mode commuting. The City of Split has developed a study "Izrade analitičke podloge - studije potencijala razvoja biciklističkih prometnica za uspostavu integriranog sustava biciklističkih prometnica na području uas-a" which envisages the construction of more than 627 km of new cycle paths (including the delineation of cycle routes within the carriageway) across the whole urban agglomeration. The entire project is estimated to cost more than EUR 29 million. Within the framework of this document, it is assumed that cycle routes will be created along a total distance of approximately 20 km.

While extending the cycling infrastructure, purchase and installation of bicycle shelters with service stations as well as infrastructure for charging devices and electric vehicles need to be taken into consideration. For this reason, there are plans to build 20 green bicycle shelters with bicycle parking stands, alongside building 20 smaller stationary battery charging points for electric bicycles and scooters. These points would be placed near the proposed newly built green cycle shelters.

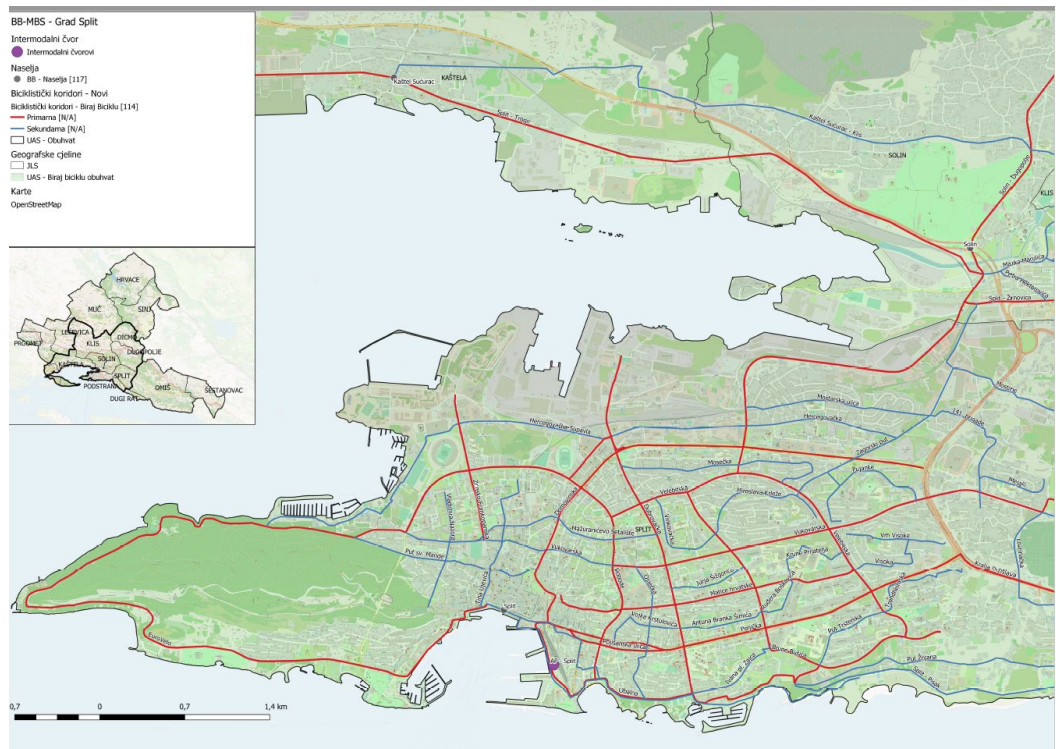


Figure 2 Assumed location of new cycle routes

SCHEDULE

Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
Implementation of the Intelligent Transport System								
Implementation of solutions and technologies enabling the prioritisation of public transport traffic								
Design development of new bus lanes, cycle routes and cycle paths in the city. Marking out their route on the streets.								
Analysis of the location and construction of new cycle paths.								

<p>ENABLING POLICIES, STRATEGIES AND ACTIONS</p>	<ul style="list-style-type: none"> • Feasibility study for introduction project of intelligent transport system in the city's functional traffic area Split • Sustainable urban mobility plan of the City of Split until 2030 • Development Strategy of the City of Split until 2030 • Development Plan of the Split-Dalmatia County 2022-2027 	
<p>POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS</p>	<ul style="list-style-type: none"> • Considering the requirements and rules of safety and universal design in terms of the development of pedestrian and bicycle infrastructure. • Ensuring that the public is consulted on the locations of bicycle parking stations, so they are defined considering the needs and commuting patterns of residents, enabling them to switch to cycling or mixed mode commuting. • Ensuring the safe use of bicycle parking stations (e.g., through appropriate lighting, monitoring system, alarm system, etc.) considering the perspective of potentially vulnerable groups (e.g., women, minors, etc.). • Ensuring that smart parking system separates information on parking spots reserved for persons with disabilities. • Reduced congestions and improved time efficiency of parking due to the smart parking system, as well as reduced travel costs due to reduced fuel consumption. • Increased traffic safety for pedestrians and bicycle users due to the construction of new pedestrian and cycling paths. 	
<p>POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES</p>	<ul style="list-style-type: none"> • Extension and implementation of an open IT platform integrating elements of the ITS system (website or mobile application). • Development of a central application offering these services for guiding parking spaces in the city. • Fully adapted Smart intersection systems in main intersections of the city. • Implementation of an Automated Traffic Management System - prioritization of public transport and public service vehicles etc. 	

MAPPING OF RISKS, CHALLENGES	<p>The most likely adverse event is a transport accident caused by harsh weather (stormy wind / heavy rainfall). This may occur several times a year, particularly in the summer months. The risk associated with them results from local flooding, causing congestion and traffic difficulties, especially in the central parts of the city. The development of solutions within the ITS system can help counteract these difficulties and improve the traffic flow system in the city in the event of hazards.</p>		
COSTS	Pre-investment	CAPEX	OPEX
	-	EUR 15,823,800	EUR 651,000
COST CALCULATION	<p>The capital expenditure for the implementation of the Intelligent Transport System has been estimated on the basis of the Development Strategy of the City of Split until 2030, amounts to EUR 12,763,900.</p> <p>Based on the recommendations and analyses attached to the document "Analitičke podloga - studije potencijala razvoja biciklističkih prometnica za uspostavu integriranog sustava biciklističkih prometnica na području uas-a" the City of Split, in cooperation with the project partners of the Choose a bike!, plans to implement a project to develop cycle routes throughout the urban agglomeration. In Split, the possibility of construction was examined more than 121 km of new cycle paths will be created at a cost of more than EUR 17 million. Due to the limitations of the existing infrastructure, it is not technically possible to build new cycle paths at all the indicated locations, due to the width of the surrounding carriageway. Within the scope of this document and in accordance with the analytical study, it is planned to create 20 km of new cycle tracks within the carriageway (with associated infrastructure). The average cost of such investments according to the analyses has been set at around EUR 140,000 per 1 km. The realisation of 20 km of cycle routes is estimated at around EUR 2,801,000.</p> <p>The cost of purchasing and installing battery charging points in electric vehicles, together with the installation of connections, has been estimated on the basis of public procurement conducted in Gdansk and Warsaw (Poland). The estimated cost of 1 battery charging point is EUR 6,400. It is planned to build 20 such points - EUR 128,500. Whereas the cost of purchase and installation of 1 green bicycle shelter amounts to EUR 6,500. It is planned to build 20 such shelters - EUR 130,400.</p> <p>The total capital expenditure for the indicated investments will amount to approximately EUR 15,823,800.</p> <p>The operating costs of maintaining the battery charging points are estimated to be around 10% of the capital expenditure. Therefore, the total annual operating cost is EUR 12,800. The costs associated with operating the ITS system (staff costs, software licences, equipment maintenance) are estimated at around 5% of Capex per year. The estimated cost will be EUR 638,200. Total operating costs will amount to EUR 651,000.</p>		

Estimated savings

The encouragement of bicycle and public transport use will save residents spending money on personal cars and fuel.

Data source: Development Strategy of the City of Split until 2030, Study On The Introduction of Intelligent Transport Systems In The city of Split, Creation of analytical basis - studies of the development potential of bicycle roads for the establishment of an integrated system of bicycle roads in the area of the Urban Agglomeration of Split, Models and variants of cycling systems – Gdansk, Municipal Road Administration Warsaw, projects implemented by Arup.

FINANCING MECHANISMS / SOURCE

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*

- C1.4. R5-I2 - Research, development and production of new mobility vehicles and supporting infrastructure
- C1.4. R5-I3 Co-financing programme for the purchase of new alternative fuel vehicles and the development of alternative fuel infrastructures in road transport

2. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*

- reaping the benefits of digitisation for citizens, companies, research organisations and public authorities,
- enhancing digital connectivity.
- promoting sustainable multimodal urban mobility, as part of transition to a net zero carbon economy.

3. *Just Transition Fund*

- investments in digitalisation, digital innovation and digital connectivity,
- investments in smart and sustainable local mobility, including decarbonisation of the local transport sector and its infrastructure.

5. *Local budget*



T5 CREATION OF ENVIRONMENT AND PASSENGER-FRIENDLY TRANSPORT HUBS

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2025	Capital investment	TR1 - Develop a transport system based on sustainable mobility, with the provision of affordable and sustainable mobility options for people	Split parking d.o.o. Promet d.o.o., Split



MEASURES / INVESTMENTS COSTS [EUR]

Administrative costs of delimiting the city's clean transport zones and the purchase of appropriate signage	50,000
The implementation of the "System of automatic detection of illegal parking"	677,000
Design and construction of 4 multi micro hubs	4,950,800
Design and construction of 2 car parks P&R	27,000,000
Implementation of a pilot programme for greening a selected car park roof	76,800
SUM	32,754,600



TARGETED RESULTS

New multi and micro-hubs	4	New P&R car and bicycles parks	2
Implementation of clean transport zones	2		



MEASURABLE BENEFITS

Estimate emission reduction (tCO₂ per year)

1,921

Job creation potential

4~20



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Reduction in CO₂ emissions (multi micro hubs - less private car kilometers and greener modes like LEV's and EV's) – 1,281 kg CO₂/year.
- Improving quality and accessibility of public spaces (incl. buildings and transport).
- Increasing the accessibility and convenience of travel around the city for residents and tourists.
- Increase the availability and number of parking spaces for residents and tourists.
- Reduce traffic and the potential for traffic congestion in the central part of the city.

DESCRIPTION AND SCALE OF ACTION

Lack of public transportation and traffic jams are major issues in many tourist destinations. Public transport and alternative mode of travel such as cycling are not very popular in the city. Traffic congestion intensifies in the summer season as a result of tourism. Residents and tourists are having trouble finding a parking space in the city centre. Increasing traffic jams increase local pollution. For this reason, it is necessary to develop P&R parking integrated with other alternative modes of transport outside the city centre. This is aimed at encouraging tourists and residents to leave their cars and conveniently switch to public transport or use the potential of a transport sharing system. This action will be correlated with the other proposed actions by increasing the accessibility of public transport, multimodal hubs and the development of transport sharing.

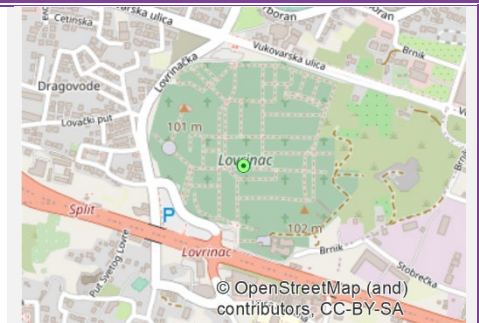
In line with the promotion of new urban mobility policies, it is planned to create conditions for the regulation of "informal" parking along sidewalks and green park areas by constructing new garage and parking facilities in highly urbanized areas of the city. This will, in turn, allow these areas to be reclaimed for pedestrians and cyclists.

1. Building a micro multimodal transport hubs as a pilot project in 3 locations in the city, including associated infrastructure, cycle parking, green infrastructure.

Offering multi and micro-mobility sharing and charging services. The mobility hubs are specially designated and arranged areas, in which various shared mobility vehicles (LEV's - e.g., shared bikes, e-scooters, e-mopeds and EV's - car sharing or other), are made available in a form of short-term rental. Additional infrastructure can be installed, like street furniture or charging stations. The driver picks up and leaves the vehicle at a designated location. The main advantage of such a lease is that users do not have to pay the cost of insurance, registration, and maintenance of the vehicle. Users can search for a vehicle online and usually book online. The fee is generally charged per kilometer travelled as well as the time of use. Fuel, cleaning, insurance, etc. costs are generally included in the rental price.

2. Sustainable P&R car and bicycles parks: pilot projects for 2 locations (Lovrinac, Turska kula).

Implementation of green infrastructure elements on redeveloped transport infrastructure, including green roofs, retention roofs on garages, water retention and green infrastructure redevelopment of concrete parking



Lovrinac location



Kopilica location

Main stakeholders

Promet d.o.o.,
Split

Split
parking
d.o.o.

City of Split –
Department for
Communal Affairs

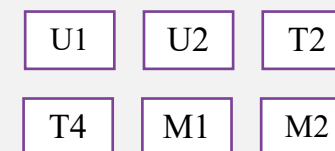
City of Split - City
Development
Department,
Urban Planning
and Construction
Department

spaces, and retention basins. The expansion of car park infrastructure is an opportunity to implement blue-green infrastructure solutions, for which it is also planned to conduct a pilot programme of roof greening and planting of plants around the new car parks.

3. Implementation of rules and buffer zones restricting entering the protected city centre.

The creation of car parks in convenient locations for the city's residents and tourists will make it possible to create special clean transport zones in the city. Increasing the parking facilities outside the city centre and developing public transport as part of other actions will make this historic part of the city more attractive to tourists but will also not pose a challenge to those wishing to visit these places. Increasing the parking base, may also allow the implementation of a system to identify improperly parked cars.

Related actions



SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
		Analysis of suitable locations for the construction of new multi micro hubs and car parks P&R							
Analysis, selection and signage of suitable locations for clean transport zones									
Design and construction of 4 multi micro hubs									
Design and construction of 2 car parks P&R									
Implementation of a pilot programme for greening a selected car park roof									

ENABLING POLICIES, STRATEGIES AND ACTIONS

- Sustainable urban mobility plan of the City of Split until 2030
- Development Strategy of the City of Split until 2030
- Development Plan of the Split-Dalmatia County 2022-2027

POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS

- Ensuring balanced participation of representatives of all genders in the development and implementation of pilot projects and inclusive recruitment processes for any new jobs created.
- Ensuring that the principles of universal design are applied when developing micro multimodal transport hubs and P&R car and bicycle parks.
- Ensuring the safe use of the micro multimodal transport hubs and P&R car and bicycle parks (e.g., through appropriate lighting, monitoring system, alarm system, etc.) considering the perspective of potentially vulnerable groups (e.g., women, minors, etc.).

POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Increase in transport sharing activities (i.e., bicycle and scooter). • To achieve zero emission volumes from transport, especially in the city centre and historic areas, and to make these areas completely free of fuel-based modes of transport. • Improving smart parking systems to prevent traffic jams in the central axis of the city due to the time spent in traffic and finding a parking space. • Use the MaaS project approach for public transport access to selected POIs, especially for multi-day tourism visits. Implementation of MaaS (mobility as a service) applications to facilitate payments in public transport. 								
MAPPING OF RISKS, CHALLENGES	<p>The city has identified risks related to the generation of air pollution from the transport sector, traffic congestion and lack of parking space. The construction of transfer hubs and new parking spaces will help to optimise traffic and increase the use of public transport, which will help to counteract these risks.</p>								
COSTS	<table border="1"> <thead> <tr> <th>Pre-investment</th> <th>CAPEX</th> <th>OPEX</th> </tr> </thead> <tbody> <tr> <td>EUR 727,000</td> <td>EUR 32,027,600</td> <td>-</td> </tr> </tbody> </table>	Pre-investment	CAPEX	OPEX	EUR 727,000	EUR 32,027,600	-		
Pre-investment	CAPEX	OPEX							
EUR 727,000	EUR 32,027,600	-							
COST CALCULATION	<p>The pre-investment costs relate to the administrative costs of delimiting the city's clean transport zones and the subsequent purchase of appropriate signage. The estimated cost is EUR 50,000.</p> <p>The implementation of the "System of automatic detection of illegal parking" included in Development Strategy of the City of Split until 2030 was estimated at EUR 677,000.</p> <p>The capital expenditure for the construction of multi and micro-hubs was estimated on the basis of an EU project, where the construction of one such hub was approximately EUR 1.2 million. To build 4 hubs of this type will cost approximately EUR 4,950,800.</p> <p>The cost of building a P&R car park with associated infrastructure was estimated on the basis of the proposed investments presented in Development Strategy of the City of Split until 2030. The total estimated investment cost of building P&R car park in the 2 indicated locations with a capacity of 1,600 spaces will be approximately EUR 27,000,000.</p> <p>In addition, implementation of a pilot programme for greening one of the car parks based on the project for greening car parks - V. Terzić (TC Joker) was estimated at EUR 76,800.</p>								

	<p style="text-align: center;">Estimated savings</p> <hr/> <p>Car and charger sharing will reduce personal costs.</p> <p>Park and ride infrastructure will provide an additional source of income.</p> <p>Restriction of cars within historical centres will make them more attractive for tourists and visitors.</p> <p>GHG savings: Basing on the previous conducted projects (Smart Shared Green Mobility Hubs) passenger-friendly transport hub provide on average 1.281 tCO₂ due to a reduction in individual transport.</p> <hr/> <p>Data source: Development Strategy of the City of Split until 2030</p>	
<p>FINANCING MECHANISMS / SOURCE</p>	<ol style="list-style-type: none"> 1. <i>EU Recovery and Resilience Facility (RRF) Grants and Funding</i> <ul style="list-style-type: none"> • C1.4. R5-I2 - Research, development and production of new mobility vehicles and supporting infrastructure • C1.4. R5-I3 Co-financing programme for the purchase of new alternative fuel vehicles and the development of alternative fuel infrastructures in road transport 2. <i>European Regional Development Fund (ERDF) / Cohesion Fund (CF)</i> <ul style="list-style-type: none"> • promoting sustainable multimodal urban mobility, as part of transition to a net zero carbon economy. 3. <i>Just Transition Fund</i> <ul style="list-style-type: none"> • investments in smart and sustainable local mobility, including decarbonisation of the local transport sector and its infrastructure. 4. <i>Local budget</i> 	



T6 ELECTRICAL WATERBORNE TRANSPORT

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2025	Capital investment	C1 - Ensure energy efficiency of all key areas	City of Split - Administrative Department for Spatial Planning and Construction, Department of Environmental Protection



MEASURES / INVESTMENTS COSTS [EUR]



TARGETED RESULTS

Feasibility study to develop urban waterborne public transport systems

500,000

Technical, detailed study on waterborne transport development of the City

SUM

500,000

1 pcs.



MEASURABLE BENEFITS

-



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Higher energy efficiency of infrastructure.
- Reducing the sensitivity of the power infrastructure to extreme climatic events.
- Secure and diverse energy supplies.
- Possibility of connecting new energy sources (including renewable ones) to the power grid.
- Electric charging station installation will contribute to carbon emission reductions

DESCRIPTION AND SCALE OF ACTION

1. Feasibility study to develop urban waterborne public transport systems.

Feasibility study to develop urban waterborne public transport systems (e.g., balancing the demand for services and coordinating an appropriate schedule, integrating the system with other public transportation, network optimisation and resilience, ensuring sustainable funding model, the necessary (additional) electricity capacity for charging stations for water transport and the capacity of the existing power grid in the city).

If the conducted analyses allow for detailed data acquisition and determination of the city's requirements and needs, the next potential steps in implementing this action will be:

- Technical study on a power supply to the city port.

Diesel emission from ships is responsible for producing GHGs, air and water pollution. Innovative technologies need to be explored to mitigate environmental pollutions without impacting the waterborne transport. It is relevant to conduct a detailed technical study including safe and reliable integration of high-capacity power charging with the electric grid in a port.

- Pilot project: Installation of charging station for boats and ships in the City Port.

The electrification of the transport sector is dependent on accessible and appropriately designed charging infrastructure. Port facilities are essential in the operations of waterborne transport, with the transition to electrification the need for high-power charging facilities arises. The action includes installation of charging stations for boats and ships in the City Port after conducting a technical study.

- Pilot project for creating a connection between City Port and island Čiovo (Slatine) with the use of electrical ferries vessels.

Ferries Vessels operate between fixed points and are the most suitable application option to become fully electric with completely zero emissions. To address the issue of increased energy demand there is need for developing an energy model to predict the required power load. Additionally, an innovative grid architecture and control strategy could be implemented and integrated into the Port ecosystem to achieve a more efficient, flexible, and sustainable waterborne transport sector.



City Port location



Location of Slatina on the island of Čiovo

SCHEDULE	Action implementation steps								
	2023	2024	2025	2026	2027	2028	2029	2030	
	Feasibility study to develop urban waterborne public transport systems								
Technical study on a power supply to the city port									
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> Sustainable urban mobility plan of the City of Split until 2030 Marine and Coastal Zone Management Plan of Split Dalmatia County 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> Ensuring balanced participation of representatives of all genders in the development of the feasibility study. Ensuring the inclusiveness of the recruitment process and equal access for women to any new jobs generated. Ensuring that the principles of universal design are applied when developing urban waterborne electric public transport system. 								
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> The development of proactive responses to pollution increases and pollutants by equipping e-boats with sensors that measure marine-sea pollution. 								
MAPPING OF RISKS, CHALLENGES	There is a risk of transport accidents that could cause fuel leakage and environmental pollution. There can be a potential transfer pollution of the sea with oils and hazardous and harmful substances from maritime facilities. Implementation of electrical waterborne transport will reduce this risk.								
COSTS	Pre-investment	CAPEX	OPEX						
	EUR 500,000	-	-						
COST CALCULATION	Pre-investment costs include feasibility and technical studies for the development of public water transport and additional port facilities have been estimated based on similar projects undertaken by Arup – EUR 500,000.								

Main stakeholders

City of Split -
Urban Planning
and Construction
Department

City of Split–
Department for
Communal
Affairs

Lučka uprava
Split

University of
Split

Related actions

U1

U3

T4

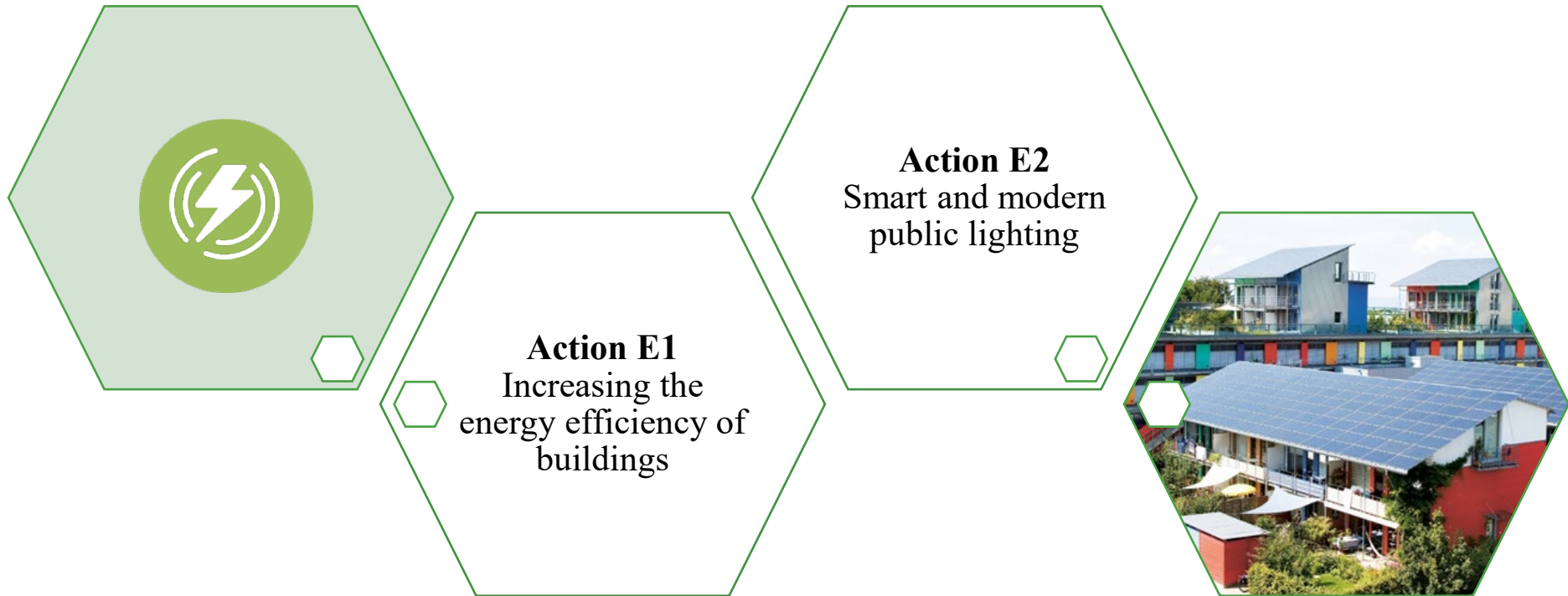
E2

M1

M2

	Estimated savings	
	The development of waterborne public transport will provide the opportunity for low cost, low carbon alternatives.	
	Data source: projects realised by Arup	
FINANCING MECHANISMS / SOURCE	<ol style="list-style-type: none"> 1. <i>EU Recovery and Resilience Facility (RRF) Grants and Funding</i> <ul style="list-style-type: none"> • C1.4. R3-I1 Modernisation programme for ports open to public traffic • C1.4. R3-I2 Procurement/construction of passenger ships used for regular coastal transport, alternative fuels • C1.4. R5-I2 Research, development and production of vehicles for new mobility and supporting infrastructure • C2.1. R2-I1 Preparation of project technical documentation for green and digital transition projects 2. <i>European Regional Development Fund (ERDF) / Cohesion Fund (CF)</i> <ul style="list-style-type: none"> • promoting sustainable multimodal urban mobility, as part of transition to a net zero carbon economy. 3. <i>Just Transition Fund</i> <ul style="list-style-type: none"> • investments in smart and sustainable local mobility, including decarbonisation of the local transport sector and its infrastructure. 4. <i>Environmental Protection and Energy Efficiency Fund (EPEEF)</i> <ul style="list-style-type: none"> • Energy efficiency 5. <i>Local budget</i> 	

SECTOR: ENERGY





E1 INCREASING THE ENERGY EFFICIENCY OF BUILDINGS

TIMESCALE

TYPE OF ACTION

OBJECTIVES/PRIORITIES

ACTION OWNER

2023-2030

Capital investment

EN1 - Increase energy efficiency and transition to clean energy

City of Split - Urban Planning and Construction Department
Stanouprava d.o.o.



MEASURES / INVESTMENTS COSTS [EUR]



TARGETED RESULTS

Development of the Energy atlas of Split and implementation of pilot programme

1,752,800

Reducing the energy consumption of the buildings after thermal modernization

Thermal modernization of public buildings

Installation of photovoltaics

4,699,200

50 kWh/m²/year

12 pcs.

Energy renovation of public buildings

3,982,300

Grants to modernise family houses

Grant to modernise multi-apartments

Creating a financial subsidy programme for private building owners to install photovoltaic panels

8,933,000

100 per year

10 per year

Thermo-modernisation of private buildings (family houses)

4,595,300

Grant to modernise multi-apartments

Total capacity of photovoltaic installations after grants

Thermo-modernisation of private buildings (multi-apartments buildings)

8,404,700

10 per year

11 MW

SUM

32,367,300



MEASURABLE BENEFITS

Estimate emission reduction (tCO₂ per year)

3,742.48

Job creation potential

3~15

Estimated savings (EUR per year)

2,374,310



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Lower emissions of pollutants and greenhouse gases into the atmosphere.
- Secure and diverse energy supplies.
- Improving climate change risk adaptation.
- Ensuring city sustainable development.
- Less dependence on fossil fuels.
- Installation of photovoltaic panels on the roof of the school reduces CO₂ emissions by 2.8 tons per year

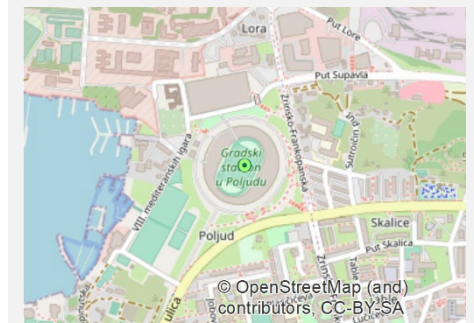
DESCRIPTION AND SCALE OF ACTION

The City of Split has no direct influence on the capacity and distribution of electricity on the grid. The action must also focus first on developing and deepening the city's cooperation with the local electricity distributor. This cooperation will enable the recommended investments to be efficiently implemented and increase the possibilities for connecting new renewable generation points to the existing grid.

1. Installation of photovoltaic panels in public areas and buildings

The City of Split has immense potential for future solar energy development. The installation of renewable energy sources on public buildings may result in significant reduction of the operating costs of electricity in Split. Proposed actions include:

- Installation of solar panels photovoltaic power plants at VIK facilities in Split, Solin, Kaštela, Marina and Dicma, CS Ravne Njive (selected for the initial pilot project).
- The installation of photovoltaic power plants in over 30 buildings owned by the city of Split is aimed at generating electrical energy. Through the implementation of the SuSustainable project and the execution of five energy renovation projects for primary schools and kindergartens, the city of Split



Stadium Poljud location

Main stakeholders



will have a total of 19 public buildings equipped with photovoltaic power plants that will produce electrical energy for their own consumption. Further installation of photovoltaic power plants is planned in more than 30 public buildings, intended for electricity generation, and will be managed by the public utility company Split Parking d.o.o. as a public electricity aggregator.

2. Energy atlas - mapping energy consumption in buildings. Creating an energy consumption database with energy management - pilot programme.

The energy atlas is an interactive tool that connects the spatial characteristics of energy consumption and visually displays them in the city. The action includes mapping energy consumption in buildings and solar potential of Split that would determine 3D mapping: solar insolation of flat, sloping, and vertical surfaces of buildings in Split, their energy consumption, available solar technology for electricity production and options for financing the installation of solar collectors with the calculation of the return on investment in photovoltaic modules.

Pilot programme should include:

- Asset management of public buildings
- Installation of sensors to monitor the way of use and consumption of four energy sources
- Center for management and control

3. Creating a financial subsidy programme for private building owners to install photovoltaic panels.

In 2014/2015, the City of Split participated in a similar, co-financing programme for the installation of solar collectors on family households in Split. This project will be continuation of the previous action. Additionally, it will serve as a representative example of using the Solar Map of Split for the purpose of increasing the capacity of energy from renewable sources and meeting the goals of the Green Deal and increasing the percentage of renewable energy sources in private sector consumption.

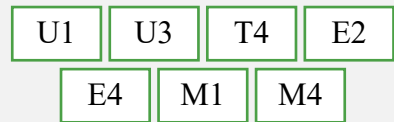
4. A grant programme for the thermal modernisation of private buildings together with the replacement of the heat source.

The energy inefficiency of buildings is strongly related to the issue of energy poverty among the citizens and large GHG emissions.

The recommended thermomodernisation work should be focused on:

- Replacing windows and doors with more energy-efficient ones.

Related actions



- Insulating the external walls, ceilings, floors, and roofs.
- Replacing outdated heating installation.
- Installation of smart energy meters (there is potential of connecting the meters with Solar Map of Split, as they could provide data on energy consumption of the buildings).

The following works may be also necessary:

- Installing renewable energy sources (such as heat pumps, water heating system via solar panels) for the building's own needs. The considerable proportion of residential buildings are heated electrically, so for this reason replacing electric boilers with high efficiency heat pumps would considerably decrease the electricity demand.
- Modernisation of ventilation and air-conditioning systems. A high-quality, modern ventilation system features heat recovery, meaning that a heat exchanger withdraws heat from the extract air and uses it to warm the cold supply air.

5. Thermomodernisation of public buildings.

Developing a framework of standard good practices for the thermomodernisation of public buildings, energy consumption standards covering public buildings, schools, administrative and recreational facilities as well as historic buildings and other types of housing owned by the City. Each building is specific and to allocate real potential of energy savings is necessary to perform quality energy audit that will define and calculate potential and energy efficiency measure that can be applied.

The action includes implementing the following steps:

- Project and technical documentation for the energy renovation of public buildings (e.g., Elementary School Split 3, DV Gariful). Additionally, thermal modernization works will be carried out on the public utility buildings of Elementary School 3 and Gariful DV.
- Gasification of Trstenik Primary - in accordance with the prepared project documentation and cost estimate, it is necessary to connect the existing boiler room to the distribution network of EVN Croatia Plin d.o.o., to use natural gas as the primary energy source for the boiler room, replacing existing oil burners with gas and combined.
- Introduction of a natural gas system in DV Adriana- the project aims to introduce a new natural gas energy system that is more efficient and cost-effective than the existing electric one.
- Insulation and facade work for dilapidated and damaged facades on the buildings of DV Adriana, DV Mala sirena and DV Mali princ

Green buildings certification process should be envisaged for deep retrofit interventions where applicable (or alternatively green building certification standards for operational buildings).									
SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
	Implementation of energy atlas and pilot programme								
	Installation of photovoltaic panels on public buildings								
	Subsidy program for private building owners to install photovoltaic panels								
	Thermal modernisation of private buildings together with the replacement of the heat source								
	Thermomodernisation of public buildings								
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Development Strategy of the City of Split until 2030 • Development Strategy of Split urban agglomeration for the period until the end of 2027 • Strategy for the development of the system of green areas of the city of Split 2017 - 2025 • CitiEnGov (Interreg Central Europe) Cities for a Good Energy Governance 2016 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Generation of new employment opportunities. Ensuring the inclusiveness of the recruitment process and equal access for women to green jobs. • Potential for immediate use of the energy for households suffering from energy poverty and vulnerable households located in the vicinity of the photovoltaic power plant (with subsidies or under favourable conditions). • Prioritizing households suffering from energy poverty and vulnerable households for the financial subsidy program for private building owners to install photovoltaic panels. • Prioritizing households that are at risk from energy poverty and vulnerable households for the grant program for the thermal modernisation of private buildings. 								
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE	<ul style="list-style-type: none"> • Use of solar energy to implement electric vehicle charging points. • Creation of a database using smart meters on electricity consumption in retrofitted buildings. 								

AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Possibility of implementing farms/installations of off-grid photovoltaic panels (using the generated energy on site or storing surplus energy generated - regardless of energy suppliers). 							
MAPPING OF RISKS, CHALLENGES	<p>Annual temperatures are forecast to rise by 2.2°C under high emissions scenario RCP8.5 and 1.5°C under RCP4.5 in Split. The number of hot days (temperatures over 35°C) in Croatia will increase. Rising temperatures, higher numbers of consecutive hot days, and maximum temperatures potentially exceeding 40°C could increase the risk of heat stress, particularly in vulnerable populations. In urban areas such as Split, increased temperatures can be exacerbated by the urban heat island effect in which high concentrations of pavements, buildings, and other manufactured structures absorb and retain heat, resulting in higher urban temperatures when compared to surrounding rural areas. Installing solar panels and creating a solar map will help realize the potential and adjust solutions to changing conditions.</p> <p>Climate change may cause the phenomenon of extreme temperatures. Thermomodernisation, improving the thermal and energy efficiency of buildings by replacing window and door frames with more energy-efficient windows and doors, insulating external walls, ceilings, floors, and roofs, and replacing outdated heating systems will counteract the risk of breakdowns and interruptions in heat supply and increase the efficiency of these systems.</p>							
COSTS	<table border="1"> <thead> <tr> <th data-bbox="383 730 831 767">Pre-investment</th> <th data-bbox="831 730 1279 767">CAPEX</th> <th data-bbox="1279 730 1677 767">OPEX</th> </tr> </thead> <tbody> <tr> <td data-bbox="383 767 831 817">EUR 1,752,800</td> <td data-bbox="831 767 1279 817">EUR 30,614,500</td> <td data-bbox="1279 767 1677 817">-</td> </tr> </tbody> </table>	Pre-investment	CAPEX	OPEX	EUR 1,752,800	EUR 30,614,500	-	
Pre-investment	CAPEX	OPEX						
EUR 1,752,800	EUR 30,614,500	-						
COST CALCULATION	<p>In order to enable the further development of solar power generation in the city, it is necessary to upgrade the existing system of solar potential. The cost of updating the current solar energy potential system is approx. EUR 788,000.</p> <p>Pre-investment costs are related to expenses that need to be incurred for the development of the Energy atlas of Split – EUR 433,900. The costs of implementing the pilot programme amount to EUR 530,900.</p> <p>Total pre-investment costs amount to EUR 1,752,800.</p> <p>Capital expenditure has been estimated based on the Development Strategy of the City of Split until 2030 and the Split city budget for 2022- 2024. Assumed investments including:</p> <ul style="list-style-type: none"> • Increasing the capacity of the city of Split for the needs of solar energy - EUR 4,500,000. • Installation of solar panels on the central building of ViK, Ravna Njiva location in Split – EUR 99,600. 							

- Pilot project for the installation of solar panels on public facilities in accordance with the assessment of the Map of Solar Potentials of Split – EUR 33,200.
- Co-financing of the project of installing solar panels on private buildings in accordance with the assessment of the Map of Solar Potentials of Split – EUR 66,400

The total costs associated with the installation of photovoltaics amount to EUR 4,699,200.

Other capital expenditure relates to energy upgrades of public buildings including:

- Use of renewable energy sources in MedILS – EUR 172,700.
- Gasification of Trstenik Primary School – EUR 62,300.
- Introduction of a natural gas system in DV Adriana – EUR 6,600.
- The estimated cost of thermal modernisation of 1 building was estimated on the basis of the projects "Renovation of DV Mandalina", "Renovation of Pojisan Primary School", "Renovation of Mertojak School" and amounts to about EUR 748,200. Therefore, the cost of modernisation of 5 educational buildings will be about EUR 3,740,800.

The remaining total capital expenditure is related to energy renovation of public buildings – EUR 3,982,300.

Cost of creating a financial subsidy programme for private building owners to install photovoltaic panels was based on 'The programme for integrated photovoltaic power plants on public buildings, multi-apartment buildings and single-family houses and companies in the City of Zagreb from 2022 to 2024', which envisaged the installation of photovoltaic panels in the city with a total capacity of 50 MW at a cost of around EUR 40 million. These costs correlate with the number of inhabitants in Split, resulting in an implementation cost for this programme of EUR 8,933,000, with the installation of photovoltaic panels of a total capacity of approximately 11 MW.

The estimated cost of thermo-modernisation of private buildings was based on the assumptions of the 'Programme of energy renovation of family houses 2014-2020'. The programme co-finances a total of 15,494 family houses amounting to EUR 89 million (co-financing per 1 family house of EUR 5,744) and 257 multi-apartment buildings amounting to EUR 27 million (grants per 1 multi-apartment building of EUR 105,058).

The action is a continuation of these objectives, and the first part concerns co-financing of 100 family house thermomodernisation investments over the period 2023-2030 (a period of 8 years including 2023). The total cost of this part is EUR 4,595,300.

The second part including grants for multi-apartment buildings of 10 in the period 2023-2030 (period of 8 years including 2023). The total cost of this part is EUR 8,404,700.

The total estimated investment expenditure under this action will be around EUR 30,614,500.

Estimated savings

Solar panels will reduce the cost of electricity bills, providing own electricity.

The increase in the efficiency of heating/cooling and heat retention in buildings will reduce the cost of heating/cooling.

GHG savings:

For the purpose of the calculations, a mean capacity factor of 17.6% was assumed for the PV panels.

In addition, 800 residential and 80 multi-family buildings with a floor area of 100 and 1,000 m² respectively were considered. The energy consumption of the buildings was assumed to be 120 kWh/m²/year before thermal modernisation and 70 kWh/m²/year after. Heat emission intensity of 0.128 tCO₂/MWh was assumed.

Electricity emission intensity was set at 0.145 tCO₂/MWh.

The unit cost of electricity was assumed to be 0.14 EUR/kWh.

Data source: City of Split, Development Strategy of the City of Split until 2030, Programme of energy renovation of family houses 2014-2020, City of Zagreb

FINANCING MECHANISMS / SOURCE

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*

- C1.2. R1-I1 Revitalisation, construction and digitisation of the energy system and related infrastructure for the decarbonisation of the energy sector
- C1.2. R1-I2 Encouraging energy efficiency, heating and renewable sources of energy for the decarbonisation of the energy sector
- C6.1. R1-I1 Energy renovation of buildings
- C6.1. R1-I3 Energy renovation of buildings with the status of cultural property

2. *Environmental Protection and Energy Efficiency Fund (EPEEF)*
 - Energy efficiency
3. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*
 - promoting energy efficiency and reducing greenhouse gas emissions,
 - promoting renewable energy in accordance with Directive (EU) 2018/2001, including the sustainability criteria set out therein,
4. *Just Transition Fund*
 - investments in the deployment of technology as well as in systems and infrastructures for affordable clean energy, including energy storage technologies, and in greenhouse gas emission reduction,
 - investments in renewable energy in accordance with Directive (EU) 2018/2001 of the European Parliament and of the Council (17), including the sustainability criteria set out therein, and in energy efficiency, including for the purposes of reducing energy poverty,
 - rehabilitation and upgrade of district heating networks with a view to improve energy efficiency of district heating systems and investments in heat production provided that the heat production installations are supplied exclusively by renewable energy sources.
5. *Local budget*



E2 SMART AND MODERN PUBLIC LIGHTING

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2030	Capital investment	C3 - Increase accessibility, inclusivity, safety, resilience and sustainability of the city	Parkovi i nasadi d.o.o. City of Split - Urban Planning and Construction Department



MEASURES / INVESTMENTS COSTS [EUR]



TARGETED RESULTS

Modernisation of the entire public lighting system

4,566,000

The number of streetlights replaced

SUM

4,566,000

17,000 pcs.



MEASURABLE BENEFITS

Estimate emission reduction (tCO₂ per year)

2,461.65

Job creation potential

1~5

Estimated savings (EUR per year)

2,376,763



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



<p>ACTION BENEFITS</p>	<ul style="list-style-type: none"> • Reducing energy dependency in city lighting as a major amount of the city's energy consumption. • Reduction of light pollution. • Ensuring city sustainable development. • Potential to address the climatic pressures. • Reducing the negative impact on the environment. • Solving issues related to public safety. It can be a key step towards preventing violence in the streets, reducing crime and vehicle accidents. 	<p style="text-align: center;">Main stakeholders</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid black; padding: 5px; background-color: #4CAF50; color: white; text-align: center;">City of Split - Urban Planning and Construction Department</div> <div style="border: 1px solid black; padding: 5px; background-color: #4CAF50; color: white; text-align: center;">Parkovi i nasadi d.o.o.</div> </div>						
<p>DESCRIPTION AND SCALE OF ACTION</p>	<p>Replacing existing city's lighting will enable the development of an intelligent, integrated lighting system based on a wireless and decentralised local or cloud-based network. This offers the potential to collect data from various types of sensors (measurements of air quality, noise, irradiation, traffic) and specialised cameras.</p> <p>Smart and modern public lighting contributes to significant cut in energy consumption and achieves savings by adjusting lightning according to traffic needs, delivering a reduction in CO₂ footprint. Managing public lighting is more effective through longer product life and reduced labour requirements (reducing maintenance costs). The suggested action would be focused on:</p> <ol style="list-style-type: none"> 1. Modernisation of 14,000-15,000 public lighting units with the application of smart and energy-efficient solutions and minimisation of light pollution e.g. <ul style="list-style-type: none"> • modernisation of road and park lighting, • replacement of old, energy-inefficient lighting fixtures with new energy-efficient lighting in primary schools and kindergartens (and if possible) other public institutions and city-owned companies, 2. Modernisation of 2000 public lightning units in the city centre <p>Action will include equipping lights with Wi-Fi transmitters for local hotspots, environment monitoring equipment. Lighting poles with communication functions, in addition to the lighting function, can be a key element of gathering and presenting information from monitoring and measurements using sensors in the city, both for air quality and traffic management.</p> <p>The total scope of the action is the replacement of more than 17,000 streetlights.</p>	<p style="text-align: center;">Related actions</p> <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 5px;">U1</td> <td style="padding: 5px;">U3</td> <td style="padding: 5px;">T4</td> </tr> <tr> <td style="padding: 5px;">E4</td> <td style="padding: 5px;">M1</td> <td style="padding: 5px;">M4</td> </tr> </table>	U1	U3	T4	E4	M1	M4
U1	U3	T4						
E4	M1	M4						

	Another smart potential solution could be to create a hybrid lighting system that integrates power in the form of photovoltaic panels, storage batteries and charging point functionality for EVst. Additionally, it would create the possibility of a PPP collaboration.								
SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
	Modernisation of public lighting								
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Strategy for the development of the city of Split until 2030 • Program for mitigation of climate change, adaptation to climate change and protection of the ozone layer • CitiEnGov (Interreg Central Europe) Cities for a Good Energy Governance 2016 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring the inclusiveness of the recruitment process and equal access for women to any new jobs generated. • Potential to avoid blanket solutions and adapt the light infrastructure to address people’s needs and experiences and ensure safe and comfortable navigating public spaces at night for everyone, but especially potentially vulnerable groups (e.g., in terms of light intensity and the use of blue light at main night-time corridors). • Increased citizens’ safety and comfort due to the implementation of smart and energy-efficient light solutions, in terms of decreased light pollution, reduced time for repairing malfunctioning streetlights, etc. 								
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Creation of human-environment lighting efficiency with dimming of led lighting. • Illumination of the city as daylight-sensitive, in accordance with its coordinate on the earth. • Providing a basis for the development of dark sky areas. • Providing information about problems such as malfunctions in lighting fixtures to the portal online. • Possibility of implementing charging points and pollution sensors on street lighting poles. • New installed light poles could be an opportunity to integrate EV charging points. 								

MAPPING OF RISKS, CHALLENGES	Changing public lighting in the city can reduce the risk of network losses in electricity distribution and light pollution.		
COSTS	Pre-investment	CAPEX	OPEX
	-	EUR 4,566,000	EUR 132,800
COST CALCULATION	<p>Costs related with this action were estimated based on the Development Strategy of the City of Split until 2030 (capital expenditure) and the Split City budget for 2022- 2024 (operational costs).</p> <p>Modernisation of the entire public lighting system in Split is the second largest project in Croatia of this type with the total cost of about EUR 4,566,000.</p> <p>Operating costs for maintenance, servicing, energy purchases have been adopted as in the Split City Budget for 2022- 2024 and amount to EUR 132,800 per year.</p> <hr/> <p style="text-align: center;">Estimated savings</p> <p>Smart and energy efficient lighting solutions will reduce the amount of electricity needed and therefore electricity bills.</p> <p>GHG savings: The calculation assumes 17,000 light points to be replaced with a lighting time per year of 4,380 hours. Replacement of 300 W sodium lamps with 80 W LEDs each and a reduction in lighting time of 10% was assumed. Electricity emission intensity was set at 0.145 tCO₂/MWh. The unit cost of electricity was assumed to be 0.14 EUR/kWh.</p> <hr/> <p>Data source: City of Split, Development Strategy of the City of Split until 2030</p>		
FINANCING MECHANISMS / SOURCE	<ol style="list-style-type: none"> 1. <i>Environmental Protection and Energy Efficiency Fund (EPEEF)</i> <ul style="list-style-type: none"> • Energy efficiency 2. <i>European Regional Development Fund (ERDF) / Cohesion Fund (CF)</i> <ul style="list-style-type: none"> • promoting energy efficiency and reducing greenhouse gas emissions, 3. <i>Croatian Bank for Reconstruction and Development (HBOR)</i> <ul style="list-style-type: none"> • ESIF Loans for Public Lighting 4. <i>City budget</i> 		

SECTOR: SOLID WASTE





O1 Construction of facilities for circular waste management

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2027	Capital investment	S1 - Improve waste management system	Čistoća d.o.o.



MEASURES / INVESTMENTS COSTS [EUR]



TARGETED RESULTS

Municipal waste management system analysis with feasibility study for the construction of a new waste treatment and recovery facility	190,000	Share of waste that has been recycled: 50%	Capacity of the small waste management facility - should be a minimum of: 18,000 tonnes
Concept development and business case for municipal waste treatment in a biogas or composting facility	190,000		
Development of feasibility study for photovoltaic plant in Karepovac	80,000		
Construction of a new municipal waste sorting, treatment and recovery facilities	6,626,600		
Sum	7,086,600		

MEASURABLE BENEFITS



Estimate emission reduction

Job creation potential

Treatment, recovery, and recycling of waste -> 84% GHG reduction in the waste sector in the city

21~45



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- These initiatives will reduce unpleasant odour and fume emissions.
- Increase of the recovery of recycled materials and raw materials – higher city recycling rate.
- Locating the indicated facilities outside the residential area will significantly improve housing conditions and provides potential for the development of unused land.
- Increasing the availability of new municipal waste management infrastructure will allow for more efficient and faster waste collection.
- Increased awareness of residents about the economic and environmental benefits of segregating waste.

DESCRIPTION AND SCALE OF ACTION

The city's landfill has recently had a major rehabilitation and reconstruction (last year, the landfill received its environmental permit for the first time, meaning that it complies with the EU Landfill Directive and the Industrial Emissions Directive). But in any case, the landfill has limited capacity for further work. It is planned that in the future the waste will have to be transported to another landfill, located outside the city area. For this reason, Split needs to ensure the best possible level of waste processing on site.

1. Municipal waste management system analysis with feasibility study for the construction of a new waste treatment and recovery facility.

Development of a detailed analysis of the solid municipal waste management system, including consideration of various technical and organisational approaches to waste management supply chain stages (generation, segregation, collection and treatment) as a basis for construction option of a new waste treatment facility.



Karepovac landfill site

Main stakeholders



2. Concept development and business case for municipal waste treatment in a biogas or composting facility.

The analysis would include a comparison of justification of composting and biogas production and the feasibility of using the end products, e.g. biogas (analysis of suitability in the city, e.g. for transport applications or electricity and heat generation for the grid). The feasibility study will assess the availability of waste for treatment and the level of segregation at source. In addition, as part of the study, an analysis of the location of the new plant will be conducted. A separate part of the study will be an economic and environmental study for the use of waste in a biogas plant or composting. The study will make a thorough assessment of what feedstock is possible and most efficient to process in the city, justifying the capacity and efficiency of the planned facilities. This will be complemented by an analysis of the needs of the receiving infrastructure and the possibilities of using or managing the biogas/compost.

3. Construction of a facilities for waste management with associated infrastructure (sorting plant with a manipulative space of 2,000 m² and treatment plant with a surface area of 10,000 m²).

This action should focus on the construction of adapted facilities for selective collection, processing (sorting, treatment (applied technology will depend on the results of in-depth analyses) and recovery of municipal waste. These facilities should be equipped with containers for biological processing of waste with full technical infrastructure, including installations for cleaning and processing of collected waste (e.g., cleaning of glass packaging, processing of bulky waste). For example, the setting up of a composting site for biodegradable waste creates the potential for the use of bio-stabilisers, which are an integral part of such facilities. In addition, anti-odour barriers and an on-site leachate treatment plant for wastewater discharged to the municipal sewer system should be installed. The facilities should be equipped with an air intake for air filters, a fire installation and other relevant equipment. The exact list of equipment needed and the relevant technology will be determined during the development of the feasibility study and the subsequent design phase.

4. Possibilities of generating and using solar energy at the Karepovac landfill site analysis.

To fully exploit the energy potential of the units in Karepovac, the possibility of using solar energy should be further investigated. In this case, a feasibility study, design and technical documentation should be developed and photovoltaic panels should be purchased and installed.

In the future, the produced energy will be able to power not only the facilities located in Karepovac, but also local schools and kindergartens.

Related actions

U1

O2

M1

SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030																		
	Municipal waste management system analysis with feasibility study for the construction of a new waste treatment and recovery facility																										
	Concept development and business case for municipal waste treatment in a biogas or composting facility																										
	Comprehensive construction of new facilities including the purchase of appropriate equipment, machinery, vehicles, and devices																										
	Possibilities of generating and using solar energy at the Karepovac landfill site																										
	Running campaigns, trainings, and workshops about circular waste management																										
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Development Strategy of the City of Split until 2030 																										
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS										<ul style="list-style-type: none"> • Ensuring balanced participation of representatives of all genders in the development of the feasibility study for the construction of new facilities. • Ensuring the inclusiveness of the recruitment process and equal access for women to any new jobs generated. 																	
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES																			<ul style="list-style-type: none"> • The provision of bio-waste as an input to energy production. • Minimising the ratio of the pollution of surface waters by leakage. 								
MAPPING OF RISKS, CHALLENGES																											

COSTS	Pre-investment	CAPEX	OPEX
		EUR 460,000	EUR 6,626,600
COST CALCULATION	<p>Pre-investment expenditure was estimated on the basis of projects conducted in cooperation with the European Union. The cost of developing a municipal waste management system analysis with feasibility study for the construction of a new waste treatment and recovery facility is estimated to be around EUR 190,000.</p> <p>The cost of a concept development and business case for municipal waste treatment in a biogas or composting facility estimated at EUR 190,000.</p> <p>The total project costs associated with the potential generate and use for solar energy in Karepovac (development of feasibility study) have been estimated at around EUR 80,000.</p> <p>Total pre-investment costs were estimated at EUR 460,000.</p> <p>Capital expenditure will involve the cost of building halls, implementing treatment (biofilter, biostabilizer, pressing machine) systems, purchasing appropriate equipment to support the treatment (for example biological) of municipal waste, purchasing electric vehicles and appropriate containers, proper redevelopment and adaptation of land for new development. The construction of new municipal waste collection, treatment and recovery facilities has been estimated based on the same project planned in Wałbrzych (Poland). The Wałbrzych municipal waste collection, treatment and recovery facility will have a capacity of 35,000 tonnes of waste and will cost EUR 12,885,000. Thus, the estimated cost of implementing such a facility in Split with a capacity of 18,000 tonnes of waste proportionally will be EUR 6,626,600.</p> <p>The annual operating expenses of the new facilities have been estimated on the basis of waste management costs at the municipal sorting and storage facilities. These costs amount to approximately 3% of capital expenditure – EUR 198,800.</p>		
	Estimated savings		
	<p>The creation of an efficient waste segregation system will reduce the cost of depositing waste at the Lećeveca landfill in the future.</p>		
	<p>Data source: European Commission – European Network for Rural Development, Arup internal resources</p>		
	FINANCING MECHANISMS / SOURCE	<ol style="list-style-type: none"> 1. EU Recovery and Resilience Facility (RRF) Grants and Funding <ul style="list-style-type: none"> • C1.3. R2-I1 Waste disposal reduction programme 	

- C1.3. R2-I2 - Program for remediation of closed landfills and sites contaminated with hazardous waste
- 2. Environmental Protection and Energy Efficiency Fund (EPEEF)
 - Environmental Protection
- 3. European Regional Development Fund (ERDF) / Cohesion Fund (CF)
 - developing and enhancing research and innovation capacities and the uptake of advanced technologies,
 - promoting the transition to a circular and resource efficient economy,
- 4. Just Transition Fund
 - investments in enhancing the circular economy, including through waste prevention, reduction, resource efficiency, reuse, repair and recycling,
- 5. Local budget



O2 LOCAL WASTE RECYCLING POINTS

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2025	Capital investment	S1 - Improve waste management system	Čistoća d.o.o.



MEASURES / INVESTMENTS COSTS [EUR]

Design and construction of 2 recycling yards	1,368,000
Purchase and installation of semi-underground waste containers	3,000,000
Sum	4,368,000



TARGETED RESULTS

Construction of: 2 recycling yards	Purchase and installation of: 600 semi-underground waste containers
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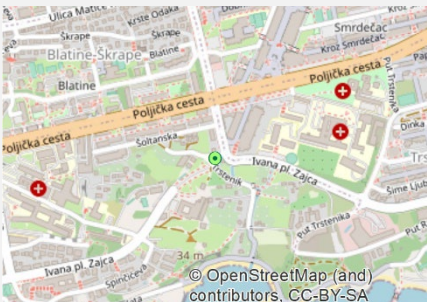
MEASURABLE BENEFITS

Estimate emission reduction	Job creation potential
Treatment, recovery, and recycling of waste -> 84% GHG reduction in the waste sector in the city	30~60



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



<p>ACTION BENEFITS</p>	<ul style="list-style-type: none"> • Increase the recovery of recycled materials and raw materials – higher city recycling rate. • Slowing the filling up of nearby rubbish dumps, large capacity of containers in a small space, aesthetically pleasing underground containers that integrate into the urban environment, no odours, leaking liquids or noise, it can be installed in any space. • Increased awareness of residents about the economic and environmental benefits of segregating waste. 	 <p><i>Sirobuja location</i></p>
<p>DESCRIPTION AND SCALE OF ACTION</p>	<p>1. Finding new locations and construction 2 recycling yards for sorted waste disposal and waste sorting promotion.</p> <p>The recycling yard is intended to meet the needs of about 30,000 people and the same number of residents will be directly covered by educational and informational activities in the scope of the project. The capacities of the recycling yard will provide preparation for reuse and recycling, as well as preconditions for recovery procedures, while avoiding and reducing waste disposal at the Karepovac landfill. The recycling yard will ensure the separation of secondary raw materials, i.e., useful product components, from the collected waste, which can then be processed and recovered in the facilities included in the dedicated action. As part of the promotion of the innovations undertaken by the City and to raise the awareness of the population about circular waste management (separate collection, processing and recovery), it is recommended that a series of public campaigns and workshops are conducted (it can also be presented as dedicated events provided during classes in schools.) Educational and information activities covering zero waste and circular waste management topics will have an impact on waste prevention by informing the public about the obligation and need for waste recycling as well as promoting the reuse of products instead of replacing new ones.</p> <p>2. Installation of semi-underground waste disposal containers</p> <p>The traditional rubbish bin or household waste container is not aesthetically pleasing; its surface is often dirty or scratched. In the case of underground and semi-underground containers, aesthetics is maintained at the highest level. Underground and semi-underground containers are more efficient than containers for municipal waste. A multiplied surface area ensures that the waste containers are emptied less frequently by the waste services. As a result, logistical costs are significantly reduced. Due to the large amount of waste from the gastronomy sector and the generation of waste by arriving tourists in the city, a tidy and efficient system for collecting all types of waste is needed. The proposed semi-underground containers will enable the collection of separated waste in all fractions (paper, plastic, metal, bio-waste). The exact locations for these containers will be determined at a later stage, after appropriate analysis. These containers could also be used as local composting stations for marketplaces and producers. There are plans to install 600</p>	 <p><i>Trstenik location</i></p> <p>Main stakeholders</p> <div style="display: flex; justify-content: space-around;"> <div data-bbox="1691 965 1892 1093" style="border: 1px solid blue; padding: 5px; background-color: #e6f2ff;"> <p>City of Split - Urban Planning and Construction Department</p> </div> <div data-bbox="1904 965 2105 1093" style="border: 1px solid blue; padding: 5px; background-color: #e6f2ff;"> <p>City of Split – Department for Communal Affairs</p> </div> </div> <div data-bbox="1803 1109 2004 1228" style="border: 1px solid blue; padding: 5px; background-color: #e6f2ff; margin-top: 10px;"> <p>Čistoća d.o.o.</p> </div>

underground containers in 200 identified areas of the city. So far, 140 have been installed in the city of Split.

The city has recently secured funding to purchase equipment to improve the city's waste management system (this will include sensors to monitor and optimise waste collection). In addition, the implementation of a smart, sustainable and circular waste management system is planned.

Related actions

U1

O1

M1

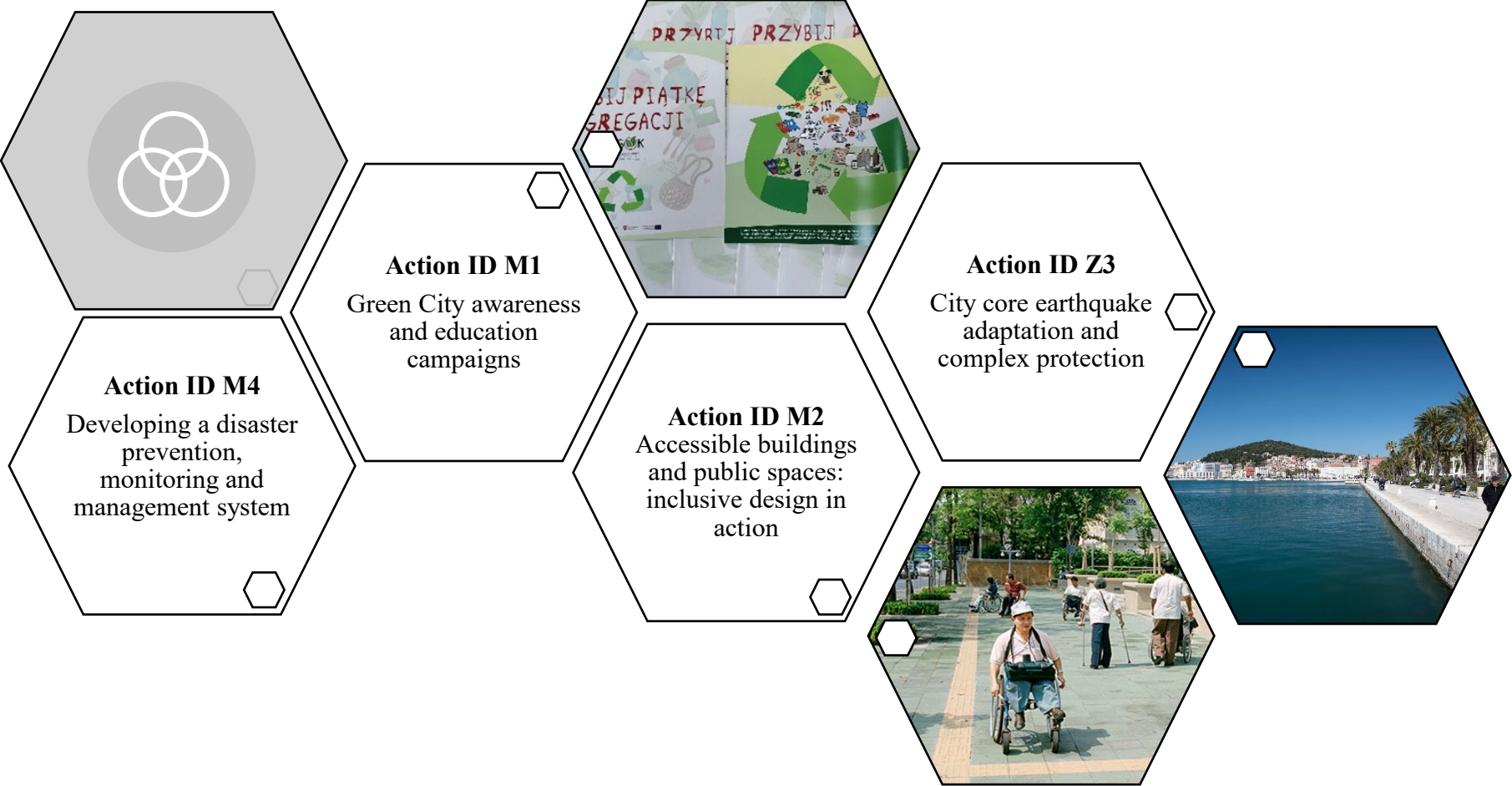
SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
	Design and construction of 2 recycling yards								
	Selection of appropriate locations for semi-underground waste containers								
	Purchase and installation of 600 semi-underground waste containers								
	Implementation of education and information campaigns about waste management								
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> Development Strategy of the City of Split until 2030 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> Ensuring the inclusiveness of the recruitment process and equal access for women to any new jobs generated. Ensuring universal design is applied for the locations of semi-underground waste disposal centers, to allow accessibility to all citizens. Increased quality of life and health benefits due to the positive effects of improved waste management and raised awareness on the circular waste management. 								

POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Sensor technology located in semi-underground containers to ensure filling limits and optimise the collection trucks routes. • Recycling units which can give credits to transportation cards with recycled amounts. 		
MAPPING OF RISKS, CHALLENGES	<p>The number of interventions for waste and container fires in some years is half to one-third of all other fire-related interventions. This suggests that there is a need for better maintenance, management and controlling of such areas. Installation of containers sensors in waste containers is intended to quickly inform about potential fires which will allow for a quick response to such events and prevent fires from spreading to larger areas.</p>		
COSTS	<p align="center">Pre-investment</p> <p align="center">-</p>	<p align="center">CAPEX</p> <p align="center">EUR 4,368,000</p>	<p align="center">OPEX</p> <p align="center">EUR 10,000</p>
COST CALCULATION	<p>Capital expenditure includes the cost of building two recycling yards in the Trstenik and Sirobuja areas, including promotional action on waste sorting. The investment cost has been estimated based on the Development Strategy of the City of Split until 2030 - EUR 1,368,000.</p> <p>In addition, the purchase and installation of semi-underground waste containers (with the appropriate software and sensors) is recommended as part of the action and to improve the current waste management system. These installations should be built in places attractive to tourists and where there is the greatest problem with waste storage. The purchase and installation of 600 containers is assumed. The cost including installation of one container has been estimated at around EUR 5,000. The total cost of this initiative will be approximately EUR 3,000,000. Total Capex expenditure will amount to EUR 4,368,000.</p> <p>Maintenance of the containers will cost approximately EUR 10,000 per year.</p> <hr/> <p align="center">Estimated savings</p> <p>Encouraging residents to sort waste will avoid the cost of subsequent waste segregation which will reduce the cost of waste collection.</p> <p>Underground waste disposal bins will increase the amount of time between waste collection due to increased space (one semi-underground container replaces five ordinary containers for mixed municipal waste), reducing the cost of waste collection and management. This may be reduced further if smart waste management systems are developed.</p> <hr/> <p>Data source: Development Strategy of the City of Split until 2030</p>		

**FINANCING
MECHANISMS /
SOURCE**

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*
 - C1.3. R2-I1 Waste disposal reduction programme
 - C1.3. R2-I2 - Program for remediation of closed landfills and sites contaminated with hazardous waste
2. *Environmental Protection and Energy Efficiency Fund (EPEEF)*
 - Environmental Protection
3. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*
 - developing and enhancing research and innovation capacities and the uptake of advanced technologies,
 - promoting the transition to a circular and resource efficient economy,
4. *Just Transition Fund*
 - investments in enhancing the circular economy, including through waste prevention, reduction, resource efficiency, reuse, repair and recycling,
5. *Local budget*

CROSS-SECTORAL ACTIONS





M1 GREEN CITY AWARENESS AND EDUCATION CAMPAIGNS

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2030	Enabling Action	C2 - Increase resilience of the city to natural risks and climate hazards	City of Split



MEASURES / INVESTMENTS COSTS [EUR]

Creation of an organizational unit - Energy Innovation Hub	2,627,600
SUM	2,627,600



TARGETED RESULTS

The number of education and information campaigns	The number of participants reached by the educational program
5 campaigns each year	10,000 participants each year



MEASURABLE BENEFITS

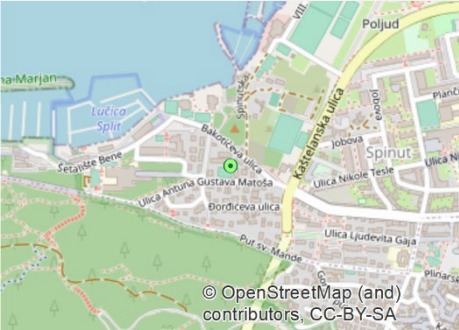
Job creation potential

31~60



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



<p>ACTION BENEFITS</p>	<ul style="list-style-type: none"> • Ensuring city sustainable development. • Creation of new employment opportunities. • Potential for local energy efficiency improvements. • Strengthening local human capital. • Development or increase of investment interest by energy companies in the city. • Improving climate change risk adaptation. 							
<p>DESCRIPTION AND SCALE OF ACTION</p>	<p>The city needs to develop and engage individuals at higher levels to advocate for changes and activities with state and county authorities related to topics over which the city does not have full jurisdiction. Cooperation is necessary in areas such as tourism, emigration, and the coastal belt.</p> <p>1. An Energy Innovation Lab - a place where any ideas, concepts and technologies can be gathered and tested under practical circumstances.</p> <p>Energy Innovation Lab will continue the development of part of the Technology Park in Split. This initiative will support ideas and solutions that help optimise energy production and consumption and enable cities to transition to a sustainable economy. It will create an ideal environment in which to study the future of urban energy supply, with the aim of demonstrating how the cities of the future can function in a climate-friendly manner. The plan for the activity is to focus on the energy system as a whole, data on buildings, the electricity grid, information and communications technology and user behaviour all feed in to one overarching energy research programme.</p> <p>These actions will consist of:</p> <ul style="list-style-type: none"> • Creating green energy sector job opportunities by leveraging the untapped potential and talent of the local workforce. • Facilitating access to funding for solutions in the renewable energy and energy efficiency sectors. • Linking green entrepreneurs to ecosystem partners, locally and internationally. • Encouraging female entrepreneurs to have a leading role in revolutionizing the Energy sector. <p>2. Implementation of education and information campaigns on the activities undertaken in the GCAP aimed at residents (e.g., schools), tourists and to promote the city.</p>	 <p><i>Energy Innovation Lab location</i></p> <p>Main stakeholders</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid gray; padding: 5px; background-color: #cccccc;">City of Split</div> <div style="border: 1px solid gray; padding: 5px; background-color: #cccccc;">University of Split</div> </div> <p>Related actions</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 5px;">U1</td> <td style="padding: 5px;">U2</td> <td style="padding: 5px;">U3</td> </tr> <tr> <td style="padding: 5px;">U4</td> <td style="padding: 5px;">T6</td> <td style="padding: 5px;">Z3</td> </tr> </table>	U1	U2	U3	U4	T6	Z3
U1	U2	U3						
U4	T6	Z3						

	<p>These campaigns will be targeted in terms of the sector and audience. They will present and ensure that GCAP activities are designed to achieve specific strategic objectives.</p> <p>One of the duties of public administration bodies is to conduct educational, informative and promotional activities in the field of nature protection, health and sustainable living. This task will include the implementation of campaigns, educational and information workshops, conferences and programs, events, staff trainings and social actions to increase public awareness of these aspects through various sources as websites, mobile apps, social networks, radio, flyers, posters, etc. These actions will be about among others the promotion of pro-ecological attitudes, appropriate use of rainwater, implementation of blue-green infrastructure solutions, the idea of closed-circuit economy, the effects of climate change.</p> <p>It is assumed that 5 projects will be implemented for around 10,000 participants each year.</p>								
SCHEDULE	<p style="text-align: center;">Action implementation steps</p>	2023	2024	2025	2026	2027	2028	2029	2030
	Creation of an organisational unit - Energy Innovation Hub								
	Establishment of a mechanism for the operation of the fund								
	Research, advisory and consultancy actions of the new entity								
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Air protection, ozone layer, climate change mitigation and climate change adaptation program for the area of the City of Split for period 2018-2021 • CitiEnGov (Interreg Central Europe) Cities for a Good Energy Governance 2016 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring the inclusiveness of the recruitment process and equal access for women to any new jobs generated. • Ensuring that educational workshops contain information on how to adapt the energy spending patterns to the specific needs, which will be available to all households, but especially those suffering from energy poverty and vulnerable groups. • Ensuring diversity of the target groups (e.g., age, gender, educational background, disabilities, minorities) in the implementation of campaigns, trainings, workshops, etc. 								

	<ul style="list-style-type: none"> • Potential to use education and information campaigns to promote STEM (science, technology, engineering, mathematics) professions among young girls. 							
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Organizing hackathons of the subject. • Generate a start-up friendly ecosystem focused on green oriented start-ups 							
MAPPING OF RISKS, CHALLENGES	Public awareness efforts and tax incentives have had a positive impact on the transition to renewable energy sources but are still slow and insufficient to bring about major changes. In the city, there is a risk of insufficient awareness among residents about proper waste management, transport attitudes to reduce the use of individual means of transportation. Implementing campaigns to educate and raise awareness among residents will help reduce the risks involved.							
COSTS	<table border="1"> <thead> <tr> <th>Pre-investment</th> <th>CAPEX</th> <th>OPEX</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>EUR 2,627,600</td> <td>EUR 4,409,300</td> </tr> </tbody> </table>	Pre-investment	CAPEX	OPEX	-	EUR 2,627,600	EUR 4,409,300	
Pre-investment	CAPEX	OPEX						
-	EUR 2,627,600	EUR 4,409,300						
COST CALCULATION	<p>Capital expenditure has been estimated on the basis of a project that is implemented by the University of Split, included in the Development Strategy of the City of Split until 2030, entitled "Blue European Digital Innovation Hub" - EUR 2,627,600.</p> <p>In addition, operational costs will represent the cost of implementing two educational events each year. The estimated cost of implementing one action was based on the completed project "Implementation of the educational-informational activities on sustainable waste management", whose value amounted to approx. EUR 363,400. Therefore, the costs associated with the implementation of two similar actions will be EUR 726,700.</p>							
	Estimated savings							
	Encouraging the uptake of green jobs will help reduce unemployment, improving the economic situation of residents and reducing the cost the city must pay out as benefits.							
	Residents will be more likely to partake in other green actions with cost-saving benefits.							
	Data source: Development Strategy of the City of Split until 2030							

**FINANCING
MECHANISMS /
SOURCE**

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*
 - C3.2. R3-I1 Introduction of a more functional project financing program framework research, development and innovation
2. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*
 - developing and enhancing research and innovation capacities and the uptake of advanced technologies,
 - developing skills for smart specialisation, industrial transition and entrepreneurship,
 - enhancing the effectiveness and inclusiveness of labour markets and access to quality employment through developing social infrastructure and promoting social economy,
 - improving equal access to inclusive and quality services in education, training and lifelong learning through developing accessible infrastructure, including by fostering resilience for distance and on-line education and training,
 - promoting the socioeconomic inclusion of marginalised communities, low-income households and disadvantaged groups, including people with special needs, through integrated actions, including housing and social services,
3. *Just Transition Fund*
 - investments in the creation of new firms, including through business incubators and consulting services, leading to job creation,
 - investments in research and innovation activities, including by universities and public research organisations, and fostering the transfer of advanced technologies,
 - upskilling and reskilling of workers and jobseekers,
4. *European Social Fund Plus*
 - promoting lifelong learning, in particular flexible upskilling and reskilling opportunities for all, considering entrepreneurial and digital skills, better anticipating change and new skills requirements based on labour market needs, facilitating career transitions and promoting professional mobility,
5. *Local budget*



M2 ACCESSIBLE BUILDINGS AND PUBLIC SPACES: INCLUSIVE DESIGN IN ACTION

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2025	Enabling Action	C3 - Increase accessibility, inclusivity, safety, resilience and sustainability of the city	City of Split: Department for Communal Affairs Department for Social Services



MEASURES / INVESTMENTS COSTS [EUR]



TARGETED RESULTS

Construction and modernisation of children's playgrounds	225,800	Number of children's playgrounds built	Number of elevators installed in buildings
Reconstruction of the children's playground	39,800	3 playgrounds	51 elevators
Increasing access for people with disabilities	66,400		
Subsidies for the installation of elevators in apartment buildings	464,800	Number of ramps installed in the city	Number of buildings which were adopted to ensure access by people with disabilities
Increasing access for people with disabilities in Split by setting up 10 new ramps in key locations	265,600	10 ramps	7 buildings
Creation of an access ramp and installation of a lifting platform for people with disabilities in the SC "Bazeni Poljud"	36,500		
Adaptation of buildings for access by people with disabilities	119,500		
SUM	1,218,400		



MEASURABLE BENEFITS

Job creation potential

10~15



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS

- Improving quality and accessibility of public spaces (incl. buildings and transport)
- Increasing equality and inclusion of vulnerable groups;

DESCRIPTION AND SCALE OF ACTION

1. Spatial adaptation of kindergartens and schools for the disabled – the action includes for example, installation of ramps to the entrances, increasing accessibility of toilets and adding elevators, installation of information boards and symbols with Braille signage, audio readers, overlays for intercoms.

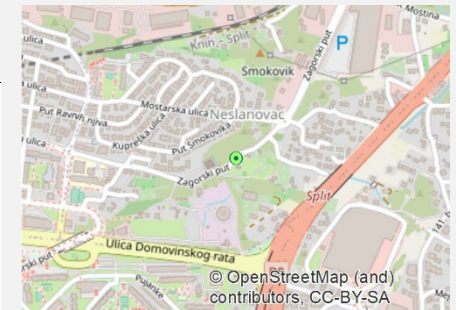
The construction of children's playgrounds at Neslanovac (along Zagorski put) and Pujanke, and reconstruction of the children's playground (GK Trstenik), will include guidelines to promote accessibility for all social groups as well as environmental issues.

In addition, there are plans to launch a programme of subsidies for the installation of elevators in apartment buildings.

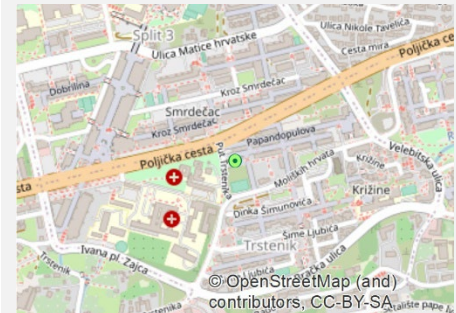
The action will also include initiatives to increase access for people with disabilities in Split by setting up 10 new ramps in key positions. In order to increase the accessibility of city facilities and enable improved mobility of persons with disabilities in the city of Split, all necessary documentation will be prepared, and construction ramps will be built that facilitate access to defined locations. Creation of an access ramp and installation of a lifting platform for people with disabilities in the SC "Bazeni Poljud".

2. Investments in accessibility infrastructure maintenance programme including spatial adaptation of pavements, roads and curbs.

Adaptation of buildings for access by people with disabilities. Accessible buildings and public spaces, support and expansion of ongoing actions implemented by the city.



Neslanovac (Zagorski put) location



GK Trstenik location

SCHEDULE	Action implementation steps		2023	2024	2025	2026	2027	2028	2029	2030	
	Construction and modernisation of children's playgrounds										
	Creation of a fund for subsidies for the installation of elevators										
	Installation of ramps to facilitate access to buildings in the city										
	Works related to increasing the accessibility of public infrastructure in the city										
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> Local Plan for Implementation of Agenda 2030 for Sustainable Development of the City of Split 										
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> Ensuring the inclusiveness of the recruitment process and equal access for women to any new jobs generated. Increased quality of life as a result of improved accessibility in the city to persons with disabilities, the elder, parents with children (greater social inclusion, greater independence). Potential for the former caregivers to join the labour market or for greater social inclusion, due to the spatial adaptation of kindergartens and schools for persons with disabilities. 										
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> Step-by-step navigation applications to be installed in buildings, especially starting with public buildings, aided by a mobile application. In this way, the elderly, visually impaired and hearing impaired are provided with step-by-step voice guidance on the mobile application. Utilisation of smart lighting technologies to enable children's playgrounds to be activated in evenings hours. 										
MAPPING OF RISKS, CHALLENGES	The city faces challenges in ensuring the accessibility of public spaces (e.g., access to beaches, insufficient number of parking spaces reserved for people with disabilities), to buildings, transportation for people with limited mobility. Implementation of the solutions developed under the action will reduce the risk of inaccessibility of infrastructure and services for vulnerable groups.										
COSTS	Pre-investment	CAPEX	OPEX								
	-	EUR 1,218,400	EUR 243,700								



SC "Bazeni Poljud" location

Main stakeholders



COST CALCULATION	<p>Capital expenditure includes:</p> <ul style="list-style-type: none"> • Construction of children's playgrounds Neslanovac (along Zagorski put) and Pujanke EUR 225,800 • Reconstruction of the children's playground (GK Trstenik) EUR 39,800 • Increasing access for people with disabilities EUR 66,400 • Subsidies for the installation of elevators in apartment buildings EUR 464,800 • Increasing access for people with disabilities in Split by setting up 10 new ramps in key positions EUR 265,600 • Creation of an access ramp and installation of a lifting platform for people with disabilities in the SC "Bazeni Poljud" EUR 36,500 • Adaptation of buildings for access by people with disabilities EUR 119,500 <p>The total amount of capital expenditure is EUR 1,218,400. Operating costs were estimated at 20% of capital expenditure and sum up to EUR 243,700.</p> <hr/> <p style="text-align: center;">Estimated savings</p> <p>Making more buildings accessible will reduce costs for people with disabilities who previously could only access adapted options that are often more expensive than regular options.</p> <hr/> <p>Data source: Development Strategy of the City of Split until 2030</p>	<p style="text-align: center;">Related actions</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">U1</td> <td style="text-align: center;">U2</td> <td style="text-align: center;">U3</td> </tr> <tr> <td style="text-align: center;">T3</td> <td style="text-align: center;">E4</td> <td style="text-align: center;">M1</td> </tr> </table>	U1	U2	U3	T3	E4	M1
U1	U2	U3						
T3	E4	M1						
FINANCING MECHANISMS / SOURCE	<ol style="list-style-type: none"> 1. <i>EU Recovery and Resilience Facility (RRF) Grants and Funding</i> <ul style="list-style-type: none"> • C3.1. R1-I2 Construction, extension, reconstruction and equipping of primary schools for the needs single-shift work and full-day classes • C1.4. R1-I2 Improving the system of exercising the rights of persons with disabilities in the field of mobility. 2. <i>European Regional Development Fund (ERDF) / Cohesion Fund (CF)</i> <ul style="list-style-type: none"> • fostering the integrated and inclusive social, economic and environmental development, culture, natural heritage, sustainable tourism and security in urban areas. 3. <i>Local budget</i> 							



M4 DEVELOPING A DISASTER PREVENTION, MONITORING AND MANAGEMENT SYSTEM

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2026	Capital investment	C2 - Increase resilience of the city to natural risks and climate hazards	City of Split City of Split – Development Department Javna vatrogasna postrojba Split



MEASURES / INVESTMENTS COSTS [EUR]



TARGETED RESULTS

Development of Smart city application	1,000,900
Renewal of the LAN network	1,083,700
Master Data Management	1,062,500
Emergency monitoring system	149,600
Construction of the City of Split's own optical network hubs and connection of remote MoDs budget users and public companies to the City of Split's optical network	1,062,500
SUM	4,359,200

Established Master Data Management	Number of smoke and temperature sensors installed in the forest areas 300 sensors
Renewed LAN network	Number of earthquake sensor installed 50 sensors



MEASURABLE BENEFITS

Job creation potential
6~30



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



ACTION BENEFITS	<ul style="list-style-type: none"> • Digitising urban services and information on an integrated platform. • Increasing accessibility to urban services and information. • Increasing quality and transparency of municipal operations. • Increasing adaptation and resilience to extreme weather events: fires, seismic risk, sea level rises, floods and droughts. 	<p style="text-align: center;">Main stakeholders</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td style="padding: 5px;">City of Split– City Office</td> <td style="padding: 5px;">City of Split– City Development Department</td> </tr> <tr> <td style="padding: 5px;">Javna vatrogasna postrojba Split</td> <td style="padding: 5px;">University of Split</td> </tr> </table>	City of Split– City Office	City of Split– City Development Department	Javna vatrogasna postrojba Split	University of Split		
City of Split– City Office	City of Split– City Development Department							
Javna vatrogasna postrojba Split	University of Split							
DESCRIPTION AND SCALE OF ACTION	<p>Developing a "disaster management / safety plan" solutions plan supported by smart solutions is needed to increase the city's capacity to adapt to Climate Change, increasing the quality of public services and the transparency of administration. The action is closely related to U1 action, which includes a new environmental database and risk mapping system.</p> <p>1. Development of smart city application</p> <p>The project represents a synergy of technological solutions that jointly provide citizens / users with digital services available from budgetary and extra-budgetary users and companies owned by the city. The emphasis of the project is on providing the public with useful services and information within an intuitive presentation interface. Creation of a 'city management platform'. This platform should include a mobile application where, in addition to sharing valuable information, citizen-friendly and environmentally sensitive demands will be collected.</p> <p>This platform, in combination with the app, will additionally create an emergency warning system (floods, fires, storms, rains, droughts), but will also create the potential to expand and integrate other possibilities, such as tourist information, a travel planner or the purchase of tickets and other city services.</p> <p>All these functionalities should be based on an Open Data Platform, where raw data and generated structured information on the platform are shared.</p> <p>The data collected in the database should be gathered from communication infrastructure in order to receive data continuously and immediately from different points of the city. An independent installation from existing GSM or Wi-Fi infrastructure (LoraWAN should be preferred).</p> <p>2. Placement of LpWan sensors for fire alarm; by placing temperature and CO₂ level sensors in forests, historical buildings and industrial facilities.</p> <p>It is about the development of a planned communication and warning system over the city platform to the responsible peoples when there is a sudden increase in the rising temperature or CO₂ level as a sign of fire in</p>	<p style="text-align: center;">Related actions</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td style="padding: 5px;">U1</td> <td style="padding: 5px;">U2</td> <td style="padding: 5px;">U3</td> </tr> <tr> <td style="padding: 5px;">E1</td> <td style="padding: 5px;">M1</td> <td style="padding: 5px;">M4</td> </tr> </table>	U1	U2	U3	E1	M1	M4
U1	U2	U3						
E1	M1	M4						

	<p>historical or industrial buildings. There are plans to install a total of 150 such sensors (2 CO₂ sensors and 1 earthquake sensor per building) in around 50 buildings.</p> <p>In forest areas, especially in inaccessible areas with the use of smoke and temperature sensors mounted on poles, can ensure that sudden change alarms are sent to the inform the competent institutions. There are plans to install 300 such sensors (CO₂ and earthquake sensors).</p> <p>For this, a LoraWan coverage plan should be made in the city, with gateways installed at emission points in accordance with this plan. It is estimated that the gateways will be established in 30 points across the city. If it is outside the city, in forest areas, a coverage area of approximately 10 km² per access point can be envisaged in the areas to be covered.</p> <p>In addition to the above-mentioned rapid information technology, there should also be a rapid intervention and information retrieval system, and even the ability to stop the process with small interventions.</p>								
SCHEDULE	<p style="text-align: center;">Action implementation steps</p>	2023	2024	2025	2026	2027	2028	2029	2030
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> • Program for mitigation of climate change, adaptation to climate change and protection of the ozone layer of the city of Split • Strategy for the development of the city of Split until 2030 • Development Strategy of Split urban agglomeration for the period until the end of 2027 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> • Ensuring the inclusiveness of the recruitment process and equal access for women to any new jobs generated. • Ensuring that the mobile app includes audio feature and information in multiple foreign languages, facilitating its use for visually impaired persons and the tourists. • Potential to use the platform for systematic collection of gender-segregated data, such as transportation patterns, time spent on unpaid work, GBVH cases, etc. 								

	<ul style="list-style-type: none"> The use of digital technologies and the digital literacy of the city can be improved among the city departments. 						
POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> Increasing the number of new start-up initiatives or private enterprises in the city with the introduction of an open data system. The city to have an IoT platform where all city data is transferred. Improving the digital literacy of the city. Encouraging the use of advanced technologies in the city administration in responding to disasters and transferring the operation of these technologies to other regions as a model. 						
MAPPING OF RISKS, CHALLENGES	<p>In the last three decades, the expansion of areas with high levels of fire danger was observed. Trends show the extension of the fire season from May to October due to climate changes, connected to solar radiation, air temperature, relative humidity and precipitation, wind direction and intensity. The increased droughts can lead to a faster and greater spread of fire, difficulty in controlling it. Human negligence and the lack of proper monitoring may create the risk of more frequent fires events. To prevent fires, it is necessary to monitor certain factors, such as soil dryness. In order to react quickly to fires, before they can spread and cause significant damage, special sensors must be installed in the right places. These objectives will be achieved under this action.</p> <p>Challenges:</p> <ul style="list-style-type: none"> It is necessary to prepare a data management team for the operation of the IoT platform, to improve capacities and start active use of the system. For this, a platform team should be organised within Split. It is necessary to establish a data governance model between the city's departments, to determine the duties and responsibilities, data and warning systems. 						
COSTS	<table border="1"> <thead> <tr> <th>Pre-investment</th> <th>CAPEX</th> <th>OPEX</th> </tr> </thead> <tbody> <tr> <td>-</td> <td>EUR 4,359,200</td> <td>EUR 61,400</td> </tr> </tbody> </table>	Pre-investment	CAPEX	OPEX	-	EUR 4,359,200	EUR 61,400
Pre-investment	CAPEX	OPEX					
-	EUR 4,359,200	EUR 61,400					
COST CALCULATION	<p>Capital expenditure will be related to the implementation of actions that are included in the Development Strategy of the City of Split until 2030</p> <ul style="list-style-type: none"> Smart city application – EUR 1,000,900. Renewal of the LAN network – EUR 1,083,700. Master Data Management – EUR 1,062,500. 						

	<ul style="list-style-type: none"> • Construction of the City of Split's own optical network hubs and connection of remote MoDs, budget users and public companies to the City of Split's optical network – EUR 1,062,500. <p>Costs associated with the emergency monitoring system (fires and earthquakes) include (in total 149,600):</p> <ul style="list-style-type: none"> • Purchase and installation of 30 gateways (EUR 1400 per 1 gateway). Total cost EUR 42,700. • Purchase of 150 sensors for the buildings (EUR 140 per 1 sensor). Total cost EUR 21,400. • Purchase of 300 sensors including supported field (EUR 285 per 1 sensor). Total cost EUR 85,500. • First installation and implementation of IoT platform EUR 19,000. <p>Total Capex expenditure will amount to approx. EUR 4,359,200.</p> <p>The annual operating costs of the emergency system involve operating fees of approximately EUR 950 and salary costs for 5 employees - EUR 61,400 (average monthly salary approximately EUR 1,000).</p> <hr/> <p style="text-align: center;">Estimated savings</p> <hr/> <p>Disaster prevention actions will help to reduce re-build costs.</p> <hr/> <p>Data source: Development Strategy of the City of Split until 2030, Projects implemented by Arup</p>	
FINANCING MECHANISMS / SOURCE	<ol style="list-style-type: none"> 1. <i>EU Recovery and Resilience Facility (RRF) Grants and Funding</i> <ul style="list-style-type: none"> • C2.2. R4-I1 Further optimisation and decentralisation of local and regional units self-government through support for functional merger, • C2.3. R3-I8 Development of a digital mobile platform, • C2.3. R3-I15 Establishment of application solutions in tourism with the aim of administration relieving the burden on entrepreneurs and transforming the tourism model towards sustainability, • C2.3. R4-I2 Construction of passive electronic communication infrastructure, 2. <i>European Regional Development Fund (ERDF) / Cohesion Fund (CF)</i> <ul style="list-style-type: none"> • reaping the benefits of digitisation for citizens, companies, research organisations and public authorities, • enhancing digital connectivity, • enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution, 3. <i>Just Transition Fund</i> <ul style="list-style-type: none"> • investments in digitalisation, digital innovation and digital connectivity. 4. <i>Local budget</i> 	



Z3 CITY CORE EARTHQUAKE ADAPTATION AND COMPLEX PROTECTION

TIMESCALE	TYPE OF ACTION	OBJECTIVES/PRIORITIES	ACTION OWNER
2023-2027	Capital investment	C2 - Increase resilience of the city to natural risks and climate hazards	City of Split - Department for Social Services City of Split - Administrative Department for Spatial Planning and Construction



MEASURES / INVESTMENTS COSTS [EUR]

Mapping Seismic Vulnerability and Risk of Cities

675,500

SUM

675,500



TARGETED RESULTS

The city core buildings structures, technical condition and damages mapped
100%

A plan of needed interventions to ensure buildings construction safety in case of earthquake
List of interventions



MEASURABLE BENEFITS


Job creation potential

1~5



IMPACT ON THE IMPLEMENTATION OF THE SUSTAINABLE DEVELOPMENT GOALS



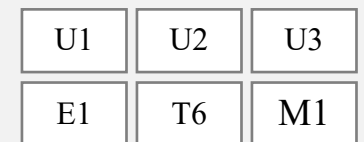
<p>ACTION BENEFITS</p>	<ul style="list-style-type: none"> • National heritage protection • Citizens and tourist safety level improvement • Maintenance of the city attraction level for the tourism, by constant raising of the safety levels, and resources quality. 	
<p>DESCRIPTION AND SCALE OF ACTION</p>	<ol style="list-style-type: none"> 1. Site examination, mapping and city core protection phased plan development. 2. Strengthening against liquefaction, sliding, rock cracking and for selected objects, along the actions phasing plan. <p>City core earthquake adaptation and complex protection of heritage value, safety of society and development of measures for multi-phase testing and location analysis.</p> <p>Analysis of city core buildings structures, technical condition and damages mapping, listing possible interventions to ensure buildings construction safety in case of earthquake.</p> <p>The multi-stage, -discipline and mixed-approach program shall consider the following key areas and measures:</p> <ul style="list-style-type: none"> • Detailed soil analysis both in-situ and laboratory, comprising of numerous dynamic and cyclic tests accompanied by specialised 3D modelling, ended with Soil classification, detailed seismic zones designation, bearing capacity of foundations assessment. • Detailed query of the objects in question with adequate classification referred to the soil classification and zoning designation. • Structural analysis of the buildings and state assessment. • Model analysis of the resonance. • Protection measures designation. • Execution plan development. • Monitoring system introduction. • Observation and extension plan development. 	

Varoš and city core location

Main stakeholders



Related actions



	<ul style="list-style-type: none"> Establishing of the data based decision-making mechanism that supports special operations introduction, in terms of protection, education, rescue and rebuild. Establishing of the monitoring data collection system supporting city management system. <p>The creation of a database and risk mapping will be possible thanks to the newly installed sensors, which were included in the previous dedicated action.</p> <p>Introduction of smart solutions in terms of monitoring data management, communication and resources optimisation and designation provides an opportunity to improve the planned future actions and limit the necessary costs.</p>								
SCHEDULE	Action implementation steps	2023	2024	2025	2026	2027	2028	2029	2030
	Project phasing scheme preparation. Detailed query of the objects under question accompanied by detailed state assessment and foundation conditions together with soil analysis.								
	Designing of the protection and repair measures. Monitoring plan and data management system design and introduction.								
	Construction and further development plan.								
	Monitoring, education, and further development.								
	Project phasing scheme preparation. Detailed query of the objects under question accompanied by detailed state assessment and foundation conditions together with soil analysis.								
ENABLING POLICIES, STRATEGIES AND ACTIONS	<ul style="list-style-type: none"> Development Strategy of the City of Split until 2030 Development Strategy of Split urban agglomeration for the period until the end of 2027 Development Plan of the Split-Dalmatia County 2022-2027 								
POTENTIAL TO DEVELOP INCLUSIVITY AND IMPROVE SOCIAL ASPECTS	<ul style="list-style-type: none"> Ensuring a balanced participation of all genders in site examination, mapping and city core protection phased plan development. Ensuring the inclusiveness of the recruitment process and equal access for women to any new jobs generated. 								

POTENTIAL FOR THE IMPLEMENTATION OF INNOVATIVE AND SMART TECHNOLOGIES	<ul style="list-style-type: none"> • Installation of motion sensors working with LoraWan on the main load-bearing columns of valuable historical buildings. observation of the limit values of the movement and vibration etc. in the axes of the columns - beams - load-bearing slabs of such buildings. carrying out remedial strengthening works related to the results of this. • Equipping the escape routes of historical buildings with smart lighting and audible warning systems. activation of location services in visitor cards with Beacons. • If it is possible to have an extension made in widely visited buildings, these extensions should be produced as strong shelter-containers - security hut etc. Wireless communication and panic-help buttons should be activated in these areas. 									
MAPPING OF RISKS, CHALLENGES	<p>The most probable adverse event around the city of Split involves an earthquake of intensity V° MSK scale. The frequency of this event size is 1 in 2 to 20 years, and the probability of this event is 5-50%. The risk of earthquakes is particularly dangerous for houses located in the historic core –and districts City: (50%) and Varoš (72%), where most housing was built before 1920. In this area of the city the greatest damage to housing stock and casualties are expected. Implementing the solutions of this action will reduce the impact of this risk.</p>									
COSTS	<table border="1"> <thead> <tr> <th>Pre-investment</th> <th>CAPEX</th> <th>OPEX</th> </tr> </thead> <tbody> <tr> <td>EUR 675,500</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Pre-investment	CAPEX	OPEX	EUR 675,500	-	-			
Pre-investment	CAPEX	OPEX								
EUR 675,500	-	-								
COST CALCULATION	<p>The pre-investment expenditure has been estimated on the basis of the project conducted in Greece "Mapping Seismic Vulnerability and Risk of Cities (MASSIVE)" and is related to the design and develop:</p> <ul style="list-style-type: none"> • a model seismic risk assessment of the pilot area, • scenarios for earthquake occurrence based on the knowledge on areas seismicity and • a population evacuation model for the selected areas. <p>Considering the indexation of costs by inflation, the estimated cost of implementing this project is EUR 675,500.</p> <p style="text-align: center;">Estimated savings</p> <p>Earthquake impact prevention actions will help reduce damage and therefore reduce re-build costs.</p> <p>Data source: European Commission - Mapping seismic Vulnerability and Risk of Cities (MASSIVE)</p>									

**FINANCING
MECHANISMS /
SOURCE**

1. *EU Recovery and Resilience Facility (RRF) Grants and Funding*

- C2.2. R4-I1 Further optimisation and decentralisation of local and regional units self-government through support for functional merger,
- C6.1. R4-I1 Development of a seismological data network

2. *European Regional Development Fund (ERDF) / Cohesion Fund (CF)*

- reaping the benefits of digitisation for citizens, companies, research organisations and public authorities,
- enhancing digital connectivity,
- enhancing protection and preservation of nature, biodiversity and green infrastructure, including in urban areas, and reducing all forms of pollution,

3. *Just Transition Fund*

- investments in digitalisation, digital innovation
- and digital connectivity.

4. *Local budget*