GREEN CITY ACTION PLAN

TIMIȘOARA

Municipiul Timișoara

European Bank for Reconstruction and Development

EBRD GREEN CITIES

Resources & Waste Advisory Group

ARCADIS Design & Consultancy for natural and built assets

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Message of the Mayor

Timișoara was and is a city of innovation, including in terms of sustainable urban development. We are keeping pace with the green trend in Europe and want to be a national benchmark in this respect. This train is not one we can afford to miss, out of convenience or because of a misleading impression that the time horizon of change is still imperceptible.

Timișoara, like the rest of Europe, is constantly evolving and developing, and has to foresee essential changes for our future. We will soon be faced with the challenge of finding new resources to ensure a better quality of life in the city.

Timișoara is not an isolated entity, but an interconnected regional centre. Over the last 20 years the urban boundaries have been permanently extended and neighbouring localities have become part of the metropolitan ecosystem. We have a duty to do our utmost to prepare Timișoara, its peri-urban localities and the entire region for how the world would be like in 10-20 years' time.

Every day new challenges arise in our lives, and I believe that this Green City Action Plan, through which we join a large number of European cities, can help us to make the transition to the sustainable reality of tomorrow. The current context, in which the world is facing an economic crisis, with both resource and energy issues at its core, sends us a very clear message: we must act now!

The green transition is an urgent and relevant necessity. We, as a public administration, take this issue as an absolute priority, both for the investments we make and for the functioning of the public services we provide. The ecological transition is not a transient fad, or an interesting addition for a specific niche, but it is our plan for the sustainable modernization of the city and the capitalization of Timișoara's potential as a leading city. This transition to a green city is perhaps the most important strategic realignment of the Municipality's investments. In this respect, our objectives are as well defined as possible and cover both Timișoara and the peri-urban areas. Thus, we want the city to be connected through green mobility corridors with the metropolitan areas, reducing the number of cars and offering efficient municipal services, connected with the whole of the wider Timișoara area. At the same time, Timișoara needs functional partnerships for a green urban digital transformation and a clean energy transition.

This is a trip we have already began. We have a public transport fleet that is constantly being renewed with state-of-the-art electric buses and trams to reduce CO_2 emissions. We encourage alternative transport and are constantly expanding the city's network of cycle paths. We have planted thousands of trees in the neighbourhoods and are upgrading green spaces. We have digitalised local government services and document management in the internal circuit of the institution.

Our medium- and long-term goal remains to improve the quality of life of Timișoara's citizens by applying a vision that may seem fanciful now, but no change of course has ever come without resistance.

The Green City Action Plan is therefore the foundation for the future and the starting point for restructuring a set of values that must also include climate policies.

Mayor of Timișoara, *Dominic FRITZ*

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List of abbreviations

AD	Anaerobic digestion
ATU	Administrative Territorial Unit
BAT	Best Available Technique
CDW	Construction and demolition waste
CHP	Combined Heat and Power (Plant)
DH	District Heating
EBRD	European Bank for Reconstruction and Development
EV	Electric vehicle
GCAP	Green City Action Plan
LED	Light-emitting diode (fixture)
LEZ	Low Emission Zone
MSTC	Multimodal smart transport corridor
NzEB	Nearly zero Energy Building
PAYT	Pay-as-you-throw
PPP	Public-private partnership
PSR	Pressure-State-Response (Framework)
PT	Public Transport
PUF	Policy and Urban Framework
RES	Renewable Energy Sources
RVA	Risk and Vulnerability Assessment
SCADA	Supervisory control and data acquisition
SEP	Stakeholder Engagement Plan
SI&DT	Smart Integration and Digital Transformation
SMA	Smart Maturity Assessment
SO	Strategic Objective
SUMP	Sustainable Urban Mobility Plan
TAS	Technical Assessment Report
WEEE	Waste from electrical and electronic equipment
WWTP	Wastewater Treatment Plant

Executive summary

Timișoara is a vibrant multi-cultural city. Its concentric layout dates back to the 19th century, when urban development progressively spread from the inner historical centre towards the outskirts. Undoubtedly also due to its charming Bega water canal crossing the entire city and the beautiful parks located along it, the city was always considered **one of the most liveable cities in Romania**.

The **EBRD's Green Cities Programme** is an excellent opportunity for the city to look at its strengths and weaknesses, to assess the challenges it faces and its development potential in an integral and systemic manner, while taking into account environmental conditions and the wellbeing of citizens. The current **Green City Action Plan** (GCAP) is a strategic document, revealing a different and novel perspective on the urban development direction Timișoara will follow in the coming 15 years. It incorporates the results of a one-year work done by a team of experts lead by EBRD team in London and Bucharest, together with the representatives of Timișoara Municipality, with the support of RWA Group and Arcadis consultancies. The GCAP development process followed the EBRD methodology, which starts with a comprehensive **assessment of the state of the urban environment and examines the pressures** on the environment coming from seven sectors: transport, energy, buildings, industry, water, waste and land use.

Based on this assessment, the city defined its main **environmental** and sectoral development **challenges** and opportunities. The former are related to poor air quality, potential soil-contaminated sites and availability and accessibility to quality green spaces. **Air quality** has been defined as the most stringent environmental challenge due to the high number of cars regularly circulating in the urban area and the district heating production facilities that are still using coal. Along with the above, a list of **sectoral pressures** for the urban environment has been drafted. This list included the key aspects which the Municipality would tackle via this GCAP and provided the starting point to formulating the GCAP vision and strategic objectives.

The vision of the GCAP is to make Timișoara a sustainable city.

Through the adoption of this Green City Action Plan, the Municipality commits to the vision of a sustainable and inclusive city to be fulfilled within the next five (through short-term actions), respectively fifteen years (through long-term actions). For this purpose, the city will work towards greening the city, as it is dealing step by step with the complex challenges of private car-dominated

traffic, with the expansion of the city in the metropolitan areas where urban services are less available, and with a now obsolete fossil fuel-based district heating system and housing infrastructure. The GCAP actions will bring forth the leadership potential of Timișoara through digital solutions, increasing the share of prosumers and RES-based energy production, creating green lungs for the city through blue-green infrastructure, improving resilience and prioritizing sustainable modes of transport.

Five strategic objectives have been defined for making sure that the vision of a sustainable city would be reached.

Strategic objectives

- SO1 **Functional partnerships for smart green urban development.**
- SO2 **Carefree is car-free: for easy-flowing, streamlined mobility.**
- SO3 **Clean and just energy transition.**
- SO4 **Green connectivity – green lungs bringing fresh air and biodiversity to the Timisoara extended area.**
- SO5 **Futureproof and resilient municipal services for the Timisoara extended area.**

A total of **34 short-term actions** are included in the GCAP. Altogether, they provide an investment plan and equate to a total funding requirement of around **781.7 million EUR (CAPEX)** over a 5-year period. 17 actions require **investments**, 7 actions foresee **policy** measures, while 10 actions have the ambition to both trigger investment and policy change. The total **annual GHG emissions savings** resulting from implementation of the GCAP short-term actions is estimated at 240,000/t CO_2eq.

The GCAP is conceived to be in line with the Smart City Strategy of Timișoara, and to incorporate as many digital elements as possible in all actions.

The plan is structured based on the analysed sectors. This was done for the ease of reading and understanding of the relations between the key challenges addressed by sectoral actions. Still, the actions included in the present document are interconnected and some of them are addressing more than one challenge and/or challenges from other sectors as well. In addition to pointing out the key challenges and detailing the short-term actions (for the upcoming 5 years), the plan also indicates the necessary long-term actions (up to 15 years) for reaching the strategic objectives and the GCAP vision. The below paragraphs present an overview of each GCAP sector, highlighting the sectoral challenges and the short-term actions presented in detail in the GCAP.

Transport

For the **Transport** sector, key challenges are related to traffic congestions, public transport routes that are not adjusted to real needs and the development of the peri-urban areas, absence of dedicated infrastructure to streamline public transport, lack of an integrated transport planning and multimodal connectivity of Timișoara with the surrounding settlements, and lack of an adaptive traffic management system.

Short-term actions	Brief description
1. **Transforming the inner-city circular roads 1 and 2 into multimodal smart transport corridors**	Redesign and reshape the inner-city circular roads 1 and 2, thereby solving conflicts with radial roads and transforming these into multimodal smart transport corridors (MTSC).
2. **Updating the Sustainable Urban Mobility Plan (SUMP) and strengthening institutions**	Updating the Sustainable Urban Mobility Plan in which to include measures specific to both the city and the metropolitan area, planning of transport routes, mobility hubs as well as car parking areas and new street design concepts and features.
3. **Extending and modernizing the cycling infrastructure in Timișoara**	Investments will expand and improve the quality of non-motorised transport networks at the metropolitan level, constructing of dedicated bike lanes, and installing of smart traffic lights for micro-mobility vehicles.
4. **Establishing coherent public transport corridors**	Investments in modern and comfortable public transport vehicles, construction of public transport and mixed modal hubs, updating the e-ticketing system of the public transport company, extension of the tram and trolleybus network, establishment of dedicated PT lanes, modernisation of PT parking facilities and bus stops.
5. **Expanding and improving pedestrian areas**	Increasing the overall quality of the pedestrian experience in the public space, while also increasing traffic safety. Investment into pedestrian infrastructure will cover not only the city centre, but the historic neighbourhoods and the newly developed districts as well.
6. **Modernizing the circular city road 4 and resolving conflicts with radial roads**	The outer-city circular road 4 will be rehabilitated and certain sections of it will be constructed in order to close the circular road.

Energy

The **Energy** sector is one of the key sectors the Municipality is currently focusing on due to its strategic importance and the environmental impacts generated by the district heating system. Key challenges are related to low energy performance of the public lighting system, low level of centralised RES harnessing system, inefficient and fossil fuel-based energy generation, underperformance of the existing district heating system.

Short-term action	Brief description
7. **Smart and efficient, large-scale public lighting programme**	This programme will target the entire city and will focus on the replacement of poles, light bulbs and network cables, introducing a new, smart and energy efficient LED system.

Short-term action	Brief description
8. **Rehabilitating and modernizing the District Heating (DH) network**	The main investments will gravitate around the district heating distribution network (approx. 60 km) which needs urgent rehabilitation, and the development of specific studies for geothermal energy source.
9. **Flexible, highly efficient and hydrogen-ready CHP**	This action foresees the design and building of a new, flexible, highly efficient, hydrogen and renewable–ready modular CHP system of 45 MWe / 48 MWth. Investments implying the use of natural gas will have to be Paris-aligned and appropriately sized, while energy transition solutions from coal to renewable energy sources will also be foreseen.
10. **In-depth energy efficiency awareness-raising programme**	The Municipality develops and implements a broad awareness-raising programme tackling several issues of the local energy system, highlighting the importance of conscious energy use and the use of renewable energy sources, and proposes solutions for energy efficiency.
11. **Installing electric vehicle charging stations enabled through smart grid upgrades**	As part of the action, the locations and type of charging stations will be identified, together with financing sources and business models for their operation, working together with the electricity grid operator to ensure necessary upgrades and promote grid improvements.

Buildings

The challenges in the **Building** sector are related to administrative barriers obstructing the deep retrofit of buildings, a large number of obsolete residential and public buildings, lack of coherent datasets on energy indicators and low level of absorption and implementation of large-scale projects for deep renovation of buildings.

Short-term actions	Brief description
12. **Improving One-stop-shop for building retrofit v2.0. including local financing facility for energy efficiency and renewable energy measures**	The One-stop-shop v2.0 will be established in the Municipality's main EE office and will be dedicated to facilitating citizens' access to knowledge, solutions, suppliers, technologies, partners, and financing for deep retrofit and (n)ZEB constructions.
13. **Implementing deep energy retrofit of block of flats**	The energy efficiency measures will follow the deep retrofit hierarchy and the residents will be encouraged to take demand-side measures to further reduce energy consumption in their buildings.
14. **Implementing EE and small-scale RES programme for non-historic public buildings and facilities**	The programme will prioritise the buildings with the highest energy consumption. The type of measures envisaged are the retrofit of building envelop, the modernization of heating and hot water systems, improvement of lighting, adoption of Building Management Systems (BMS) and small-scale renewable energy.
15. **Implementing New European Bauhaus and nZEB building Pilot Projects**	The Municipality will create a Centre for Art, Technology and Experiment called MultipleXity in the former tram repair workshops and tram depot. In addition, it will transform the "Round Block", a landmark building from the communist era located in the city centre.

Short-term actions	Brief description
16. **Establishing renewable energy communities to reduce energy poverty**	The action aims to reduce energy poverty by promoting renewable energy communities through a pilot project in municipal buildings, enabling the sharing of generated energy with social housing units or low-income families for free or at a reduced cost.
17. **Heat pumps and solar heating programme for residential buildings in areas not connected to DH**	Promote the widespread adoption of heat pumps and solar heating systems in residential buildings located in selected areas of Timișoara that are not connected to the District Heating (DH) network.

The **Industry** Sector in Timișoara is currently focused on automotive and electrotechnical components, logistics and IT sector. The key challenges are related mainly to insufficiently developed transport infrastructure for freight flow and the pressure induced by industrial facilities in mixed-use urban areas.

Short-term actions	Brief description
18. **Developing logistics hubs to optimize freight and traffic flows in and around the city**	Keeping non-polluting light industry and other economic activity accessible in the municipality, including in the inner city requires the development of an efficient, seamless, and green logistics system. In such a system goods are bundled in logistics hubs at the periphery of the city and delivered by electric vans or cargo bikes.
19. **Creating and running a platform for partnerships in green urban innovation**	The action includes soft and hard measures, including organization of networking and matching events as well as open calls for identification of innovative green urban development solutions.
20. **Enhancing the air quality monitoring network, especially in the proximity of industrial sites**	The action refers to the monitoring of air quality in the vicinity of industrial areas inside the city, focusing on areas destined for mixed development zones and where pollution pressure may increase.

The **Water** sector in Timișoara is one of the well-developed sectors. In recent years, many projects aiming at modernizing and rehabilitating the water and wastewater infrastructure were implemented. Still, the sector has its particularities, and the pipeline networks have to be constantly maintained and innovative measures implemented. Thus, the main challenges identified are related to the frequency of clogged sewerage pipelines, stormwater runoffs, limited access to sewerage infrastructure in the peri-urban areas and usage of drinking water for irrigation purposes.

Short-term actions	Brief description
21. **Continuing the rehabilitation and maintenance of drinking water and sewage network with a focus on the metropolitan area**	This action continues the rehabilitation and maintenance of the local water and sewage network through a holistic approach that takes into account the continuous expansion of the networks across the metropolitan area. An important element included in this action is related to the introduction of digital tools for monitoring water leakages, water consumption and the networks in general. Aquatim is committed to continue the efforts to digitalize all the infrastructure they are operating.

Short-term actions	Brief description
22. **Water circularity**	The action foresees an investment programme for the deviation of the rainwater from the municipal wastewater collection system and the construction of rainwater storage and reuse systems in new buildings. This will be achieved via developments of separate rainwater collection and other management systems in the area of operation considering the existing infrastructure and the new developments, as well as via construction of water retention facilities in areas under flooding risks.
23. **Streamlining sponge city solutions into city-wide planning for climate resilience and flood protection**	This action points to a holistic urban approach with where abundant natural areas such as trees, lakes, and parks or other specific designs intended to absorb and reuse rainwater and prevent flooding are abundantly present in different areas of the city.

Waste

The key challenges in the **Waste** sector are, as in many other urban areas of Romania, linked to the low involvement of public in waste segregation at source, lack of efficient waste sorting facilities, illegal dumping and limited collection points for special waste streams.

Short-term actions	Brief description
24. **Piloting pay-as-you-throw systems**	The action involves testing different models of pay-as-you-throw (PAYT) systems and selecting the most appropriate ones for the different types of housing in Timișoara.
25. **Feasibility Study for the establishment of a biowaste management system**	The feasibility study will identify the types and generation sources of biowaste, will establish the quantities to be separately collected as well as the type of recovery system that needs to be established in line with the existing policy framework.
26. **Developing green waste composting in Timișoara**	Establishment of a system for source separation and recycling of separately collected green waste. Green waste will be collected from landscaping activities in public areas as well as from individual houses. Subsequently, the source-separated green waste will be recycled at a designated facility near Timișoara. The system will be part of a larger biowaste management system for the Timișoara extended area.
27. **Establishing an anaerobic digestion plant**	Establishment of an anaerobic digestion (AD) plant for separately collected biowaste from the entire Timiș County. Biowaste will be collected from households, businesses generating food waste and markets for fresh produce.
28. **Developing a recycling plant for construction and demolition waste**	Establishment of a recycling plant for construction and demolition waste (C&D waste) is one of the main objectives of Timișoara Municipality, since the city is in constant development, and large quantities of C&D waste are produced daily. Beside the plant, which will be able to process about 50–70 t/h of C&D waste, the Municipality will also develop a mobile application to report illegal dumping of waste.
29. **Boosting circularity in the region by attracting recycling companies**	Develop an outreach program to market Timișoara as a potential business development pole for recycling activities. Via networking and promotion, the

Short-term actions	Brief description
	Municipality is aiming at attracting businesses (private and/or PPPs) that will be engaged in the waste sector, especially in activities aiming at “reduce, reuse, recycle”, and contribute to increasing the waste recycling rates.

Land Use

The **Land Use** sector, which is of strategic importance for the Municipality, confronts with situations of urbanization by exceptions (via Urban Zonal Planning), insufficient and discontinuous blue-green spaces, increased focus on road infrastructure in urban planning and lack of developments of basic infrastructure for the quality of life in the metropolitan area of the city.

Short-term actions	Brief description
30. **Converting hard surfaces into green areas for improved drainage**	Transforming hard surfaces by investing in flood prone areas and school yards to permeable surfaces for improved drainage and by imposing the gradual transforming of a part of the pavement in front of buildings into green areas.
31. **Establishing green urban spaces to address localized heat island effect**	Increasing the total area of green urban spaces with a focus on areas suffering from heat island effect and related thermal stress. This will be done through three key measures: by creating tree canopy in heat island areas, on pedestrian and micro-mobility corridors, by installing green rooftops, and by devising policies for resilience construction and retrofitting.
32. **Integrating green and social infrastructure in new developments and the metropolitan area**	Establishing urban development regulations for new and modernized areas and the metropolitan area to include all the necessary infrastructure, thus reducing the need for daily cross-city commuting. The new climate-robust neighbourhoods will include social, cultural, economic infrastructure and blue-green elements for a high quality of life.
33. **Implementation of blue-green infrastructure for connecting Moșnița with Pădurea Verde**	The existing water stream that stretches between Moșnița Nouă community and Pădurea Verde will be rehabilitated and will serve as a good practice example of functional blue-green infrastructure that brings benefits both for nature and the community. This action will focus on redesigning the existing water stream in order to maximize the ecosystem services it provides. The project is enriched by various elements such as micro-mobility pathways and parks, including an Agro-park.
34. **Developing the new Metropolitan Green Space Strategy**	The new Metropolitan Green Space Strategy will be developed to maximize the multifunctional potential and benefits of these areas, for climate proofing against heat and extreme weather events, recreational areas, micro-mobility, and nature-based solutions for air, soil, and water contaminations. The new strategy will include the newly established ambitious green space requirements by the European Council on nature restoration, establishing no net loss in urban ecosystems unless the green spaces already constitute 45% of the city area.

Background

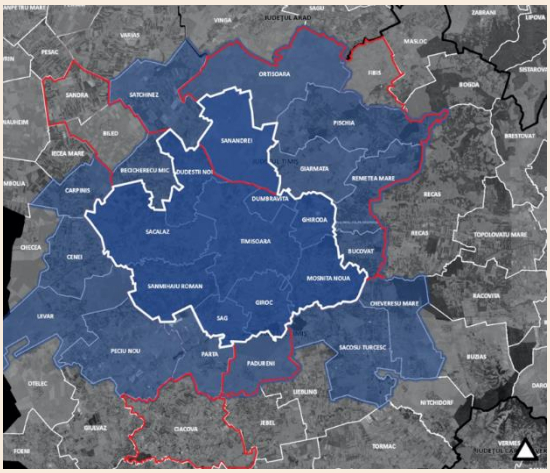
1

How the GCAP was developed

The European Bank for Reconstruction and Development (EBRD) undertook to support the Municipality of Timișoara with the development of the present document, the Green City Action Plan (GCAP). The document provides a baseline environmental assessment and detailed prioritised actions that will help the Municipality take forward sustainable infrastructure investments and policy measures to become a "Green City". The GCAP was developed by the Municipality with the support of the consortium composed by RWA Group and Arcadis Belgium (the Consultant).

The aim of the GCAP is to address the city's existing environmental and urban development challenges in a systematic way, while supporting green outcomes and co-benefits including increased resilience, gender equality, economic and social inclusion.

Timișoara is one of the six cities in Romania (along with Craiova, Iași, Mediaș, Bucharest, and Alba Iulia) to join the EBRD's flagship Green Cities Programme, an urban sustainability initiative providing more than EUR 5 billion support to 60 cities across EBRD countries of operation. The development of the GCAP was triggered[1] by the EBRD's EUR 20.3 million loan for the renewal of city's tram fleet and the rehabilitation of the T5 tram line, signed in December 2021.



Target area

GCAP Timișoara refers to the administrative area of the city itself and the 9 settlements (ATUs) within the first crown surrounding the city. This will help the integrated development of the city's metropolitan area.

The 9 ATUs are: Dudeștii Noi, Dumbrăvița, Ghiroda, Giroc, Moșnița Nouă, Săcălaz, Sânandrei, Sânmihaiu Român, Șag, with a total population of 396,025 inhabitants.

Process and methodology

The present GCAP is the outcome of an extensive process of data collection and analysis, stakeholder consultations, and prioritization exercise, with the ambition to map the environmental conditions in the city, the anthropogenic factors that put pressure on the environment, the policies and measures enabling the performance of various sectors in terms of greening the city. The screening of these factors followed the EBRD methodology of traffic lighting, which uses international benchmark indicators to assess these factors.

[1] EBRD lends Timisoara €20.3 million for urban tram improvements: https://www.ebrd.com/news/2021/ebrd-lends-timisoara-203-million-for-urban-tram-improvements-.html

Thus, the GCAP development process consisted in the following phases and key milestones:

In the first phase, the city baseline was developed. It was a complex process, which aimed to assess the environmental and policy performance of the city, to map its resilience based on risks and vulnerabilities, to examine its smart maturity, and to perform an analysis of gender aspects.

Following this assessment, *challenges were identified and consulted with key stakeholders*. The consultation process allowed us the prioritization of the challenges.

Once the prioritized challenges were formulated, a *long list of actions* was elaborated and submitted to public consultation, which had as a final result the range of short- and medium-term actions to include in the present action plan.

It is to note that *all the above-mentioned aspects are broadly discussed and presented in a series of stand-alone documents available at the Municipality*. These documents are the following:

- Stakeholder Engagement Plan (SEP)
- Policy and Urban Framework (PUF)
- Green City Baseline:
    - Indicators' Database
    - Technical Assessment Report (TAS)
    - Risk and Vulnerability Assessment (RVA)
    - Smart Maturity Assessment (SMA)
    - Gender and Social Inclusion Report

Stakeholder engagement

The GCAP was developed by a team of experts consisting of representatives of the Municipality, consultants of the consortium of RWA Group and Arcadis, and representatives of EBRD London and Bucharest team. Stakeholder engagement was key to building a strong, constructive, and responsive relationship with the community and conceive a viable strategy shared by authorities, academia, business environment and citizens alike.

The engagement level for each of the stakeholder consultation events is captured in the table below:

Stakeholder engagement event	No. of participants	Percentage of women
1st SE: Launch event and consultation of the emerging environmental issues of the city	83	39%
2nd SE: Environmental challenges prioritization	371	28%
3rd SE: Vision & SOs and Action prioritization	112	26%
4th SE: GCAP actions presentation	35	40%

The 4 stakeholder consultations were aligned to the development phases of the plan:

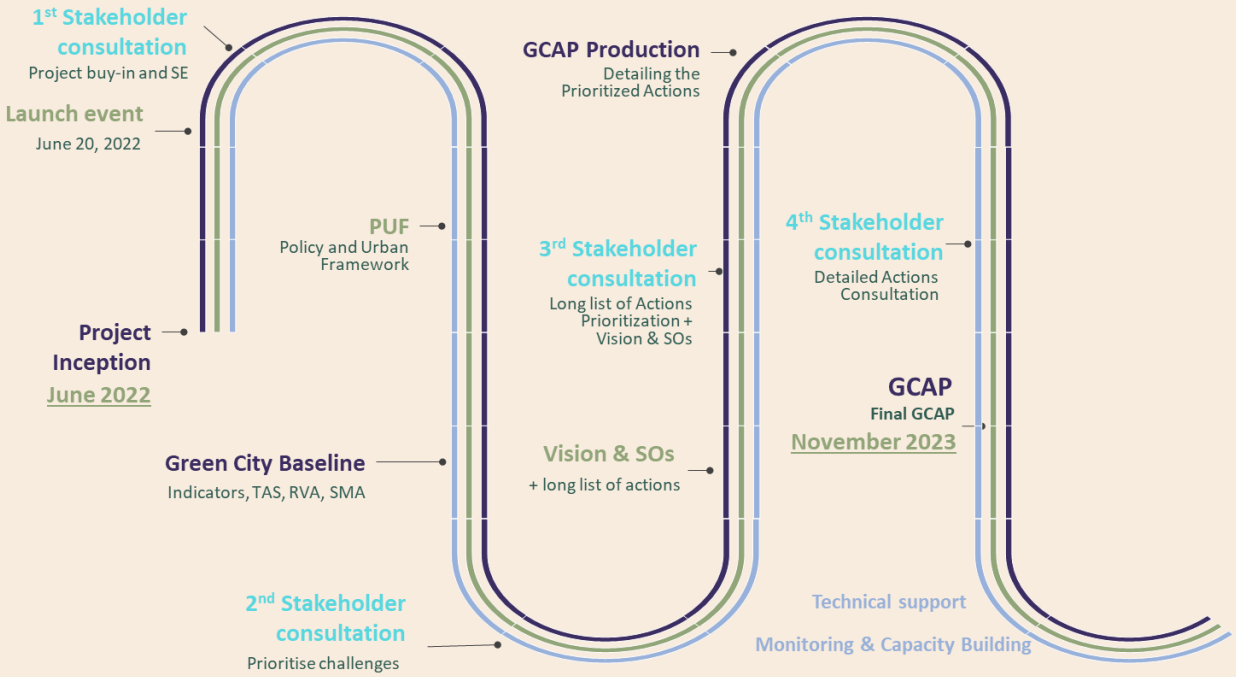


Figure 1 GCAP workflow

Brief overview of the city

Demographic, geographic, and social aspects

Timișoara has a population 315,280 inhabitants according to the latest data available at National Institute of Statistics from 2022. It is to note that the area covered by the GCAP (the city and the 9 adjacent ATUs) has a total of 396,025 inhabitants. The city is situated at less than 700 km distance from 13 European capitals, and on 2 trans-European transport networks (road and railroad corridors), the good accessibility stimulating socio-economic development.

Over time the development of urban structures followed a concentric layout, starting from the centre and historic districts and expanding in later stages as individual or collective housing districts were being established. There is an accelerated growth towards the northeastern, eastern and southern parts of the city, creating a continuous urban fabric between Timișoara and peri-urban municipalities.

The Bega canal, the Timiș river and secondary waterways create potential for the development of blue-green corridors. When properly managed, water bodies and ponds hold a potential for becoming biodiversity hotspots and recreational areas. There are important forests, watercourses, protected areas that can be interconnected to generate shelterbelts around the metropolitan urban core.

Being a flat area, the city is suitable for an extended bike lane network. Timișoara is historically considered a “garden-town”, as in the interwar period the town had 200 ha green areas. Therefore, any initiative of extending, restoring, restructuring green areas is well received by the population. Urban planning has a history of over 3 centuries, thus urban development mindful of the environment is well anchored in local urban planning traditions.

Timișoara is a city where the living standards and quality of life is quite high as compared with other urban areas in Romania. It is one of the top 4 cities where people would prefer to live in. Timișoara offers a wide range of job opportunities and has the advantage of being a large city where excellent universities are present.

It is also a multicultural city and the European Capital of Culture of 2023. Open-mindedness and creativity are two of the main characteristics of Timișoara citizens. Gender mainstreaming in all public services and in daily municipality management activities would be an aspiration that will enable Timișoara to be the first city in Romania where gender equality principles are fully and efficiently implemented.

The Social Assistance Directorate of Timișoara is very active and has good professionals within its structure. The city is facing social inclusion challenges, but the Municipality manages them quite well, with room for improvements in certain areas.

GHG emissions

The total emissions of the city are estimated at roughly 1 million tonne of CO_2 equivalents per year. The data shows that the city’s building sector is the highest emitting sector, followed by industry and transport. One of the key culprits for high emissions is the coal-based district heating widely used for the building and industry sectors thermal energy and hot water needs, responsible for an estimated 236,700 tCO_2eq stationary combustion.

In terms of targets, the NDC targets translate into reductions target in the buildings, public lighting, transport and industry sectors of about 269,700 tCO_2 eq/year, or 26% of the baseline emissions to be reached by 2030.

Based on the assessment an appropriate yearly GHG emission reduction target is 250,000 tCO_2 eq/year or a 25% reduction as compared to the baseline. This should be reached by the end of the 5-year implementation period (2029) and includes actions in all GCAP sectors in the city.

Policy landscape relevant for the GCAP

This sub-chapter presents in brief those local and regional policies, which have high relevance to this plan, providing the legal basis for implementing the actions developed. It is to mention that *the Policy and Urban Framework Assessment includes not only a detailed*

mapping of relevant policies, but also a benchmarking of these policies against the assessed Green Cities indicators.

Since the GCAP area of influence includes the first ring of the metropolitan area, it is substantial to align the green city actions to integrated, metropolitan level policies and strategies as well.

Thus, the most important policies and the areas/sectors for which these are relevant are the following:

Integrated Urban Development Strategy (IUDS) for the Timișoara Growth Pole 2015-2020

It coordinates sectoral policies including economy, transport and environment, and highlights priority investment projects such as the promotion of clean transport modes. The first IUDS was developed for the 2015-2020 period. A new version is being prepared for the 2021-2027 period, a draft of this document currently being under revision.

IUDS and GCAP scopes overlap in a proportion of 60-70% (a detailed correlation analysis is provided in Annex 1 to the Policy and Urban Framework Report). As per the correlation analysis, the GCAP can contribute to the IUDS update by providing a solid baseline that was built on the pressure-state-response (PSR) framework. The PSR framework provides a useful structure to understand the linkages between activities that place pressure on the environment, the resulting state of the environment and associated existing responses by the local authorities, residents and the private sector to address the pressures.

General Urban Plan of Timișoara

The General Urban Plan approved by the Local Council Decision no 157/2002, extended by Local Council Decision no 619/2018, is still in force. Being 20 years old, the planning document is outdated by the subsequent development of the city and its dynamics. Taking this into consideration, the procedures for a new General Urban Plan were initiated in 2010, and in January 2012 the General Concept of Urban Development (Masterplan) was finalized. The new Plan is still in the approval procedure, meanwhile the urbanization/urban restructuring is being carried out through Zonal Urban Plans approved by the Municipality.

Air Quality Maintenance Plan in Timiș County 2020-2024

It is the main policy document at county level dealing with monitoring and managing air quality. The approved plan contains measures to reduce the concentration of emissions from linear and surface sources and to keep air pollution levels within the hourly/daily/annual threshold values and their target values as provided by Law no 104/2011. In Timiș County, the foreseen measures with outstanding relevance for GCAP are related to transport, building, land use, water, industry sectors, such as: upgrading the transport infrastructure; encouraging the use of public transport and bicycles to streamline traffic; thermal rehabilitation of public and residential buildings; increasing the energy efficiency of public buildings; creation/modernization of parks and public urban leisure spaces, identification of degraded land for afforestation, etc.

Energy Efficiency Strategy of Timiș County 2021-2027

It is a tool for addressing climate and energy challenges, as well as challenges related to energy security, energy efficiency and resilience to climate change.

Relevance for green spaces: it declares that more green spaces are needed in Timișoara and in the adjacent ATUs (estimated budget 50,000,000 EUR). Also, measures such as the development of green urban areas, green roofs/walls on public buildings, urban gardens are highlighted in the strategy, with a budget estimate of approx. 100,000 EUR/project. The main project proposed in the strategy will consist in increasing the area of green spaces in each ATU of the county (5,000,000 EUR). The project foresees various stages of development depending on the ATU, from the project idea to the completed project.

Relevance for transport: procurement of electric public transport vehicles for 9 ATUs with over 5,000 inhabitants (including Timișoara) and installing charging stations accordingly.

Relevance for buildings and energy: focused on promoting smart solutions and energy efficiency measures, deep retrofitting and regulations for construction of new buildings with low emission and energy consumption levels; modernization of the heat distribution network in Timișoara (9,067 km of primary network, 20,095 km secondary network); development of high energy efficiency cogeneration capacity within COLTERM.

Strategy for the Economic and Social Development of Timiș county 2021-2027

The document focuses on integrated aspects of multiple GCAP sectors, such as transport, energy, water and wastewater, waste and land use sectors, and also indicates related project ideas, i. e. feasibility study and technical project for an Integrated Metropolitan Public Transport System relying on the tram and railway network, in the metropolitan area of Timișoara; smart-grid system implementation at public buildings; Net Zero Accelerator, dedicated to the decarbonization of the processing industry, just to mention a few.

Sustainable Urban Mobility Plan for the Growth Pole Timișoara 2016-2030 (SUMP)

It is the main strategic document for the transport sector, written in 2015 and updated in 2020 with new projects. The comprehensive plan includes a detailed list of actions with specific locations in terms of mobility, public transport network, road infrastructure, etc. Moreover, it includes a list of phased priority interventions starting with 2016 until 2030.

Waste Management Plan of Timiș County

It is the main document which governs waste management improvement in Timiș County. The document has ambitious objectives and is correlated with the national sectoral policies.

Smart City and Digital Transformation Strategy 2022-2027

Timișoara is one of the pioneer cities in terms of sustainable urban development in Romania. In recent years, the city has worked towards enhancing its competitive advantages and strengthening its position as a smart and digital city. One of the outcomes of these efforts is the Smart City and Digital Transformation Strategy 2022-2027, which is the most important policy guiding the future urban digitalization process.

The strategy has been established with the involvement of citizens (through the Digital Economy and Society Index - DESI Timișoara, the 'Quality of Life' barometer), international experts and an extended stakeholder group of professionals from businesses, academia, finance, research, public administration, business support organisations, civil society and freelancers. The participatory approach of the strategy will be extended into the implementation phase.

The policy mapping revealed that most sectors in the city are well covered by existing overarching and sectoral policies. However, implementation challenges have been observed in terms of the required bureaucratic procedures, insufficient enforcement and limited cooperation with ATUs in the metropolitan area for the implementation of much needed integrated projects. The city faces an institutional gap and lack of a clear legal basis for involving ATUs in planning. GCAP is intended to help build the institutional bridge, starting with the first crown of 9 ATUs as, at the moment, these are of primary interest for the Municipality of Timișoara. The GCAP experience and lessons learned will serve as a good basis for involving other ATUs as well.

Smart maturity

The GCAP development process included a thorough assessment of the smart maturity of Timișoara, based on the data available in public documents and following the discussions between representatives of Timișoara Municipality and other key local stakeholders and the consultant team. The city's smart maturity assessment revealed that *Timișoara is in its enabling stage of smart integration and digital transformation*: the Municipality acknowledges the importance of smart components, has already developed and implemented certain smart solutions and is making efforts to digitalize as many processes as possible. Still, there is room for improvements in all GCAP sectors and at Municipality level.

The main challenges that the city is facing concerning the digitalization process refer to:

- Lack of an integrated IT management system for all processes and procedures at Municipality level
- Lack of an integrated database system and the possibility of consulting real-time data
- Lack of e-archiving options
- Limited institutional capacities for Smart Integration (SI) and Digital Transformation (DT) – the Municipality is currently working towards establishing the institutional structure which will be responsible for the implementation of the Smart and Digital Transformation Strategy

The main conclusions regarding smart gaps in GCAP sectors highlighted the following:

- Limited institutional capacities for SI and DT

- Low-level and difficult online interaction of the citizens with the Municipality
- Limited capacity for capturing, processing and exposing data for traffic modelling, route planning, and land management
- Limited data capturing and sharing in a cross-sectoral approach
- Limited engagement and involvement of private/industry ecosystem in smart initiatives

Throughout the developed GCAP actions, measures are foreseen to address these gaps.

Identified environmental challenges

The performed analysis on environmental factors, namely air quality, soil, water bodies, biodiversity and land use points to indicators falling within the yellow benchmark for PM_{10} and $PM_{2.5}$, pressure on *air quality* most likely being attributable to the high proportion of private cars in transport and the district heating system which is 35% coal based. Upstream measurements of the Bega River *water quality* indicate good surface water quality, however, the biochemical oxygen demand measured in rivers and lakes downstream from the wastewater treatment plant indicate values situated in the yellow benchmark. Although there are certain areas in Timișoara with a high chance of *soil* contamination (e. g. industrial sites), no monitoring is performed on the quality of soil. Although the value of available *green space* (15.73 m^2/capita) is a value over the established green benchmark, the accessibility of green spaces falls into the yellow benchmark.

Linkages observed between the state of the environment and the pressures the various sectors of the economy and city development put on the environment are presented synthetically in the infographic below.

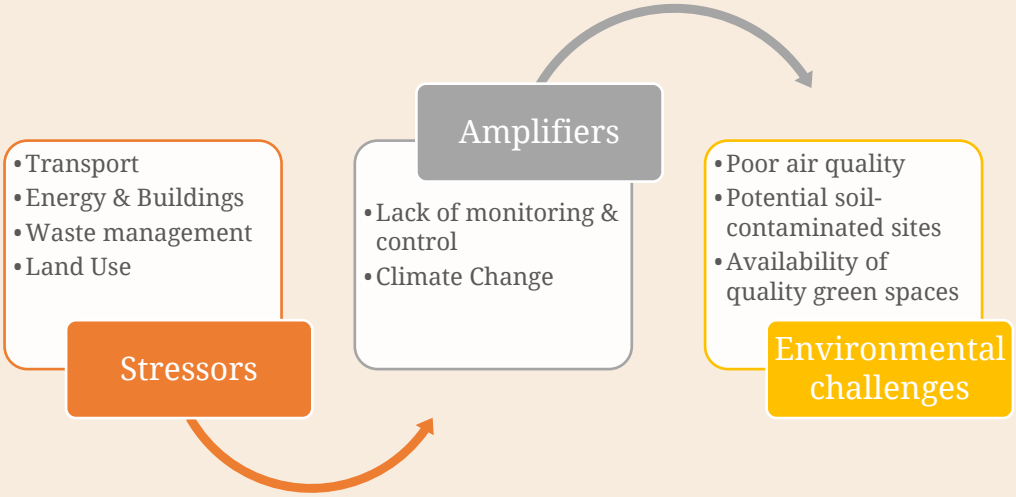


Figure 2 Main environmental stressors, amplifiers, and challenges in Timișoara

Risks and vulnerabilities

The *Risk and Vulnerability Assessment Report* identified several natural risks connected to climate change that are due to increase in the coming years. The seasonal summer windstorms becoming more intense and frequent in recent years is an already perceptible consequence in the city related to climate change. International and national studies see this as a main risk in the area, therefore direct actions in several sectors of the city (such as energy, buildings and transport) are required to ensure the adequate resilience of the city.

In addition, studies and local perception alike indicate a general increase of average temperature in the city, coupled with the emergence of heat islands that are already manifesting and will continue to be a significant risk in the area. The constant increase of the intensity and duration of heatwaves is putting heavy pressure on sectors such as buildings and industry (through increasing cooling needs, paired with increased energy demand), biodiversity and green spaces (prolonged droughts that will affect their health and will require additional watering). The general quality of life is also under pressure under heat waves, with sensitive groups such as the ill, elderly, and children, suffering from thermal discomfort that could affect their health.

The most prominent anthropogenic risks are noise pollution generated by the transport sector in case of degraded infrastructure (road and tram line) which affects the general quality of life (and health) in the city, and poor air quality caused by the heavy use of fossil fuels in the transport (private vehicle-based) and energy sector (coal fuelled district heating).

Natural Risks

- Increased frequency of storms leading to building and infrastructure damage
- Increasingly frequent and prolonged heat waves and urban heat island effect affecting population and increasing energy consumption
- Droughts affecting urban greenery, biodiversity and urban services
- Increase in mean temperatures affecting the cityscape and urban services and leading to increased energy consumption for cooling

Anthropogenic Risks

- Noise pollution due to poor quality of road and tram track infrastructure
- Air pollution due to increased use of motorized transport and insufficient/ unsatisfactory alternatives

Green City Action Plan

2

Vision and Strategic Objectives

GREEN CITY ACTION PLAN
TIMIȘOARA

Vision: Sustainable City

Timișoara has traditionally been the hometown of innovation and a valued member of the European community, that always had the courage to innovate and inspire. From the technological innovations of electric street lighting and tram lines to the social and cultural inclusivity of its community, Timișoara aims once again to be a beacon of good practices in Romania's sustainable urban development.

Through the adoption of this Green City Action Plan, the city commits to a sustainable and inclusive vision for the next five- and fifteen-years horizons. For this purpose, the city will work towards greening the city, as it is dealing step by step with the complex challenges of private car-dominated traffic, with the expansion of the city in the metropolitan areas where urban services are less available, and with a now obsolete fossil fuel-based district heating system and housing infrastructure.

Historically, the city proved its potential to be a trendsetter in the region for several quality-of-life improvement factors, a fact that should be harnessed. The GCAP actions will bring forth the leadership potential of Timișoara through digital solutions, increasing the share of prosumers and RES-based energy production, creating green lungs for the city through blue-green infrastructure, improving resilience and prioritizing sustainable modes of transport.

The GCAP will strengthen and anchor Timișoara's identity as a leader and a source of inspiration for sustainable, green development.

Strategic objectives

- SO1 **Functional partnerships for smart green urban development**
- SO2 **Carefree is car-free: for easy-flowing, streamlined mobility**
- SO3 **Clean and just energy transition**
- SO4 **Green connectivity – green lungs bringing fresh air and biodiversity to the Timișoara extended area**
- SO5 **Futureproof and resilient municipal services for the Timișoara extended area**

EBRD GREEN CITIES

Municipiul Timișoara

European Bank for Reconstruction and Development

Strategic Objective 1: Functional partnerships for smart green urban development

Urban development requires perseverance, commitment, innovation, and partnership. Local authorities drive urban development and build on strong partnerships with stakeholders from the private sector, NGOs, academia and citizen representatives.

Timișoara is a vivid city where cultural diversity and smart development are part of daily life. The 2023 European Capital of Culture status of the city attracts much attention and increases stakeholders' expectations. The Municipality pulled together a team of enthusiastic experts that brought together all the energy and available resources into organizing a one-year programme of events that will be memorable and will shape the identity of the city and the sense of belonging of the citizens.

Still, the Municipality understands its main role as the local government that needs to bring improvements to the daily life of citizens. Therefore the local authorities are committed to doing more and are eager to strengthen their capacities to develop, implement, monitor, and evaluate projects to increase the overall quality of life in Timișoara.

Green urban development is the true spirit of the decision-makers and is used in all strategic planning documents. Developments towards greening the city are already visible in some sectors. Timișoara initiated partnerships with different stakeholders, such as the academic environment, industries, and civil society organizations active in the city. Such partnerships lead to the implementation of different projects and co-creation activities, participatory decision-making processes, and innovation. For the future, the aim is to continue such positive experiences, build on the lessons learned and nurture future cooperation opportunities, especially with representatives of surrounding ATUs.

The Municipality strongly supports establishing knowledge-based community structures – functional clusters – focused on specific urban development challenges. It also aims to constantly improve its operational structures, policies, and regulations, and enhance its capacities for establishing functional partnerships. Such partnerships would foster collaboration and encourage knowledge exchange, dialogue, sharing of different opinions, sharing resources and work to achieve innovation for all.

Strategic Objective 2: Carefree is car-free: for easy-flowing, streamlined mobility

The city relies heavily on private cars for mobility, as greener, comfortable, and safer alternatives are often missing or less attractive. Citizens commuting from surrounding ATUs to Timișoara in the morning for work or school, and then back again in the afternoon put pressure on private car traffic and create congestion.

Sustainable mobility options like public transport, bikes, e-scooters or walking are currently slower, less comfortable and to some extent also less safe than using a private car for daily commute.

In order to change this state of play and have citizens voluntarily shift towards more sustainable transport means, investments in infrastructure and related policies are needed, to make public transport usage and other green mobility towards and through the city safer, faster, more comfortable and easily accessible by all users than the use of private cars, in every season.

Mobility through the city should be 'carefree' for citizens. This implies that public transport and other green mobility options should be easily available; these options must be reliable, frequent, fast, easy to use and pay for, affordable, comfortable, and safe to choose. Thus, citizens would be encouraged to opt for less use of their private cars. Tourists or commuters within the city need to be able to access, be encouraged to, and easily use public transport, shared soft mobility means (bikes or e-scooters), or walking through safe and comfortable infrastructure, layout, and public amenities.

In turn, private cars' movement through the city should be low speed, streamlined, and regulated. This implies clear regulation and broadcasting of information about where, how and when to drive or park, together with consistent and thorough enforcement. Public transport prioritization through dedicated lanes and priority traffic light management would be a central part of this strategy. A good public transport system and alternative modes of transport reduce stress related to parking, and being stuck in traffic, enhance opportunities for pit-stops and socializing, and increase opportunities for physical activities and sports, all of these contributing to a more carefree and pleasant daily life for the citizens.

Strategic Objective 3: Clean and just energy transition

Energy and energy efficiency is double faceted in Timișoara. On the one hand, Timișoara is a fast adapter as the county has the most prosumers, the city is supporting passive house development through a dedicated office and is developing the charging infrastructure for electric vehicles. On the other hand, Timișoara is well-known for the obsolete and fossil fuel-based district heating system currently in use, which also means a financial burden for the city.

Leadership in terms of digital and clean energy transition is attainable for Timișoara, as this is supported by a strong technical university, the active business community, high potential for solar and biomass-based energy, and the city's orientation to support these initiatives.

Transforming the energy system to a clean and reliable system and implementing demand-side measures is key for the city. It is equally important that nobody is left behind in this transition performed as a balancing act between green and social matters.

The city is actively searching for ways to upgrade and green the district heating energy generation and distribution system while maintaining competitive costs of heating and hot water. *Timișoara Thermal Strategy for 2022-2030 and Its perspectives for 2050* has been recently finalized and sets as goals the use of renewable resources and increased comfort for users.

This objective also entails a focus on deep retrofit for the building stock, using all available resources and funding sources in a more efficient way. Timișoara has been struggling with the pace of retrofits for public buildings and high-rise residential buildings.

Cooling and thermal comfort is an increasing priority since Timișoara is facing exceptionally warm periods during summer. Cooling requiring energy use and technology must be coupled with the development of blue-green infrastructure and the Strategic Objective 4 of creating the green lungs of the city, as this will play a significant role in cooling and reducing heat islands.

Strategic Objective 4: Green connectivity – green lungs bringing fresh air and biodiversity to the Timișoara extended area

State-of-the-art European urban planning of a city means creating sustainable connectivity networks between the most important mobility corridors in the wider development area. For the city of Timișoara, the connection between the urban and peri-urban is most important. The layout of the wider development area of Timișoara has great potential to connect the available green spaces in a blue-green mobility network for leisure and alternative transit.

Currently, the distribution of green spaces is uneven within the city. Most of the extensive green spaces were created along the Bega Canal during the nineteenth and twentieth centuries, with generous parks laid out in a continuous network. These are also the main leisure areas within the city but are easily accessible only to a limited number of inhabitants. This is because the central area is mostly home to institutions, commercial activities, and services and not so much to people. In addition, several parks, squares, and planted alignments are located in the neighbourhoods, but they are not integrated into a continuous network. The green space network needs updating and development that has in view ecological balance, increased biodiversity, the need for extending open green spaces enhancing climate resilience, or specific arrangements for sustainable non-motorized mobility. Also, most of the neighbourhoods in the northern part of the city, as well as the peri-urban developments will need to take into account establishing access to green spaces within 300-500 meters of each dwelling for increased quality of life. Therefore, this SO proposes to ensure and underpin the development of green corridors, encouraging greater connectivity between urban and peri-urban areas for micro-mobility, but also for the continuity of naturally developed green corridors along watercourses within the urban area.

This objective pursues an increase in the percentage of green spaces per capita in urban and peri-urban areas, a continuous network for alternative mobility, that would also function as an ecological skeleton for increasing biodiversity within built-up areas. Furthermore, the objective proposes a mechanism for public management of green spaces registered as green space by urban plans but not yet developed and open to the public.

A landmark project in this regard will be the improvement and opening to the public of the Green Forest.

Strategic Objective 5: Futureproof and resilient municipal services for the Timișoara extended area

This strategic objective sets out to align key municipal services with future needs of the city as they arise from challenges that are foreseen but not yet integrated in the urban planning and daily governance.

The actions under this SO will improve the municipal services on two important levels: the internal operational level – referring to efficiency and the overall economic feasibility of the systems – and the user interface level – referring to activities to improve the proper use, ease of use, and accessibility of public services for various local groups. Coherent strategic development of both elements is important to achieve maximum efficiency and comfort for users.

A good practice example of sustainable urban services in the city is the Water sector services, with the water supply and treatment system performing well on various indicators, such as low water loss, good drinking water quality, and integration of smart monitoring elements. To further improve this performance and make it outstanding, smart and digital solutions are needed, together with initiatives to better integrate the peri-urban areas covered by the local water company.

The two major sectors of the city targeted by this SO are the Transport sector – by improving local and metropolitan public transport – and the Solid Waste sector – through reduction of waste generation, proper separation and collection of waste, recycling and disposal activities.

Achieving this SO will improve the quality of life for citizens. Enhancing the public transport system and encouraging its use is key to reducing reliance on private cars. This will have an immediate positive impact on air quality and the overall accessibility of the city.

Waste management improvements can enhance cleanliness and reduce costs, nuisance and odours from waste accumulating in public spaces, discourage illegal dumping, and reduce emissions generated by landfilled waste.

Overview table of GCAP actions

Sector	No	Title	SO1 Functional partnerships	SO2 Sustainable mobility	SO3 Clean energy transition	SO4 Blue-green network	SO5 Future proof municipal services
Transport	1	Transforming the inner-city circular roads 1 and 2 into multimodal smart transport corridors	✓	✓			✓
	2	Updating the Sustainable Urban Mobility Plan (SUMP) and strengthening institutions	✓	✓			✓
	3	Extending and modernizing the cycling infrastructure in Timișoara	✓	✓		✓	
	4	Establishing coherent public transport corridors	✓	✓			✓
	5	Expanding and improving pedestrian areas	✓	✓		✓	✓
	6	Modernizing the circular city road 4 and resolving conflicts with radial roads	✓	✓			✓
Energy	7	Smart and efficient, large-scale public lighting programme	✓		✓		✓
	8	Rehabilitating and modernizing the District Heating (DH) network	✓		✓		✓
	9	Flexible, high-efficiency and hydrogen-ready CHP	✓		✓		✓
	10	In-depth energy efficiency awareness-raising programme	✓				✓
	11	Installing electric vehicle charging stations enabled through smart grid upgrades	✓		✓		✓
Buildings	12	Improving One-stop-shop for building retrofit v2.0. including local financing facility for energy efficiency and renewable energy measures	✓		✓		
	13	Implementing deep energy retrofit of block of flats	✓		✓		
	14	Implementing EE and small-scale RES programme for non-historic public buildings and facilities	✓		✓		
	15	Implementing New European Bauhaus and nZEB building Pilot Projects	✓		✓		
	16	Establishing renewable energy communities to reduce energy poverty	✓		✓		
	17	Heat pumps and solar heating programme for residential buildings in areas not connected to DH	✓		✓		
Industry	18	Developing logistics hubs to optimize freight and traffic flows in and around the city	✓	✓			
	19	Creating and running a platform for partnerships in green urban innovation	✓		✓	✓	✓
	20	Enhancing the air quality monitoring network, especially in the proximity of industrial sites	✓				✓
Water	21	Continuing the rehabilitation and maintenance of drinking water and sewage network with a focus on the Metropolitan area	✓				✓
	22	Water circularity	✓				✓
	23	Streamlining sponge city solutions into city-wide planning for climate resilience and flood protection	✓				✓
Waste	24	Piloting pay-as-you-throw systems	✓				✓
	25	Feasibility Study for the establishment of a biowaste management system	✓				✓
	26	Developing green waste composting in Timișoara	✓				✓
	27	Establishing an anaerobic digestion plant	✓				✓
	28	Developing a recycling plant for construction and demolition waste	✓				✓
	29	Boosting circularity in the region by attracting recycling companies	✓				✓
Land use	30	Converting hard surfaces into green areas for improved drainage	✓			✓	
	31	Establishing green urban spaces to address localized heat island effect	✓			✓	
	32	Integrating green and social infrastructure in new developments and the metropolitan area	✓			✓	✓
	33	Implementation of a blue-green infrastructure for connecting Moșnița with Pădurea Verde	✓			✓	✓
	34	Developing the new Metropolitan Green Space Strategy	✓			✓	✓

Transport

GREEN CITY ACTION PLAN
TIMIȘOARA

Sector overview

BASELINE

The transport **infrastructure** in Timișoara is determined by the radial concentric plan of the city. In addition, the road infrastructure is frequently intersected by the major blue-green network, the Bega Canal and the railway infrastructure, the TEN-T Core Railroad connecting Bucharest, Craiova, Arad and Budapest. On one hand this concentric layout is proper for good transport infrastructure, on the other hand it presents insufficiencies in certain sections, thus unevenness in how the ring roads developed.

The development of the city in the 20th century included newly built, generously sized boulevards between the old rural and peri-urban settlements, which have become main collecting roads connecting large neighbourhoods. These are, in fact, the roads that ensure the main mobility in the city, with flow management issues especially in the main intersections.

However, the existing fabric does not allow accommodating the needs of all modes of transport. Mobility network development opportunities arise though through industrial platforms to be crossed by main transport arteries (the former ILSA Factory, the Solventul platform, the industrial platform on Strada Constructorilor) that will complete the street network.

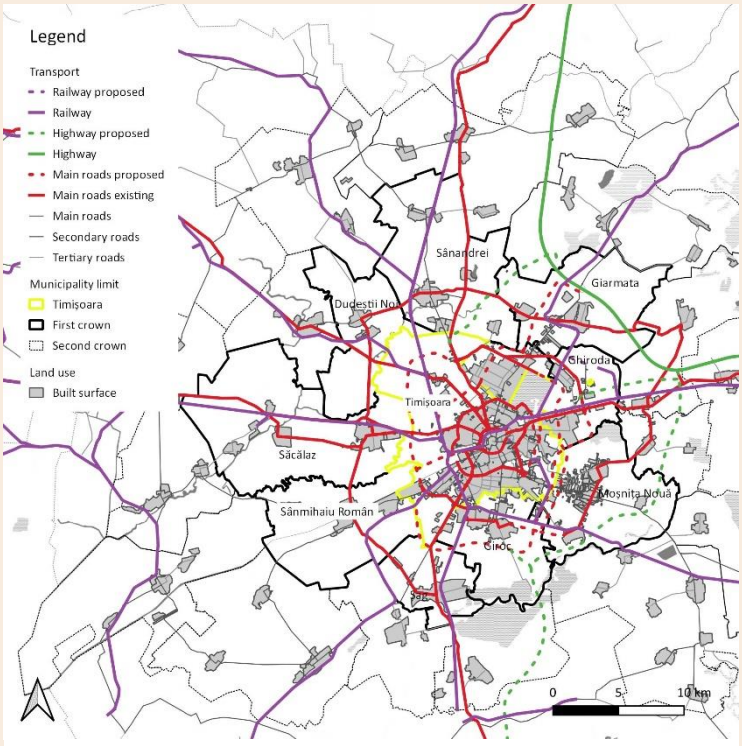


Figure 3 Map of existing and proposed transport network

Public transport network highlights

Timișoara is one of the cities in Romania with the highest accessibility to public transport stations (access to public transport stations within a 15-minute walk at most for the entire population), but transport remains inefficient due to long travelling times, lack of dedicated public transport lanes, reduced speed of public vehicles, long interchange times, lack of efficient transport hubs, lack of predictability regarding arrival times and limited communication with travellers.

The public transport system is organised under the coordination of the Societatea Metropolitană de Transport Timișoara (SMTT, Timișoara Company for Metropolitan Transport, operating in the metropolitan area). It operates trams, trolleybuses, buses and vaporettos, and regular trips to 18 settlements around Timișoara.

In recent decades the low comfort level and the relative slowness of public transportation have determined people to travel by car. However, the number of trips made using public transport increased between 2017 and 2020 by a percentage of 7.6%. This figure partly is the outcome of the extension of service coverage and the increase in the number of inhabitants in peri-urban communes.

Parking

In 2022, Timișoara adopted a new regulation for its parking system called TimPark. According to the Municipality's data, over 80,000 public parking and stopping places are available in Timișoara (47,445 parking places and 32,805 stopping places).

Modal share

According to studies prepared for the Sustainable Urban Mobility Plan for the Timișoara Growth Pole (2016), the modal share between public and private is in favour of the private transport in any time of the day: in the peak time of the morning the modal share for public transport is 25.9% and 43.9% for private transport, while between peaks 22.1% for public transport and 27.9% for private transport.

The number of **electric and hybrid cars** circulating in the city is on the rise. While in 2020 there were only 449 hybrid cars and 49 electric cars registered in the city, in 2021 their number had already doubled to 1,182 hybrid cars and 156 electric cars. In September 2022, the city inaugurated 16 charging stations for electric cars, financed by the Environmental Fund Administration.

Non-motorized trips are not considered alternatives in the true sense, but offer solutions for small-scale accessibility, for the last hundreds of meters, to services, schools and workplaces. Among these, cycle paths have the potential to offer alternative on a large scale, connecting important areas of the city, respectively urban and suburban areas, if the infrastructure could allow safe travel at adequate speeds. In terms of the length of cycle paths, Timișoara is in a favourable position, the 28.92 km per 100,000 inhabitants exceeding the green threshold of 25.

POLICY FRAMEWORK

The **Sustainable Urban Mobility Plan** sets the city's strategic priorities in this sector. The main objectives include:

- Prioritization of mobility in the order of: (1) public transport, (2) non-motorized transport and (3) private transport;
- Increasing the attractiveness of public and non-motorised transport;
- Cohesion at metropolitan level in terms of mobility: public transport integrated and of a quality that tends to be equal to that of the urban area;
- Reducing the negative impact of private transport in the urban area, including through congestion reduction;
- Increasing efficiency and reducing the negative impact of public transport;
- Elimination of transit traffic (and most of the crossing traffic) in the municipality;
- Significantly improving access of the metropolitan area to the motorway network

IDENTIFIED CHALLENGES

- **Traffic congestion during peak hours** in areas of interest (such as schools, business centres, public institutions) and in intersections between radial and ring roads;
- **Public transport lines are not adjusted according to the real needs of the population** and the development of the metropolitan and peri-urban area;
- **Pronounced pressure on the city transport system from transit transport** due to slow progress of the proposed major infrastructure projects;
- **Lack of integrated transport planning and multimodal connection of Timișoara with the ATUs in the peri-urban area**, with the exception of initiatives in public transport, resulting in fragmented transport systems for the different modes of transport (road, railway, bicycles, pedestrian) and for services and infrastructure (bike sharing, electric charging etc.);
- **Absence of dedicated infrastructure/dedicated public transport lanes** to streamline public transport ensuring frequency, predictability, and attractiveness;
- **Lack of a functional adaptive traffic management system**, lack of high-performance digital applications for route planning, as well as a digitized database to contribute to an efficient management of the allocation of financial resources for infrastructure interventions;
- **Predominant use of road infrastructure and transport based on personal vehicles**, an increasing trend especially in the ATUs in the peri-urban area.

SHORT-TERM ACTIONS FOR 2024–2028	LONG-TERM ACTIONS UP TO 15 YEARS
1. Transforming the inner-city circular roads 1 and 2 into multimodal smart transport corridors	Develop and implement city-wide mobility application (MaaS – Mobility as a Service)
2. Updating the Sustainable Urban Mobility Plan (SUMP) and strengthening institutions	Implement a road maintenance programme
3. Extending and modernizing the cycling infrastructure in Timișoara	Establish a Mobility Coordination Centre (CCM/MCC)
4. Establishing coherent public transport corridors	Reconfigure high complexity areas
5. Expanding and improving pedestrian areas	Transport plan for large companies
6. Modernizing the circular city road 4 and resolving conflicts with radial roads	Transform the airport into an advanced air mobility hub
	Establish and equip new public transport system for peri-urban–urban connection: tram-train / metropolitan train
	Implement “Park & Ride” linked with the construction of circular road
	Support the mobility initiatives of local and community organisation (CBO)
	Electrify the taxi fleet

STAKEHOLDERS

Name	Actions to be involved in
Municipality of Timișoara	**1, 2, 3, 4, 5, 6**
STPT – Local Transport Company	1, 2, 4, 5, 6
SMTT – Metropolitan Transport Company	1, 2, 4, 5, 6
Aquatim – metropolitan authority for water and sewage	1
Horticultura – public company administrating the green areas	1
APM – Regional Authority for Environmental Protection	1
Wide community involvement, including NGOs, citizen associations, schools and the private sector	**3, 5**

SMART AND DIGITAL ASPECTS

Actions 1 and 6 directly contribute to a more performant traffic management system and to generating reliable traffic data. Both actions are focused on rehabilitating and extending road infrastructure and modernising the existing one. All new road infrastructure will be developed considering the integration of digital elements, such as smart traffic sensors for data traffic data collection as well as smart traffic lights. **Action 1** also includes the development of the existing traffic management centre, especially by enhancing the existing infrastructure through upgrading the software system with additional modules which will ensure a smooth traffic flow in the main road junctions. In addition, the installation of a network of permanent counting points under **Action 3** will allow the monitoring of the effectiveness of the new cycling infrastructure, strategic analysis and the motivation of users.

Updating the SUMP requires the digitalization of the public transport system, including traffic management, ticketing, and real-time information updating. In addition, **Action 4** contributes to a more advanced public transport with more efficient interchanges, as well as with a more reliable timetable.

SOCIAL AND GENDER ASPECTS

Actions 1, 2 and 3 bring a direct contribution to a more inclusive mobility system and to a more efficient public transport network by reducing the need for a car to travel in the city centre and its adjacent areas and by ensuring the accessibility of public transport.

Actions 3 and 5 contribute to increasing activity levels among citizens by providing safe and pleasant routes for non-motorised travel, thus creating a modal shift towards sustainable modes of transport, and by creating a public space that motivates people to walk.

Action 1
Transforming the inner-city circular roads 1 and 2 into multimodal smart transport corridors

Transport

TYPE OF ACTION

Investment

ABSTRACT

Timișoara will redesign and reshape the inner-city circular roads 1 and 2, thereby solving conflicts with radial roads and transforming these into multimodal smart transport corridors (MSTC). The action softens the inner-city area as cars transiting from one side of the city to the other no longer need to pass through the centre, as non-motorized and public transport will be prioritized. Creating low-emission zones and optimizing traffic management in the inner city are also part of this action.

CHALLENGE/VULNERABILITY ADDRESSED

- Traffic congestion during peak hours in areas of interest such as schools, business centres, public institutions and in intersections between radial and circular roads
- Absence of dedicated infrastructure / dedicated public transport lanes to streamline public transport ensuring its frequency, predictability, and attractiveness
- Predominant use of road infrastructure and transport based on personal cars, low use of alternative modes of transport
- Lack of a functional adaptive traffic management system
- Poor air quality and high noise levels from traffic affecting citizens and the historic buildings in the city centre

STRATEGIC OBJECTIVES

SO1 SO2 SO5

BENEFITS

- Improved air quality in the city centre and reduced number of complaints related to air quality in this area
- Decreased CO_2 emissions due to a decrease in the use of private cars
- Improved quality of life and improved health due to a softer city centre

TARGETS

- City inner circular roads 1 and 2, redesigned and completed
- Traffic monitoring in city centre shows 20% less cars transiting the city centre
- Sale of public transport tickets increased by 15%
- Officially designated LEZs in the city centre

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	772.6 tCO_2eq	53,000,000 EUR

Context

The mobility network in Timișoara is structured to optimize the connection between the centre and the outer areas by a system of circular and radial roads.

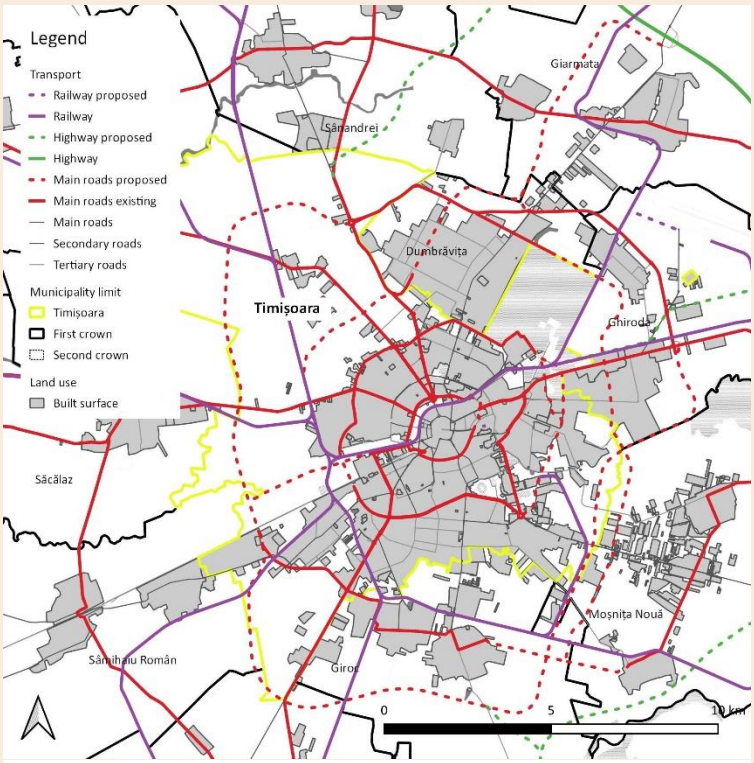


Figure 4 Mobility network of Timișoara (source: Timișoara Municipality)

The radial roads are much wider than the circular roads and are only partially built, putting transit pressure on the city and increasing traffic in the centre. The road network will be optimised if the continuity of the city's circular roads is ensured. This will create the opportunity for enhanced traffic management, prioritising alternate modes of transport, optimising logistics and softening the city centre.

This action is strongly embedded in the city's policy.

The project idea defined first in the General Urban Plan and then detailed in the Sustainable Urban Mobility Plan is currently being detailed in a feasibility study for the needed construction works on the circular roads.

The **New General Urban Plan (PUG)** of the city for the 2020–2030 period is yet to be approved. The plan foresees the integration of relevant, sustainable mobility modes, extension and modernisation of tram and bus networks, bicycle and pedestrian infrastructure, improved accessibility and optimisation of traffic and transport, which goes hand in hand with this action. This plan contains measures for completing circular road 2 on sections identified at project idea level, focusing on creating flyovers in three areas, that is Consiliul Europei square, Gheorghe Lazar street and Bogdanestilor boulevard. The PUG also foresees a new parking area on the first city circular road, at the junction with Paris street.

The **Sustainable Urban Mobility Plan (SUMP)** foresees a series of investments into road infrastructure, including those of circular road 1 and 2 of the inner city. The lack of complete continuity of the circular road 2 puts much pressure on the inner circular road (1) in terms of motorised transport, parking, logistics and freight, public transport and non-motorized mobility.

Therefore, the completion and optimisation of circular road 2 and relieving pressure from this circular road are also among the top priorities of the SUMP, and a package of actions within refer to these measures. The overall objective of the actions as described in the SUMP is to redirect transit traffic from the inner city to the circular road 2 and the radial roads connecting these.

Based on the available traffic data from 2016[2] the number of vehicles transiting the city centre was very high. For example Nistrului street had a traffic volume of more than 8,000 Vt/14h on the road towards the Pestalozzi boulevard and almost 8,800 Vt/14h on the other way. These data have most probably doubled since 2016. Also, circular road 2 presents many junctions where traffic jams frequently occur due to improper design and/or insufficient capacities. Therefore, the road needs improvements and redesigns at certain intersections and it needs enlargement in certain sections. Once the circle is complete, a significant increase in cars is expected on the road. This GCAP action envisages redesigning the inner circular roads of the city in such a way to discourage car use and focus more on alternative mobility modes, micro-mobility and public transport prioritisation.

Public transport infrastructure is currently present both on inner circular road 1 and 2. The Corneliu Coposu, Vasile Pârvan, Tudor Vladimirescu, Nicolae Titulescu, Jiul and Circumvalațiunii road segments provide distribution between bus and trolleybus stops in the central area (e.g. bus stop 33 at the Orthodox Cathedral or the Traian Grozăvescu - Poșta Veche multimodal station) and the radial routes through which many public transport lines reach the historic districts or the high-density neighbourhoods built in the communist era. Circumvalațiunii street is also used as a circular route for bus lines crossing the city from north to south, including one stop at the railway station. Also, tram lines are available on the main roads in the city centre. These are crossing the inner circular roads twice.

Thus, the already 4-lane portion of circular road 2 benefits from bus and trolleybus transit, and this will be extended to the other segments as routes are optimised, new segments are widened to 4 lanes, new bridges and overpasses are built, and a continuous flow of transit is provided.

In addition to public transport and car traffic, pedestrian and cycle networks are continued on sections already completed, with additional investment needed at key junctions to prioritise non-motorised transport. A pedestrian bridge will be built to ensure a better connection between the ISHO area (the area with the highest density of housing and jobs forecast for Timișoara) and the historical Fabric district.

[2] Memoriu Tehnic Explicativ – Studiu de Oportunitate premergator PUZ. Source: https://primariatm.ro/file_uploads/aviz_oportunitate_Lege_Noua/4%20PS_2%20Memoriu%20tehnic%20explicativ.pdf

Action description

The action foresees integrated interventions to optimise and redesign the inner-city circular roads 1 and 2 according to specific needs. The roads will be transformed into multimodal transport corridors. The action also includes a new traffic management system and designates low emission zones in the city centre, along with smart mobility features.

Currently, one section of circular road 2 is not completed, while sections in the eastern and western parts need improvements to enable better traffic conditions. The new profile of this road will support non-motorised mobility through continuous dedicated pedestrian and cycle routes. It will also provide dedicated public transport lanes, ensuring good connectivity with radial roads and the junctions between significant roads. The creation of multimodal transport hubs in the distribution areas towards north (Consiliul European square) and south (Michelangelo square) is also envisaged within this action. Construction/ reallocation of the necessary surfaces for the usual motorised traffic, including access to major parking platforms, aims at relieving the circular road 1 and, therefore, the historic centre of this pressure. The new road design will also include stormwater collection system, green canopy, and smart mobility infrastructure (EV charging stations, smart bus stops, smart traffic lights etc).

The following investments are foreseen within this action:

Road infrastructure investments for completion of circular road 2:

- A total length of 1.62 km of new roads, out of which:
    - New road with 4 lanes between Antenei boulevard and A. Demetriade street, including modernization of a junction with Antenei boulevard – 0.79 km
    - Enlarging the Enric Baader street to 4 lanes and modernization of junctions with Înfrățirii street and Take Ionescu boulevard – 0.55 km
    - Construction of a new road with 4 lanes (within the perimeter of former company ILSA)
    - New bridge over Bega canal with 2 lanes – 0.28 km
    - Enlarging the A. Demetriade street to 4 lanes on a section of approximately 300 m situated between Divizia 9 Cavalerie street and Enric Baader street to ensure good connectivity with MSTC
- Enlarging the Splaiul Nistrului street to 4 lanes between Academician Corneliu Micloși and J. H. Pestalozzi streets – 0.54 km; this is an additional investment required in the context of modernization of the circular road 2, since the developments in the northern and western part of the city will bring additional pressure on traffic in this area and at present, the Splaiul Nistrului street has only limited capacity.
- In the western part, the road infrastructure investment will focus on 3 junctions at Consiliul Europei square, Gheorghe Lazăr street and Calea Bogdăneștilor street. All these junctions will be at the level of existing roads.

- Allocation of road space to different modes of transport, but also to greening and shading. This approach is based on the concepts foreseen in the Urban Development Plan and SUMP and will add enhanced solutions where possible.

Investments focused on public transport network

- The roads will be designed to ensure that PT vehicles move fast and have dedicated lanes (as much as possible) throughout their entire routes. Furthermore, the junctions will be adapted so that PT vehicles have priority. Special attention will be given to left turnings to avoid traffic jams.
- The investments will also focus on rehabilitating all the bus stops along the MSTC and introduce smart information boards where passengers can find information about the PT vehicles, arrival times, etc.

Investments on micro-mobility dedicated infrastructure and equipment, EV charging stations and pedestrian facilities

- The micro-mobility infrastructure will consist of dedicated lanes for bikes and micro-E-vehicles that can be used in urban areas. These lanes will be separated from the actual road and the pedestrian walkways.
- At major junctions, where the MSTC is intersecting the radial roads and where Multimodal Transportation Hubs will be established (separate action in GCAP), there will be shared facilities for EV-charging, bike and e-vehicles renting services etc.
- Pedestrian walkways will be separated and covered with permeable surfaces in order to allow water to penetrate the soil. In addition, vegetation will be planted, and urban furniture will be installed along the pedestrian walkways.

Investments on smart traffic lights

- Traffic light system is described in the traffic management action within this GCAP. It was cross-referenced here for a better understanding of the MSTC and the way this corridor would look like once finalized.

Ensuring priority to public transport and non-motorized mobility for circular road 1

- Implementing one-way traffic around the historic centre through dedicated lanes for public transport
- Dedicated cycle lanes and ample pedestrian areas, as well as storm water collection and green canopy
- Implementing regulation for prioritization of access for public utility and supply vehicles for commercial premises, as well as for residents.

Establishment of low emissions zones and restricting parking areas in the city centre

- At present, the Municipality is considering the designation of the entire city centre as a low emission zone (picture below). Also, along the circular road 2 and along the Bega canal several other areas are considered to be designated LEZ. The new design of the inner circular roads will make a significant contribution to reducing traffic flows towards the city centre via the alternatives provided for micro-mobility and public transport.

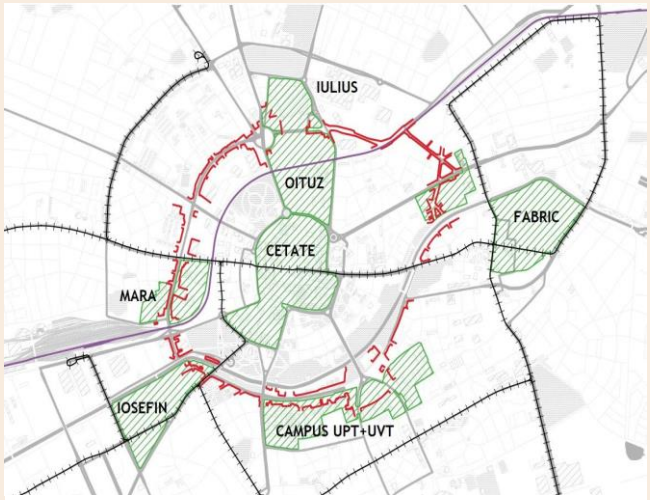


Figure 5 Low Emission Zones - Timișoara city centre (source: RWA Group)

The resulting changes in the design of the inner-city circular roads 1 and 2 are depicted in the map below:

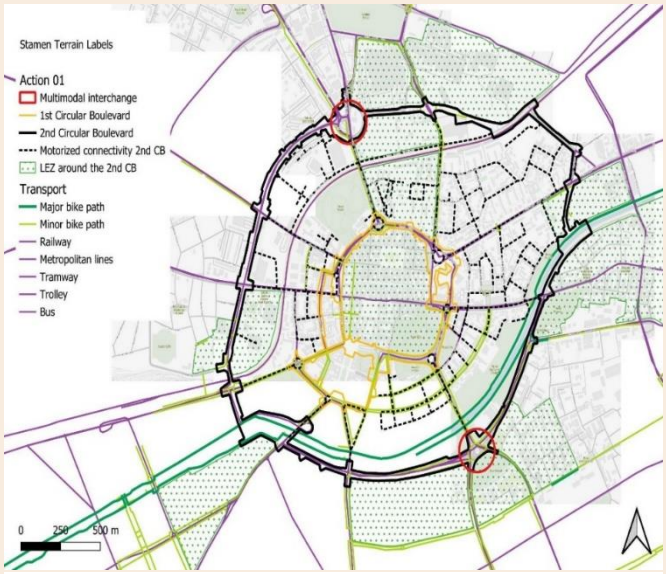


Figure 6 New design of inner-city circular roads 1 and 2 (source: RWA Group)

Supporting measures and design elements	
Urban logistics	The action is correlated with the current readjustments of urban logistics, location of industrial areas and warehouses, and the routes of urban logistics fleets in city centre. This is detailed as a separate action in the GCAP: Action 18 in the Industry sector (Developing logistics hubs to optimize freight and traffic flows in and around the city).
Green spaces	The street profiles proposed and shown above include green areas and tree canopy for shading in each area of intervention on the city circular roads. Furthermore, shading through the green canopy (Action 31 Land use: Establishing green urban spaces to address localized heat island effect) and creation of blue-green networks (Action 33 Land use: Implementation of blue-green infrastructure for connecting Mosnita with Padurea Verde) are foreseen.
Flooding	Circular road 2 will have stormwater and drainage systems included in the design at the areas of intervention (enhanced by relevant GCAP action in Water sector 22: Water circularity). The extension of green spaces along these roads will also increase the absorption capacity in the vicinity of the roads. Furthermore, the GCAP foresees converting hard surfaces into green areas in the city with a focus on the city centre and flood-prone areas (see Land use Action 30: Converting hard surfaces into green areas for improved drainage).
Sustainable design	During the implementation of the construction works, priority will be given to locally sourced secondary materials. The GCAP foresees improving the collection system of construction and demolition waste as well as reusing and recycling this waste as a short-term priority in the waste sector (Action 28: Developing a recycling plant for construction and demolition waste).

Implementation steps

1. Update the feasibility study for the inner-city circular road 2 interventions and include in the feasibility study all measures foreseen in the package of interventions (inner-city circular road 1, traffic management and low emission zones).
2. Carry out the technical design and construction of the extension of inner-city circular road 2, as well as for space reallocation on the existing road segments of inner-city circular road 1 and 2, traffic management and low emission zones.
3. Implement regulations related to softening of inner city and low emission zones.

Estimated costs

Item	CAPEX (EUR)	OPEX (EUR/Y)
Update the feasibility study for the inner-city circular roads and prepare the technical design and construction - Construction of the missing sections of circular road 2 on the east side (Antenei boulevard – E. Baader street – Splaiul Nistrului street) - Enlargement and reallocation of space, circular road 2 (Splaiul Nistrului street between Academician Corneliu Miclosi street and J. H. Pestalozzi street)	51,000,000	N/A

- EV charging stations (10 stations @ 50,000 EUR/station) - Interventions on circular road 1 and softening city centre – pedestrian area and cycling infrastructure		
Traffic management system	1,000,000	N/A
Implementation of low-emission zones	1,000,000	10,000*

* In the first 3 years; thereafter, starts to generate revenues.

Source of financing

International funds from EU sources and IFIs; internal budget of the municipality for co-financing the action.

Action 2
Updating the Sustainable Urban Mobility Plan (SUMP) and strengthening institutions

Transport

TYPE OF ACTION

Policy

ABSTRACT

Updating the Sustainable Urban Mobility Plan is needed, in which to include measures specific to both the city and the metropolitan area, planning of transport routes, mobility hubs as well as car parking areas and new street design concepts and features. Institutional capacity building will enhance the overall competencies of the actors engaged in mobility-related decision-making and enforcement of regulations.

CHALLENGE/VULNERABILITY ADDRESSED

- Traffic congestion during peak hours in areas of interest such as schools, business centres, public institutions and in intersections between radial and circular roads
- Public transport lines not adjusted according to the real needs of the population and the development of the metropolitan and peri-urban area
- Lack of integrated transport planning and multimodal connection of Timișoara with the ATUs in the peri-urban area, with the exception of initiatives in public transport, resulting in fragmented transport systems for the different modes of transport (road, railway, bicycles, pedestrian) and for services and infrastructure (bike sharing, electric charging etc.)
- Predominant use of road infrastructure and transport based on personal vehicles, increasing trend especially in ATUs in the peri-urban area

STRATEGIC OBJECTIVES

SO1 SO2 SO5

BENEFITS

- Coherent mobility policy applicable at urban and metropolitan level
- Improved air quality in the city
- Increased level of satisfaction of citizens due to reduction of traffic congestions

TARGETS

- Decrease in the number of journeys by private cars with 20% in the city centre
- Increase in the use of public transport with 25% in the coming 5 years on specific routes
- Increase in the number of journeys by bicycle and other non-motorised means of transport with 10% per year

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2025	N/A	500,000 EUR

Context

Timișoara currently has a Sustainable Urban Mobility Plan, which was approved in 2016. However, the lack of an integrated transport planning and multimodal connection of Timișoara with the ATUs in the peri-urban area, doubled by the citizens' preference to travel by personal cars, puts pressure on the urban and metropolitan transport system, both on the physical infrastructure and the system's operation.

The traffic data used for the SUMP prepared in 2016 is outdated. New traffic studies need to be conducted to determine the current mobility patterns and the main bottlenecks of the mobility system, and to be able to develop the forecast scenarios for the future. Also, the SUMP update comes as a direct need to incorporate new mobility principles and the latest infrastructure developments in the city and the relation with the rapidly developing surrounding ATUs. The new SUMP shall be formulated in line with the Timișoara metropolitan development area.

The Sustainable Urban Mobility Plan update is also triggered by the need to include measures which are specific to Timișoara's context (and the metropolitan area) for travel planning, parking and street design.

Action description

Following an assessment of how the current SUMP has been implemented over the 2016-2023 period, the update of this document should take into account the following principles:

- prioritising different transport networks (cars, public transport, pedestrians, bicycles, logistics, etc.)
- increasing the connectivity between Timișoara and the metropolitan ATUs through public transport
- increasing the accessibility to areas of public interest
- developing regulations on travel planning, parking, and street design through a participatory approach
- alignment to population trends
- enforcement of regulations

The new SUMP will focus on developing a study regarding the impact of public transport on Timișoara, at the following levels:

- regional (trains and buses)
- metropolitan (trains, buses, trolleybuses, bike lanes)
- local (trains, trams, buses, trolleybuses, bike lanes, pedestrian corridors)

The SUMP will include a study to identify areas where difficulties in public transportation arise, the bottlenecks and conflict junctions where public transport vehicles usually get stuck or register high delays. At present, preliminary data are collected and information is available on such bottleneck situations, but a thorough analysis is needed. The picture

below highlights the already identified mobility infrastructure, where potential conflicts arise and traffic jams usually occur.

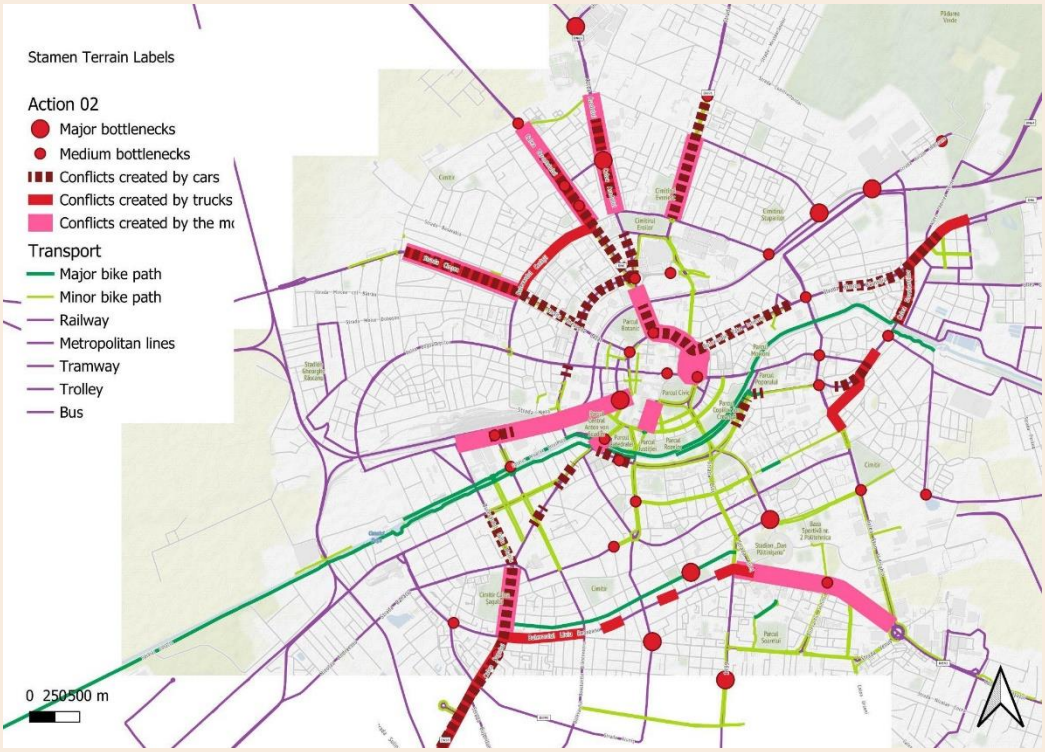


Figure 7 Mobility infrastructure with traffic conflicts (source: RWA Group)

The SUMP will formulate proposals for infrastructure investments in order to:

- prioritise one lane for public transport (on roads with 2 or more lanes) wherever possible;
- improve public transport connectivity with the airport and with the surrounding ATUs;
- improve road safety at intersections with tram lines and public transport stations and give priority to public transport vehicles as much as possible.

During the SUMP development, a series of dedicated and focused workshops will be organized with key stakeholders (Timișoara Municipality, Metropolitan Transport Company, County Council, Timișoara Public Transport Company, National Railway Company, National Road Administration Company, Traffic Police Department, etc.) with the purpose of strengthening the local and metropolitan capacities on mobility aspects and creating the premises for innovation and future cooperation between these stakeholders. Furthermore, the Municipality will establish a research centre with the aim of having an institutional structure ready to conduct applied research for mobility, collect reliable data on mobility aspects and provide lifelong learning programmes dedicated to professionals active in the transport sector.

Implementation steps

1. Prepare the Terms of Reference for the SUMP update and the necessary public transport study.

2. Select the contractor for the elaboration of the public transport study and SUMP.
4. Elaborate the public transport study & update the SUMP.
5. Strengthen the institutional capacity of local stakeholders by establishing a centre for applied mobility research and conduct a series of workshops during the SUMP development with the representatives of key stakeholders engaged in the mobility sector in Timișoara both at local and metropolitan level. The operational costs of the centre will be integrated in the city budget and it will also finance itself through research projects and provision of services to third parties, including cooperation with academia.

Estimated costs

Item	CAPEX (EUR)	OPEX (EUR/Y)
SUMP update, including traffic studies and yearly data updates	300,000	N/A
Establishment of a centre for applied mobility research and capacity building programmes	200,000	10,000

Source of financing

Timișoara Municipality – local budget; EU financing sources; IFIs – via technical assistance programmes and loans

Action 3
Extending and modernising the cycling infrastructure in Timișoara

Transport

TYPE OF ACTION

Investment

ABSTRACT

Timișoara sets out to transform the city and its nine surrounding ATUs into the first bicycle-friendly urban area in Romania. Investments will expand and improve the quality of non-motorised transport networks at metropolitan level. This will include among others expanding the existing bike network, constructing of dedicated bike lanes, and installing of smart traffic lights for micro-mobility vehicles.

CHALLENGE/VULNERABILITY ADDRESSED

- Traffic congestion during peak hours in areas of interest such as schools, business centres, public institutions and intersections between radial and circular roads
- Predominant use of road infrastructure and transport based on personal cars, a trend increasing especially in the ATUs of the peri-urban area

STRATEGIC OBJECTIVES

SO1 SO2 SO4

BENEFITS

- Reduced traffic congestions, emissions and noise linked to the decrease of journeys by car
- Increased quality and number of journeys by bicycle / other non-motorised means of transport
- Fast and easy connectivity between points of interest in the city
- Increased safety for all traffic participants
- Improved health and improved community cohesion

TARGETS

- Construction of bike lanes, including rapid transit bike paths (high speed bike routes, 5 km/year)
- Installation of smart traffic lights (at 5 intersections/year)
- The number of journeys by bicycle / other non-motorised means of transport increased by 10% per year

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	240.6 tCO_2eq	12,700,000 EUR

Context

Timișoara's transport system is characterised by the preference of residents to travel by private car, which puts high pressure on the road infrastructure, generates traffic congestion at peak times, and leads to a low-quality cycling experience in public spaces. Non-motorized trips are not considered alternatives in the true sense but offer solutions for small-scale accessibility, for the last hundreds of meters, to services, schools and workplaces. Among these, cycle paths have the potential to offer alternatives on a large scale, connecting essential areas of the city or making a link between urban and suburban areas if the infrastructure allows safe travel at adequate speeds. In terms of length, Timișoara has approximately 89 km of bike lanes. Most of them have technical parameters that encourage non-motorised travel. The Municipality is already investing in creating such paths within the limits of existing street profiles, while carrying out road repairs. Although the length of the cycle paths is considerable, their positioning is, in many situations, not suitable for optimal and relaxing trips. The figure below presents the existing and the proposed bike network in Timișoara.

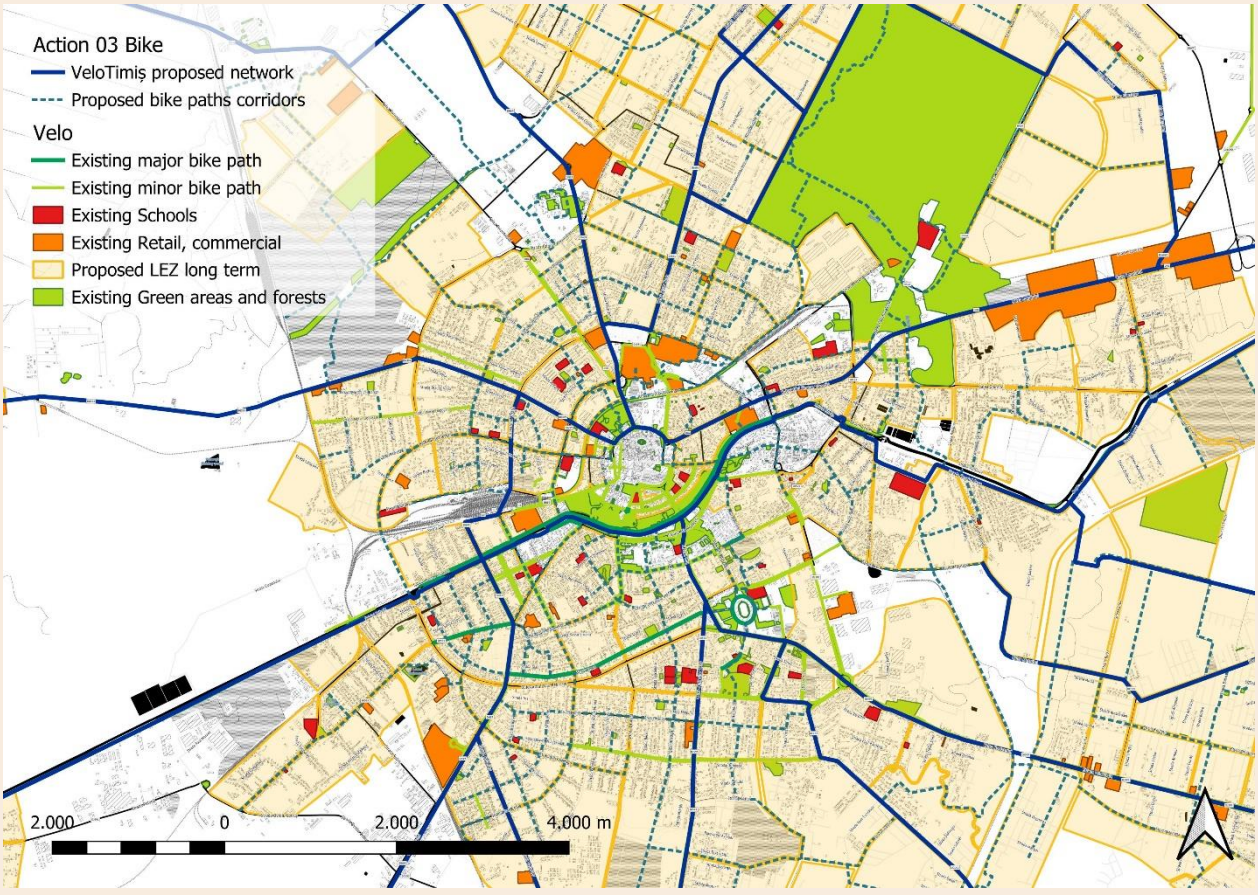


Figure 8 Map of existing and proposed bike network (source: RWA Group based on General Urban Plan)

Action description

Creating a safe, well-connected, and functional cycling network in the metropolitan area in order to transform Timișoara and its nine surrounding ATUs into the first bicycle-friendly urban area in Romania is the core investment in this action. This objective will be included

in the updated SUMP. At the same time, the development of a comprehensive package of measures for the creation of a cycling network will include:

- Identification of optimal solutions to increase accessibility for cyclists at intersections linked to the cycling networks in the surrounding ATUs, considering routes parallel to the radial roads
- Provision of bicycle parking facilities both near public buildings, public spaces, and private buildings
- Integration of cycling paths with public transport
- Awareness-raising activities

Implementation steps

1. Develop a coherent strategic plan for cycling, including missing links and intersections with traffic lights.
2. Supervise the cycling paths construction works. The primary focus will be on connecting the routes towards and between universities, with the aim of having 5–10 coherently connected bike routes.
3. Organize awareness-raising campaigns to promote the use of the cycling network by showing its advantages and strengths.
4. Monitor, maintain and evaluate the existing network and keep looking for shortcomings and innovation.
5. Monitor benefits and user satisfaction of the cycling network.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Strategic plan for cycling	200,000	N/A
Construction of bike path, including high-speed bike lanes (5 km/year in the coming 4 years)	10,000,000	100,000
Installation of smart traffic lights (5 intersections/year in the coming 4 years)	1,000,000	10,000
Construction of 3 tunnels or bridge for pedestrians and /or cyclists	1,500,000	10,000

Source of financing

Timișoara Municipality – local budget; IFIs and/or EU funds available in the transport sector or other funding programmes, including Recovery and Resilience Facility.

Action 4
Establishing coherent public transport corridors

Transport

TYPE OF ACTION

Investment

ABSTRACT

The development of public transport corridors aims at increasing the capacity, efficiency and attractiveness of PT for passengers. Timișoara sets out to define the main PT corridors of the city, invest in modern and comfortable PT vehicles, construct PT and mixed modal hubs, update the e-ticketing system of the PT company, extend the tram and trolleybus network, establish dedicated PT lanes, and upgrade PT parking facilities and bus stops. At the same time, a number of projects regarding the upgrading of the railway system are currently planned for Timișoara, which will positively impact public transportation within the city.

CHALLENGE/VULNERABILITY ADDRESSED

- Public transport lines pnot adjusted according to the real needs of the population and the development of the metropolitan and peri-urban area
- Pronounced pressure on the city transport system from transit due to the slow progress of the major infrastructure projects
- Lack of integrated transport planning and multimodal connection of Timișoara with the ATUs in the peri-urban area
- Absence of dedicated infrastructure / dedicated public transport lanes to streamline public transport ensuring frequency, predictability, and attractiveness

STRATEGIC OBJECTIVES

SO1 SO2 SO5

BENEFITS

- Improved air quality and reduced noise levels due to reduced travel times and less traffic jams
- Increased accessibility to and between cultural heritage sites and leisure sites within the city
- Business development opportunities around new bus stations
- Integration of the train stations as intermodal hubs, with a focus on the East and North Train Stations

TARGETS

- Increased use of public transport
- Increased frequency of public transport vehicles with 25% on certain routes
- Average age of all public transport vehicles less than 10 years
- Functional e-ticketing system
- Dedicated PT lanes on major routes – 25% of total bus and trolleybus routes by 2028
- 100% of bus stops rehabilitated

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	683 tCO_2eq	178,300,000 EUR

Context

At present, public transport system in Timișoara is facing challenges as it is not adjusted to the real needs of the population and tourists/visitors. This situation is the result of the continuous development of the metropolitan and peri-urban area. Within the city, the entire population has access to public transport stations within a 15-minute walk at most, albeit this is not so in the metropolitan area.

The local Public Transport Company (STPT) is the only one operating in the city and the system includes:

- Tram lines – 6 lines and 121 stations;
- Trolleybuses – 9 lines and 91 stations;
- Buses – 38 routes and 651 stations;
- Vaporettos – small boats which run along the Bega Canal.

STPT is currently operating with 55 buses (EURO 3 standards) acquired in 2005, 30 buses fuelled by EURO 4 diesel and 20 minibuses (used for the transportation of pupils to schools) acquired in 2017 (EURO 5 standards). This situation is going to be to improve soon following the implementation of an 87.2 million euro project co-financed by EBRD for the acquisition of electric buses. Via this project a total of 44 new electric buses will be operational in Timișoara in the coming 2 years. The first 2 electric buses arrived in Timișoara in December 2022. Also, the Municipality recently attracted 62.5 million euros using a funding scheme through the Recovery and Resilience Facility of Romania, in order to renew the electric public transport fleet with 30 buses, 17 trams and 8 trolleybuses. Also, the project to buy 25 trolleybuses and build 49 charging stations for electric vehicles through the Recovery and Resilience Facility was declared a winner at the beginning of December 2022. The investment value is approx. 12.5 million euros. These recent developments add up to a total of 162.2 million euros of investment in the public transport fleet. Beside hard infrastructure investments, the EBRD has also financed a study for the optimization of the public transport network and the e-ticketing system development.

In recent decades the low comfort level and the relative slowness of public transportation determined people to travel by car. However, as the Municipality made efforts to improve the system, the number of trips made using public transport increased between 2017 and 2020 by a percentage of 7.6%. The increase in public transport use correlates with the extension of service coverage and the increase in the number of inhabitants in peri-urban areas.

The accessibility of public transport stations in Timișoara is among the highest in Romania, but transport remains inefficient due to long travelling times, lack of dedicated public transport lanes, reduced speed of public vehicles, long interchange times, lack of efficient transport hubs, lack of predictability regarding arrival times and limited communication with travellers.

Action description

The public transport network will be expanded and improved, including terminals and PT interchanges, in order to reduce journey times and increase the accessibility and reliability of the PT system. The system will be correlated with the future investments foreseen by the national railway system in Timișoara. The proposed measures include:

- *Development / upgrading of regional public transport terminals*. There are currently three major (Autotim, Super Imposer and Normandia) and three smaller regional bus terminals within the city of Timișoara. All of them are outdated and require investments for rehabilitation and modernisation.
- *Development / upgrading of public transport interchanges and bus stops* – this is an ongoing activity initiated by the Municipality and foreseen to continue in the coming 4 years. The ultimate goal is to upgrade all the bus stops in the city by introducing modern information boards which will give access to real-time data on PT vehicles. The new bus stops will also have modern waiting infrastructure with green roofs. The areas where the existing railway stations are located will become multimodal transport hubs once the railways stations will be rehabilitated.
- *Purchase of new public transport vehicles* and renovation of the trolleybus clamping net. The process of renewal of PT vehicles has been already initiated by the Municipality and will continue in the coming years. Via this action the Municipality also seeks to replace all cabling for trolleybuses with a resilient clamping net (upgraded netting with primary clamping, quick-passing cranes, flat spacers and improved bent elements). At the same time, it focuses on the extension of the trolleybus network inside the city and towards the suburbs (from Continental station to Iulius Mall, Giroc road and Mehala neighbourhood).
- *Development of modern e-ticketing system.* The e-ticketing system will simplify the ticketing process by allowing users to purchase, manage, and use electronic tickets. It will consist of a user-friendly interface for ticket browsing and purchase, ticket generation in the form of barcodes or QR codes, ticket management options for modifications and transfers, ticket validation through scanning, access control mechanisms for entry, integration with payment gateways and other platforms, and reporting and analytics features. At present, the Municipality is analysing 3 e-ticketing options: Option 1 QR Code ABT System, Option 2 EMV Ticketing System, and Option 3 EMV plus Account based QR Code AFC System. The selected option will offer convenience, eliminating the need for physical tickets, and will provide a seamless ticketing experience for both users and event organizers or transportation providers.
- *Establishment of dedicated PT lanes* is one of the activities which correlates with Action 1. Dedicated public transport lanes will be developed by the Municipality wherever possible after the SUMP will be updated, and specific traffic studies will be conducted. The Municipality will work towards establishing such dedicated lanes on an annual basis with the goal of having at least 25% of public transport routes (bus and trolleybus) on dedicated lanes by 2028.

- *Development of new tram line between Solventul area and Gara de Nord train station.* The investment will include the construction of a new double tram line for approximately 1.4 km and all necessary infrastructure for connecting North Train Station (Gara de Nord) with outer-city circular road 4 (this measure corelates with Action 6 which is dedicated to the modernization of circular road 4).

Implementation steps

1. Implement the current new PT vehicles acquisitions projects.
2. Develop the new e-ticketing system.
3. Prepare the Terms of Reference for the modernisation of bus stops and run the tender procedure for selection of construction works and acquisitions of equipment.
4. Supervise the construction works for bus stops modernization.
5. Prepare the Terms of Reference for the modernisation of regional bus interchanging stations and run the tender procedure.
6. Supervise the construction works for the modernization of the regional bus interchanging stations.
7. Establish dedicated bus/trolleybus lanes.
8. Construct the new tram lines.

Estimated costs

Item	CAPEX (EUR)	OPEX (EUR/Y)
New and modern PT vehicles	162,200,000	1,000,000
Modernisation of bus stops (20 bust stops/year in the coming 4 years @ 5,000 EUR/bus stop)	400,000	4,000
E-ticketing system	1,200,000	25,000
Modernisation of regional bus interchanging stations (1 station)	2,000,000	20,000
Dedicated bus lanes (at least 5 km/year)	500,000	50,000
Construction of new tram lines between Solventul and Gara de Nord	12,000,000	100,000

Source of financing

Co-financing is secured by EBRD loan; EU grants, National Recovery and Resilience Plan, municipal budget and other funds.

Action 5
Expanding and improving pedestrian areas

Transport

TYPE OF ACTION

Policy and investment

ABSTRACT

The pedestrian infrastructure will be developed in order to increase the overall quality of the pedestrian experience in the public space, as well as to increase traffic safety. Investment into pedestrian infrastructure will cover not only the city centre, but the historic neighbourhoods and the newly developed districts as well.

CHALLENGE/VULNERABILITY ADDRESSED

- Traffic congestion during peak hours in areas of interest such as schools, business centres, public institutions and in intersections between radial and circular roads
- Lack of a functional adaptive traffic management system, lack of high-performance digital applications for route planning, as well as lack of a digitized database contributing to an efficient management of the allocation of financial resources for infrastructure interventions
- Predominant use of road infrastructure and transport based on personal vehicles, increasing trend especially in the ATUs in the peri-urban area

STRATEGIC OBJECTIVES

SO1 SO2 SO4 SO5

BENEFITS

- Decreased number of journeys by car
- Improved air quality, limited noise levels and increased quality of the pedestrian experience in public spaces
- Increased accessibility to and between cultural heritage sites and leisure sites within the city
- Increased traffic safety by limiting the number of accidents

TARGETS

- Construction or redesign of pedestrian routes (5 km/year)
- Reduced number of traffic accidents where pedestrians are involved by 25% by 2028
- Approved Road Safety Action Plan and enforcement mechanism

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2025–2027	N/A	8,150,000 EUR

Context

Besides the development of the cycling network, Timișoara will also improve the pedestrian infrastructure. Currently, pedestrian walkways are sometimes shared with bike lanes. Some of the pedestrian routes are not well connected, thus discouraging their usage since obstacles are present and citizens cannot easily reach certain areas. The figure below presents the existing and proposed pedestrian infrastructure in Timișoara as it is proposed in the current SUMP. The map also indicates the existing conflictual situations with other infrastructure.

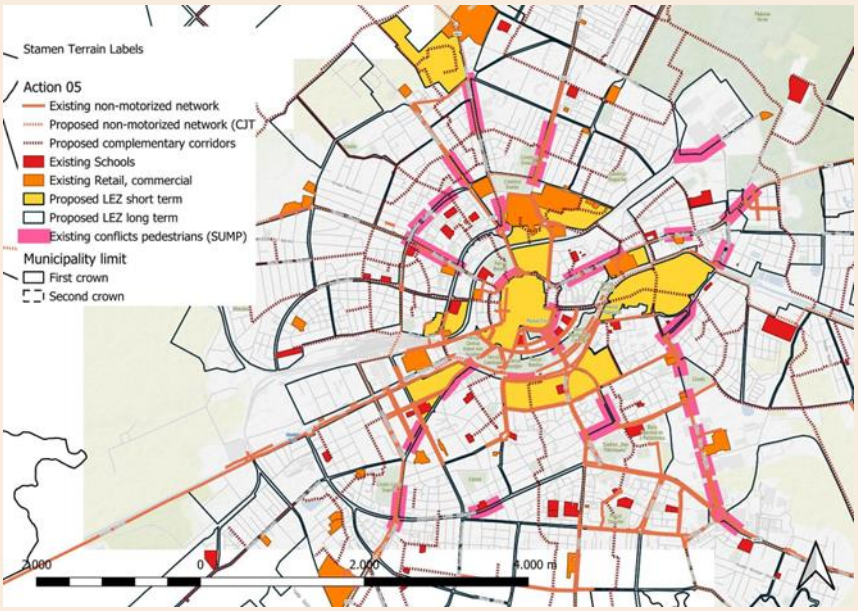


Figure 9 Pedestrian infrastructure (source: RWA Group)

The most congested areas are those at the main intersections of the city, around large shopping centres and markets, and around major public institutions. Ensuring optimal conditions for pedestrians requires an easy connection between these objectives and public transport stations, as well as specific arrangements that do not hinder movement.

The study carried out as part of this action will focus on the pedestrian routes and will identify the most important ones which will be developed and/or enhanced in order to include smart and green elements, such as: smart city furniture where people can re-charge their electronic appliances, green areas which will ensure shading of walking routes, etc.

Action description

A safe walking environment will be created in the city, connecting major attractions and allowing citizens and visitors to enjoy the pedestrian walkways of the city. As such, this action focuses on the development of pedestrian/residential areas in neighbourhoods, in accordance with the current legislation, to facilitate micro-mobility and access to local facilities such as schools, community centres, shops and markets, green spaces, children's playgrounds, etc. At the same time, an inventory of all pedestrian crossings in the city will be done, in order to prioritize these for safety measures such as increased street lighting and others.

The concrete measures to be implemented are:

- Establishment of dedicated pedestrian zones and pedestrian paths. One such zone which could be reclaimed as a pedestrian zone is the area situated around the Theresia citadel.[3] This is currently used for different events and is a lovely pedestrian zone with the exception that there is a 3-lane road crossing it. This is part of inner circular road 1 and has a very good potential of becoming a pedestrian zone after redesigning the circular road 1 (Action 1).

- Setting / delineating clear and safe school paths allowing children to access schools safely. This measure is complementary to the parking measures and is aiming at establishing zones where parents can drop-off their children and from where children can walk in safety to their schools.
- Setting up road crossing facilities for pedestrians
- Rehabilitation of sidewalks

At the same time, this action focuses on the preparation of a Road Safety Action Plan to be implemented and monitored by the Mobility Coordination Centre, addressing the planning (engineering), education and support components.

The Action Plan will focus on:

- analysis of accident data and establishment of black spots,
- preparation of support programmes, campaigns and educational activities,
- pedestrian prioritization measures in black spots (including more pedestrian-friendly phasing of traffic lights),
- establishment of concrete measures that ensure pedestrian-only access on the sidewalks,
- requirements for sidewalk quality monitoring and maintenance activities.

Implementation steps

1. Develop the Road Safety Action Plan.
2. Prepare the Terms of Reference and run the tender process for the selection of suppliers and acquisition of materials for the new pedestrian routes.
3. Supervise the construction of new pedestrian routes and/or other pedestrian-related infrastructure.

[3] Source: https://commons.wikimedia.org/wiki/File:Bastionul_Theresia_ansamblu.jpg

Estimated costs

Item	CAPEX (EUR)	OPEX (EUR/Y)
Road Safety Action Plan	150,000	N/A
Construction of pedestrian routes (5 km/year) and/or pedestrian infrastructure (dedicated school paths etc.)	8,000,000	400,000

Source of financing

Timișoara Municipality – local budget; IFIs and/or EU funds available in the Transport sector or other funding programmes, including the Recovery and Resilience Facility.

Action 6
Modernizing the circular city road 4 and resolving conflicts with radial roads

Transport

TYPE OF ACTION

Investment

ABSTRACT

The outer-city circular road 4 is one of the major city roads with a strong influence over inner-city traffic. This road will be rehabilitated and certain sections of it will be constructed in order to close the circular road. The aim is to transform this road into a fully functional smart, green, multimodal transport corridor, with micro-mobility elements included in the road design, providing optimal traffic conditions for all participants in the traffic and resolving conflicts with radial roads.

CHALLENGE/VULNERABILITY ADDRESSED

- Traffic congestion during peak hours in areas of interest (such as schools, business centres, public institutions) and in intersections between radial and ring roads
- Public transport lines not adjusted according to the real needs of the population and the development of the metropolitan and peri-urban area
- Pronounced pressure on the city transport system from transit transport due to the slow progress of the proposed major infrastructure projects
- Lack of integrated transport planning and multimodal connection of Timișoara with the ATUs in the peri-urban area, with the exception of initiatives in public transport, resulting in fragmented transport systems for the different modes of transport (road, railway, bicycles, pedestrian) and for services and infrastructure (bike sharing, electric charging, etc.)
- Absence of dedicated infrastructure / dedicated public transport lanes to streamline public transport ensuring frequency, predictability, and attractiveness

STRATEGIC OBJECTIVES

SO1 SO2 SO5

BENEFITS

- Increased traffic fluidity in order to reduce travel times and accessibility
- Improved air quality, limited noise levels
- Convenient access to TEN-T corridors without the need for freight transport to cross the city
- Increased competitiveness of industrial parks

TARGETS

- Construction of missing parts of circular road 4 (approximately 7 km in the southeastern part, Solventul Bridge and other parts missing from the western part)
- Bike lanes along the road, where feasible

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	N/A	80,000,000 EUR

Context

Timișoara faces pronounced pressure on the urban transport system from transit transport, as well as from the fact that public transport lines are not correlated with the real needs of the population and the development of metropolitan and peri-urban areas. For this reason, a priority at urban level is to optimize transit by investing in the completion of inner- and outer-city circular roads. Action 1 focuses on inner-city circular roads 1 and 2, while this action focuses on outer-city circular road 4.

At present, the Municipality has managed to prepare a Feasibility Study for the rehabilitation and completion of circular road 4. The picture below presents the existing and envisaged sections of the circular road 4, as well as the sections which need rehabilitation. The yellow-marked sections are under construction, while the red-marked sections (E, I, H and G) are still missing.

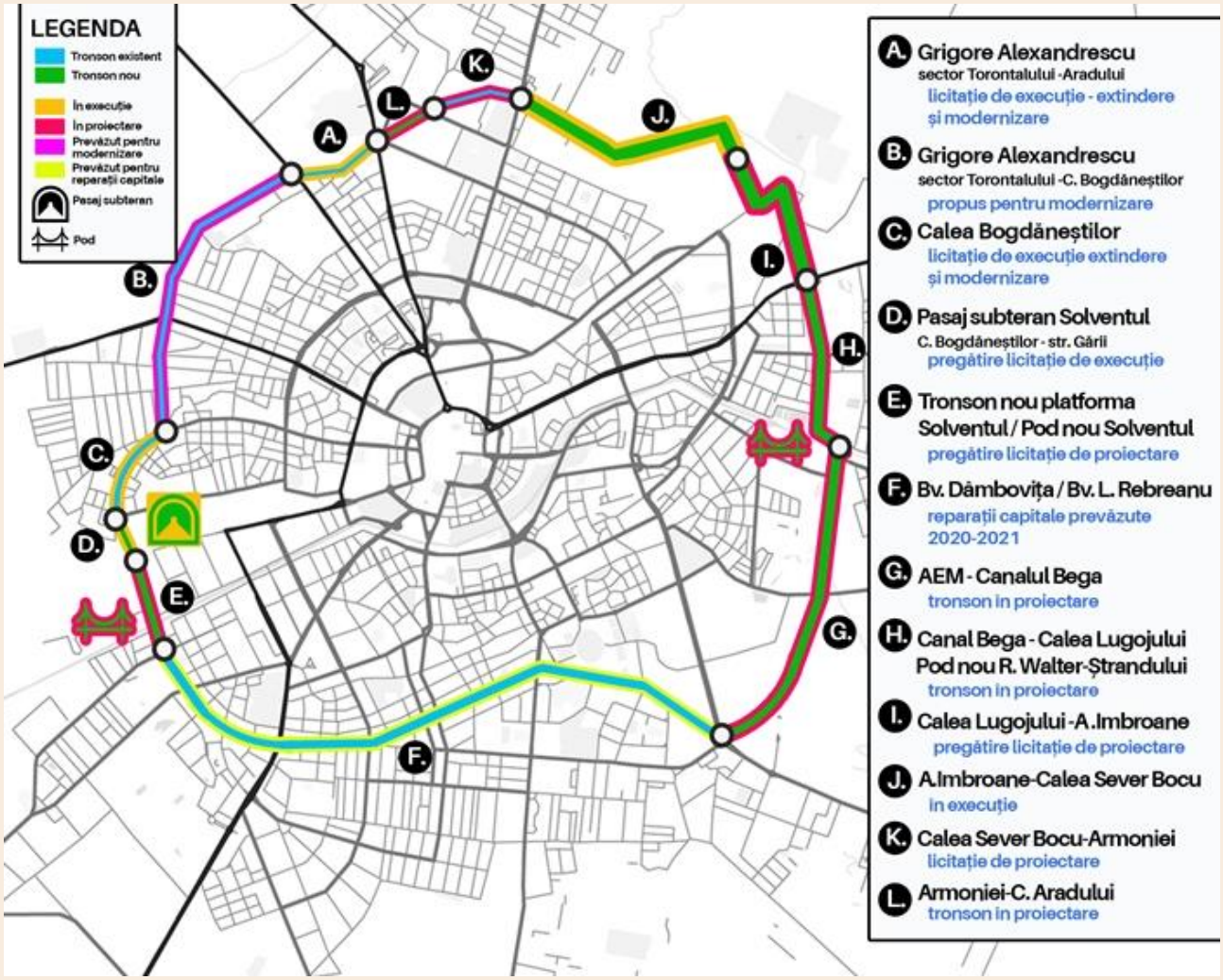


Figure 10 Outer-city circular road 4

Action description

The Municipality will undertake a large infrastructure investment program to optimize traffic flow conditions in Timișoara and to encourage connectivity with the surrounding ATUs. Thus, distributed access for logistics to industrial and large commercial areas located adjacent to outer-city circular road 4 will be ensured. The figure below presents the way the future circular road 4 would look like when all elements will be completed. It should be also noted that other major infrastructure projects (e. g. Timișoara ring road) will also alleviate most of the constraints related to the transit of heavy traffic through the city. The circular road 4 will also ensure that the heavy traffic movement will not reach the city centre.

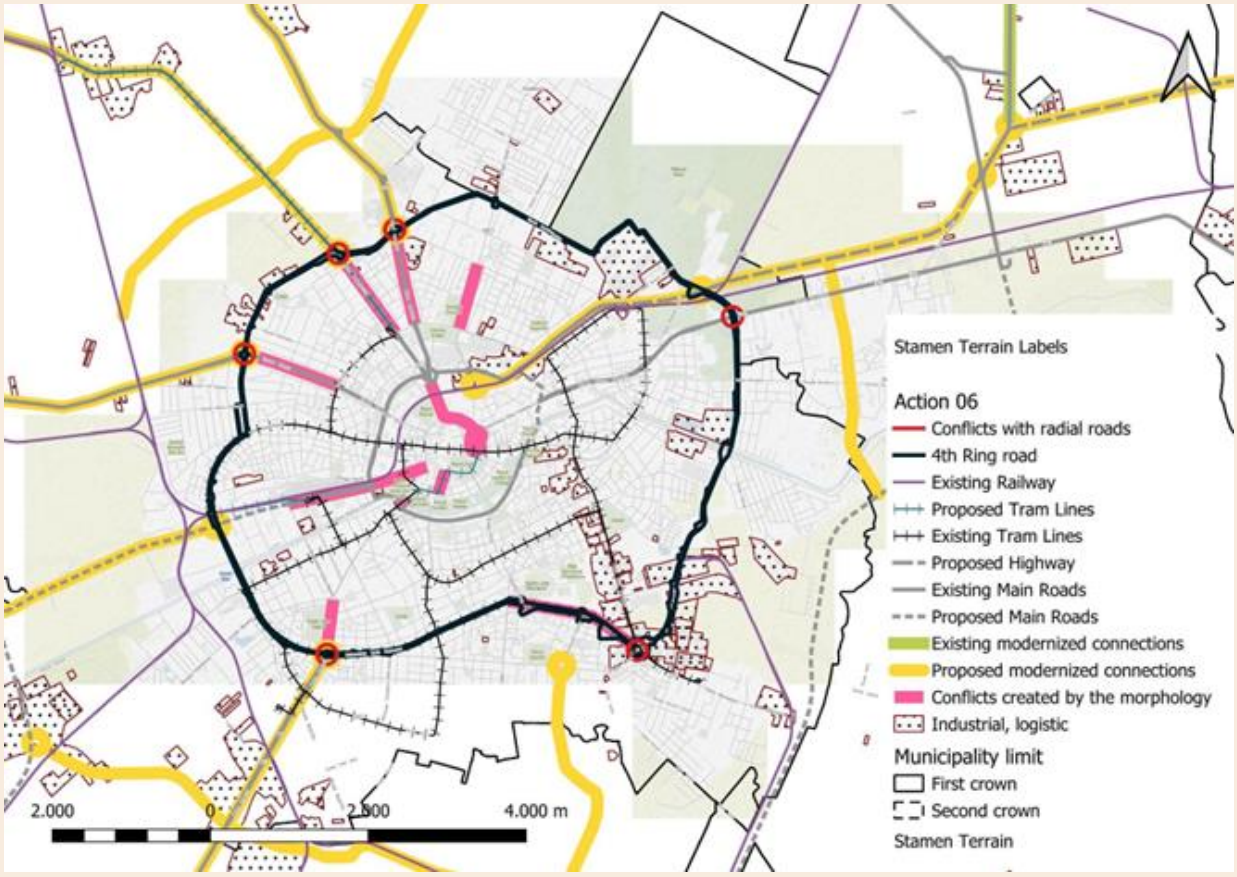


Figure 11 Design of the future circular road 4

Investments include building connections between Timișoara's ring road and the main industrial platforms in Timișoara, as well as with the peri-urban areas, as dedicated routes for logistics, but with additional benefits for the transit of international, national or regional transport routes.

The new design of the circular road 4 will include elements which will transform it into a smart (including EV charging stations) and green multimodal transport corridor. The road will include public transport infrastructure for trams, dedicated bike lanes as well as green zones in between the vehicle lanes and bike lanes/pedestrian lanes, wherever feasible and needed.

Implementation steps

1. Prepare the tender documentation for the building of missing parts of circular road 4.
2. Select the construction companies and supervise the construction works.

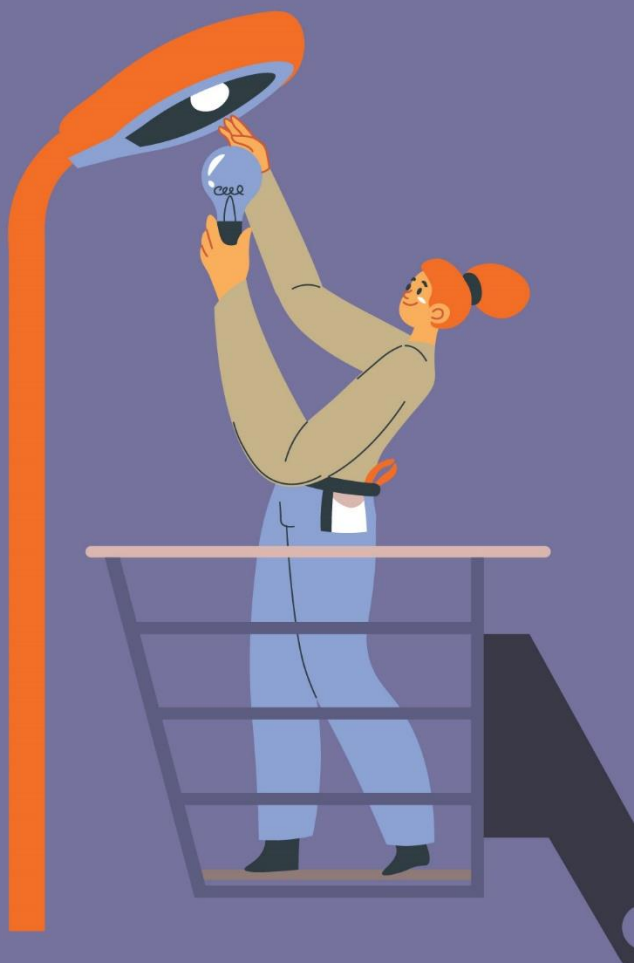
Estimated costs

Item	CAPEX (EUR)	OPEX (EUR/Y)
Construction works for completion of circular road 4 and supervising activities	80,000,000	1,000,000

Source of financing

Timișoara Municipality – local budget; IFIs and/or EU funds available in the Transport sector or other funding programmes, including National Recovery and Resilience Facility.

Energy



GREEN CITY ACTION PLAN
TIMIȘOARA

Sector overview

BASELINE

Electricity consumption and the grid: Electricity for the city of Timișoara and the surrounding area is provided by the National Energy System (NES) which has a generation composition of hydro with 36.3%, followed by coal and wind with 16.9% and 16.4% respectively. E-Distribuție Banat is the main medium and low voltage distribution system operator (DSO) in Timișoara, supplying electricity for households, public institutions, industrial and commercial entities. The power distribution grid is developed both underground (1,111.6 km) for the city centre and in residential areas, and above ground (710 km) in certain areas of the city. In 2020, 99.5% of the city was connected to the local power distribution grid, consuming around 1,000 GWh city-wide. Generally, the biggest energy consumers in the city are the economic entities (79%) followed by the residential buildings (19%). Until 2020, the general energy consumption in residential buildings was situated well under 300,000 MWh/year, while during the COVID-19 pandemic, the electricity consumption increased almost four times reaching nearly 800,000 MWh.

Public lighting: The public street lighting of Timișoara is developed on 649 km; it uses predominantly sodium-based and to a lesser extent LED fixtures and covers 98% of the city. The upgrading and extension of public lighting started in 2006 and lasted until 2015. Since then, the investments have been minor, and consisted rather in maintenance and replacements. On the main boulevards, LED-based smart lighting was installed starting in 2021, but the overall coverage with new lighting fixtures is low.

District heating: District heating is currently managed by SC COLTERM SA, a municipally owned utility company; it is based on fossil fuels, the two main energy sources being coal and natural gas. The municipal district heating (DH) system supplies hot water and heating to an estimated 55,000 households (less than 50% of the households) and to about 900 public institutions and companies. The system is composed of two large generation plants, one being a gas-fired heat-only unit, while the other a coal-fired combined heat and power (CHP) unit; three small neighbourhood CHPs; three neighbourhood heat-only-boilers; and a transport and distribution network. The overall generation capacity of the system sums up to around 560 MW thermal energy and around 23 MW electricity. Even though the district heating sources its energy mostly from natural gas, which is a lower CO_2 emission fuel compared to coal, the share of district heating from carbon-intensive sources is still problematic. 35% of the total energy output is generated from coal with natural gas as support, generating significant environmental impact through the emission of GHGs and other associated pollutants.

Heat consumption and demand: The main DH system user is the residential sector which used 380,000 MWh in 2020, while companies and public institutions used around 77,000 MWh and 24,000 MWh respectively. The local DH is suffering from a major disconnection trend due to the poor quality of the thermal agent for some of the users. In 2021 the DH system had an overall energy loss of 40%, a concern for the consumers living in multi-level buildings of over 4 levels and especially for levels 8 and above, where the temperature and pressure of the thermal agent are substandard. Over the past decades the general trend

among the citizens is to disconnect from the underperforming DH and install apartment-level gas boilers in order to have the necessary level of comfort and control over their consumption.

District heating challenges and outlook: COLTERM has been dealing with financial difficulties arising from a combination of factors, including deficient tariffing, technological inefficiencies, and a decreasing client base. As a result, COLTERM has been struggling to secure the necessary gas and coal supply for its functioning. Timișoara Municipality is committed to and is actively working on turning around the decline of the district heating in the city through energy security and decarbonization of the DH system. The envisaged technical solutions include optimizing distribution, putting an end to disconnections, and eventually increasing the client base, but also switching to a more sustainable mix of sources of energy. Even though, as of now, more than half of Timișoara's population is not connected to the DH, the collapse of the system will force the remaining several tens of thousands of households to find alternatives for heating. The switch to household gas boilers, which would be an obvious consequence of the closing the local DH system, will have significant social impacts and will generate high levels of GHG emissions across the city.

Renewable energy sources: Because of its geographical position and economy, Timiș county has a great potential to use RES: biogas generated from wastewater sludge, municipal waste, organic waste, and landfill gas extraction, geothermal energy, and solar energy. In 2020 at county level the main renewable source for electricity generation was solar harnessing, with 63% (around 50 MW) of the total generation potential, followed by coal with 25%, indicating good CO_2 emission-related performance of the county electrical grid. At city level, the only centralized RES generators are at the Micro Hydropower Plant Bega (which generated 1,895 MWh electricity in 2020) and the solar panels installed at the CET Freidorf (which generated 31 MWh thermal energy in 2020). In spite of the high generation potential, capacities for grid connection are limited in the region, in fact currently these are reported as being zero and are expected to grow to 300 MW in 2025 and up to 700 MW in 2030. However, PPA legislation allows direct sales to consumers, so the potential for RES development is higher than grid limitation suggests.

POLICY FRAMEWORK

The developments of the local energy system are regulated through numerous documents such as the **Energy Efficiency Plan for Timiș County 2021-2027**, the **Development Strategy for Timișoara Nord (2022), the Spatial Management Plan for Timiș County** (last update in 2013) and the **Timișoara Thermal Strategy 2022–2030.**

The **Timișoara Thermal Strategy 2022–2030** is the main local document that analyses the current operation of the local DH, identifies issues, and proposes actions and scenarios for future development. As part of the strategy, the proposed scenarios analyse all the possible outcomes from inaction and the eventual closure of the DH up to the establishment of a healthy system that generates energy from a mix of fossil and renewable energy sources, therefore eliminating the dependency on one energy source and reducing the overall environmental impact.

IDENTIFIED CHALLENGES

- **Centralized RES harnessing** for the city is almost **inexistent.**
- **Inefficient and fossil-fuel based energy generation** leads to a high CO_2 footprint.
- **Citizens need more support in the transition** towards the electrification of mobility and heating/cooling.
- **Low user comfort and service performance of the district heating system** connected to declining demand and disconnections.
- **Low energy performance of the public lighting system.**

SHORT-TERM ACTIONS 2024– 2028

7. Smart and efficient, large-scale public lighting programme
8. Rehabilitating and modernizing the District Heating (DH) network
9. Flexible, high-efficiency and hydrogen-ready CHP
10. In-depth energy efficiency awareness-raising programme
11. Installing electric vehicle charging stations enabled through smart grid upgrades

LONG-TERM ACTIONS UP TO 15 YEARS

Feasibility studies for the implementation of large renewable energy power plants

Modernizing CHPs with the aim of decarbonization through decentralized renewable sources

Pilot project on green hydrogen production

Developing an energy community at USAMVB Campus

Revitalizing Timișoara's hydro-energy generation

Establishing an Energy from Biomass Facility for the region

STAKEHOLDERS

Name	Actions to be involved in
Timișoara Municipality	**7, 8, 9, 10, 11**
SPV companies to develop renewable energy sources and supply the DHS	**8, 9, 10**
Private-owned companies Energy efficiency and RES solution providers	**7, 8, 9**
COLTERM after a substantial redefinition of its governance model	**8, 9, 10**

Technical University of Timișoara as a technical assistance provider in the energy transition towards the decarbonization of the DHS	**8, 9, 10**
Local Transport and Road Safety Department	7, 11
Mobility and public transport operators	11

SMART AND DIGITAL ASPECTS

Action 7: The new public lighting fixtures will include different levels of smart features. The main arteries will be endowed with remote control, dimming, and sensor add-on capabilities (for air quality, river level monitoring, and cameras for littering and traffic monitoring, and data gathering for planning, etc.), while the secondary streets will only have local dimming based on proximity sensors.

Action 8: The use of reduced temperature and renewable energy sources, together with the ability to shift demand allows cost optimization and brings economic benefits; however this action relies on the level of digitalization and the use of AI and self-learning algorithms to integrate data from consumers with production and substations enabling real system efficiency.

Action 9: SCADA control of the new gas-fired CHP modular power plant will be introduced, therefore assuring flexibility in relation to the power grid.

Action 10: The action will include the development of a digital platform allowing citizens to access information regarding local energy solutions. The platform will aim to compile as much information as possible over time and redirect citizens to other local and national initiatives in energy efficiency such as the One-Stop-Shop (Action 12 in the Buildings sector).

Action 11: The study on electrical grid capacity for the integration of electrical chargers will also cover the capacity of the grid for new prosumers and the role of digitalization. Furthermore, the new stations will be included in the digital mapping platforms for EV chargers and will be compatible with the most used app on the local market.

SOCIAL AND GENDER ASPECTS

Action 7: The modernization of the local street lighting will increase visibility, while also increasing the overall sense of safety during the night. Moreover, additional road signalling could decrease the number of accidents and provide better guidance to visually impaired citizens.

Action 8: Currently, the DHS operator, Colterm has overall aged personnel, with fewer and fewer professionals and challenges in keeping the staff. This is why the Municipality will have to develop a social and gender action plan through which to attract young professionals regardless of any socio-economic barriers. Furthermore, cooperation between the Municipality and the DSO could have as a result the provision of scholarships for high

school graduates in relevant fields such as management and development of energy systems and renewable energy.

Action 8 and 9: Special attention will be given to vulnerable consumers and the eradication of energy poverty, while significantly reducing the subsidies for heating delivery, through the upgrading of the DHS, the individual energy metering of the households and through a marketing and awareness raising campaign for secure and low emissions energy delivered from the DHS.

Action 10: The energy efficiency awareness activities will also address the specific issues of vulnerable groups and provide solutions to avoid energy poverty that will require little to no investment.

Action 11: The new charging stations will be located in heavily transited locations and will facilitate access to multiple vulnerable groups such as the elderly, the chronically ill, mobility-impaired people and young mothers.

Action 7
Smart and efficient, large-scale public lighting programme

Energy

TYPE OF ACTION

Investment

ABSTRACT

The Municipality will develop and implement a large-scale programme aiming at the improvement of the public lighting system. This programme will target the entire city and will focus on the replacement of poles, light bulbs and network cables, introducing new, smart and energy efficient LED system.

CHALLENGE/VULNERABILITY ADDRESSED

- CO_2 emissions associated with high energy consumption
- Inefficient streetlight fixtures
- Lack of centralized control centre
- Lack of smart technologies

STRATEGIC OBJECTIVES

SO1 SO3 SO5

BENEFITS

- Increased public lighting quality
- Increased road and pedestrian safety
- Reduced energy, maintenance, and operational costs
- Promoting the adoption of smart city technologies

TARGETS

- Replacement of 24,000 light fixtures in the municipality

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2027	2,120 tCO_2eq	8,230,000 EUR

Context

On the 12th of November 1884, Timișoara became the first city with electric street lighting in Europe. The 731 electric lamps changed the way people understood and appreciated electricity and used public spaces at night.

Nowadays public lighting is a critical public service that aims to provide high visibility for road users, pedestrians and citizens, while reducing traffic accidents and increasing the level of safety perceived by citizens. However, public lighting consumes a significant amount of energy and contributes to greenhouse gas emissions.

The street lighting of Timișoara is developed on 649 km, using predominantly sodium-based and to a lesser extent LED fixtures, covering 98% of the city. The upgrade and extension of public lighting started in 2006 and lasted until 2015. Since then, the investments have been minor, and the focus has been on maintenance and replacements. On the main boulevards, LED-based smart lighting was installed starting with 2021.

Public lighting is managed by the Municipality. In 2021 it included 25,753 fixtures and was responsible for a consumption of 16,301 MWh.

Action description

The replacement of inefficient streetlight fixtures with the best available options, such as LED (light-emitting diode) technology represents a significant step towards sustainability and cost-effectiveness by increasing the energy efficiency of the system and promoting the adoption of internet-of-things devices.

LED fixtures offer numerous advantages over traditional lighting systems, since they use significantly less energy, leading to substantial reductions in electricity consumption, subsequently to reductions of greenhouse gas emissions and to cost savings. The main arteries can be fitted with light fixtures with remote control, dimming, and sensor add-on capabilities for air quality, river level monitoring, cameras for littering and traffic monitoring, and data gathering for planning, while the secondary streets can have only local dimming based on proximity sensors.

Additionally, new technologies allow the adoption of connected and smart city technologies such as smart controllers or different sensors such as traffic, air quality or river level monitoring. With a smart city approach, all systems can be controlled or monitored in a centralised control centre, and the infrastructure can be used to provide bidirectional communication.

The programme is designed to ensure the replacement of 24,000 inefficient fixtures with LED fixtures until 2027 according with relevant standards such as EN 13201. This represents an opportunity to use best practices in procuring performance-based design, financing, installation, operation, and maintenance of energy efficient solutions. Where no funding is available, new ways of financing with a focus on third-party finance and performance contracts, such as the Energy Performance Contracts (EPC) developed by Energy Service Companies (ESCOs) should be considered.

Implementation steps

1. Develop a feasibility study and implementation plan for the upgrading of the public street lighting system applying the smart city approach.
2. Outsource the public lighting system upgrading and rehabilitation works. This includes the preparation of the Terms of Reference and procurement documentation. The ToR should include minimum performance indicators, eligibility criteria, and business models.
3. Perform renovation and upgrading according to the implementation plan.
4. Train administrative personnel, the operating and maintenance staff on how to operate, manage and maintain the public lighting system and smart control centre.
5. Monitor implementation and evaluate performances. Promote results through information campaigns.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Feasibility Study and Implementation Plan	20,000	N/A
Improving and retrofitting existing lighting fixtures (24,000 light fixtures)	7,000,000	87,500
Control centre and smart infrastructure (covering 30% of the retrofitted light fixtures)	1,200,000	15,000
Information and awareness campaign	10,000	20,000

Source of financing

European Structural and Investment Funds (ESIF); National Recovery and Resilience Plan (PNRR); Romanian Energy Efficiency Fund (REEF); Environmental Fund Administration. Equally, Energy Services Companies (ESCO) providing private capital under Energy Performance Contracts, commercial loans and soft loans from IFIs are options for financing.

Action 8
Rehabilitating and modernising the District Heating (DH) network

Energy

TYPE OF ACTION

Investment

ABSTRACT

This action focuses on the implementation of the large-scale rehabilitation, modernization and extension programme of the District Heating (DH) network in Timișoara. More specifically, the main investments will gravitate around the district heating distribution network (approx. 60 km) which needs urgent rehabilitation, and the development of specific studies for geothermal energy source.

CHALLENGE/VULNERABILITY ADDRESSED

- High level of water and energy losses in the transmission and distribution system
- Accelerated decoupling of buildings from the DH system
- Poor quality of the hot water supply service, both related to technical parameters and delivery time
- High level of CO_2 emissions generating operational costs
- Significant subsidising of the thermal energy supplied to the population, estimated at 30,000,000 EUR/y

STRATEGIC OBJECTIVES

SO1 SO3 SO5

BENEFITS

- Better user comfort and health
- Reduction of energy poverty
- Reduced financial burden for Municipality as a result of reduced subsidy needs
- Improved air quality
- Improvement of network and infrastructure resilience
- Increased number of connections to the DH system
- Contribution to the energy security, both at national and local level

TARGETS

- Rehabilitation of 20%, i.e., around 60 km, of DH infrastructure as part of an ongoing large-scale rehabilitation programme
- 4 feasibility studies for DH infrastructure decarbonization developed and approved

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	4,075 tCO_2eq	80,000,000 EUR

Context

The local District Heating (DH) network is managed by SC COLTERM SA, a municipally owned utility company, currently under insolvency. The DH network includes 73 km of transmission and 208 km of distribution pipelines, respectively. In 2021, the company supplied 486,7 GWh/y thermal energy.

The DH system supplies domestic hot water and thermal energy to an estimated 900 public institutions and companies and 50,000 households, representing slightly less than 50% of the total number of households in the city. The number of connections is in constant decline, mainly due to the poor quality of the thermal agent for some of the users. The recent energy crisis, however, slowed down this trend, as increased energy prices were curbed by subsidies for those connected to DH.

In 2021 the DH system had an overall energy loss of 54% because of frequent equipment and pipe failures, and poor pipeline insulation. This resulted in frequent supply disruptions, customer complaints and increased costs for the already insolvent system.

A major concern of the consumers is the poor quality of the domestic hot water supply service. In buildings where most of the households are disconnected from DH, tap water starts warming after several minutes, with wasted water still being billed as hot water to the customer. Substandard temperature and pressure of the hot water is a prevalent issue in high-rise residential buildings as well. These issues, coupled with poor PR services on the part of the DH company are the main reasons why the citizens choose to disconnect from the system.

The accelerated disconnection trend in the past decades further aggravates the energy loss, the inter-household dependency on efficient service delivery, and the financial issues of the company. Colterm is constantly trying to patch and replace the most problematic segments of the network, but investment is too low to address most of the issues. Energy losses in the distribution network are the main contributors to the lack of service quality, which is not yet addressed. In order to achieve proper economic stability of the DH system, investments in the network will need to be accompanied by the introduction of sustainable and high-efficiency energy generation equipment (Energy Action 9) and awareness, marketing and user experience activities (Energy Action 10) to increase the number of domestic users.

Action description

Since the DH infrastructure and facilities are outdated, any intervention to improve the system's functioning entails significant energy saving potential.

The infrastructure needs a continuous comprehensive rehabilitation and upgrading program to achieve efficiency. The program should include the replacement of obsolete pipelines, pumping stations, storage tanks, and thermal points, as well as the installation of local individual heating substations, with heat pumps and PVs. In addition, the SCADA automation of the system needs upgrading.

The use of heat pumps can play a significant role in achieving the objectives of the Municipality's Thermal Energy Supply Strategy, as well as the overall decarbonization of the system. The vision is to install both centralized, large-capacity heat pumps in the

existing thermal power plants, as well as at thermal points, where feasible. There is no intention to switch from the existing 3rd generation to a 5th generation pipeline system in the entire network, but only in case of pipeline system extension to new consumers.

Specific feasibility studies for each part of the DH system need to be drafted, namely for the existing CHPs, transport and distribution network, the Thermal Points and the introduction of locally distributed renewable sources (PV, heat pumps, geothermal). In the medium to long term, the adoption of low-temperature networks should be considered for new areas of the city, potentially with local integration of RES.

99% of users lack individual smart metering systems, thus the deep renovation of apartment blocks (Action 13 in the Buildings sector) will include the transition from vertical to horizontal distribution which allows for individual smart metering of both hot water and thermal energy supply. The project will test measures to encourage the inclusion of building-level thermal energy sub-stations and smart cost allocators.

In summary, the action includes:

- Large-scale programme for the rehabilitation of facilities, transport and distribution pipelines
- Measures to improve pressure and temperature through energy efficient smart pumping system
- Adoption of digital technologies which will enable the DH company to detect heat losses (e. g. thermal loss imagery), development of thermal hydraulic model for future interventions and smart metering
- Large-scale automation and SCADA integration of the DH
- Transition from vertical to horizontal energy distribution for blocks of flats, with individual smart metering at apartment level
- Developing feasibility studies for:
    - Pipeline system rehabilitation
    - Low-temperature networks enabling the use of RES for heating and cooling
    - Upgrading the existing thermal points, with the introduction of heat pumps

Implementation steps

1. Develop an investment programme, detailing priority investments, and available and upcoming funding options/schemes/grants.
2. Conduct feasibility studies of the priority network segments.
3. Carry out works.
4. Carry out capacity building and allocate resources to increase internal project management capacity, particularly for energy managers.

5. Monitor implementation and evaluate the energy, decarbonization and sustainability performance through key performance indicators (KPIs) including the smart metering systems results.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Feasibility studies	2,000,000	N/A
Exploration studies and feasibility assessments for further decarbonization of the network	3,000,000	N/A
Network rehabilitation and modernization (60 km)	75,000,000	2,250,000

Source of financing

Modernization Fund; National Recovery and Resilience Plan (PNRR); Sustainable Development Operational Program (PODD); Regional Operational Program (ROP); Romanian Energy Efficiency Fund (REEF); Environmental Fund Administration; International Financial Institutions; Energy Services Companies (ESCO) providing private capital under Energy Performance Contracts

Action 9
Flexible, highly efficient and hydrogen-ready CHP

Energy

TYPE OF ACTION

Investment

ABSTRACT

This action foresees the design and building of a new, flexible, highly efficient, hydrogen and renewable-ready modular CHP system of 45 MWe / 48 MWth. Investments implying the use of natural gas will have to be Paris-aligned and appropriately sized, while energy transition solutions from coal to renewable energy sources will also be foreseen.

CHALLENGE/VULNERABILITY ADDRESSED

- Increased environmental impact of current coal-burning heating sources
- Severely affected energy security due to the high dependence on coal and uncertainty of supply in each winter season
- High costs with the CO_2 certificate purchase due to coal use
- Accelerated trend of disconnections from the DH system
- Poor quality of the hot water supply service
- Significant budget allocation for subsidizing the thermal energy supplied to the population, estimated each year at around 30,000,000 euro/year

STRATEGIC OBJECTIVES

SO1 SO3 SO5

BENEFITS

- Improved air quality
- Reduced reliance on fossil fuels (coal)
- Lower costs of primary energy for the Municipality
- Contribution to energy security, both at national and local level
- Secure and low-emission energy, for both electricity and heating

TARGETS

- Construction of a modular 45 MWe and 48 MWth CHP hydrogen ready unit
- Feasibility studies for the complete upgrade of the gas and coal fuelled energy plants for full phase-out of coal

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	72,000 tCO_2eq	69,500,000 EUR

Context

Local District Heating (DH) is managed by the currently insolvent SC COLTERM SA, the municipally owned DH utility company. Both the coal-based (CET South) and the natural gas-based (CET Centre and the 5 small-scale neighbourhood thermal points) energy plants are obsolete when compared to modern energy efficiency standards.

Even though the DH system is based mostly on natural gas, a lower CO_2 emission fuel as compared to coal, the share of DH from carbon-intensive sources is still problematic. 35% of the total energy output at city level is generated from coal with natural gas as support, this classifies the system as 'red' in the indicator benchmark. The share could be considered even higher when considering the (seldom) use of heavy fuel oil (HFO). Around 240,000 tonnes of CO_2 are emitted from the DH yearly, and together with the quantities of SO_x, NO_x, and particulate matter associated with fossil fuels, this significantly impacts the targets related to air quality and the climate ambitions of the city.

In addition to environmental aspects, specific economic and energy security issues have to be pointed out. COLTERM has been dealing with financial difficulties arising from a combination of factors, including deficient tariffing, technological inefficiencies, and a decreasing client base. As a result, COLTERM has been struggling to secure the necessary gas and coal supply for its operations. Due to difficulties in paying gas suppliers, COLTERM has been buying gas at higher prices on the spot market and this eventually led to insolvency and interruption of service for a limited period during the winter of 2021/2022. The company was confronted with difficulties due to purchasing coal at higher prices as well, since the Municipality was unable to buy directly from the extraction companies.

Action description

Timișoara Municipality is committed to turning around the decline of district heating in the city and to decarbonization. The City Council has recently approved the City's Thermal Energy Supply Strategy for this purpose. Based on the annual energy audits and decarbonization strategy, upgrading the heating sources through an initial energy transition phase involving the replacement of the existing coal-based energy plant with a modular 45 MWe gas-fired CHP plant is a priority. For this project, a Feasibility Study and application for financing have been submitted within Romania's National Recovery and Resilience Plan, under a specific call for District Heating systems. This approach is emphasized in the Thermal Energy Supply Strategy as a transitional solution, to be followed by the expansion of the local energy mix towards biomass/RDF along with PV and HP distributed systems. This CHP solution was adopted by the Municipality due to the recent energy security issues associated with coal supply and the financial pressure of the CO_2 certificate prices, which are constantly increasing due to NRRP DH decarbonization funds.

Thus, production sources and facilities alike need to be upgraded and working temperatures reduced as much as possible to facilitate the future integration of new technologies like heat pumps, PV systems, and renewables such as biomass or RDF. Also, the current micro-hydro power plant owned by COLTERM needs retrofitting or rebuilding.

The new CHP unit is meant to supply the DH system and replace the existing coal-based power plant, but in the future, the Municipality plans to introduce the usage of RDF/biomass CHP systems at the location of the current coal-based CET South.

In summary, the action includes:

- Replacement of coal-based and natural gas-based energy plants with high-efficiency cogeneration units, based on natural gas as a transition, followed by RES on the long term.
- Development of feasibility studies considering the adoption of Best Available Techniques (BAT) for energy efficiency and fuel switch to gas/hydrogen mix.
- Clear identification of funding and financing opportunities.
- Building and operating the new CHP modular system. The exact system specifics are to be determined through in-depth assessments and, if needed, phasing in a multi-year investment plan. The main aim is the introduction of highly energy efficient natural gas and hydrogen-ready CHPs, subsequently the total phase-out of solid fuels.

As indicated in Action 8, specific feasibility studies will be conducted for each part of the DH system. For energy production, there will be two such studies, one for each of the South and Central CHPs.

The owner of the District Heating system will continue to be the Municipality, while the arrangements for operations shall be determined later depending on which operator model will bring the best results in terms of securing financing and delivering key performance indicators.

Implementation steps

1. Build a new modular 45 MWe / 48 MWth CHP unit.
2. Develop a feasibility study for upgrading the currently coal-based South CHP, considering renewable and RDF sources to be integrated in parallel with fossil fuel. This will also include a roadmap for switching to clean energy production in line with EU targets.
3. Develop a feasibility study on the upgrading of the currently gas-based Central CHP, based mostly on high-efficiency cogeneration and heat pumps.
4. Implement upgrade works at South and Central CHP.
5. Allocate resources for capacity building, particularly project management capacity of energy managers.
6. Monitor implementation and evaluate the energy, decarbonization and sustainability performance through key performance indicators (KPIs) including the smart metering systems results.
7. Launch a long-term marketing campaign to promote the low-emission and secure energy delivered from the DH system.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Feasibility studies – the priority: • High-efficiency gas cogeneration • High-efficiency renewable energy cogeneration	150,000	N/A
High-efficiency gas-fired CHP modular power plant – hydrogen ready (This is an energy transition solution from coal towards renewables)	49,000,000	2,500,000
Upgrade works at South and Central CHP	20,000,000	1,000,000
Feasibility studies on decarbonizing and switching to hydrogen and RES	350,000	N/A

Source of financing

Modernization Fund, National Recovery and Resilience Plan (PNRR), Sustainable Development Operational Program (PODD), Romanian Energy Efficiency Fund (REEF); IFIs; Services Companies (ESCO) providing private capital under Energy Performance Contracts

Action 10
In-depth energy efficiency awareness-raising programme

Energy

TYPE OF ACTION

Policy

ABSTRACT

The Municipality develops and implements a broad awareness-raising programme tackling several issues of the local energy system, highlighting the importance of conscious energy use and the use of renewable energy sources, and proposes solutions for energy efficiency.

CHALLENGE/VULNERABILITY ADDRESSED

- Lack of awareness on energy efficiency and conscious energy use
- High rates of decoupling from the district heating system
- Low rates of building retrofit

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Environmental behaviour change
- Increasing energy generation from local RES
- Reduced CO_2 emissions and environmental impacts
- Reduced reliance on fossil fuels
- Increasing local energy efficiency consciousness
- Reduced energy bills
- Orienting the consumers towards environmentally friendly solutions

TARGETS

- Two awareness-raising campaigns per year
- 50% of the residents of Timișoara reached through targeted campaigns
- Decreased household energy consumption by up to 10% due to behaviour change
- Increased use of EE electric appliances
- Increased use of small-scale RES solutions
- Online carbon footprint calculator tool developed

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	11,152 tCO_2eq	250,000

Context

A focus on the demand side of the energy equation has never been more important. Supply uncertainty, high prices, and urgent climate targets all point to the value of energy efficiency and energy savings. Well-designed campaigns can educate and motivate people to reduce their energy use and turn towards the use of renewable energy sources.

The city is struggling with both the demand and supply side of sustainable energy. Some of these aspects can be shaped positively through behaviour change. Residential electricity consumption was high during the 2016-2020 period and peaked during the pandemic. Heat consumption is not as high but is still coal- and gas-dependent. District heating is seen as an outdated alternative with residents decoupling at a high rate due to comfort issues. Hot water either does not reach certain floors in buildings or reaches them with great delay, apartments are often overheated in the winter, and smart metering is not available. All of this makes DH unattractive.

In 2021, around 40% of the residential buildings were connected to DH, but this value is in constant heavy decline in the last 5 years as there are about 21% less connections as compared to 2015. The massive household disconnections, especially in the residential blocks, where some apartments remain connected to DH, while others choose different heating solutions are creating development issues, also increasing costs and energy loss.

Coupled with this is the low rate of building retrofit, which is hampered by a multitude of factors among which insufficient awareness of the benefits of energy saving for saving costs and living more sustainably. Thus, there is a clear need to align the vision of the residents, the community and the local government around the longer-term goals of sustainable energy for decarbonization in the medium to long term.

On the positive side, because of its geographical position and economy, Timiş county has great RES potential from biogas to be generated from wastewater sludge, municipal waste, organic waste, and landfill gas extraction, geothermal energy, and from solar energy. Also, during the pandemic period of 2020-2021, the number of prosumers increased, reaching to a total power installation of 4,337 kWp, thus being the third biggest prosumer-based electricity generator county. This capacity can be further increased.

Action description

The action envisions the establishment of a broad awareness-raising programme that could address several issues depending on the priorities:

- Electricity consumption arising from heating and use of different appliances; electricity labelling
- Energy efficient behaviour habits
- Smart technologies such as smart metering of the heat
- Environmental impact of various sources of energy and benefits of switching to renewables
- Comparison between household gas boilers, district heating, and heat pumps

- The impact of small-scale renewable energy sources such as photovoltaic in self-consumption or for energy communities
- Marketing and awareness campaign for the DHS and its related opportunities of secure and low-emissions heating delivery
- Real cost-saving potential of the solutions

Successful awareness raising programmes are targeted, relatable and use well-designed communication and visibility activities. There is a wide variety of choices for communication channels such as digital for real-time information and nudging, social media, or the more conventional channels. Guidelines for specific target groups or promotional materials may be produced.

International DH companies from countries such as Germany, Denmark or Finland, have good communication and public relations strategies, establishing themselves as reliable partners, attentive to customers' needs, willing and able to offer modern, flexible, and customized solutions that best meet customers' needs. In Romania, cities such as Iasi and Oradea managed to change for better their situation similar to Timișoara through major investments in the DH infrastructure that were accompanied by awareness raising, marketing, and activities to ensure user-friendly services. This approach managed to achieve domestic and industrial reconnections to the DH that increased the economic viability of the system. It is clear that in Timișoara, the investments into DH equipment and infrastructure should be paired with strong communication and customer support activities, to achieve the revival of the system. Currently COLTERM, the local DH company doesn't have a proper communication and dissemination approach to present their development and what are the benefits for the citizens of staying connected or reconnect to the DH. The action also aims to address, establish, and improve some of the marketing elements identified and proposed in the new Timișoara Thermal Strategy for 2022-2030 and its perspectives for 2050 such as:

- Lack of a standard procedure for taking and handling phone calls and lack of automated systems of interaction with the public (e. g. chat function, automatic confirmation of receipt of e-mail messages etc.).
- The use of a predominantly outdated style in terms of design and a language that favours technical, specialist terms.
- Investment presentations or descriptions of the company's services do not present direct benefits to end consumers and do not address their general concerns.
- Need to increase the general awareness, engagement, transparency, and credibility for regaining users under the DH system, through accurate, publicly available, and easy-to-read information.

As part of the action to increase the appeal of the DH and reduce the overall household energy demand, an online carbon footprint calculator tool will be developed to allow citizens to assess and compare their GHG emissions and other pollutants connected to using private heating systems as opposed to district heating, outdated home appliances and private vehicles. The tool will collect easily obtainable information from product

descriptions, present the impact through common sense comparison and propose alternatives to reduce the impact of various energy consumers.

The action could be implemented as one of the activities of the One-stop-shop v.2, Building Action 12 in cooperation with the coordination and execution entities implementing the Smart City Strategy of Timișoara.

Implementation steps

- Develop an awareness-raising programme, with a specific focus on the current and potential DH customers in the short term. The programme will include two campaigns to be carried out per year, detailing target audience, communication channels, expected results and outputs. This step can be coordinated by the One-stop-shop.
- Carry out the campaign together with capacity building and awareness raising activities. This step is to be done either through open calls or through partnerships with Smart City Strategy implementation structures and partnerships with NGOs and the private sector.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Development and roll-out the awareness-raising programnme (2 campaigns / year), including the development of an online carbon footprinting tool	250,000	40,000

Source of financing

Municipality's own budget, private sector suppliers interested in developing EE and RES market, EU financing dedicated to climate change, EE and decarbonization

Action 11
Installing electric vehicle charging stations enabled through smart grid upgrades

Energy

TYPE OF ACTION

Investment

ABSTRACT

The aim of this action is to carry out an electric vehicle charging stations and infrastructure development programme. As part of the programme the locations and types of charging stations will be identified, together with financing sources and business models for their operation, working together with the electricity grid operator to ensure necessary upgrades and promote grid improvements.

CHALLENGE/VULNERABILITY ADDRESSED

- CO_2 emissions and air pollution due to traffic
- Growing number of electrical vehicles
- Low number of charging stations available
- Reduced capacity of the grid to support new electrical infrastructure

STRATEGIC OBJECTIVES

SO1 SO3 SO5

BENEFITS

- Reduction of CO_2 emissions, air pollution and noise
- Improvement of the network and infrastructure resilience
- Adoption of a smart grid approach
- Accelerating the energy transition on clean mobility

TARGETS

- 45 fast and 100 slow charging points implemented
- Study on electrical grid capacity and EV masterplan developed and approved
- Increased number of electrical vehicles used in the city

TIMEFRAME

2024–2028

GHG SAVINGS / YEAR

1,323 tCO_2eq

CAPEX

8,425,000 EUR

Context

In accordance with the global trend, the number of electric and hybrid cars circulating in the city is on the rise. As such, while in 2020 only 449 hybrid and 49 electric cars were registered in the city, in 2021 their number had already doubled to 1,182 hybrid cars and 156 electric cars. Also, a total of 44 new electric buses will be operational in Timișoara in the coming years demonstrating the advantages of electric mobility.

In September 2022, the city inaugurated 16 charging stations for electric cars, financed by the Environmental Fund Administration and two months later, each of these stations is being used for an average of 6.6 charges per day. Additional 7 charging stations have been approved for financing. Besides public charging stations, some of the larger hypermarkets, as well as other privately owned, but publicly accessible parking facilities also offer charging stations for their clients.

In some areas of Timișoara the electric grid is very old and used close to its maximum capacity. This problem is aggravated by the increase in the electrification of transport, share of renewable energy sources, storage, or demand response systems. These changes are driving an increasing need to improve and reconfigure the grids. Infrastructure upgrades to accommodate these changes, and ensure system reliability, quality, and security of supply are expensive and slow to implement.

For these reasons the electrical grid is imposing limitations and in some cases the installation of charging stations is not viable or, in order to install them, the developer must invest in all related infrastructure such as power transformers and other infrastructure. The Distribution System Operator (DSO), Enel is implementing rehabilitation projects on various locations of the grid.

This limitation can reduce the adoption of e-mobility for private and public transport.

Action description

Considering the need to increase the number of charging stations and the limitations of the grid, the measures include the development of a study on the capacity of the electrical grid to integrate EV chargers. The study will be developed in close cooperation with Enel and the DH company. It will contribute to the definition of investments needed for enabling the electrical infrastructure to incorporate various projects undertaken by the Municipality and private partners for electrification, such as small-scale renewables, storage of electricity, and electric vehicle charging points. At the same time, investments will be defined to support grid flexibility and demand response.

In parallel a charging stations masterplan will be developed in order to define the charging stations and hubs location based on specific requirements such as mobility partners and users dynamics, location of transformers, grid capacity and expected grid investments. The masterplan also must detail possible sources of funding and business models to be adopted.

Fast chargers should be installed in the central areas, close to administrative buildings or shopping centres, while slow chargers for overnight charging should be installed in neighbourhoods and in the intermodal parking.

New developments and retrofitted buildings should consider the installation of such chargers according to a preliminary study on the current and future needs of the users.

The implementation of the charging stations and hubs can be complemented with investments in electric vehicles for the Municipality, public companies and private operators of public services in order to promote the adoption of e-vehicles.

Implementation steps

1. Develop the study on electrical grid capacity and the master plan for the implementation of the charging infrastructure.
2. Implement electric vehicle charging stations and hubs.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Develop the electrical grid capacity study and EV masterplan	100,000	N/A
Implementation of the plan (considering 45 fast and 100 slow charging points)	8,325,000	200,000

Source of financing

National Recovery and Resilience Plan (PNRR); Romanian Energy Efficiency Fund (REEF); Environmental Fund Administration or private capital

Buildings

GREEN CITY ACTION PLAN
TIMIȘOARA

Sector overview

BASELINE

Buildings inventory

The buildings inventory as presented in the Energy Efficiency Improvement Programme of 2021 and cross-checked with the inventory of the Municipality-owned public buildings in Timișoara is presented in the table below. This inventory does not include government-owned public buildings and commercial buildings.

Type of building	Number of buildings	Useful area (sqm)
Public buildings	**129**	**380,870**
Administrative buildings	8	8,000
Schools and kindergartens	110	197,000
Hospitals	2	120,000
Cultural buildings	9	30,870
Other buildings	1	25,000
Public and private housing	**144,328**	**7,933,716**
Private individual houses	22,898	3,438,989
Private apartments	122,460	4,456,640
Public housing	1,474	38,087
TOTAL		**8,314,586**

A major part of the apartment buildings was built in the communist era during the 70s and 80s; at least an estimated 2,000 high-rise buildings need an urgent retrofit. Buildings from the 90s and early 2000s would also need energy efficiency improvement, but these are generally not eligible for financing opportunities.

Energy consumption in buildings

Thermal consumption is 133 kWh/m^2 in residential buildings and 188 kWh/m^2 in public buildings, however, local energy audits performed prior to the deep renovation of residential buildings indicate higher values. The data identified in energy audits requested by the Municipality would rather indicate a heat demand between 200 and 250 kWh/m^2 in residential buildings, while public buildings present values between 250 and 300 kWh/m^2 for the same.

Almost all consumed thermal energy is fossil fuel-based (coal and gas for district heating and gas for apartment-based central heating). In 2021, around 40% of residential buildings were connected to DH, a value in constant heavy decline in the last 5 years (21% reduction in DH energy demand compared with 2015). The massive household disconnections, especially in the residential blocks, where some apartments remain connected to DH while

others choose different heating solutions are creating development issues while also increasing costs and energy loss.

Buildings retrofit

Timișoara has an obsolete building stock, therefore there is a clear need for building renovation.

The retrofit of private buildings has been financed so far either through the Regional Operational Programme (ROP) of the EU or through private financing. There are buildings where retrofit is financed and carried out privately, but the Municipality does not have an inventory of these. Public building retrofit is financed both from ROP and the local budget. Some buildings have also received financing as part of Timișoara's preparation for becoming the European Capital of Culture.

There are several barriers making retrofit cumbersome. One such difficulty is that changing installations in a block of flats requires 100% consensus of the dwellers, while for thermal insulation a quorum of two-third of the dwellers is enough.

Data derived from discussions with the department tasked with residential building rehabilitation indicated that over 2000 blocks of flats would require energy efficiency improvements.

Vulnerability of building stock to climate change impacts

Extreme weather events, especially heavy windstorms are an increasing problem in the city in recent years. Even though the rainwater management system is mostly capable of managing flash floods, windstorms are producing yearly increasing damages to the buildings.

The yearly increasing temperatures in the Banat region, together with the emergence of heat islands in certain areas of the city, will put high pressure on the electricity consumption for cooling in the residential buildings in the years to come.

ATU context

Several of the ATUs in the first ring of Timișoara function as "bedroom suburbs", where 80% of the population works in the city and commutes daily. Thus, the construction of housing both by developers and by private persons has been a strong trend in the last two decades.

The building standards in these newly developed areas vary greatly among the various ATUs. The public buildings of the ATUs are typically renovated even if not to high energy efficiency standards. Some ATUs have been able to access funds from the National Environmental Fund for acquiring photovoltaic panels for their public buildings.

POLICY FRAMEWORK

One of the main regulatory documents for the sector is the **General Urban Plan of Timișoara**: it has both a strategic and a regulatory character and is the main operational planning tool, forming the legal basis for the implementation of development programs. It proposes measures for the rehabilitation, protection and conservation of the urban environment.

The policy documents available on metropolitan and county level, such as Energy Efficiency Plan for Timis County 2021-2027 or the Energy Efficiency Improvement Program for the city

of Timișoara, are focused on promoting smart solutions and energy efficiency measures, deep retrofitting and regulations for construction of new buildings with low emission and energy consumption levels.

According to the estimates, the total photovoltaic potential at household level is around 960 MW. Solar energy projects are already being developed in the region, one of the most recent being the Photovoltaic Systems to Increase the Energy Efficiency of Public Buildings project, financed by EAA Grants in Ghiroda, a commune neighbouring Timișoara and included in the reference area of the GCAP. Another similar project in Timișoara is being developed by the Banat University of Agricultural Sciences, which consists of the development of a cogeneration system for electricity and thermal energy from renewable sources.

A training for the energy efficiency in buildings (ILETE) was implemented, which included the development of a professional training course on the topic of reducing energy consumption in buildings for architects, construction engineers, and construction workers.

Another ongoing project is the thermal rehabilitation of 61 residential buildings in the city of Timișoara for which funding application have been submitted (according to the Air Quality Maintenance Plan in Timiș County 2020-2024).

IDENTIFIED CHALLENGES

- **Low capacity to absorb and implement large-scale projects** from EU funding schemes (PNRR, POR) for deep renovation of residential and public buildings
- **Deep retrofit and efficiency of installations are hindered by administrative barriers** (need for 100% consensus of tenant associations for major rehabilitations)
- **Obsolete residential and public building stock** and a low rate of retrofit
- **Lack of coherent database and strategy on energy efficiency in buildings**
- **Small number of constructors skilled and interested in thermal rehabilitation** and in the technical solutions proposed within the programs

SHORT-TERM ACTIONS 2024–2028

12. Improving One-stop-shop for building retrofit v2.0. including local financing facility for energy efficiency and renewable energy measures
13. Implementing deep energy retrofit of block of flats
14. Implementing EE and small-scale RES programme for non-historic public buildings and facilities

LONG-TERM ACTIONS UP TO 15 YEARS

Deep energy retrofit of historical buildings

Smart meters at apartment level

Historical buildings deep renovation pilot

Engage and co-create with constructors, EE companies and ESCOs

15. Implementing New European Bauhaus and nZEB building Pilot Projects
16. Establishing renewable energy communities to reduce energy poverty
17. Heat pumps and solar heating programme for residential buildings in areas not connected to DH

STAKEHOLDERS

Name	Actions to be involved in
Timișoara Municipality	12, 13, 14, 15, 16, 17
Municipalities of the ATUs in the metropolitan area	12, 13, 14, 16, 17
ISC (State Construction Inspectorate)	13, 14, 15
Citizens of Timișoara	12, 13, 14, 15, 16, 17
Owners' associations	13, 14, 16, 17
ANRE (Romanian Energy Regulatory Authority)	13, 14, 15, 16, 17
Local construction companies – private businesses	13, 14, 15
COLTERM – district heating public company	12, 13, 14, 15, 16, 17
Electricity distribution companies	12, 13, 14, 15, 16, 17
Gas supply companies	12, 13, 14, 15, 17

SMART AND DIGITAL ASPECTS

Digitalization and the introduction of smart technologies in the retrofit, RES solutions, new developments in the modernization of buildings help to optimize energy use, reduce operational costs, decrease carbon footprint, and create more sustainable and comfortable environments for the residents. Also, monitoring energy use with the support of digital tools is important for ensuring an informed decision about potential solutions for building retrofit.

Equipping residents with real-time data on their energy use empowers them to make informed decisions about their energy consumption, leading to greater control over their energy costs.

Actions 13, 14, 15, 16, 17: Introducing the following elements into RES, energy community and building modernization programs helps create a more resilient, efficient, and interconnected energy ecosystem.

- Smart energy management systems (EMS) that monitor, control, and optimize energy consumption and generation within each apartment and building.
- Installing digital sensors to collect real-time data on energy consumption, weather conditions, temperature, performance of renewable energy assets, etc.
- Automated systems that adjust HVAC and lighting based on real-time occupancy data, reducing energy consumption in unoccupied areas.
- Integrated energy storage systems (batteries) to store excess energy generated by RES. This can provide backup power during peak demand periods or grid outages and optimize self-consumption of generated energy.
- Smart grids to manage and control decentralized energy resources such as solar panels, energy storage.
- Smart meters to track energy consumption in real time and provide accurate data for billing purposes. The introduction of dynamic pricing models encourages energy conservation during peak hours and energy-conscious behaviour and allows for accurate, transparent billing based on actual use.
- Enabling remote monitoring and control of building systems through a centralized platform or mobile app, allowing to make adjustments and diagnose issues remotely.
- Incorporating tools to monitor and display the reduction in carbon emissions and other environmental benefits achieved through the use of RES.

Action 16: will ensure that community members can track energy production, consumption, and savings on user-friendly interfaces (aps or web portals). Providing blockchain technology facilitates peer-to-peer energy trading within the community, enables residents to buy and sell excess energy directly. Transparency, security, and traceability in energy transactions need to be ensured.

SOCIAL AND GENDER ASPECTS

Cross-action aspect: The actions foresee measures that ease the pressure related to the increase in living costs for the most vulnerable persons, including elderly, young people, and those living with disabilities. They address issues related to accessibility, health, and comfort for all residents. Low-income residents will also have access to the benefits of improved energy efficiency and reduced energy costs.

The needs of vulnerable and marginalized groups will be taken into account to ensure they are not disproportionately affected by the developments.

The retrofit measures and RES solutions will be designed with affordability in mind, and new developments and improvements in the modernization of buildings will be carried out in both the poor neighbourhoods and the richer parts of the city in order to avoid gentrification.

Action 12: The One-stop-shop will include a complex database, technical and writing support, and facilitation to access to grants. It is important to ensure its accessibility to everyone, regardless of their socio-economic background.

Action 13: Residential buildings (blocks of flats) do not feature infrastructure for people with different mobility-related challenges or other vulnerable persons (elderly, young mothers, people with disabilities). By reducing energy consumptions through retrofit measures and RES, residents can enjoy lower energy bills, making energy more affordable for all, including those with limited financial means. Improved insulation and ventilation contribute to better indoor air quality and thermal comfort, benefiting the health and well-being of all residents. Residents and homeowners' associations will be involved in the decision-making processes and responsibilities.

Action 14: The programme will prioritise schools, kindergartens, hospitals, medical facilities. Measures will be implemented targeting vulnerable persons, increasing their accessibility to public buildings.

Action 15: Given that the buildings will host innovative hubs, measures will be implemented targeting gender and social inclusivity of all vulnerable persons, to ensure the accessibility and comfort of staff and visitors throughout their use.

Actions 16 and 17: Ensuring the inclusivity of the project helps protect vulnerable and marginalized groups from disproportionately bearing the burden of energy costs or experiencing discomfort due to inadequate living conditions.

Action 12
Improving One-stop-shop for building retrofit v2.0 including local financing facility for energy efficiency and renewable energy measures

Buildings

TYPE OF ACTION

Policy

ABSTRACT

The action aims to extend and enhance the One-stop-shop for building retrofit currently run by the Municipality. One-stop-shop v2.0 will be established in the Municipality's main EE office and be dedicated to facilitating citizens' access to knowledge, solutions, suppliers, technologies, partners, and financing for deep retrofit and (n)ZEB constructions. The One-stop-shop is mainly targeting blocks of flats and homeowner associations.

CHALLENGE/VULNERABILITY ADDRESSED

- Low rate of building retrofit in Timișoara
- CO_2 emissions from obsolete building stock

STRATEGIC OBJECTIVES

SO1 SO3

BENEFITS

- Reduced energy demand per apartment by up to 50%
- Increased building rehabilitation rate
- Reduced CO_2 emissions and environmental impacts, improved resource efficiency
- Safely managed C&D waste arising from retrofit and construction

TARGETS

- Increased building deep retrofit rate to 200 blocks per year
- Established 50 (n)ZEB new constructions in the coming 10 years

TIMEFRAME

2024–2028

GHG SAVINGS / YEAR

633 tCO_2eq

CAPEX

450,000 EUR

GREEN CITY ACTION PLAN TIMIȘOARA

Context

Timișoara Municipality has been a signatory to the Covenant of Mayors since 2014 and in 2018 it became one of the partners in "Expanding PadovaFIT! Home Solutions" project financed within the EU Horizon programme.

Albeit the One-stop-shop is a positive initiative of the Municipality, so far it focused on working with investors and developers aiming at passive or semi-passive housing, helping to identify professionals, engineers, financing sources, and constructors for this type of building. This shows that the One-stop-shop had a narrow scope of activity so far. In addition, the office functions within the Department of Environmental Protection (Serviciul pentru protectia mediului) and has limited access to other departments dealing with building retrofit, accessing financing for building retrofit, investment department, etc. Therefore, the One-stop-shop was not able to achieve the goal of increasing the motivation of homeowners and incentivizing suppliers to invest in energy efficiency in buildings.

Timișoara has an obsolete building stock and low rates of renovation. The retrofit of private buildings has been financed so far either through the Regional Operational Programme (ROP) of the EU or through private financing. While demand is high for accessing this program, with more than 1,000 blocks of flats having the paperwork done and having initiated the process for obtaining financing with the Municipality, only 68 of these have been approved for financing in the ROP 2014-2021 financing period and a mere 6 of these are in construction. There are buildings where the retrofit is financed and carried out privately, but the Municipality does not have an inventory of these. The total number of blocks of flats that need retrofit is estimated at around 2,000.

There are several barriers that explain this low rate of retrofit. Former international rehabilitation programs that were available in Timișoara did not take into consideration the local context and especially the local availability of technology, technical know-how, and/or materials[4]. Other legal and bureaucratic barriers persist, i.e. the requirement of 100% consensus of owners in case of a deep retrofit, or ineligibility for funding in case micro-companies are registered in buildings or when the ground floor is occupied by commercial entities such as shops.

In case of new buildings, there are a lot of bottlenecks during permitting and construction; additional challenges are related to the proper management of construction and demolition waste, the lack of information on the use of sustainable and locally sourced materials, on how to become a prosumer, and on all the legal requirements, solutions and financing for active buildings.

These barriers are well known and for this reason, there are several funding programmes both at national and European level as well as different financial schemes that have been successfully tested and implemented.

[4] Past programs introduced insulation elements from prefabricated panels that were logistically hard to manage, and there was no workforce available locally that knew how to use them.

Concerted action is needed in the face of all these challenges to enable an accelerated deep retrofit and the implementation of (n)ZEB standards for new buildings.

Action description

The One-stop-shop will be moved to a more prominent place in the organigram to act as the Municipality's main EE office to oversee the activity of the various offices currently dealing with the topic. The capacities of the office will be enhanced, and services will include:

- Providing information on energy efficiency measures (including connection and access to internet-based surfaces covering standardized solutions)
- Technical support to the definition of energy efficiency measures via comprehensive energy audits
- Database and connection to service companies, including energy audit experts, energy efficiency experts, and architects
- Database and connection to qualified constructors, ESCOs, RES technology providers
- Mapping all funding and financing options and, in cooperation with relevant stakeholders leveraging new financing schemes tailored to the specific needs of Timișoara; the combination of the local incentives with available funding and financing schemes will leverage the impact of energy efficiency and small-scale renewable energy.
- Grant writing support and facilitating access to grants / EU funding schemes and credit schemes available on the market
- Construction supervision and post-work monitoring, including energy performance
- Information about demonstrators and access to demonstrator sites
- Information related to circular economy, waste, and raw material recovery
- Introduction of active buildings concept in relation to the grid, prosumers, and distributed energy services
- Information on legal requirements, incentives and barriers (i.e. all new constructions have local renewable energy sources, and when these exceed a certain size, they have EV charging infrastructure and centralized heating sources)

This action includes capacity-building activities to increase the capacity to absorb and implement large-scale projects from EU funding schemes for municipal staff, market development and promoting energy efficiency and RES solutions through promotion and awareness campaigns for citizens. The One-stop-shop will aim to provide aid for the block of flats sector of the city, since it is the biggest residential energy consumer. Furthermore, the One-stop-shop should also provide guidance to individual households for elements such as approval procedures, best practice for energy saving, and constructor market and their reliability.

The One-stop-shop could be set up in a demonstrator building such as a ZEB building, a regenerated former industrial building, or the demonstrator building selected for the New

European Bauhaus concept (refer to Buildings Action 15). Additionally, even though the office is not providing direct financial aid, it is a good rehabilitation rate accelerator that could work in parallel with the new Deep Retrofit Programme (refer to Buildings Action 13), and an important facilitator for the emergence of local energy communities (refer to Buildings Action 16) and for the Heat Pumps and Solar Heating Programme (refer to Buildings Action 17).

The One-stop-shop will act as the main administrator for all sustainable investments in the building sector, thus simplifying the local administrative chain which is currently scattered across several departments within the Municipality.

Implementation steps

1. Redefine the scope and mandate of the One-stop-shop, move it to a prominent place in the organigram, and designate it as the main office dealing with EE in buildings.
2. Carry out finance facility study.
3. Carry out energy audits.
4. Supplement staffing and allocate resources in the office, set yearly targets for key actions identified above.
5. Implement and operate the One-stop-shop.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Implementing and operating the One-stop-shop (estimated as 3 additional full-time staff * 25,000 EUR/year, dedicated office space, budget for technical assistance, communication, travel etc. – additional equipment and software to be procured as well)	100,000	120,000
Study to identify financing sources and setting up a coherent finance facility	50,000	N/A
Support for comprehensive energy audits	300,000	N/A

Source of financing

EU Horizon funds, other EU grant financing sources (Zero Carbon Cities, European Urban Initiative, URBACT), the Municipality's own budget

Within 1 year the office must be able to attract financing from various EU and national funding sources for 50% of its operational costs.

Action 13
Implementing deep energy retrofit of blocks of flats

Buildings

TYPE OF ACTION

Investment

ABSTRACT

The aim of the action is to enhance energy efficiency and renewable energy use in private non-historical blocks of flats in Timișoara. The energy efficiency measures will follow the deep retrofit hierarchy and residents will be encouraged to take demand-side measures to further reduce energy consumption in their buildings. The programme will emphasize the use of small-scale renewable energy solutions.

CHALLENGE/VULNERABILITY ADDRESSED

- Obsolete, inefficient building stock causing high CO_2 emissions
- Low adoption of renewable energy measures
- Energy poverty as households are unable to heat their homes conveniently
- Growing energy prices

STRATEGIC OBJECTIVES

SO1 SO3

BENEFITS

- Improved residents' comfort
- Improved energy efficiency
- Improved resource efficiency
- Reduced energy bills
- Reduced energy poverty
- GHG savings

TARGETS

- Deep retrofit of 6,000 apartments in total, with a gradually increasing target of 220,000 m^2

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	490 tCO_2eq	75,000,000 EUR

GREEN CITY ACTION PLAN TIMIȘOARA

Context

In Timișoara there are approximately 122,460 private apartments with a total useful area of 4,456,640 sqm. These buildings were primarily constructed in the 70s and 80s during the communist era. It is estimated that at least 2,000 high-rise buildings need urgent retrofit.

Buildings from the 90s and early 2000s also have high potential for energy efficiency enhancement, however, these are generally not eligible for financing opportunities and have not undergone major rehabilitation efforts, especially in low-income areas.

This has resulted in a highly deteriorated housing stock with poor energy efficiency performance, further exacerbating the energy challenges faced by residents such as energy poverty. To address these issues, there is a pressing need to support residents and homeowners' associations in retrofitting privately owned, and non-historical residential multi-storey buildings in Timișoara. The aim is to establish a comprehensive deep energy retrofit program that encompasses a significant number of dwellings.

The impediments to the implementation of deep retrofit and accessing funds for retrofit are also linked to the limited capacity within the Municipality to provide all the technical assistance needed by homeowners' associations.

Action description

By using the assistance of the dedicated One-stop-shop which will provide a more streamlined and efficient project preparatory assistance, this action seeks to implement the actions determined during the investment-grade energy audits, showcase successful rehabilitation technologies and materials, promote existing incentives, and encourage the adoption of new financing schemes to promote deep energy retrofit of private non-historical block of flats. Investment-grade audits include a very thorough, calculated and detailed analysis process, able to identify cost-effective intervention measures. Linking this action with the Regional Development Agency's facility for project preparation can further streamline the process of preparing mature projects.

Based on the results of an investment-grade audit and thermal images to evaluate the energy efficiency performance of buildings, residents will be informed of appropriate retrofit measures, their impact, and existing local and national incentives.

The energy efficiency works in buildings will follow the deep retrofit hierarchy, focusing first on the reduction of demand via passive measures, then on the use of energy efficient systems and appliances and at the end on the generation of energy from renewable sources to cover the remaining needs to the extent possible.

Residents and homeowners' associations will be responsible for implementing the measures that can include passive measures, such as insulation of the building envelope, window and door replacements, as well as active measures including heating improvements, such as individual thermostatic radiator valves and apartment-level heat metering. Other measures may include the installation of hot water cylinder jackets or heat pumps, replacement of elevator equipment with more energy efficient alternatives, adoption of efficient LED lighting, water-saving initiatives, and where feasible, the implementation of green solutions such as green roofs. The program will also emphasize

the adoption of small-scale renewable energy sources to further reduce energy consumption and promote sustainability. This may include the installation of photovoltaic systems for self-consumption or establishing an energy community, as well as the integration of solar water heaters to meet the remaining energy needs of the buildings. Where needed, the program will also accommodate structural interventions to the buildings.

Financial incentives will be made available for the remaining blocks of flats for connecting to the DH, investment support for smart metering of vertical distribution, heat and hot water supply in flats.

In parallel it is expected that the homeowners' association approval process for deep retrofit in apartment blocks will be streamlined. There is a need to change the requirement of full consensus for deep retrofit to a simple majority.

Local regulation will make sure that in all blocks of flats (retrofitted from public funds) the transition from the horizontal supply to the vertical supply will happen, and energy metering for water and thermal agent will be installed in each flat, whether they are connected to the DH system or not.

Implementation steps

1. Conduct, via the One-stop-shop, comprehensive energy audits and assessments to identify the most effective energy efficiency measures and renewable integration opportunities.
2. Develop terms of reference and technical documentation for approval of intervention works, including detailed technical design for the retrofit that includes insulation panels, glazing upgrades, roof insulation, and other relevant energy efficiency solutions, tailored to the specific needs and characteristics of each block. Link to the Western Regional Development Agency's project preparatory facility during this process.
3. Present grants or fiscal incentives that facilitate the implementation.
4. Support the outsourcing of the renovation works according to the terms of reference.
5. Monitor implementation, evaluate performances and incorporate the results in the One-stop-shop.
6. Conduct information and awareness campaigns to promote energy efficiency in residential buildings via specific action.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Building retrofit (12,500 EUR/dwelling)	75,000,000	N/A

Source of financing

National Recovery and Resilience Plan (PNRR); Regional Development Programme, Romanian Energy Efficiency Fund (REEF); Environmental Fund Administration. Equally, Energy Services Companies (ESCO) providing private capital under Energy Performance Contracts, commercial loans and soft loans from IFIs are options for financing.

Action 14
Implementing EE and small-scale RES programme for non-historic public buildings and facilities

Buildings

TYPE OF ACTION

Investment

ABSTRACT

Enhancing energy efficiency, upscaling renewable energy and digitalization in non-historic public buildings and facilities in Timișoara is the main goal of this action. The Municipality will perform a building inventory and select the most relevant ones for energy efficiency interventions. The programme will prioritise the buildings with the highest energy consumption. The envisaged measures are the retrofit of building envelop, the modernization of heating and hot water systems, improvement of lighting, adoption of Building Management Systems (BMS) and small-scale renewable energy.

CHALLENGE/VULNERABILITY ADDRESSED

- Obsolete, inefficient building stock causing high CO_2 emissions
- Low adoption of renewable energy measures
- High energy costs in public buildings
- Negative impacts on health and well-being

STRATEGIC OBJECTIVES

SO1 SO3

BENEFITS

- Achieving required standards for indoor thermal comfort, i.e. temperature and humidity in working and living spaces
- Improved energy efficiency, reduced energy bills and GHG emissions
- Extended building lifetime, increased asset values and public health
- Increased accessibility to public buildings for vulnerable persons

TARGETS

- Minimum of 40% savings of primary energy
- Consumer behaviour change to more energy efficient behaviours

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	502 tCO_2eq	15,615,000 EUR

GREEN CITY ACTION PLAN TIMIȘOARA

Context

There are 129 public buildings in Timișoara with a total useful area of 388,870 sqm. Most of these public buildings were built several decades ago, in the 70s and 80s during the communist era, when no energy standards existed, have limited insulation, and imply high energy consumption.

Energy audits of the Municipality reveal a heat demand between 250 and 300 kWh/m^2/year, indicating high energy losses. This is mostly because the building stock lacks sufficient investments in maintenance or energy rehabilitation measures. At the moment almost all consumed thermal energy is fossil fuel-based (coal and gas for district heating).

This action involves a holistic approach to reduce energy consumption in Timișoara and renovate public buildings in the city through a deep retrofit approach designed to increase their energy and water efficiency and adopting digitalization technologies. The drive to act is strengthened by the ever more ambitious targets set by the European Parliament through the revised Energy Performance Building Directive and the Renovation Wave programme.

Action description

A guide for energy efficiency retrofit in public buildings will be drafted to promote deep retrofit of public buildings aiming at energy efficiency, thermal refurbishment, and smart technologies. An energy efficient behaviour programme will be implemented including information campaigns and capacity building.

It is expected that the results of this action targeting public buildings will have a demonstration effect and will be used as good practice in information and awareness campaigns to promote energy efficiency in private offices and commercial buildings.

The programme will prioritise schools, kindergartens, hospitals, medical facilities and swimming pools having the highest impact in the energy consumption and in the life of the community, and will include the retrofit of building envelop, the upgrading of heating and hot water systems, the improvement of lighting, the adoption of Building Management Systems (BMS) and small-scale renewable energy.

All existing public buildings and facilities belonging to the Municipality within the city boundaries are virtually eligible for this action. A feasibility study, based on a building inventory followed by energy audits, will be carried out to select the buildings.

An assessment of the energy efficiency and smart/digitalization readiness of public buildings and facilities will be performed by updating the building inventory and setting up an energy audit programme. The audits will include an analysis of the structural conditions of the buildings as well. Based on the results of this programme the most energy-inefficient buildings will be subject to a deep retrofit.

The energy efficiency works in buildings will follow the deep retrofit hierarchy, focusing first on the reduction of demand via passive measures, then on the use of energy efficient systems and appliances, and at the end on the generation of energy from renewable sources to cover the remaining needs to the extent possible.

As such, the deep retrofit can include measures such as insulating the building envelope, replacing windows and doors, heating/cooling and mechanical ventilation improvements, efficient lighting and appliances, building management systems, smart metering and control systems, green roofs, or water harvesting/reuse.

Based on the results of the audits an energy efficiency and comfort design guide for future building retrofits will be developed. This guide will be part of the terms of reference in the renovation projects and will assess funding and financing opportunities. The Municipality will also explore and analyse the possibility of acquiring energy via Power Purchase Agreement (PPA) type of contracts.

Simultaneously with the implementation of the programme, an energy efficient users' guide for all occupants of public buildings will be designed, and an energy efficient behaviour programme (via the One-stop-shop) will be delivered.

Implementation steps

1. Update the building inventory and develop a feasibility study based on building inventory, energy audits, and a comprehensive thermal imaging programme.
2. Develop an energy efficiency and comfort design guide for future building retrofits. This guide will be part of the terms of reference in the renovation projects and will identify funding and financing opportunities.
3. Develop the terms of reference for the retrofits (minimum requirements etc.) and the technical documentation for the approval of intervention works, including detailed technical design and maintenance requirements.
4. Carry out implementation works and construction supervision.
5. Carry out an ex-post evaluation based on the Energy Performance Certification of the renovated buildings.
6. Monitor implementation and evaluate performances via digital tools.
7. Develop an energy efficient users' guide for all occupants of public buildings, and deliver an energy efficient behaviour programme, including training of maintenance staff.
8. Organize site visits to promote implemented measures and results.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Building inventory, audits and feasibility study	500,000	N/A
Assessment programme and ToR development (10 buildings)	100,000	N/A
Development of materials for the energy efficient behaviour programme	15,000	N/A

Measures implementation. Average investment cost of 500 EUR/m^2; for ~10 buildings (30,000 m^2)	15,000,000	150,000

Source of financing

European Structural and Investment Funds (ESIF); National Recovery and Resilience Plan (PNRR); Romanian Energy Efficiency Fund (REEF); Environmental Fund Administration. Equally, Energy Services Companies (ESCO) providing private capital under Energy Performance Contracts, commercial loans and soft loans from IFIs are options for financing.

Action 15
Implementing New European Bauhaus and nZEB building Pilot Projects

Buildings

TYPE OF ACTION

Investment

ABSTRACT

The Municipality will create a Centre for Art, Technology and Experiment called MultipleXity in the former workshops and tram depot. In addition, it will transform the “Round Block”, a landmark building from the communist era located in the city centre. These two pilot projects will follow the New European Bauhaus (NEB) principles to create innovation hubs.

CHALLENGE/VULNERABILITY ADDRESSED

- Low rate and limitation in deep renovation and retrofit of buildings
- Low capacity to absorb and implement large-scale projects from EU funding schemes for deep renovation of buildings
- High electricity consumption and expected increase of electricity consumption due to cooling demand during summer and due to the electrification of heating and mobility
- Dissonant heritage buildings often constructed with substandard construction materials that dominate certain neighbourhoods and the public space in the centre of the city
- Low rate of repurposing industrial heritage buildings

STRATEGIC OBJECTIVES

SO1 SO3

BENEFITS

- Improved aesthetics of public space and buildings
- Improved energy efficiency of the targeted buildings, improved resource efficiency
- GHG emission reduction, opportunity for reduction of embodied carbon
- Biodiversity and green space elements through integration of nature-based solutions
- Creating space for strengthening the sense of community

TARGETS

- Restoration of a building complex of 19,820 sqm (workshops, tram depot of 2,740 sqm and its surrounding area; the outdoor area of the Museum)
- Contracting 5 organizations to operate in the spaces created in the centre
- At least 10 events/year and/or permanent activities to be hosted in the centre
- Deep renovation and retrofit of the “Round Block” of 2,750 sqm

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2026	76.11 tCO_2eq	35,050,000 EUR

Context

There are several landmark buildings from the communist era located in central areas of the city, dominating the public space. These buildings may have a specific aesthetic, unpleasant for some citizens either because these are decayed industrial sites, or due to communist era association, while being built according to outdated standards and from low-quality building materials. They are often left to suffer from decay, structural damage, or embed outdated systems that no longer meet current needs or regulations.

These may need an update not only in terms of retrofitting but also aesthetics, functionality and sustainability performance. Such a building complex is the former tram repair workshop and the adjacent buildings. Another example is the “Round Block”. The space adjacent to all these buildings is inefficiently used, poorly designed or perceived by the public as unattractive.

These locations are excellent test beds to implement and demonstrate the principles of the New European Bauhaus initiative, since the NEB seeks to combine aesthetics, sustainability, and inclusion in the design and transformation of spaces.

By integrating NEB concepts such as accessibility, aesthetics, participatory design, sustainability and circular economy principles, and fostering innovation, this action will breathe new life into these buildings and their surrounding area, while contributing to a more sustainable and inclusive future. Rehabilitating these buildings presents an opportunity to reduce the embodied carbon by reducing the quantity of carbon-intensive materials used, in addition to refurbishing the buildings as an alternative to new buildings.

Action description

The Municipality had already developed a project proposal to create a centre for arts, technology and innovation called MultipleXity, connecting two sites located along the Take Ionescu Boulevard. Site 1 is the former tram depot hosting today the Corneliu Miklosi Museum exhibiting a collection of trams; this site requires interventions on the outer areas in order to ensure aesthetic integrity with Site 2 and also to allow for a greener and more representative welcome area to the museum. Site 2, where the MultipleXity centre will be located, requires more extensive interventions. The external areas will be redesigned: a small square will be created in the place of a demolished building now hosting the central heating; more green areas will be also established. The buildings of the tram depot and workshops will be restored and repurposed in order to host exhibition areas, screening hall called immersive media space, studio, co-working area, workshops also for children, bistro and many other functions.

The project proposal is the winner project in the contest for solutions organized by the Municipality and the Romanian Order of Architects due to its potential to fully demonstrate NEB principles.

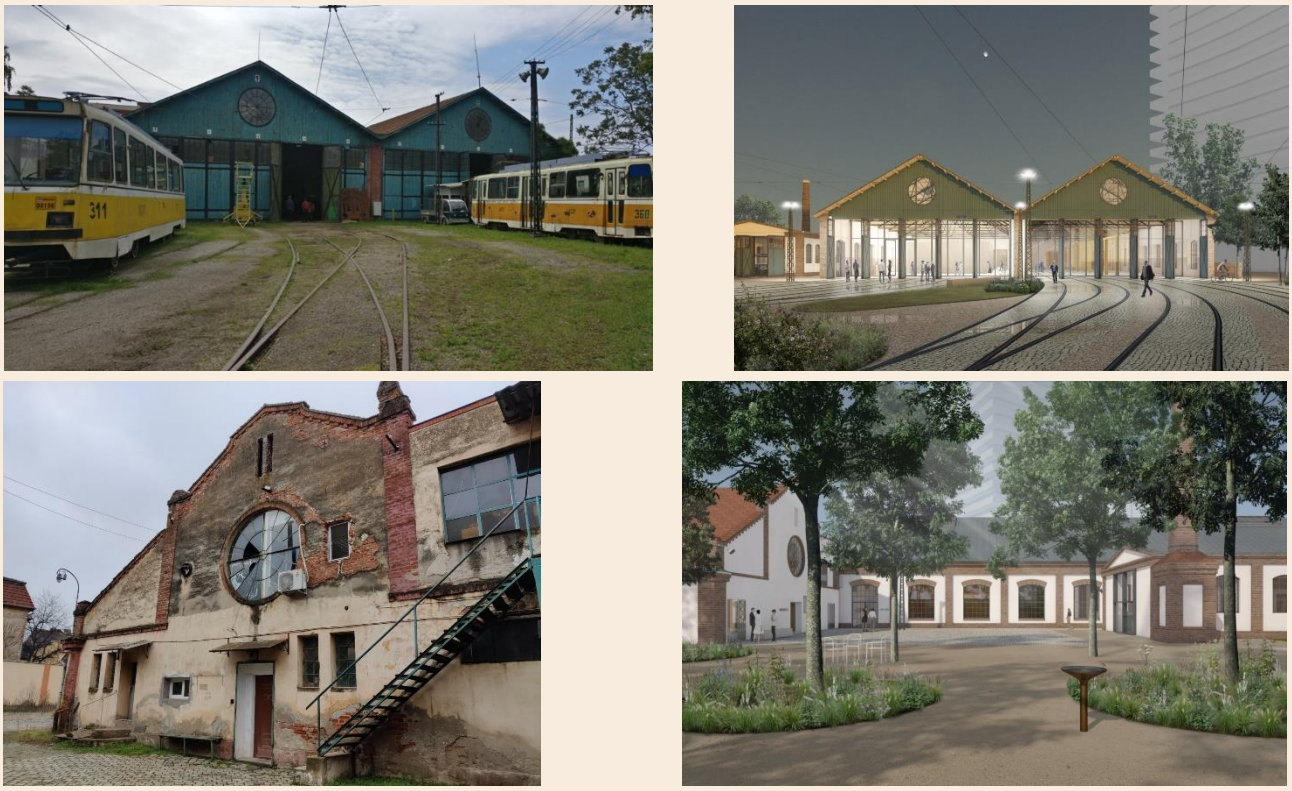


Figure 12 The tram depots: present and future

The expert knowledge, skills and innovative potential required for this project can be channelled towards other NEB demonstrator projects as well to demonstrate and support the concept of rehabilitation, consolidation and modernization of old buildings, while following the guidance of the NEB principles and Nearly Zero Energy Buildings (nZEB) philosophy. The “Round Block” hosting the National R&D Institute for Welding and Material Testing will be subjected to an extensive transformation including renovation and retrofit of the building in order to make it functional and attractive as an innovation hub. The institute is currently performing research, development, material testing and inspections, while also offering vocational training and certification. The action aims to continue the activities while also expanding the functionality of the building towards other sectors such as sustainable investments in the building sector as the location for the One-stop-shop (refer to Action 12, Improving one-stop-shop for building retrofit), education in sustainable materials and establishing the building as a good practice reference for functional and aesthetic redesigns of outdated architecture. Reducing the quantity of carbon-intensive materials used (such as concrete and steel) will contribute to reducing the embodied carbon of the building and will promote such practices for building renovation.

Due to its proximity to green areas, the area could be redesigned in accordance with Actions 30 and 31 from the Land Use section to integrate green elements such as better pedestrian access and permeable surfaces of the streets, while green roofs could be integrated into the nearby buildings. Expanding the scope of the action to a wider integration of multiple actions would homogenize the area, create more benefits, and boost community sense.

Figure 13 The NEB pilot project - The "Round Block" indicated with purple and elements in the area that could be sustainably redesigned indicated with green.

The NEB programme developed a compass that helps to navigate towards the three core values of the initiative when creating space for experimentation: aesthetics, inclusion, and sustainability.

Aesthetics should arise from the created space where innovation, artistic and beautiful content are welcomed, and positive and collective experiences, integration, and meaningful social interactions are sought. Harmony with nature and the environment is highly prioritized, and connections are to be present between both people and places. Therefore, the surrounding public spaces will undergo a process to re-design and/or re-think their aspect.

Inclusion will be sought both by the process of transformation, involving citizens in the co-design of the public space and building, but also during the lifetime of the building transformed into an innovation hub. Gender and social inclusivity, accessibility aspects will be observed to ensure the comfort of staff and visitors throughout use.

Sustainability is the third pillar of NEB which will guide the retrofit of the building and transformation of the surrounding space, therefore elements such as the following will be considered:

- Biosolar (green and photovoltaic) roofs
- Water harvesting equipment and rainwater reuse system
- Use of renewable energy sources (e.g. solar)
- Use of natural materials respecting circular economy principles
- Natural and energy efficient heating, ventilating, air conditioning and lighting
- Nature-based solutions
- The concept of sponge city and blue-green networks to connect to green areas

The overall measures will lead to nearly zero energy buildings, and if feasible the buildings can be subject to an energy certification (e.g. LEED or BREEAM).

Retrofitting of the buildings includes technology transfer, which implies the introduction of smart building services, smart energy management systems and smart metering.

Implementation steps

1. Create a project management unit within the Municipality charged with launching the tender, selecting the construction company, and supervise the execution of the MultipleXity.
2. Prepare the tender documentation and select the construction company for the MultipleXity.
3. Supervise the construction of the MultipleXity.
4. Co-create and co-design the NEB demonstrator concept for the Round Block, including building functions as a community hub for innovation, and seek financing solutions.
5. Launch the tender for implementation taking the innovation partnership route for tendering for the NEB demonstrator.
6. Supervise the building and public space transformation.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Creating the MultipleXity	25,000,000	25,000
Co-creation and co-design process of the Round Block	50,000	N/A
Transformation of building and surrounding space of the Round Block	10,000,000	10,000

Source of financing

European Structural and Investment Funds, Regional Development Fund West, expected axis for financing on New European Bauhaus; National Recovery and Resilience Plan (PNRR); Environmental Fund Administration; EU Cohesion funds for implementing the European Urban Agenda.

Action 16
Establishing renewable energy communities to reduce energy poverty

Buildings

TYPE OF ACTION

Policy and investment

ABSTRACT

The action aims to reduce energy poverty by promoting renewable energy communities through a pilot project in municipal buildings, enabling the sharing of generated energy with social housing units or low-income families for free or at a reduced cost.

CHALLENGE/VULNERABILITY ADDRESSED

- Increased energy prices
- Energy poverty
- Low level of decentralized energy sources

STRATEGIC OBJECTIVES

SO1 SO3

BENEFITS

- Increased use of renewable energy sources and established energy communities
- Reduced CO_2 emissions and environmental impacts, improved resource efficiency
- Alleviated energy poverty and reduced vulnerability of low-income consumers

TARGETS

- Approximately 300 kWp of photovoltaic power production installed on the roof of a public building
- Local regulation for renewable energy communities developed

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024	83 tCO_2eq	360,000 EUR

Context

Timișoara's abundant solar resources provide an excellent opportunity to leverage solar energy as a clean and cost-effective alternative for energy production. At the same time costs related to solutions such as photovoltaic panels have been decreasing, therefore their economic viability increased.

However, many social housing units or low-income families are under pressure from soaring energy prices, facing challenges in accessing affordable and reliable energy sources, all this contributing to energy poverty.

In order to promote a sustainable strategy to fight energy poverty, it is important to develop multiple instruments that provide long-term reduction of energy expenditure. The participation of vulnerable consumers in energy communities and in collective self-consumption can have a significant impact in this strategy.

Energy communities offer a means to re-structure energy systems by harnessing the energy and allowing citizens to participate actively in the energy transition, thereby lowering their electricity bills and creating local job opportunities.

Renewable energy communities are community-based associations that, based on decentralized and small-scale facilities, produce and share, usually among them, renewable energy.

Action description

The action aims at the implementation of a pilot project of a renewable energy community using a municipal building as the production facility and involving social housing or low-income families as consumers for the produced energy. The pilot project will have approximately 300 kWp of photovoltaic installed on the roof of a public building to be selected. This installation will provide around 370,000 kWh of clean energy.

By sharing the generated renewable energy with social housing units or low-income families at no cost or at a reduced rate, the pilot is directly alleviating energy poverty and reducing the vulnerability of the involved residents. At the same time the pilot can be used to support the development of local regulations for energy communities and, in cooperation with the DSO, test grid capacity and the role of smart metering and energy digitalization.

Based on the evaluation of the impact, a large-scale renewable energy community programme will be designed, considering among others available funding and financial schemes. With the support of awareness raising campaigns (e.g. via the One-stop-shop) this action can promote the rollout of renewable energy communities in Timișoara.

Implementation steps

1. Identify suitable municipal building for the renewable energy installations based on criteria such as energy consumption, location (in relation with social housing or low-income families' buildings) or available area and solar exposure.
2. Implement the pilot project.

3. Design local regulations for energy communities in partnership with relevant stakeholders and based on the acquired experience.
4. Monitor and evaluate the performance and impact of the renewable energy community's pilot.
5. Design a large-scale renewable energy communities programme.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Energy Community	300,000	N/A
Development of local regulations (legal support)	20,000	N/A
Development of a large-scale renewable energy communities programme	40,000	N/A

Source of financing

Municipal budget or National Recovery and Resilience Fund (PNRR)

Action 17
Heat pumps and solar heating programme for residential buildings in areas not connected to DH

Buildings

TYPE OF ACTION

Policy and investment

ABSTRACT

The aim of this action is to promote the widespread adoption of heat pumps and solar heating systems in residential buildings located in selected areas of Timișoara that are not connected to the District Heating (DH) network. This action will involve, in the first stage, financial support to 500 households for installing heat pumps or hot water solar heating systems.

CHALLENGE/VULNERABILITY ADDRESSED

- Obsolete, inefficient building stock causing high CO_2 emissions
- Low adoption of renewable energy measures
- Energy poverty as households are unable to heat their homes conveniently
- Growing energy prices

STRATEGIC OBJECTIVES

SO1 SO3

BENEFITS

- Improved air quality and better indoor thermal comfort
- Future-proofing household level heating infrastructure – heat pumps can be combined in the future with measures on low-temperature district heating
- Technical/financial support for adopting the technology that will lead to lower costs for low-income households

TARGETS

- Install high-performance RES-based heating systems in 500 households

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2027	511 tCO_2eq	3,550,000 EUR

Context

In the city of Timișoara, there are approximately 122,460 private apartments primarily constructed in the 70s and 80s during the communist era without any energy efficiency standards.

The share of buildings connected to the District Heating (DH) system is decreasing and the majority of residents switch to individual gas boilers. The amount of renewable energy produced locally and used in the blocks of flats is very limited. In turn, the overall number of prosumers in the county of Timiş is very high due to the geographical conditions and availability of governmental funds. In most cases, household-based PV installations are used to satisfy the electricity demand of the households, without direct pairing with high-efficiency heating/cooling equipment. Heat pumps and solar heating systems are mature technologies that allow greater use of renewable energy sources and together can be used for heating or hot water. The European Commission, recognizing the relevance of heat pumps to lower Europe's gas demand for heating in buildings, set up the goal to double the current deployment rate of heat pumps in buildings and, in parallel, foster the deployment of large district heating network heat pumps.

The Municipality is currently preparing a local decision to support the introduction of such alternative systems only if the project reveals a better environmental performance as compared to a connection to the district heating system.

Action description

The action proposes solar heating and heat pump programme for residential buildings located in selected areas that are hard/impossible to connect to the DH. By promoting the use of renewable energy in these areas it can promote future integration of low-temperature DH networks and the use of smart energy meters and control systems. The measure will involve, in the first stage, the financial support to 500 households where different equipment could be installed at household level (heat pumps or hot water solar heating systems). The impact of the programme will be regularly assessed, including the rate of adoption, energy savings, GHG emission reduction, and financial benefits impact. The goal of the Municipality is to implement such systems complementing and not competing with the district heating system, therefore the proposed projects should be able to reveal higher environmental benefits as compared to district heating. The expansion of the programme will be evaluated based on the success and impact of this first stage.

This measure will be supported by mechanisms to promote investments, namely:

- Technical support for the adoption of the technology and planning requirements through the One-stop-shop established at the Municipality
- Fiscal incentives and/or access to grants for the adoption of individual heat pumps and/or solar heating
- Financing incentives to support low-income households, primarily in the transition from gas to heat pumps or solar heating

The terms of the incentive and selected areas for intervention will be developed in a feasibility study. Investment can include the necessary complementary works for the installation of heat pumps and solar heating.

Implementation steps

1. Develop a feasibility study for the selection of the areas and impact of the heat pumps and solar heating programme, also assessing the electricity grid capacity and the possible need for upgrades.
2. Develop the terms of reference for the incentive mechanisms (funding rates, performance indicators, eligibility criteria etc.).
3. Promote the incentive mechanisms via awareness campaigns and technical support using the One-stop-shop.
4. Support the implementation via opening the call for projects, managing the applications, and granting direct financial support for vulnerable households.
5. Evaluate the impact and decide on the continuation of the programme.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Feasibility studies and terms of reference development	50,000	N/A
Programme implementation (supply and installation of equipment)	3,500,000	5,000

Source of financing

National Recovery and Resilience Plan (PNRR) or Environmental Fund Administration.

Industry

GREEN CITY ACTION PLAN
TIMIȘOARA

Sector overview

BASELINE

The development of the local industry: Timișoara has a vast background in research, development and innovation in various industrial segments. Historically, industry was concentrated along the Bega canal, mainly in the Fabric and Iosefin districts. During the 20th century the industrial areas were relocated along the railway routes, along the Buziașului road, near the Green Forest (Pădurea Verde), and in Freidorf district. Currently, urban sprawl pushes industrial areas out of the city along the main routes, such as Torontalui road and Șagului road, or to the metropolitan area, namely the municipalities of Giroc, Sânmihaiu Român, Remetea Mare, Şag and Ghiroda. The construction of the ring road between Lugojului road and Aradului road, as well as the access to the A1 highway at Giarmata, determined the establishment of a strong industrial area on the northeast side of the city. Land available at low prices transformed the real estate market. ATUs have managed to attract investors due to the eased access to main road infrastructure, airport and the natural environment.

Main industrial activities:

- Timișoara: chemical industry, the production of automotive and electrotechnical components, logistic areas for various sectors such as construction materials and other industrial products, IT sector, research and development, manufacturing of various products such as textiles, and retail.
- The metropolitan area: various manufacturers from sectors such as shoes and clothing, steel boards, foils and profiles, electrical equipment, automotive components.

Environmental monitoring: Air quality is being monitored by the 4 stations of the National Air Quality Monitoring Network as well as by other third-party monitoring networks. The official stations are not properly maintained and managed, generating a lot of errors and inconclusive data unsuitable to be compared to the legal thresholds. This fact is usually interpreted as “no issue” for air quality, though the third-party stations indicate exceedances, and citizens constantly complain about the smell. The soil contamination assessment of current and past industrial sites is generally not performed in the city. It is assumed that there are some areas in Timișoara with a high probability of soil contamination. The possible areas include industrial sites such as Freidorf Industrial Park, Buziașului road industrial site, and Lugoj road industrial site, while CET Centre and especially the coal-using CET South energy generation units could also present soil-related pollution.

The future development of the sector: The Municipality intends to keep some of the non-polluting industries within the city in order to maintain the easy access of workers to their working place. Furthermore, the Municipality plans to expand the local industry, with a focus on research, development, and innovation in future-proof sectors such as IT and automotive. In order to sustainably continue its industrial development on this trajectory, the Municipality needs to carry out proper impact assessments across several key urban

services such as wastewater management, transport, noise and air pollution but also the landscape and the general quality of life of the citizens.

POLICY FRAMEWORK

The overall influence of the Municipality on private industrial developments in terms of regulations is generally limited with a few local and county documents establishing certain legal provisions. The most important documents are the Sp**atial Management Plan for Timiș County** (last update in 2013), the **General Urban Plan** (under approval, 2023), and the **Strategy for the Economic and Social Development of Timiș County for 2021-2027**. These documents set requirements and goals regarding energy and land use efficiency, and environmental impact such as the requirement of Best Available Technologies in industrial set-ups where water is treated as part of internal processes, rehabilitation of heating systems prioritizing emission reduction, areas of the city open for economic/industrial activities, and the projects that have the biggest strategic importance for the development of the city and county.

The promotion of green, non-polluting industry is one of the main objectives of local measures, however, the extent of law enforcement is insufficient. One of the necessary measures is to strengthen the compliance of industrial facilities with the environmental regulations in force. Another aspect would be the application of severe fines and sanctions for those who do not comply with environmental provisions.

IDENTIFIED CHALLENGES

- **Lack of transport infrastructure to ensure the distribution of freight flows outside the city** without the need for freight to cross the city and/or surrounding ATUs
- **Insufficient connection of new facilities with the city's road and rail networks**
- **Pressure on urban traffic from the current industrial areas within the city** (in the mixed-use development areas)
- **Insufficient measures for ensuring the protection of housing in the industrial areas of the city** turning into mixed areas and where the non-polluting industry continues to develop

SHORT-TERM ACTIONS 2024–2028

18. Developing logistics hubs to optimize freight and traffic flows in and around the city
19. Creating and running a platform for partnerships in green urban innovation

LONG-TERM ACTIONS UP TO 15 YEARS

Implement a programme to incentivize environmentally friendly companies that invest in this area and have a significantly positive impact on the city

Establishing partnerships with the surrounding ATUs for the development of industrial parks

20. Enhancing the air quality monitoring network, especially in the proximity of industrial sites	Implementing specific planning regulations for sites vulnerable to pollution

STAKEHOLDERS

Name	Actions to be involved in
Timișoara Municipality	**18, 19, 20**
Private sector	**18, 19**
NGOs	18, 19, **20**
Public at large	**19**
Technical University	**18, 19**

SMART AND DIGITAL ASPECTS

Action 18: The action has the potential to integrate the use of GPS through already existing traffic-guiding maps; thus logistics managers and drivers could be informed on the most efficient route, which takes into account weight limitation, the general road load, and best hours for transit. By taking this approach, the additional pressure that logistics is putting on the local transport infrastructure could be significantly reduced.

Action 19: The platform for partnerships in green urban innovation could entirely be a digital, online platform. This approach would facilitate the ease of access for all interested parties. Furthermore, enterprises that are looking to expand but are yet local/national could easily access information regarding important decision-making factors such as fiscal benefits, market needs, and land availability for their operations.

Action 20: The air quality monitoring expansion will include BAT in the sector endowed with digital data sharing capabilities. The data collected by the new stations can be integrated into the Municipality's online platforms such as the official website (www.primariatm.ro) or the data-sharing platform (https://beta.primariatm.ro/).

Industry actors can also benefit from the One-stop-shop envisaged to be developed under Action 12 from current GCAP (One-stop-shop for building retrofit, including local financing facility for energy efficiency and renewable energy measures). The institutional setup for this One-stop-shop and the resources allocated for its operation will enable them to provide information and answer questions on energy efficiency related matters which might come from industry.

SOCIAL AND GENDER ASPECTS

Action 18: The action's aim to reduce the pressure of logistics on the local traffic will generally increase the quality of life for citizens. Streamlining logistics will increase the use

of small vehicles for targeted store supply and reduce the need for manual labour, therefore allowing all groups of people to apply for jobs in logistics.

Action 19: The successful deployment of the platform will create new jobs in various sectors. Complementary with the city's ambitions for innovation, research, and cutting-edge technologies, the new partnerships could create jobs with reduced manual labour, making them accessible to various vulnerable groups.

Action 18
Developing logistics hubs to optimize freight and traffic flows in and around the city

Industry

TYPE OF ACTION

Policy and investment

ABSTRACT

Keeping non-polluting light industry and other economic activity accessible in the municipality, including in the inner city requires the development of an efficient, seamless, and green logistics system. In such a system goods are bundled in logistics hubs at the periphery of the city and delivered by electric vans or cargo bikes. This will allow the seamless flow of goods from regional to local infrastructure with the least possible impact on other city services and quality of life. The logistics hubs will also serve to keep transit freight out of the city and will create better conditions for softening the inner-city areas within the second circular road.

CHALLENGE/VULNERABILITY ADDRESSED

- Increased urban traffic flows and aggravated congestion due to logistics of freight related to the current industrial areas within the city in the mixed-use development areas
- Lack of sufficient transport infrastructure to ensure the distribution of freight flows outside the city without the need to cross the city and/or surrounding ATUs
- Environmental pollution due to inefficient freight logistics and transit transport

STRATEGIC OBJECTIVES

SO1 SO2

BENEFITS

- Reduced traffic, consequently reduced air and noise pollution in the city
- Reduction of CO_2 emissions from freight transport
- Increased cost-efficiency of last mile delivery

TARGETS

- Reducing freight related transit transport in the city by 30%
- Implementing and operating 3 logistics hubs
- Switching inner city freight transport to small-scale electric vehicles and cargo bikes

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	2.43 tCO_2eq	2,210,000 EUR

Context

Historically industry was concentrated along the Bega canal, mainly in the Fabric and Iosefin districts. During the 20th century the industrial areas were relocated along the railway routes, along the Buziașului road, near the Green Forest (Pădurea Verde) and to Freidorf district. Currently, urban sprawl pushes industrial areas out of the city along the main routes having a relatively even distribution in the settlements surrounding Timișoara.

The General Urban Plan establishes the main areas of urban regeneration focusing on easily accessible former or current industrial areas in the city. Most of the regeneration projects include mixed-use buildings, mixing residential, office and commercial/retail functions. As a general rule the heavy industry located within the 4th circular road will be relocated outside the city. However, the Municipality would like to keep in the city non-polluting light industry and commercial activity in mixed development systems to maintain a lively city and easy access for citizens to their workplace.

Therefore, SUMP foresees creating micro-hubs around the first and second circular roads for facilitating access for retailers and service providers to the central area. Additionally, logistics hubs are needed around the city to help prevent cargo from transiting the city, especially during peak traffic hours.

Action description

The Municipality will develop logistics hubs of various sizes at the periphery of the inner city based on traffic studies and dedicated freight and logistics studies. The hubs will be implemented through public-private partnerships. The hubs can be developed from scratch in strategic locations, but areas where basic infrastructure already exists and is unused, such as existing industrial platforms will also be considered when selecting locations.

Potential locations are chosen in relation to the location of the industry and commercial activity as can be seen on the map below:

- Antenelor and Circumvalațiunii areas (approx. 5,000 sqm)
- Ronaț, Constructorilor and Buziașului road (approx. 20,000 sqm)
- The connection nodes between the radial roads and the circular road (approx. 40,000 sqm).

The Municipality will act both as planner and regulator, inviting the private sector in for construction, operation and financing.

The hubs will allow goods from various suppliers to be consolidated and then delivered in centralized locations in the city in a more cost-efficient and sustainable manner. As shown on the map, part of the solution are about 40 dedicated parking lots, which will be allocated for freight loading and unloading based on a dynamic allocation of time slots.

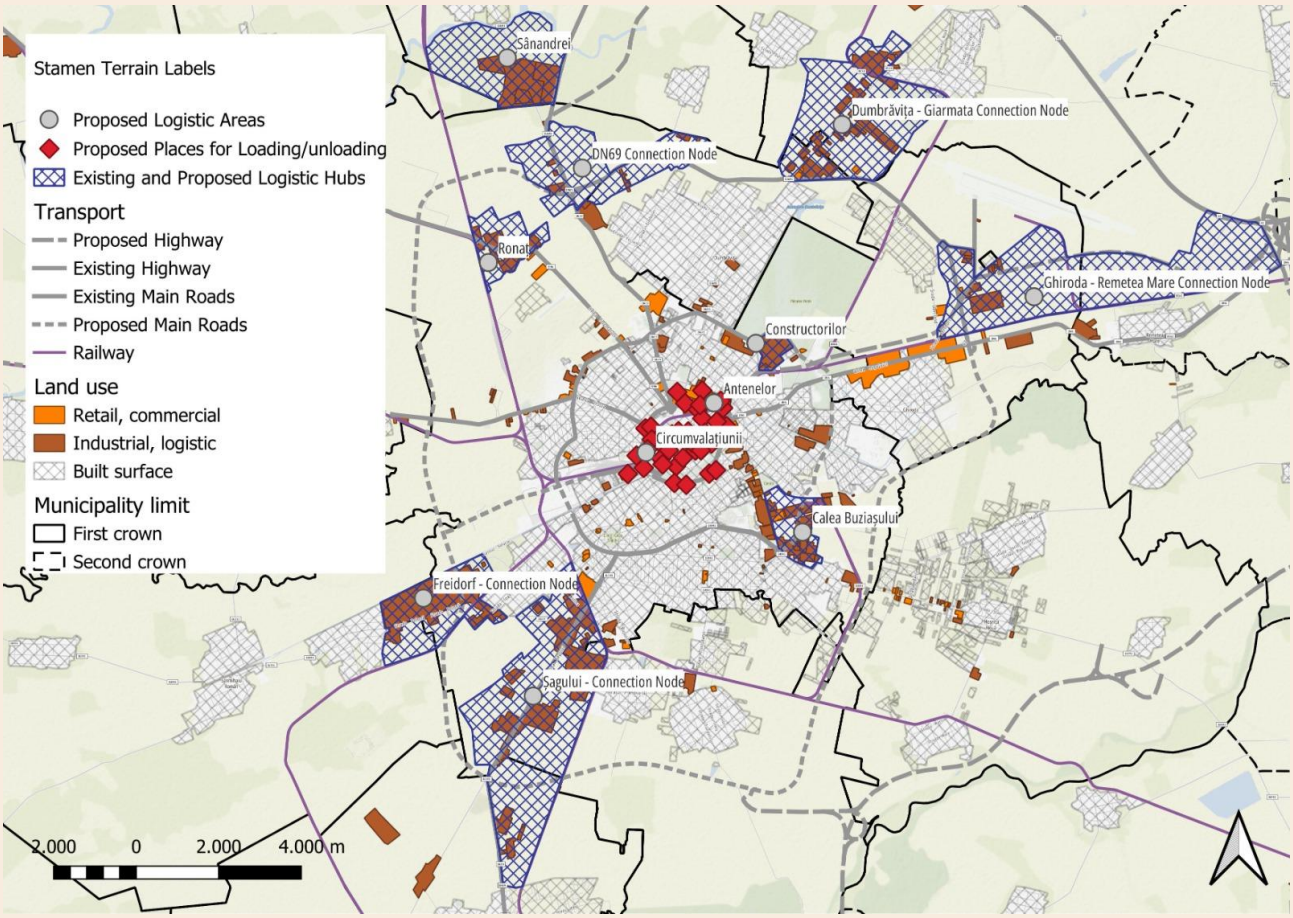


Figure 14 Proposed logistics hubs (source: RWA Group)

As part of the public-private partnership ensuring inner city logistics, targets will be set for efficiency and environmental performance, including the requirement to use electric vehicles and digital solutions for route and delivery optimization, with a special focus on Last Mile Delivery Management that considers all urban traffic restrictions and activities in the area.

Implementation steps

1. Commission and carry out a logistics study aimed at optimizing freight transport in the city through the creation of logistics hubs of various sizes in and around the city. This should include a study of the existing and underused industrial sites, publicly owned land and the business model which will yield necessary revenues for a public-private partnership. It should also include the accompanying measures that the Municipality should take. Circulation measures which limit the access to the city centre for heavy trucks should be defined.
2. Consult and validate the outcomes of the study with stakeholders from commercial entities and industry and logistics companies. Establish a freight partnership.
3. Include logistics hub locations in urban planning documents, select pilot areas for implementation.
4. Finalize Terms of Reference and launch a call for public-private partnerships for building and managing logistics hubs for freight optimization.
5. Implement construction and procurement and operate pilot logistics hubs; three pilot logistics hubs are envisaged in the short term.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Logistics study	50,000	N/A
Establishing freight partnership and carrying out consultations	10,000	N/A
Implement first phase of freight optimization: Modifying or creating logistics platform with necessary equipment, including dedicated parking, 3 @ 100,000 EUR each = 300,000 EUR Procuring electric small-size vehicles for inner city transport, 30 @ 60,000 EUR each = 1.8 million EUR Software for real-time route optimization – 50,000 EUR	2,150,000	65,000*

* 3% of CAPEX in the first 3 years; efficiency gains are expected to offset OPEX after that.

Source of financing

Public-private partnership with potential co-financing from municipal budget (including in-kind contribution through allocation of land or existing platforms), IFI soft loans and equity based on the developed business model.

Action 19
Creating and running a platform for partnerships in green urban innovation

Industry

TYPE OF ACTION

Policy

ABSTRACT

The Municipality will be actively involved and will initiate the development and use of innovative solutions, products and services in Timișoara through partnership with industry and academia. The action includes soft and hard measures, including organization of networking and matching events as well as open calls for identification of innovative green urban development solutions.

CHALLENGE/VULNERABILITY ADDRESSED

- Industrial development is driven by multinational companies losing sight of the potential added value of the local business environment, research groups, and the specifics of the place
- Limited capacity of the Municipality and local authorities to implement smart and green innovative projects

STRATEGIC OBJECTIVES

SO1 SO3 SO4 SO5

BENEFITS

- Reducing the ecological footprint of Timișoara's development
- Improved resource efficiency
- Creating sustainable local business opportunities
- Creating green jobs

TARGETS

- 2 focused networking events on green innovation per year
- At least 2 urban development projects which take up local innovative solutions

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2025–2028	N/A	700,000 EUR

Context

Industry in Timișoara is driven by multinational companies sometimes losing sight of the potential added value of the local communities and specifics of Timișoara. Though many positive examples exist for private sector participation and partnerships with universities, these are rather ad-hoc and a systematic approach for fostering and developing these partnerships is still missing.

Perhaps the most important opportunity in this sense lies in Timișoara's commitment to working towards smart integration (SI) and digital transformation (DT) in the coming years as established in the Smart City Strategy of Timișoara. Digital transformation is led by the Municipality, but the current structures within have limited capacity. Three additional entities will be set up by the end of the year to implement the Smart City Strategy, namely a coordination entity SmarTM, an executive entity, and an extended but stable and organized group of stakeholders. These entities can undertake this action within their mandate.

At the same time, in Timișoara there are many private initiatives and there is also a strong IT and educational sector with a substantial contribution to the introduction of new and smart solutions at all levels. Other notable initiatives include creating a partnership between universities and the Municipality to provide scholarships related to urban development topics. Also, the air monitoring system was developed in a partnership between Timișoara Municipality and two private IT companies (uRadMonitor and ETA2U). The results are published live both on the Municipality webpage and on the local open data portal. Furthermore, at regional level there are innovation centres and clusters looking at absorbing EU funds for various initiatives, but the Municipality does not have a leading role in those.

Action description

Building on the existing commitments and initiatives, the Municipality takes a lead role in promoting and fostering partnerships for green innovation. Screening all development areas within the GCAP and identifying those that could benefit from an innovation partnership can be a starting point. These partnerships can be pursued through open calls and matchmaking for identifying solutions. Soft measures can be directly implemented by the Municipality and by the coordination, execution and consultative entities created for the implementation of the Timișoara Smart Strategy or similar entities in close cooperation with the Municipality. Hard measures can be carried out through public procurement following the route for innovation based on the existing legal framework in Romania.

At an initial screening during GCAP development, the projects that could benefit from innovation partnerships are:

- Real-time inner-city logistics optimization (refer to Industry Action 18);
- Sensors for street lighting infrastructure to serve other purposes such as smart parking and enhancing the current air quality monitoring especially in industrial areas (refer to Energy Action 7);

- Extending and improving air quality monitoring to include higher capacity sensors for depicting pollen, ambrosia, burnt tires and better coverage in industrial areas (refer to Industry Action 20);
- Management of green spaces through Internet of Things solutions. The idea is to create a digital inventory that is able to produce to-do list for maintenance, including the forecast of the volume of work and budgets needed;
- Multimodal transport platform (public transport, velo, taxi-Uber), with inclusive mobility facility (mothers, seniors, disabled) and community car-pooling facility;
- Compliance control for waste collection and abandonment of waste (refer also to Waste Action 28);
- Systems to harness geothermal and other types of renewable energy;
- GIS mapping on web-based platform including different useful layers of data;
- Nature-based solutions for climate resilience.

Implementation steps

1. Screen existing development plans including the GCAP for projects that have promising innovation uptake potential.
2. Organize matchmaking event between the Municipality and innovative businesses plus academia for defining the scope of actions and pursue partnerships; include citizens and NGOs in the consultation process.
3. Ensure to include in the mandate of legal entities as part of the municipal structures and separate legal entities associated to the Municipality sufficient scope to implement partnerships for green smart innovation for urban development.
4. Run open calls/ challenges to invite companies/ universities to define the appropriate solution for the urban development issue at hand.
5. Based on step 4 above, for hard measures develop call for public procurement and take the route of public procurement for innovation, Art. 95 -103 of Law 98/2016.
6. Based on step 4 above, for soft measures implement the action through the coordination, execution and consultation entities established for implementing the Smart City Strategy (e.g. From Lab to Market – support package to attract innovators and startups from around the world; Information package for newcomers to the ecosystem: human resources, facilities, knowledge, specialisations, local actors, etc.; International Innovation / Local Smart City Strategic Projects Fair; New sustainability rules for the setting up of business production capacities in the city – e.g. carbon footprint, greenhouse gas emissions, types of waste generated, etc.).
7. Implement 2 green development projects with a strong innovation component during the planning period.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Organize matchmaking and consultation events	N/A	10,000
Run open calls for innovative solutions and launch call for innovative partnership (50,000 EUR/year for 4 years)	200,000	N/A
Implement 2 projects with major green innovation components	500,000	N/A

Source of financing

Municipality's own budget for the open calls; Regional Operational Programme for the Western region.

The innovative partnership projects can be financed by IFIs, EU financing programmes, or implemented in a public-private partnership, depending on the business model developed for the idea. Revenue generating business models can attract project-based finance from commercial financing sources such as banks and equity.

Action 20
Enhancing the air quality monitoring network, especially in the proximity of industrial sites

Industry

TYPE OF ACTION

Policy and investment

ABSTRACT

This action refers to the monitoring of air quality in the vicinity of industrial areas inside the city, focusing on areas destined for mixed development zones and where air pollution might increase.

CHALLENGE/VULNERABILITY ADDRESSED

- Insufficient measures for ensuring the protection of housing in the industrial areas of the city turning into mixed areas and where non-polluting industry continues to develop
- Insufficient air quality monitoring in the city, especially in the vicinity of industrial areas coupled with complaints related to air quality in those areas

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Delineation of areas with poor air quality for improvement measures
- Awareness raising by making information on environmental quality accessible to the public
- Establishing the best locations for housing

TARGETS

- PM2.5 pollution levels reduced by 10%
- 20 additional air quality monitoring stations established, and current ones improved to measure a wider range of pollutants
- 2 high performance stations in the industrial areas installed

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	N/A	300,000 EUR

Context

Timișoara, as most urban agglomerations, has an air pollution problem, which is aggravated in the warm season. The buildings and paved surfaces create a specific urban environment with higher temperatures and air circulation restriction, which leads to the production of heat islands.

The Air Quality Maintenance Plan in Timiş County 2020-2024 is the main policy document at county level dealing with monitoring and managing air quality, which includes specific measures for all sectors and pollutants. Following the approval of the county level plan, Timișoara Municipality has developed the Air Quality Plan for the PM10 indicator 2020-2024 as Timișoara was exceeding the daily threshold values for PM10 in the course of several years.

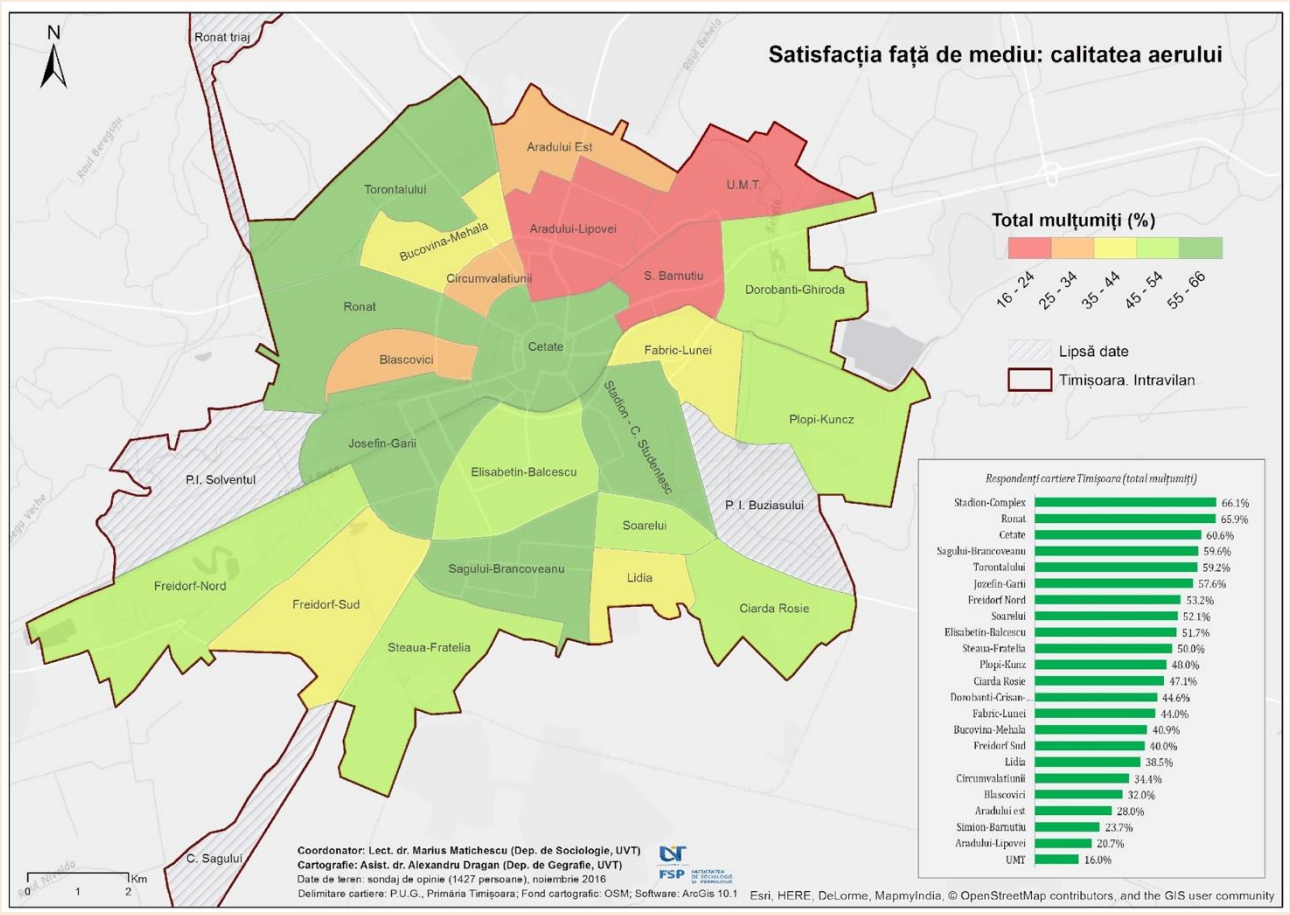


Figure 15 Air quality satisfaction (source: Air Quality Maintenance Plan)

An air monitoring system was developed in a partnership between Timișoara Municipality and two private IT companies (uRadMonitor and ETA2U). The results are published live both on the Municipality webpage and on the local open data portal. In total, 32 sensors collect information on air quality from all neighbourhoods, including the city centre. At the same time, the air quality in Timișoara is permanently monitored through the National Air Quality Monitoring Network (RNMCA). Nevertheless, these systems, while valuable, are unable to capture a wide enough spectrum of pollutants sufficiently frequently and covering the entire city to be able to efficiently respond to air quality problems and related

complaints. The map above shows the areas with most complaints regarding air quality which coincide with industrial areas.

Expanding and enhancing air quality monitoring is even more important, considering that the Municipality intends to keep the non-polluting industries within the city to maintain easy access of workers to their workplace. However, even light industries may be polluting as there are no local regulations or tax policies to promote energy efficiency, cleaner production or waste minimization in industry that go beyond the national legal requirements.

Action description

The action can build on the existing system and be implemented by the same partnership with the private sector and/or opening up the partnership to more actors and the academia.

It aims at the implementation of a local air quality monitoring and control system, with sensors located in the most sensitive areas identified in planning documents as having industrial uses. An environmental monitoring network for air quality, especially in proximity to industrial sites, typically includes monitoring stations, sensors and instruments measuring air quality parameters in real time, a data acquisition and transmission system, a data management and analysis system, a visualization and reporting system, and a stakeholder engagement system.

Besides the straightforward monitoring of industrial and traffic-related pollution, other parameters such as pollens, ambrosia and burnt tire odours can be measured. Information can be made available digitally, alerting the impacted population in case of high levels of pollution.

Implementation steps

1. Define the scope of the monitoring system in consultation with residents, NGOs, the private sector, and academia.
2. Launch an open call for partnership for enhancing and extending the existing air quality monitoring system.
3. Implement and operate air quality monitoring and reporting.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Citywide AQ stations (20 stations at 10,000 EUR/station)	200,000	3,000
Industrial AQ stations (2 stations - 50,000 EUR/station)	100,000	3,000

Source of financing

Private sector co-financing, crowd funding, local budget and grant financing from available EU funds are potential sources.

Water

GREEN CITY ACTION PLAN
TIMIȘOARA

Sector overview

BASELINE

Local water supply and wastewater management are provided by the Aquatim company, which is providing services to most of the metropolitan area as well since 2010.

Drinking Water

Supply: The water supply of Timișoara is divided between two water sources: about 25% from underground sources (through deep boreholes, located in the east, southeast, and west of the city) and about 75% from above-ground sources, mainly the Bega canal.

Treatment: Water treatment is performed according to the capture source: underground water is treated at the Urseni and Ronat plants, while the aboveground water is treated at the Bega plant.

Distribution network: The local network has a length of 715 km, with around 65% of it being under rehabilitation works. According to the local distribution company, 100% of the city population has access to drinking water.

Consumption: The citizens of Timișoara consume approximately 108 litres of water per capita in a day, a normal value for the development level of the city. Only 5% of the water consumed in the city was flagged by the water company as “non-revenue water”, indicating the high performance of the system.

Sewage and wastewater treatment

Network: The total length of the network is approximately 697 km, out of which around 4 km are recent extensions. The local water company indicates that almost all citizens have access to the sewage network. Most of the sewage is GIS monitored; in 2020, 7,711 failures were identified, 92% of which were fixed in less than 24 hours.

Treatment: The main Wastewater Treatment Plant (WWTP) of the city was rehabilitated in 2012 and was dimensioned for 440,000 inhabitants (in 2023 Timișoara has 308,587 inhabitants according to the provisional data provided by the National Institute of Statistics), seemingly indicating sufficient capacity. The fact that the rainwater and sewage systems are combined in the historic parts of the city, and the network extension in the metropolitan area imply constant pressures on the treatment capacity of the plant.

Water discharge and sludge management: The local water provider is constantly monitoring the wastewater discharge from the major economic operators (40 operators are annually verified); if the discharge does not meet the requirements twice in a year, penalties are applied. The provider is currently building a small waste-to-energy plant that will manage the sludge and generate energy for internal use of the system.

POLICY FRAMEWORK

The **Spatial Management Plan for Timiș County** (last update in 2013) is the main local document that sets specific measures and priority actions in the field of surface water and groundwater protection:

- Upgrading and extending wastewater treatment plants
- Introducing BAT in industrial facilities where water is treated as part of industrial processes
- Eliminating the risk of petrol leakage into the soil and consequently to the groundwater where drilling is carried out, i.e. Dudeștii Noi, Dumbrăvița, Giroc, Sânandrei, Săcălaz, Timișoara
- Reducing water contamination from hospitals
- Protection of water sources (water protection zones at groundwater abstraction sites, i.e. in Sânmihaiu Român)

Other important local and national policy documents include the National River Basin Management Plan, Banat Basin Flood management plan, Nitrates Directive, Bathing Water Directive, and Drinking Water Directive.

IDENTIFIED CHALLENGES

- **Frequent occurrence of clogged sewerage lines**
- **Lack of measures for delaying stormwater runoff** putting pressure on the wastewater treatment plant and cause flooding in the city
- **Limited access to sewage infrastructure and insufficient capacity of the networks and treatment facilities in the peri-urban area**
- **Irrigation of green spaces with drinking water** causing high costs

SHORT-TERM ACTIONS 2024–2028

21. Continuing the rehabilitation and maintenance of drinking water and sewage network with a focus on the metropolitan area
22. Water circularity
23. Streamlining sponge city solutions into city-wide planning for climate resilience and flood protection

LONG-TERM ACTIONS UP TO 15 YEARS

Optimizing the wastewater collection system in the area of operation (Aquatim operates in Timișoara and some of the ATUs around it but not in all)

Increasing energy efficiency, including new energy efficient equipment and PV installations

Assessing and mapping flood and climate change risks

STAKEHOLDERS

Name	Actions to be involved in
Timișoara Municipality	**21, 22, 23**
Aquatim	**21**, 22
Intercommunity Development Association Apă-Canal Timiș	21, **22**, 23
NextGen Water	21, 22, **23**
University – through landscape architects	21, **22, 23**
Citizens of Timișoara	21, **22, 23**
Nature NGOs	21, 22, **23**

SMART AND DIGITAL ASPECTS

Actions 21 and 22: Smart meters can be installed, therefore allowing closer monitoring of the water consumption and identification of water losses/leakages/damages of the water system (pipes, pumping stations). All investments in the water system will be integrated into the existing SCADA system to eventually reach a citywide implementation. The company will continue to implement the District Metered Area concept until metering the entire area of Timișoara and surrounding ATUs.

Action 23: By combining nature-based solutions with essential grey and digital infrastructure a state-of-the-art urban drainage system can be achieved providing real-time analysis and forecasting of drainage, reuse of water, and exposure to flood risk. The digital tools used for monitoring the water level and precipitation will feed into hydraulic modelling system which will enable to identify and predict the areas at flooding risk. This can also be connected with the early warning system already available.

SOCIAL AND GENDER ASPECTS

Actions 21 and 22: The rehabilitation and extension of the water systems will create new jobs across a large spectrum of specialties such as funding management, engineers for design and construction, and construction workers. The varied required specialties indicate that gender equality and equal rights could be easily integrated.

Action 23: The adoption of sponge city features into the city design will create new blue-green infrastructure that will increase the overall quality of life in the city through reduced discomfort associated with flash floods, heatwaves and air quality. Furthermore, the green area expansion as part of the sponge city effect will take into consideration the ease of

access for vulnerable groups such as less abled people, the elderly, and young mothers. Leasure areas should also be established in order to accommodate these groups.

Action 21
Continuing the rehabilitation and maintenance of drinking water and sewage network with a focus on the metropolitan area

Water

TYPE OF ACTION

Investment

ABSTRACT

This action continues the rehabilitation and maintenance of the local water and sewage network through a holistic approach that takes into account the continuous expansion of the networks across the metropolitan area. An important element included in this action is related to the introduction of digital tools for monitoring water leakages, water consumption and the networks in general. Aquatim is committed to continue the efforts to digitalize all the infrastructure they are operating.

CHALLENGE/VULNERABILITY ADDRESSED

- Frequent occurrence of clogged sewage pipes
- Occurrence of water leakages, low pressure, and insufficient capacity of wastewater networks, especially in the ATUs
- Leakages in the wastewater networks generating soil and groundwater pollution

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Sustainable use of water resources
- Pollution prevention due to reduced sewage leakages into surface and underground water sources
- Improved quality of life
- Reliable water and sewage network for the citizens

TARGETS

- Reduced water consumption by reducing water losses by more than 10%
- Rehabilitated and extended, where needed, 38 km of water distribution pipelines and 27 km of sewerage network in the southern part and 35 km of water distribution and sewerage network in the northern part of Timișoara
- Extension of water and sewerage networks in ATUs around Timișoara, reaching 100% coverage in all ATUs

TIMEFRAME

2024–2026

GHG SAVINGS / YEAR

20.55 tCO_2eq

CAPEX

36,500,000 EUR

Context

Since 2010 water supply and sewerage services in Timișoara are provided by Aquatim, the regional water utility company in Timiş county. It operates in all the surrounding ATUs as well, except for Dumbrăvița.

The 715 km piping of water supply and sewerage network in the city has been partially replaced, 100% of the distributed water is metered and 95% of the water is accounted for. The overall system leakage in the city is currently very low. However, non-revenue water is a pressing issue in the newly developed areas and especially in the ATUs surrounding the city.

In the city of Timișoara the Wastewater Treatment Plant receives communal, industrial wastewater and rainwater. The length of the network is 697,451 kms and covers the entire city. The plant was fully rehabilitated in 2012, 100% of the city population has access to the services. However, in case of heavy rain some networks come under pressure. Also, similarly to the drinking water network, in the ATUs around Timișoara the sewerage network is in different stages of development, covering most of the area, but not yet the entire territory of the ATUs.

The rapid development of the metropolitan area is a constant pressure on the regional water management system which could possibly affect the citizens of Timișoara if no direct action for sustainable integration is taken. The network coverage and capacity of piping is insufficient in these areas.

The connection rate to the wastewater collection system, especially in the ATUs around Timișoara must increase to 100% in order to comply with the Urban Wastewater Treatment Directive.

Action description

The proposed rehabilitation and extension programme aims to establish specific requirements and targets across all the areas covered by the regional system, thus increasing overall quality and efficiency.

The goal of the action is to develop an integrated program for the rehabilitation and extension of the drinking water and sewage networks based on:

- the status of the existing networks (age, operational conditions),
- the need for extension according to urban planning,
- the available financing sources (e.g. operational programmes) and the Aquatim Investment Plan.

The operator will analyse the existing situation regarding the drinking water supply system and wastewater collection system, which will imply an inventory of the networks (e.g. topographic coordinates, length, diameters, materials, age, technical conditions/deteriorations), conditions of operation (e.g. under pressure, not operated, losses and leakages, failures in operation, operational programme). In general, the materials became obsolete due to natural and artificial factors, which weakened their technological performance (e.g. increase of water loss and subsequently water consumption,

deterioration of water quality, energy consumption, breach in operation, increase of operational costs, decrease of safety in operation, damages in underground constructions and surface infrastructure etc.). All these aspects should be at least considered under the analysis of the existing infrastructure.

Upon the analysis of the existing situation, the operator will develop the map of the water and wastewater infrastructure, considering mainly the urban planning and the local development strategy. Based on these data, a clear picture of the needs in terms of the infrastructure is drawn up, which represents the design theme for the rehabilitation and extension programme. An options analysis must be carried out to obtain the most feasible solution for the programme, considering the applicable techniques for rehabilitation (e.g. relining, pipe-in-pipe, replacement of pipe sector/sections etc.) and extension. The accessories on the distribution network and sewerage (manholes, valves, flowmeters, hydrants etc.) will be selected depending on the type of network and will play an important role in the operation of the networks.

The development program will be based on a proper design according to the real and forecasted demand for water consumption, urban planning/development; the material will be selected according to the local conditions. The programme will establish the performance indicators for the water/wastewater system, which will allow the proper monitoring of the system. These indicators will be integrated into the entire water/wastewater system operated by Aquatim, and will include but will not be limited to the following:

- Technical indicators for drinking water network: specific length of the network (m/inhabitant), number of connections per km, the annual volume of water introduced in the network, the annual volume of losses, specific water consumption (l/person/day), metering degree, specific consumption of energy per m3, number of failures, number of hours without operation, number of inhabitants connected to the drinking water network and connection rate, number of inhabitants connected to both water and sewerage network, etc.
- Technical indicators for sewerage network: specific length of the network (m/inhabitant), number of connections per km, number of interventions on sewerage, degree of discomfort due to malfunction, number of inhabitants connected to the sewerage network and connection rate, etc.
- Specific indicators for service quality: number of complaints, the supportability of tariffs, increase of the connection rates, reduction in the number of interruptions and interventions, etc.
- Economic indicators: drinking water tariff, wastewater tariff, the annual cost of intervention works, annual cost of personnel for operation, productivity of operation personnel, etc.
- General benchmarks for quality service: infrastructure leakage index, influence of sewerage on the operation of the wastewater treatment plant, infiltration of water in sewerage.

Successful implementation of the new investments in the water and wastewater networks should be followed by the extension of the monitoring system (smart metering and SCADA system), with the purpose of increasing the operational efficiency of the water supply system and wastewater collection system, diminishing the operational expenses, and increasing service quality.

Implementation steps

1. Develop feasibility study for key areas of the network, including the technical design and the public procurement documents.
2. Contract technical assistance for works supervision and project management.
3. Contract and implement the works, including the implementation of SCADA and digitalization and integration in the system, as well as smart metering.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Rehabilitation and extension of water and sewerage networks in Timișoara (approx. 90 km @ est. 400,000 EUR/km)	36,000,000	360,000
SCADA and smart metering system on new infrastructure	500,000	5,000

The budget estimation for the extension of the water and sewerage networks in ATUs around Timișoara is approximately 6 mil EUR (15 km @ 400,000 EUR/km). This budget is not included in the above table since this should be acknowledged by the relevant ATUs around Timișoara. According to the available data, the drinking water distribution network and the sewage network in the ATUs around Timișoara need to be extended, since new residential areas are emerging in these ATUs. The length of these networks should be extended with approximately 5 km/year.

Source of financing

European Union funds – Large Infrastructure Investment Programme; Program for Sustainable Development (PDD); National Recovery and Resilience Plan (PNRR); local and state budget

Action 22
Water circularity

Water

TYPE OF ACTION

Policy and investment

ABSTRACT

The action foresees an investment programme for the deviation of the rainwater from the municipal wastewater collection system and the construction of rainwater storage and reuse systems in new buildings. This will be achieved via developments of separate rainwater collection and other management systems in the area of operation considering the existing infrastructure and the new developments, as well as via construction of water retention facilities in areas under flooding risks.

CHALLENGE/VULNERABILITY ADDRESSED

- Lack of measures for delaying stormwater runoff putting pressure on the sewerage networks and wastewater treatment plant
- Lack of rainwater management systems on several streets of the city, and especially in the metropolitan area
- Risk of flooding

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Reduced occurrence and severity of floods
- Reduced wastewater treatment costs due to reduced quantity of wastewater to be treated
- Decreased pressure on the wastewater system from rainwater run-off quantities and water buffer during drought periods through building-based rainwater collection and reuse systems

TARGETS

- Reduced quantity of wastewater to be treated by 10%
- Rainwater deviation / collection and reuse systems installed in 2 flood risk areas of the city
- 20 public buildings endowed with rainwater storage tanks and water reuse systems

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	N/A	31,950,000 EUR

Context

Timișoara has an overall combined sewage and rainwater collection system. Wastewater and rainwater are transported to the city's Wastewater Treatment Plant through five main collectors. Timișoara WWTP was fully rehabilitated in 2012 through an investment from European funds. The WWTP is dimensioned for 440,000 inhabitants and is equipped for mechanical and biological treatment.

Under normal conditions, the wastewater system has sufficient capacity to manage all the wastewater of the city. However, during heavy rains, some parts of the sewage network, especially in underpasses, fall short in terms of capacity, resulting in hotspots of flash floods due to the level differences. The local authorities installed water retention ponds with delayed evacuation in several key underpasses, but the issue is not tackled citywide, as noticed during the heavy storms of 2023.

Detailed maps with flooding-prone areas are available for Timișoara online at www.inundatii.ro. These maps highlight the areas vulnerable to flooding due to heavy rain and overloading of the sewerage system.

Figure 16. Flooding-prone areas in Timișoara (source: www.inundatii.ro, 2023)

The rainwater collection system is mostly inexistent in the surrounding ATUs. In some cases, discontinued roadside ditches were dug or combined sewage and rainwater pipes were installed.

The surrounding ATUs facing rapid expansion, such as Dumbrăvița, Giroc and Ghiroda did not enforce proper rainwater management regulations, resulting in a large number of streets with no system, thus prone to flooding even in cases of normal precipitations.

Since the city of Timișoara and the metropolitan area were developed on a drained marsh, there is a large system of drainage/irrigation channels that could be integrated into a system as a discharge point for the collected rainwater from the newly urbanised areas.

Action description

For the existing wastewater and rainwater collection infrastructure, an investment programme must be developed, providing solutions for the deviation of the rainwater from the municipal wastewater collection system. The following steps are foreseen: the transformation of the grey infrastructure (collection system through gutters, pipes, etc.) in

green infrastructure by the reuse of the rainwater (not discharged into the sewerage), construction of additional reservoirs to collect the stormwater from buildings or large concrete platforms, construction of retention ponds in key areas and installation of a green infrastructure (permeable pavement, rain gardens) to capture stormwater.

For the new areas served by the wastewater collection systems, the stormwater collection system should be separated from the domestic wastewater system, which will increase the efficiency of the wastewater treatment plant and will reduce the risk of flooding during periods of heavy rain. Currently, the best practice in terms of environmental management for a sustainable sewerage system is to have separate systems for rainwater and for municipal wastewater; regular check-ups for new residential/commercial/industrial areas need to be properly established in order to avoid scenarios in which the system is wrongly implemented. In addition, real estate developers should be incentivised and persuaded to take into account rainwater collection tanks at the design stage of the new residential areas, together with the rest of the public utility networks.

Therefore, the water operator should develop and implement separate rainwater collection and other management systems in the area of operation considering the existing infrastructure and the new developments, including:

- Development of the monitoring programme of the rainwater management (and where the collection is combined to include sewage) networks paired with regular cleanup activities;
- Establishing a monitoring commission with a pre-defined schedule that should do regular check-ups of the existing network and the new real estate developments in the area of operation. The Urban Zonal Plans should allow only separate collection of rainwater and sewage in the entire metropolitan area.
- Mainstreaming the collection and reuse of rainwater through investments in rainwater storage tanks. Incentives should be offered in order to promote such activities to existing and new developments. The local authorities of Timișoara and the ATUs should implement rainwater storage tanks at key public buildings that have a large footprint and major paved areas in order to showcase the benefits to the public.
- Construction of 2 types of retention facilities at the city level:
    - Retention facility with discharge into the Bega canal: Central Park (Republicii boulevard) of 30,000 m^3 capacity and Iuliu Maniu boulevard of 10,000 m^3 capacity;
    - Temporary retention facility with discharge into the sewage: Karlsruhe park (1st of December street) 30,000 m^3; Stadium Park (Iosif Bulbucă boulevard) 30,000 m^3; Pădurice Park (Lidia) 70,000 m^3; STPT Depot (Dâmbovița boulevard) 60,000 m^3; Botanic Park (Aristide Demetriade street) 30,000 m^3.
- Specific requirements and rewards should be established for the major real estate developers in order to integrate rainwater collection systems in the design stage of the projects.

Implementation steps

1. Establish a new framework for regulations and requirements for the implementation of rainwater management systems in new buildings.
2. Select specific zones for the development of rainwater deviation/collection and reuse systems.
3. Select 20 public buildings where different measures for water circularity/reuse will be implemented.
4. Elaborate the technical design (feasibility studies) and the public procurement documents for the establishment of rainwater management systems (retention ponds) in 2 flooding-prone areas and 20 buildings where new rainwater collection systems and/or water reuse systems will be introduced.
5. Contract technical assistance for works supervision and project management.
6. Contract and supervise the construction works.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Feasibility studies for 5 areas exposed to flash flooding	200,000	N/A
Feasibility studies for 20 buildings where new rainwater collection and water reuse system will be developed (50,000 EUR/building)	1,000,000	N/A
Construction works (12,000,000 EUR/ water retention/delay system in flooding-prone areas, 300,000 EUR/building for rainwater collection and /or water reuse system)	30,750,000	100,000

Source of financing

European Union funds; Program for Sustainable Development (PDD); National Recovery and Resilience Plan (PNRR); local and state budget

Action 23
Streamlining sponge city solutions into city-wide planning for climate resilience and flood protection

Water

TYPE OF ACTION

Policy and investment

ABSTRACT

This action points to a holistic urban approach where natural elements such as trees, lakes, and parks or other specific designs intended to absorb and reuse rainwater and prevent flooding are abundantly present in different areas of the city. The Municipality will work towards introducing new and innovative elements in the urban landscape which will enable the environment to absorb water and to reduce the pressure on the sewage system.

CHALLENGE/VULNERABILITY ADDRESSED

- Increasing number and intensity of flash flooding events
- Increasing irrigation needs due to rising temperatures
- Increasing temperature and span of local urban heat islands

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Reduced need for grey infrastructure for water runoff
- Collected rainwater that can be used for irrigation during drought periods
- Improved ecologic environment and biodiversity
- Increased city resilience to climate change
- Improved air quality for better public health
- Establishment of an attractive green environment that promotes pedestrian commuting and increases the well-being of citizens and visitors

TARGETS

- 60% of the urban area designed and redesigned to achieve sponge city requirements by 2034
- 40% of the annual rainfall absorbed by 2034
- 10 pilot projects focused on applying the sponge city concept implemented

TIMEFRAME

2024–2028

GHG SAVINGS / YEAR

415.19 tCO_2eq

CAPEX

10,270,000 EUR

Context

Timișoara is built on a former swampland, where a series of drainage canals were created. The Bega river runs through the city as a blue vein with several parks along its banks. Currently, the river has strong natural value for irrigation/drainage and biodiversity on the segments that cross the metropolitan area. The city should also take advantage of the river and integrate it in several ways as a sponge to help mitigate urban flooding and as a water source during drought periods.

The sponge city is an urban construction model aimed at improving water storage and discharge capacity, enhancing water quality and alleviating heat island effects through a mix of nature-based and grey solutions. A sponge city is planned and constructed to soak up almost every raindrop and make it available for reuse. The creation of a sponge city is linked to urban planning, and it is a strong international best practice that can facilitate the development of local policies and regulations.

The historic drainage canals present an opportunity for creating a sponge city because they already provide a backbone of the blue-green artery in Timișoara. Not all drainage canals are intact today, since some of them have been interrupted by project developments. Policy action should be taken to preserve the remaining drainage canals, reshape their drainage function in order to keep water in the city, reconnect and use this backbone of blue-green infrastructure connecting them to the needed water buffering and infiltration, and extend this across the city.

Action description

The action proposes the introduction of sponge city solutions as a local best practice policy that should influence all future landscaping and real estate developments of the city. Specific policies are required to prioritize adaptation, technical support for analysis, risk-informed planning to retrofit urban areas, and functional green space planning. Sponge city solutions can be introduced on three different levels: at the level of low impact developments (LID), in the traditional stormwater system, and in the extreme precipitation stormwater system.

LIDs are applicable at the level of buildings, roads, squares, green and blue areas and can incorporate water infiltration, retention, storage, purification, utilization, and drainage. The stormwater systems help implement storage of rainwater and drainage.

Water related nature-based solutions and green infrastructure include:

- Extending the river wetlands
- Installing water retention parks – leisure areas that can be flooded during extreme weather events
- Rain gardens
- Bioswales
- Pervious pavement
- Green roofs

Implementation refers to the entire city, starting development from the areas adjacent to the existing blue-green network. The map below provides an insight into a possible Timișoara Sponge City.

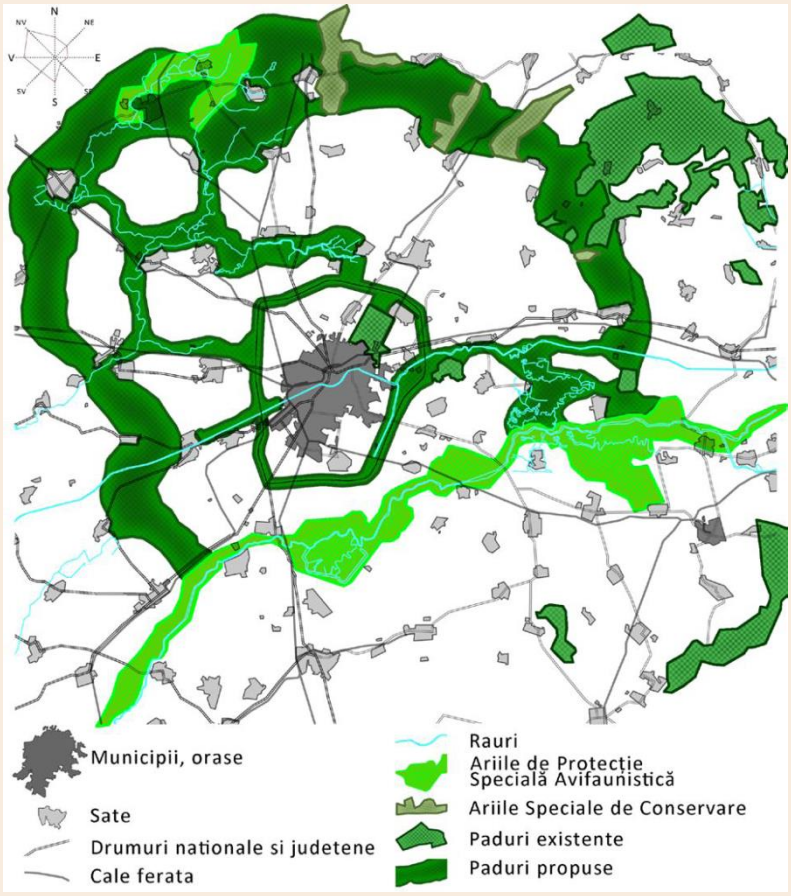


Figure 17 Current and future green areas in the city

Implementation steps

1. Outsource a study to evaluate the potential to increase the local sponge city value, paired with a methodology for integrating this best practice in the local UZPs and GUP. The study should also assess different scenarios and their respective gains and expenses for the local context. Community engagement activities should be established as part of the study.
2. Development of an investment plan to realize the enrichment of the blue-green corridors that are the backbone of the sponge city.
3. Decide on the areas that carry the highest opportunity and priority such as realizing a blue-green corridor east of the city and connecting it with the Bega river corridor.
4. Stimulate private investors to consider the revitalization of the city in the design of the blue-green corridors.
5. Include the sponge city set-up in the update of any urban planning documents for the city.
6. Develop new, or build upon existing community networks to engage local people in local climate adaptation actions.

7. Develop an action plan to enrich the city life alongside the blue-green corridors. Involve the community networks in the development process of the enhancement of the blue-green corridors.
8. Communicate regularly and provide assistance to the inhabitants who live in the surroundings of the project locations.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Develop a study to evaluate the potential to increase the local sponge city value	20,000	N/A
Develop feasibility studies for the potential pilots identified in the Sponge City Study	200,000	N/A
Implementation of large-scale sponge city projects	10,000,000	100,000
Prepare communication materials related to sponge city measures and provide aid to the citizens in the proximity of the sponge city projects	50,000	5,000

Source of financing

Local budget, state budget, IFIs, private investors, loans, public-private partnerships

Waste

GREEN CITY ACTION PLAN
TIMIȘOARA

Sector overview

BASELINE

Generation: The waste generation sparkline presents a normal generation increase, in accordance with economic growth. The 2020 report on the state of the environment in Timiș County established specific waste generation values for urban and rural communities of 0.9 kg/cap/day and 0.4 kg/cap/day.

Composition: According to the Timiș County Waste Management Plan (2020-2025), the waste composition in 2019 for Zone 1 (which includes Timișoara, the 9 ATUs under the GCAP area of influence, and other communities) indicated that 27.23% are recyclables (plastic, metal, paper/cardboard, glass) and 41.12% are biodegradable materials.

Collection: The waste collection system covers almost 100% of the households in the city and the metropolitan area. The population struggles bringing bulky waste or WEEE to the collection points, therefore abandoning them on the public domain.

Recovery: Timișoara sorting station (TSS) established in 2011 is a mechanical sorting line currently owned by the Municipality and managed by Colterm SA. Since it is an obsolete sorting station often operating only one sorting line, recovery rates are low and continuously decreasing. The low rate of waste recovery marks this indicator as red according to GCAP methodology benchmarks, indicating the need for immediate action toward recycling. According to latest developments, a new operator will be selected for the transfer station and a tender will be launched to upgrade it. This will be done at county level by the Waste Management Association.

Disposal: The refuse waste from the sorting station is delivered to the Ghizela Sanitary Landfill. The landfill started its operation in 2012 and is currently managed by SC Retim Ecologic Service SA. Currently, the 2nd cell out of the 5 designed cells is used, standing at a filling rate of approx. 15%, indicating a remaining exploitation period of over 30 years. The landfill is EU compliant, having a good level of control, with soil protection and leachate management in place, while also performing covering activities.

Composting: The only operational composting station in Timiș county is located at the Ghizela landfill, with a 1,700 t/year capacity in a passively aired open windrow. It cannot manage all the generated biodegradable waste, therefore the majority of the waste generated in Timișoara is transported to a composting station in a neighbouring county.

POLICY FRAMEWORK

The **Waste Management Plan of Timiș County, 2020-2025** is the main document which governs the waste management upgrade in Timiș county. It has ambitious objectives and is correlated with the national sectoral policies.

It foresees, among others, the following:

- Increasing the separate collection rate into 3 fractions (paper/cardboard, plastic/metal, glass): 50% in 2023, 70% in 2024, 70% in 2025

- Implementing separate collection of biowaste, with the following minimum collection rate targets: 50% in 2022, 55% in 2023, 60% in 2024-2025
- Extension of separate collection system at county level of green waste from public parks and gardens, with the following collection rates: 60% in 2023, 70% in 2024, 80% in 2025
- Separate collection and proper treatment of bulky waste and hazardous waste
- Construction and operation of 7 voluntary collection centres for special waste streams (hazardous waste, bulky waste, C&D waste, green waste, textile) – starting with 2023
- Specific measures towards waste generation prevention, e.g. implementation of PAYT system for all waste categories
- Increasing the degree of energy recovery of municipal waste to recover 15% of the total amount of municipal waste into energy by 2025
- Construction of an anaerobic digestion facility for biodegradable waste (total capacity 85,000 t/year) – 2024
- Dedicated action plan for packaging waste, emphasizing the need to increase the recycling rate (2024) and improve the implementation of the EPR scheme

Actions 24, 25, 26, 27 bring a direct contribution to the achievement of the targets set in the Waste Management Plan for Timis County.

Timișoara Municipality is part of the Waste Management Intercommunity Association of Timis County and has limited decision-making power within this institutional structure. Therefore, all municipal intervention in the waste sector will be correlated with the county level investments. Some investments, such as investments on transfer and sorting stations are to be done by county level authorities, thus not included in this GCAP as dedicated short-term actions but only as long-term actions.

IDENTIFIED CHALLENGES

- **Illegal dumping** in waterways and forests, especially in the metropolitan area
- Large quantities of **abandoned waste on the public domain**
- **Limited collection points** for special waste streams (bulky, hazardous or WEEE) in the metropolitan area
- Low involvement of the public in **waste segregation** at source
- **Underperforming and obsolete waste sorting lines** at the Timișoara Sorting Station

SHORT-TERM ACTIONS 2024–2028

LONG-TERM ACTIONS UP TO 15 YEARS

24. Piloting pay-as-you-throw systems
25. Feasibility Study for the establishment of a biowaste management system
26. Developing green waste composting in Timișoara
27. Establishing an anaerobic digestion plant
28. Developing a recycling plant for construction and demolition waste
29. Boosting circularity in the region by attracting recycling companies

Introducing separate collection of textiles

Establishing drop-off centres for bulky waste, WEEE, C&D (complementary infrastructure to the existing facility and the facility to be developed in the near future)

Creating management solutions for unrecyclable waste streams

Developing the Integrated Waste Management Information System (WMIS)

Introducing measures to minimize waste

Establishing a craft centre in the city

Establishing a collection system for household hazardous waste

Upgrading the technologies available at the local sorting and transfer stations

Introducing bio-materials circularity

Enhancing circularity in construction and retrofitting

STAKEHOLDERS

Name	Actions to be involved in
Timișoara Municipality	**24, 25, 26, 28, 29**
RETIM SA	24, 25
Waste Management Intercommunity Association of Timis County (ADID)	24, 26, **27**
Private sector	28

SMART AND DIGITAL ASPECTS

Action 24. The envisaged pay-as-you-throw system relies on software to be developed which will be able to read data and attribute waste quantities collected to respective households. All models which will be developed and tested will involve smart solutions for tracking waste quantities from households, bins/bags and waste collection vehicles.

Actions 25-28. The separate waste collection system, the composting system, the new AD facility, and the new recycling facility should be connected to an integrated waste management information system (WMIS), which will enable Timișoara Municipality to

receive, monitor and analyse real-time data on collection, treatment and recovery of biowaste and CDW.

Action 29. Data collected during the waste sector assessment could be presented on the Municipality's online platform, https://data.primariatm.ro/.

SOCIAL AND GENDER ASPECTS

Actions 24 and 25. To be elaborated during the development of a public awareness program.

Actions 26-28. The staffing requirements identified in the feasibility study will take full consideration of gender equality and equal rights for job opportunities. Similarly, technical specifications for administrative buildings and other working premises will provide for separate utilities for male and female staff.

Action 29. A bonus package for the companies that integrate vulnerable groups into their workflow, such as granting free public transportation can be created by the Municipality.

Action 24
Piloting pay-as-you-throw systems

Waste

TYPE OF ACTION

Policy and investment

ABSTRACT

The action involves testing different models of pay-as-you-throw (PAYT) systems and selecting the most appropriate ones for the different types of housing in Timișoara. Waste fees paid by households will be established according to the amount of mixed waste delivered to the waste management system.

CHALLENGE/VULNERABILITY ADDRESSED

- Low involvement of the public in waste segregation at source
- Inability to fulfil recycling targets
- Contaminated recyclable fractions

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Reduced pressure on the environment through waste prevention
- Reduced service costs
- Increased resource efficiency and recycling rates
- Closing the circularity loop of the packaging and food waste streams
- Extended lifetime of the landfill

TARGETS

- Re-use and recycling of 60% of total municipal waste by 2030
- Reduction of quantities of municipal waste for landfill (only 10% of the total amount of municipal waste by 2035)

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2025	838 tCO_2eq	520,000 EUR

Context

The Waste Management Plan for Timis County 2020-2025 envisages the implementation of PAYT system to support the achievement of the recycling targets. The plan envisages PAYT to be initiated in 2020. This action will support the implementation of the plan. It will also support the Municipality's initiative to introduce 5-stream separate waste collection for blocks of flats (application to PNRR) and is in line with Action 25. Depending on the timing and specificities of this initiative, the testing of different PAYT models could also be conducted as part of the initial phase of this project.

The project is also in line with waste management targets for minimum recycling and preparing for the re-use of municipal solid waste (60% and 65% by 2030 and 2035 respectively).

Action description

PAYT is a scheme in which waste fees paid by users are modulated according to the amount of mixed waste delivered to the waste management system. The aim of PAYT is to actually implement the polluter pays principle in a fair way. PAYT schemes generally lead to positive results, like reducing waste generation and increasing the amount of waste separately collected and sent for recycling.

The action is about developing and piloting different models for collection of household waste allowing the measurement of either the volume or the weight of the collected household waste.

The following PAYT models can be tested:

- Volume-based schemes, where waste fees are charged based on the size of containers emptied
- Bag-based schemes, where waste fees are charged based on the number of prepaid waste bags used by a household
- Weight-based schemes where waste fees are charged based on the weight of the waste collected in a given container
- Frequency-based schemes where waste fees are charged based on the frequency with which a container is left out for collection

The models will be tested for different types of housing in Timișoara on a sample of approximately 10% of total population. These types of housing should include:

- City zones with high-rise buildings
- City zones with individual houses
- City zones with mixed housing types

The models should allow for the measurement of the weight or volume and attributing the measurement to a respective household or building.

The models should also include:

- Description of the recommended systems

- Computing models for forecasting quantities of generated waste and the required waste collection equipment in terms of capacities and frequency of waste collection
- Costing of the recommended PAYT systems

Once the pilot testing period is over, the Municipality will choose the preferred technical solution for PAYT system and expand it at city level.

The action needs to be supported by an intensive public awareness campaign where environmental, social and economic benefits will be communicated to citizens. Parallel to this, efforts need to be placed for monitoring and control over improper use of the system and potential illegal dumping, which could be expected in the initial stages of project implementation.

Implementation steps

1. Prepare Terms of Reference and run the tender procedure for the selection of a consultant for developing and testing different models of PAYT systems.
2. Develop software and pilot different models of PAYT systems.
3. Prepare Terms of Reference and run the tender procedure for the selection of a consultant for developing public awareness campaign.
4. Develop and implement the public awareness campaign.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Developing software and piloting different models of pay-as-you-throw systems	500,000	
Develop materials for and delivery of a public awareness campaign	20,000	30,000

Source of financing

Sustainable Development Operational Programme; National Recovery and Resilience Plan

Action 25
Feasibility Study for the establishment of a biowaste management system

Waste

TYPE OF ACTION

Policy and investment

ABSTRACT

The feasibility study will identify the types and generation sources of biowaste, will establish the quantities to be separately collected as well as the type of recovery system that needs to be established in line with the existing policy framework.

CHALLENGE/VULNERABILITY ADDRESSED

- Low involvement of the public in waste segregation at source
- Present inability to respond to upcoming legal requirements towards the separate collection of biowaste
- Contaminated recyclable fraction
- Lack of proper biowaste management system

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Avoided GHG emissions due to diversion of biowaste from disposal
- Extended lifetime of the landfill
- Closing the circularity loop of the food waste stream while also valorising it as a resource
- Improved air quality

TARGETS

- Introduction of city-wide separate collection of biowaste by the end of 2026
- Recycling of 35% of the total municipal waste quantities
- Reduction of biodegradable waste for landfill by 65%
- Reduction of quantities of municipal waste reaching landfill (only 10% of the total amount of municipal waste by 2035)

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024	N/A	300,000 EUR

Context

The action is envisaged to precede and support the activities foreseen in Action 26 (green waste composting) and Action 27 (anaerobic digestion of biowaste), by identifying the parameters of the needed separate collection and recovery system of biowaste.

The project is in line with the targets set in the Waste Management Plan for Timis County, 2020-2025. The establishment of biowaste recovery system will considerably help the county in achieving the waste management targets for minimum recycling and recovery of municipal solid waste (60% and 65% by 2030 and 2035 respectively).

According to official documents, waste composition is the following:

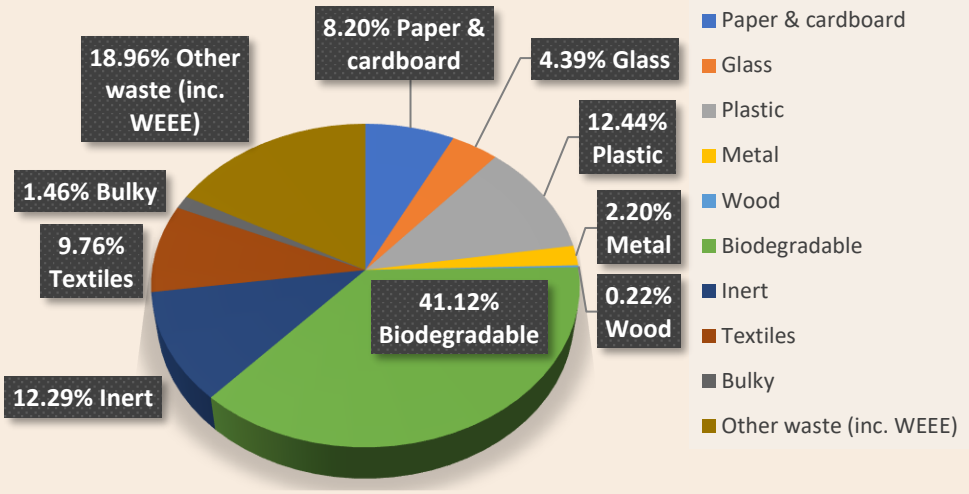


Figure 18 Municipal Waste Composition in the Timișoara expanded area, 2020 (mass %)

At present, an integrated system for the separate collection and recovery of biowaste is lacking. At the same time, biowaste is reportedly the most significant waste stream generated in Timis county and the City of Timișoara – around 40%. Thus, there is a need for biowaste management system, which will divert significant quantities of biodegradable waste from landfill.

The project also supports the City's initiative to introduce 5-stream separate waste collection for blocks of flats (application submitted already for EU funding).

Action description

This action focuses on identifying solutions for the proper collection and treatment of biowaste in Timișoara. The first step would be to develop a comprehensive feasibility study which will focus on understanding the waste composition via conducting a survey/analysis in Timișoara extended area. The survey will establish the type and specific quantities of biowaste from the municipal waste. It will aim for the following:

- Establish the quantities of biowaste by generation source (households, businesses, institutions, fresh produce markets, public green areas, etc.)
- Design a separate biowaste collection system for the different sources of generation.

- Develop a concept for establishment of biowaste recovery facilities considering the different type of biowaste generated and technologies suitable for their recovery.
- Conduct a site location for the identified biowaste recovery facilities.
- Develop a cost-benefit analysis of the proposed investment projects.
- Develop a conceptual design for the recovery facilities.
- Develop an operator model for the separate collection and recovery of collected biowaste.

Implementation steps

1. Prepare Terms of Reference and run the tender procedure for the selection of a consultant for developing the feasibility study.
2. Develop the feasibility study.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Development of a feasibility study	300,000	N/A

Source of financing

Sustainable Development Operational Programme; National Recovery and Resilience Plan; IFIs

Action 26
Developing green waste composting system in Timișoara

Waste

TYPE OF ACTION

Investment

ABSTRACT

The action aims at the establishment of a system for source separation and recycling of collected green waste. Green waste will be collected from landscaping activities in public areas as well as from individual houses. Subsequently, the source-separated green waste will be recycled at a designated facility near the city of Timișoara. The system will be part of a larger biowaste management system for the Timișoara extended area.

CHALLENGE/VULNERABILITY ADDRESSED

- Lack of proper biowaste management system
- Present inability to respond to upcoming higher legal requirements towards biowaste management
- Higher current operating costs due to distances to regional composting facilities
- Inadequate segregation at source

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Avoided GHG emissions due to diversion of green waste from disposal
- Improved air quality
- Extended lifetime of the landfill
- Closing the circularity loop of the green waste stream while also valorising it as a resource

TARGETS

- Introduction of city-wide separate collection of biowaste by the end of 2026
- Reduction of quantities of municipal waste for landfill (only 10% of the total amount of municipal waste by 2035)

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2025–2026	14,339 tCO_2eq	1,470,000 EUR

GREEN CITY ACTION PLAN TIMIȘOARA

Context

Currently, the collection of green waste in the city of Timișoara is not performed under a systematic approach for proper collection of green waste from public and private green spaces. The collection system focuses mostly on green waste generated in public areas, with only a few points across the city where citizens can drop the green waste generated by their gardens. This setup creates a lot of openings for improper disposal of green waste through the municipal solid waste system or in some cases for incineration or illegal dumping. The separately collected green waste is transported to Arad (60 km away) and Ghizela (53 km away), which leads to high transport costs and emissions. Timișoara being the largest city and waste generator in Timis County will benefit from the establishment of a designated composting facility for green waste, serving the city and the neighbouring villages.

This action will be preceded and informed by Action 25 (feasibility study) on the preferred source separation and recycling system to be established for biowaste.

Action description

It is expected that the main source of green waste will be public areas – parks, cemetery, road trimmings etc. Households living in individual houses will be another source of collection, particularly those living in areas in proximity to the future recycling facility. The actual location of the facility will be determined during the feasibility study stage. The area adjacent to the current sorting and transfer station could be considered for the establishment of the composting station.

The exact technology (open windrows, in-vessel, forced aeration) will be determined in the feasibility stage, based on the selected location, quantities to be recycled, and the available area of the site. Preliminary estimates indicate that the capacity of the composting facility could be about 5,000 tonnes a year.

The produced high-quality compost can be used for landscaping activities in public areas or can be marketed for direct use in agriculture. Preliminary estimates indicate that the successful implementation of the project will lead to the recycling of about 10% of the biowaste generated in Timișoara.

Implementation steps

1. Prepare detailed Terms of Reference and run the tender procedure for the selection of a construction company and consultancy services for supervision.
2. Carry out construction and supervision works and ensure equipment supply.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Construction work, supply of equipment and supervision	1,470,000	50,000

Source of financing

Sustainable Development Operational Programme, IFIs

Action 27
Establishing an anaerobic digestion plant

Waste

TYPE OF ACTION

Investment

ABSTRACT

This action aims at the establishment of an anaerobic digestion (AD) plant for separately collected biowaste from the entire Timiș county. Biowaste will be collected from households, businesses generating food waste and markets for fresh produce.

CHALLENGE/VULNERABILITY ADDRESSED

- Lack of proper biowaste management system
- Low involvement of the public in waste segregation at source
- Present inability to respond to upcoming higher legal requirements towards biowaste management

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Avoided GHG emissions due to the diversion of green waste from disposal
- Improved air quality
- Extended lifetime of the landfill

TARGETS

- Introduction of city-wide separate collection of biowaste by the end of 2026
- Recycling of 35% of the total municipal waste quantities
- Reduction of biodegradable waste for landfill by 65%
- Reduction of quantities of municipal waste for landfill (only 10% of the total amount of municipal waste by 2035)

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2026	89,414 tCO_2eq	48,800,000 EUR

Context

The data presented in the Waste Management Plan for Timiș County 2020-2025 indicates that the biodegradable fraction has the highest mass in the local municipal waste with around 41%, approximately 43,000 tonnes in 2020. The high quantity led to the adoption of specific targets to tackle this waste stream in the local legal framework on waste management.

In accordance with the governing document, separate collection of biowaste from households needs to be established by the end of 2023. At present there is no integrated separate collection system for biodegradable (food) waste in Timișoara city, nor in other settlements in Timiș county. Furthermore, the current treatment facilities are limited and most of the food waste is ending up at the landfill, contributing to higher GHG emissions.

Action description

This action will focus on the construction of an Anaerobic Digestion Plant which will process all the food waste from Timișoara city and other settlements in Timis county.

Anaerobic digestion is a process of controlled decomposition of biodegradable materials under controlled anaerobic conditions where free oxygen is absent. Applied temperatures support naturally occurring micro-organisms that digest the biomass. As a result a methane-rich gas, known as biogas, is released that is used to generate heat and/or power. The remaining material, known as digestate, is rich in nutrients and can be used as a fertilizer after additional stabilization. A possible location is the Ghizela Waste Management Centre, where the stabilization could take place in the existing site for composting. This will reduce the capital cost of the intervention. However, the actual siting of the facility will be established during the feasibility study stage (Action 25).

The AD facility will recover source separated biowaste. The actual source separation system will be identified during the feasibility study. It is expected that the main sources of biowaste will be:

- Households. In Timișoara alone, about 22,900 households live in individual houses. The action aims at establishing a food waste source separation system by distributing a designated bin to each household living in an individual house (it shall be noted that the Municipality has already planned to establish a separate waste collection system for households living in blocks of flats, including a separate bin for food waste). However, since the project scope covers the entire county, the feasibility study will identify the actual number of households to be covered by the separate collection of biowaste.
- Commercial establishments (restaurants, canteens, hotels)
- Markets for fresh produce

Preliminary estimates indicate that the capacity of the AD facility could be about 80,000 tonnes a year. The actual capacity needed will be identified by the feasibility study. The successful implementation of the biowaste management system will allow for the recycling of 35% of the total municipal waste quantities.

Implementation steps

1. Prepare detailed Terms of Reference and run the tender procedure in order to select the consultants for the design, respectively the construction company for the works.
2. Construction and supervision of works and supply of equipment.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Construction works and supply of equipment	46,500,000	500,000
Supervision of the construction works (5% of works)	2,300,000	N/A

Source of financing

Sustainable Development Operational Programme; National Recovery and Resilience Plan; IFIs

Action 28
Developing a recycling plant for construction and demolition waste

Waste

TYPE OF ACTION

Investment

ABSTRACT

Establishment of a recycling plant for construction and demolition waste (CDW) is one of the main objectives of Timișoara Municipality, since the city is in constant development and large quantities of CDW are produced daily. Beside the CDW plant, which will be able to process about 50–70 t/h of CDW, the Municipality will also develop a mobile application to report illegal dumping of waste.

CHALLENGE/VULNERABILITY ADDRESSED

- Lack of proper CDW management system
- Large quantities of abandoned waste in the public domain
- Illegal dumping in waterways and forests, especially in the metropolitan area

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Resource efficiency in construction materials
- Reduced illegal dumping of CDW, therefore reduced contamination of soil

TARGETS

- Attaining a recycling rate of CDW of minimum 70%
- Eliminating illegal waste dumping of CDW in the city

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2025	240 tCO_2eq	2,665,000 EUR

Context

Currently, Retim SA collects CDW which is subsequently used for infrastructural improvements at the Ghizela landfill. In 2018, about 20,000 tonnes of CDW were collected in Timis county. This is less than 10% of the estimated total quantities of CDW. This leads to large quantities of abandoned waste in the public domain.

This action tries to address the problem of not having an established system for recycling and recovery of large amounts of CDW and contribute significantly to eliminating the environmental pollution from dumped waste.

Action description

CDW has the potential to be recycled as a secondary material. The main types of CDW that should be targeted for recycling are concrete and reinforced concrete; asphalt concrete; building ceramics (bricks etc.); broken rock materials; and mineral (inert) waste.

Data shows that these five types amount to 80-85% of the total quantity of generated CDW. The predominant fraction of construction waste, like concrete and bricks, is suitable after crushing to be used in road construction instead of primary resources like gravel and sand. Depending on the initial quality of the concrete, it could be re-used for the same construction purposes. Most often, recycled concrete can be applied for soil reinforcement, noise-protecting barriers, embankments, drainage material, temporary roads, sports facilities etc.

The facility will have to provide for (i) area for crushing and separating the fractions from CDW, and (ii) area for storage of separated fractions ready for re-use. The required area is about 3,000 m^2. At least 800 m^2 of this area needs to be covered with concrete. The fraction that is not usable can be transferred to the Ghizela landfill and can be used as a cover material.

The facility needs to be equipped with a mobile crusher. The envisaged crusher is an equipment with a capacity of 50-70 tons per hour to process all possible fractions of CDW – concrete, aerated concrete, bricks, etc. The size of the output can be adjusted with the sieve. The crusher can be transported to active construction sites upon request from private construction companies. This is a possible service that could be offered by the operator of the recycling facility.

This action envisages the development of a mobile application to report illegal dumping of waste as well. This will be implemented as an online platform where citizens can report and pin locations and attach pictures of dumped waste. The new app for cell phones should ensure easy access and quick upload.

Implementation steps

1. Prepare Terms of Reference for the selection of consultants for detailed design and construction company for works.
2. Tender process for the selection of a company for construction works.
3. Initiate construction works and supply of equipment.

4. Supervise the construction works.
5. Prepare Terms of Reference for the development of a mobile application for illegal waste dumping.
6. Tender process for selection of developer.
7. Develop a mobile application for illegal waste dumping.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Construction works, supply of equipment and supervision	2,625,000	200,000
Development of mobile application for illegal waste dumping	40,000	5,000

Source of financing

Private sector.

The action can be implemented through a voluntary agreement between the Municipality and the Association of Construction Entrepreneurs as a representative of the construction industry.

Action 29
Boosting circularity in the region by attracting recycling companies

Waste

TYPE OF ACTION

Policy

ABSTRACT

This action refers to the development of an outreach program to market Timișoara as a potential business development pole for recycling activities. Via networking and promotion, the Municipality is aiming at attracting businesses (private and/or PPPs) that will be engaged in the waste sector, especially in activities aiming at “reduce, reuse, recycle”, and contribute to increasing the waste recycling rates.

CHALLENGE/VULNERABILITY ADDRESSED

- Low recycling rate
- Low involvement of the public in waste segregation at source
- Limited collection points for special waste streams
- Underperforming and obsolete waste sorting lines

STRATEGIC OBJECTIVES

SO1 SO5

BENEFITS

- Increased recycling rate and landfill diversion
- Jobs created
- Increased involvement of citizens in recycling incentivized by visible results
- Increased resource efficiency in the local manufacturing industry
- Industrial symbiosis

TARGETS

- Establishment of 2 recycling / industrial symbiosis businesses
- 20% waste recycling rate at city level

TIMEFRAME

2024–2026

GHG SAVINGS / YEAR

1,253 tCO_2eq

CAPEX

90,000 EUR

Context

Currently the waste collection system of Timișoara is organized into 3 fractions – residual municipal waste (black bin), recyclables (mixed plastic, metal, paper & cardboard – yellow bin), and bell-shaped containers for glass waste. The national and European regulatory frameworks aim for waste separation into 5 fractions (mixed residual, biodegradable, paper & cardboard, plastic & metal, and glass), a requirement that the city is already trying to align to through various initiatives across the city.

While the Municipality is taking action for proper source separation of waste, recycling initiatives are non-existent in the county, forcing the local authorities to export clean waste streams to distant counties or even abroad. The logistics required to transport the waste over long distances to reach a recycler is putting a big strain on the economic viability of the local waste management system, resulting in significant quantities of clean recyclables stored in the local waste sorting plant for a prolonged period. The resulting streams are landfilled or frequently used as RDF in cement kilns because of the lack of recycling options. The expansion of separate collection paired with awareness raising, the ongoing periodic control of source segregation and the quality of recyclables in the primary bins are expected to increase the quantities of clean recyclable waste streams that the city will generate while having no appropriate local solution for recycling.

The proper management of waste in Timișoara is a long overdue issue that the city couldn't address internally, therefore attracting high-performing private recycling companies could have a positive impact on the local setup. This goes hand in hand with the tightening requirements for recycling and reuse and the incentives coming from Extended Producer Responsibility schemes.

Action description

Building on the proximity principle, the Municipality will seek opportunities for industrial symbiosis or circular economy solutions for specific separately collected waste streams. This will be done by a task force of the Municipality including the waste management, investment and communication departments. The task force should prepare information materials that present the waste management situation and the forecast of materials available in Timișoara.

The information and promotional materials produced should take a bottom-up approach and present the opportunities for the circular economy, presenting the system at all levels. First, the team will look at ensuring the collection of reliable waste generation data and forecasts by using internationally proven best practice methodologies, for example the UN–Habitat's Waste Wise Cities Tool. It will also be necessary to collect and present reliable data on the waste management system and its planned development, legal setup, performance requirements for environmental and social compliance, the recycling targets of the city by materials established based on value chains and upstream markets for outputs, available facilities for investors, including land and any fiscal investments. Such information material can attract potential private sector operators and investors.

The southern part of the city hosts the current waste transfer and sorting station that needs capital investments to improve operation. This area has the potential to be developed as a circular economy development zone for the county driven by PPPs or private investments. Concurrently, the rehabilitation of the local district heating plant (CHP South) and phasing out coal will reduce the necessary space requirements of the plant, thus freeing up the area to develop circular economy initiatives. These may be combined also to recycle historical waste generated by the district heating, i.e. bottom ash from the plant.

Implementation steps

1. Carry out a waste characterization study paired with options analysis for the future development of the SWM and possibilities of industrial symbiosis between secondary materials and the nearby manufacturers.
2. Train the task force representatives from the waste management, investment and communication departments of the Municipality in the field of circular economy and related business models to prepare for investments.
3. Present the results of the sector assessment through marketing materials for key stakeholders: investors, technical experts, financing institutions, and governmental bodies.
4. Identify the best outreach methods including international events, IFI meetings, and partnerships between municipalities to attract recycling companies in the city.
5. Participate at international outreach events in the waste sector to present Timișoara as a good investment potential for the circular economy in Romania.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Waste Sector Study	50,000	N/A
Training on circular economy opportunities	20,000	N/A
Producing the marketing material (paper and digital)	20,000	N/A
Participation at promotion events (two events on average per year)	N/A	5,000

Source of financing

International funds from development agencies and IFIs such as the UN, EU financing sources and IFIs.

Internal budget of the Municipality for the outreach activities.

Land use

GREEN CITY ACTION PLAN
TIMIȘOARA

Sector overview

BASELINE

Population density: At city level, population density is within relatively good parameters, being above the minimum sustainability threshold of 2500 inhabitants per hectare. The graph of the 2015-2019 interval shows a slight decrease, from 2,583 inhabitants per hectare in 2015 to 2,518 in 2020. Since the COVID-19 pandemic, the citizens of Timișoara started relocating from the city to the metropolitan area. This trend accelerated the development of the surrounding ATUs and allowed the emergence of residential developments that have low quality-of-life standards.

Land use and urban planning: The urban development of the city should follow the General Urban Plan (GUP). In 2023, the GUP is still under development; in August of 2023, the document entered the public consultation stage. In the absence of this important document, the construction permits were awarded through Zonal Urban Plans that allowed the emergence of underperforming urban areas. As a consequence, the influence of private investors preceded urban planning priorities and the protection of the environment, nature, and citizen wellbeing. This chaotic development had a great impact on important quality-of-life aspects such as pedestrian, non-motorized, private, and public transport, as well as on green space availability and ease of access to day-to-day amenities. The overall development consistency of the city and the metropolitan area differs very much between ATUs and even neighbourhoods.

Green Space Network: Due to its positioning in the Banat Hydrographic Basin, Timișoara is crossed by numerous water channels that facilitate the development of blue-green areas. The city is crossed right through the centre by the Bega canal, which facilitated the development of most of the green spaces in the city. Timișoara has an overall good green space coverage, but their functionality is generally reduced; the development of parks and other functional green areas in the city did not take into consideration any accessibility standards, resulting in large areas of the city with reduced or even no access to green areas within 300 m. Even though the city has a good network of parks and other green areas, their potential is not yet fully achieved for other functionalities such as non-motorized and pedestrian transit, rainwater management, and thermal discomfort management.

Urban expansion: Timișoara started incorporating the nearby settlements into its urban structure around the year 2000. Starting with 2012, all of the 9 ATUs that surround the city developed and expanded in an accelerated manner due to a local socio-economic trend. Due to this trend, some of the ATUs developed in a chaotic manner that focused on rapid development with little regard to quality-of-life endowments such as educational infrastructure, public transport, green spaces, day-to-day amenities, rainwater, sewage, and waste management. Since the Covid-19 pandemic, the migration trend drastically increased, resulting in even higher pressure on the proper urban development of these settlements.

POLICY FRAMEWORK

The main regulatory document for the sector is the **General Urban Plan of Timișoara**. The development of the local GUP started in 2012 and never reached the approval stage. At the time of writing this document in 2023, the GUP was updated to better reflect the needs of the city and it is under public debate, being available online via the Municipality's data-sharing platform. The main objectives of the new GUP include the correction of insufficient or inconsistent previous regulations, the establishment of clear and detailed rules for all, the simplification of the approval process, and the objective to ensure harmonious, coherent, and sustainable development.

The most important local green space management document is the **Strategy for the Development of Green Spaces of Timișoara 2010-2020**. This document presents past developments and the current requirements for green space availability in private and public areas. Several good practice requirements were introduced, such as the requirement that 50% of the property must be left open in case of individual households, and 20-30% in case of commercial, educational, and industrial buildings, but there are cases in which the obligations were not met. The strategy is currently outdated and underperforming, since it did not introduce a proper enforcement mechanism; therefore, a lot of new urban developments do not have the required open green space or access to quality green spaces within 300 m.

The importance of green spaces in the city is highlighted in other regulatory documents, such as the Integrated Urban Development Strategy of the Timișoara Growth Pole 2015-2020, Strategy for the Economic and Social Development of Timiș County 2021-2027, and even the Energy Efficiency Strategy of Timiș County 2021-2027.

IDENTIFIED CHALLENGES

- **Insufficient and discontinuous green spaces**, which are under pressure as a result of climate change characterized by increasing average temperatures, heat waves, prolonged droughts or other extreme weather
- **Insufficient development of the basic infrastructure for the quality of life in the metropolitan area** (green areas, services, access to utilities)
- **No continuous network of blue-green spaces** in the metropolitan area
- **Urbanization of the city by exceptions** (Zonal and Detailed Urban Plans) determined by the delays in approving the new General Urban Plan for 2012-2023
- **Increased focus on road infrastructure in urban planning**, both in Timișoara and the metropolitan area, with a secondary focus on alternative modes of transport
- **Development of the Digital Twin** concept is in its early stages

SHORT-TERM ACTIONS 2024–2028

30. Converting hard surfaces into green areas for improved drainage
31. Establishing green urban spaces to address localized heat island effect
32. Integrating green and social infrastructure in new developments and the metropolitan area
33. Implementation of blue-green infrastructure for connecting Mosnita with Padurea Verde
34. Developing the new Metropolitan Green Space Strategy

LONG-TERM ACTIONS UP TO 15 YEARS

Increasing the area of and enhancing the quality of green public spaces

Creating green coverage in cemeteries to reduce heat island effect

Introduce GIS for all properties and municipal infrastructure in Timișoara

Data integration for digitalizing future urban planning

Urban regeneration project for former industrial sites

STAKEHOLDERS

Name	Actions to be involved in
Timișoara Municipality	**30, 31, 32, 33, 34**
Municipalities of the ATUs in the metropolitan area	33
Citizens of Timișoara	30, 31, 32, 33, 34
Nature NGOs	30, 31, 32, 33, 34
Local businesses	30, 31
Local academia	30, 31, 32, 33, 34

SMART AND DIGITAL ASPECTS

Action 30 and 34: By combining nature-based solutions with essential grey and digital infrastructure a state-of-the-art urban drainage system can be achieved providing real-time analysis and forecasting of drainage, reuse of water, and exposure to flood risk. In addition Action 34 has a substantial opportunity to capture digital data on blue-green infrastructure assets and integrate this data with digital urban planning databases. The collected data can be published and used by future investors in the city's green/smart infrastructure.

Action 31: The action can be paired with the installation of digital weather stations throughout the city making it able to identify the neighbourhoods affected most by the urban heat island effect but also creating the opportunity to monitor the positive effects of the investment actions over time. Furthermore, it is beneficial to couple this with the mapping of blue-green values and open spaces, including their scoring by the community in

GIS. This will enable the Municipality to use reliable spatial information when updating the city's planning documents and re-evaluating the city's blue-green network.

Action 32: New development projects could be submitted for approval in a digital format, with georeferencing of structures and site amenities. This digital approach should facilitate accessibility assessments and even scoring. This could be a starting point to go to a full digital cadastre of the city. This requirement could first apply to projects above a certain size or/and value which require approvals from the urban planning department.

Action 33: The regulations established as part of the action could be linked to a digital GUP; several data and metrics can be linked allowing optimal planning and monitoring, while also indicating where requirements are not met. Working towards this digital holistic approach could protect and increase the functionality of the blue-green network across Timișoara and its expanded area.

SOCIAL AND GENDER ASPECTS

Cross-action aspect: All the new green space development and redesign activities will take into consideration accessibility for vulnerable groups such as the elderly, less abled persons, and young mothers. Furthermore, the actions aiming for regulatory updates should establish a minimum requirement standard for green space accessibility and endowment for all neighbourhoods and citizen groups, regardless of any socio-economic aspect.

Actions 30 and 31: Greening projects often do not consider the already unequal distribution of accessible green spaces where poorer neighbourhoods often have fewer accessible green spaces in their environment, and the green space available is also of a lower quality, compared to wealthier neighbourhoods. Therefore gentrification has to be prevented: green infrastructure and street enhancements that provide neighbourhood "upgrades" can raise housing costs (rent, market rate, food) and drive poorer populations to less expensive neighbourhoods. The actions will work towards finding the right combination of measures that prevent displacement and those that ensure a fair and inclusive realization of green spaces that is optimal for the city's specific context.

Action 32: New developments and urban improvements are realized in both the poor neighbourhoods and the richer parts of the city. Eco-gentrification must be avoided. The lowest-income households in suburban communities will feel the most financial pressure to own a car. With more investment in walkability schemes and public transport infrastructure, low-income families will no longer have to worry about maintaining a car, allowing them to remain in the city.

Adoption of the "at walking distance concept" for day-to-day commutes should benefit local people of all backgrounds, ages, and abilities.

Actions 33 and 34: Proper regulation with enforcement mechanisms in the local blue-green infrastructure will generally increase the surface and functionality of these areas. Once properly regulated as part of the GUP, the increased green surfaces will bring health, safety and social equality benefits citywide.

Action 30
Converting hard surfaces into green areas for improved drainage

Land Use

TYPE OF ACTION

Investment

ABSTRACT

The action aims at transforming hard surfaces by investing in flood prone areas and school yards to permeable surfaces for improved drainage and by imposing the gradual transforming of a part of the pavement in front of buildings into green areas.

CHALLENGE/VULNERABILITY ADDRESSED

- Climate risks, especially heat island effect and flooding during intense rain events
- Water and air pollution
- Insufficient and discontinuous green spaces, which are under pressure as a result of climate change characterized by increasing average temperatures, heat waves, prolonged droughts or other extreme weather
- Existence of poorly maintained and underutilized publicly owned land in the city

STRATEGIC OBJECTIVES

SO1 SO4

BENEFITS

- Reduced pressure on the rainwater drainage network, especially in the inner city where rainwater drainage and wastewater sewage use the same network
- Increased water drainage through infiltration
- Cooling through evaporation and the reduced heat reflection of green areas
- Increased public green space and biodiversity

TARGETS

- Pilot project implemented in the flood prone Gheorghe Lazar Railway underpass area
- At least 40% of the schoolyard of 2 schools per year transformed into an unpaved natural playground
- The pavement of 10% of citizens changed to vegetation cover in front of the house within the first 3 years
- A minimum of 30% unpaved area imposed for new developments

TIMEFRAME

2024–2028

GHG SAVINGS / YEAR

0.48 t CO_2eq for the pilot project

CAPEX

3,050,000 EUR

Context

Climate change risks of flooding, heat islands and extreme windstorms are an increasing problem in the last decade for Timișoara. Windstorms come with significant quantities of rainfall, flash floods or hotspots for floods. Traffic underpasses were the most susceptible for flooding, thus in recent years the Municipality installed drain pumping systems there that improved much of these problem zones. However, during the 2023 spring and summer storm season several new flash flood hotspots emerged across the city. Streets such as the Emile Zola, Letea, Mures, Azuga, Maresal Al. Averescu, Drubeta and Bujorilor were marked by the County Inspectorate of Emergency Situations as heavily affected by flooding[5], while in the Gheorge Lazar railway underpass several cars were stuck in the flood.

Inside the city, large green areas are located along the Bega Canal, as well as towards the historic neighbourhoods of Iosefin, Fabric and Elisabetin. However, in the northern area of the city access of the citizens to quality green space is limited. At the same time the city's General Urban Plan (PUG) imposes a 20% minimum area of green spaces for new developments aiming at economic activities, which is not ambitious enough.

The city lays in an area with numerous watercourses and canals. This presents an opportunity for ensuring a high-quality natural environment for citizens in the metropolitan area. Through the network of irrigation and drainage canals and the green banks of these, the penetration of blue-green corridors to the core of the city and the peripheral neighbourhoods of Timișoara is a given. This serves as an excellent base to generate a thriving blue green network, extensively covered in the document issued in 2019 and entitled Guide for the development of green-blue corridors in the Timișoara Growth Pole.

Action description

Permeable surfaces will be created citywide, in all areas that allow such transformations, be it on public or private land. As a policy measure, a minimum requirement of 30% green space will be imposed for new developments.

For the investment measures, firstly, the flood-prone areas of the city will be identified and mapped. Based on this, measures will be defined to increase water absorption while keeping the functionality of the targeted areas.

An ample pilot project will be implemented to act as a demonstrator for the benefits and impacts of improved permeability in the Gheorghe Lazar railway underpass area. The area includes substantial impermeable plots as part of a schoolyard, driveways, parking areas, and unmaintained green areas with low water absorption, that could be modernized to increase rainwater runoff time and retention capacity as shown in the map below.

[5] https://www.mediafax.ro/social/case-curti-si-subsoluri-din-Timișoara-inundate-in-urma-ploii-torentiale-21907881

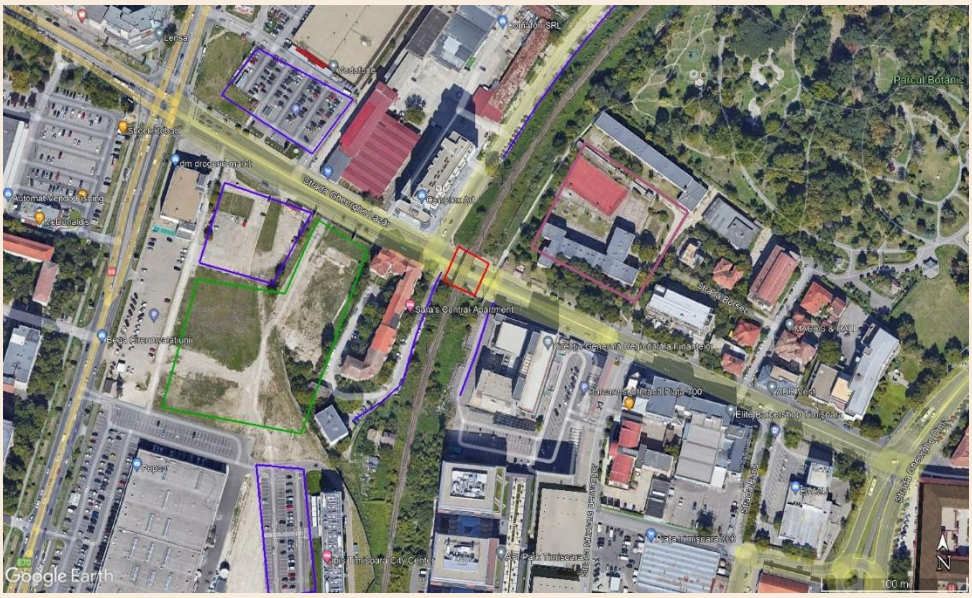


Figure 19 Pilot area - Gheorghe Lazar railway underpass, source: Google maps (red – the flash flood hotspot, pink – paved schoolyard, purple – parking areas that could become more permeable, green – unmaintained green area with low water retention capacity)

Areas to be tackled in the short term include:

- Residential neighbourhoods that have large, paved yards or front lawns. They should be engaged through awareness campaigns supported by the neighbourhood managers and incentivized to take action towards changing the pavement to permeable surfaces in front of the houses and creating façade gardens and permeable pavement for driveways and parking lots.
- Convert school playgrounds incorporating more natural and permeable surfaces. These yards will be established as mixed-use areas – schoolyards during the day and parks in the afternoons – in order to open new recreational areas for the citizens and increase water absorption citywide.
- Converting paved areas such as parking lots and driveways into permeable pavement. Large paved areas, like those located in retail centres and administrative areas, will integrate permeable surfaces to increase rainwater runoff time and prevent the creation of flash flood hotspots.

Additionally, the Municipality will take the opportunity to involve citizens proactively through an open call for citizens to submit proposals of places where they think softening is possible and needed. Neighbourhood groups will thus have the opportunity to come up with proposals to speed up the process of quick wins for more green spaces that citizens cherish, and communities feel as their own. The Municipality can build on its existing experience of participatory budgeting.

This action will be implemented at the entire city level, starting from the areas prone to flash flooding and areas adjacent to the existing blue-green network. The pictures below present some potential areas to start with.

Figure 20 Potential neighbourhood street modernization to facilitate water absorption (Source: https://urbangreenbluegrids.com/)

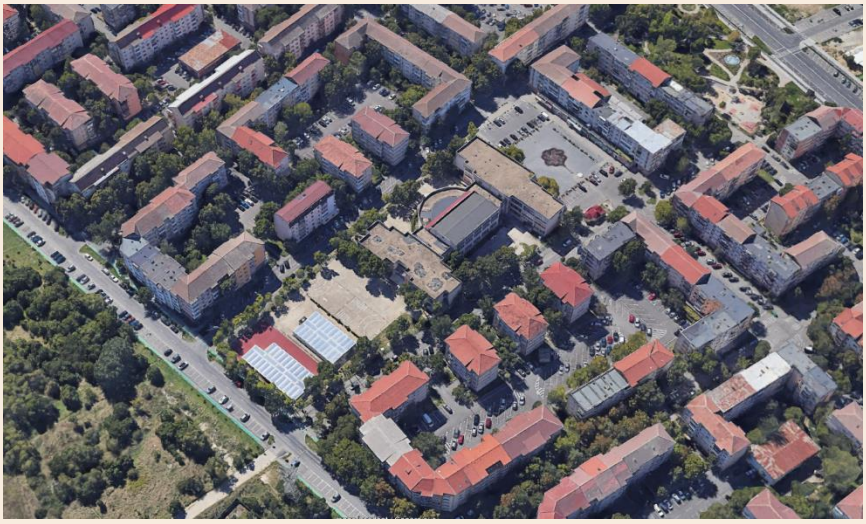


Figure 21 School no 30 – southern part of the city (Source: Google maps)

Implementation steps

1. Define, design, and implement pilot action in the Gheorghe Lazar railway underpass area that will include the flood hotspot of the railway underpass, nearby paved schoolyard of the Lenau high school, and unmaintained green space as well as impermeable parking areas in the vicinity; this work includes the mapping of the owner structure, the evaluating on which plots actions are needed and the starting of the consultation process with the owners; a possible need (only if it cannot be avoided) could be expropriation.
2. Define and implement an awareness raising campaign promoting pavement to be converted into green areas, using the pilot project as a demonstrator. Offer incentives and benefits for those participating, i.e. consultancy, free planting material, small machinery/service to excavate pavement, soil or compost free of charge.

3. Identify and map flood-prone areas through a participatory process and define targeted actions for these areas.
    a. Parking lanes, parking lots, and driveways that can be softened by using permeable pavement.
    b. Schoolyards and playgrounds that can be softened (e.g. School no 30 and Middle School no 13 which also won a project for greening in the recent participatory budgeting exercise).
    c. Streets that could be transformed into pedestrian-only streets that incorporate larger green areas with urban resilient plants and trees.
4. Perform a feasibility study of the programme, paying attention that in urban context undergrounds are often saturated with utility connections and cables.
5. Work with a landscape architect to design and work out the softening of the surfaces at local and city-wide scale.
6. Launch tender and implement the first phase of the programme to include 8 schools and 5 of the flood-prone hotspot areas which need intervention the most urgently. Set up a professional jury (authority, university, landscape architect) and organize a public vote.
7. Communicate regularly with the inhabitants who live in the surroundings of the project locations selected for the programme.
8. Change urban regulations to increase the requirement of green spaces for new developments to a minimum of 30%.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Design and implement pilot action at Gheorghe Lazar railway underpass	300,000	N/A
Awareness raising, citizen support through incentives, communication about softening plans	N/A	25,000
Develop a climate-proof programme through participative processes	250,000	N/A
Implement the first phase of the programme for impermeable surfaces	2,500,000	N/A

Source of financing

Municipal budget, Environment Fund Administration, reduced city taxes for those embarking on sustainability linked loans, crowdfunding.

Action 31
Establishing green urban spaces to address localized heat island effect

Land Use

TYPE OF ACTION

Policy and investment

ABSTRACT

The action foresees the increasing of the total area of green urban spaces with a focus on areas suffering from heat island effect and related thermal stress. This will be done through three key measures: by creating tree canopy in heat island areas, on pedestrian and micro-mobility corridors, by installing green rooftops, and by devising policies for the resilience of constructions and retrofitting.

CHALLENGE/VULNERABILITY ADDRESSED

- The increasing strength and duration of heatwaves and draught periods
- Increasing discomfort, health impacts and mortality rate in the summertime due to extreme temperatures
- High water and energy needs during the expanding heatwave and draught periods
- Social imbalance in the city accentuated by climate change as poor areas typically have fewer and discontinuous blue-green infrastructure and are more affected by heatwaves

STRATEGIC OBJECTIVES

SO1 SO4

BENEFITS

- Decreased temperature and extent of heat islands
- Improved air quality and carbon sequestration across the city
- Improved biodiversity and climate resilience
- Continuous pedestrian corridors acting as ventilation channels that bring cooler air from outside the city
- Increased and greener corridors for connecting recreational areas to the city by alternative modes of transport

TARGETS

- 5 new green connectivity projects in the Southern part of the city
- The tree canopy coverage on major pedestrian corridors increased by 25%
- 50 km of streets redesigned as green corridors – reduced impermeable surface and increased tree canopy coverage
- Green roofs installed on 50 buildings

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2028	772.6 tCO_2eq	4,610,000 EUR

GREEN CITY ACTION PLAN TIMIȘOARA

Context

In 2020, the average August temperature registered at the Timișoara meteorological station was 23.6°C, with the highest registered temperature being 34.7°C. Due to the increasing temperatures heat islands causing general thermal discomfort during summertime emerge. The design of the squares in the centre, the road infrastructure and newly developed buildings using heat-reflective materials such as cobblestone, pavement, and glass are the main amplifiers of the heat islands. The surface temperature difference between rural and highly urbanized areas can reach up to 10°C on hot days indicating the need to establish citywide interconnected blue-green areas that create cool spots. Including green infrastructure in the city at the highest extent possible may lead to a temperature reduction of about 2°C. Relevantly, when the peak daily temperature drops by 0.1°C, then the percentage of heat-related mortality decreases on average by 3.0%.

Overall Timișoara is a relatively green city, but not all neighbourhoods are equally endowed. The Bega canal and the adjacent parks create a strong blue-green corridor south of the city centre. Along the east of the city, in the north-south direction, there is a good opportunity to preserve and strengthen a perpendicular blue-green axis. Currently, this blue-green axis is fairly underdeveloped, having no important role in pedestrian or recreational commuting. Moreover, the SUMP highlights the need for increasing green areas and spaces intended for pedestrians in intersections and in their vicinity.

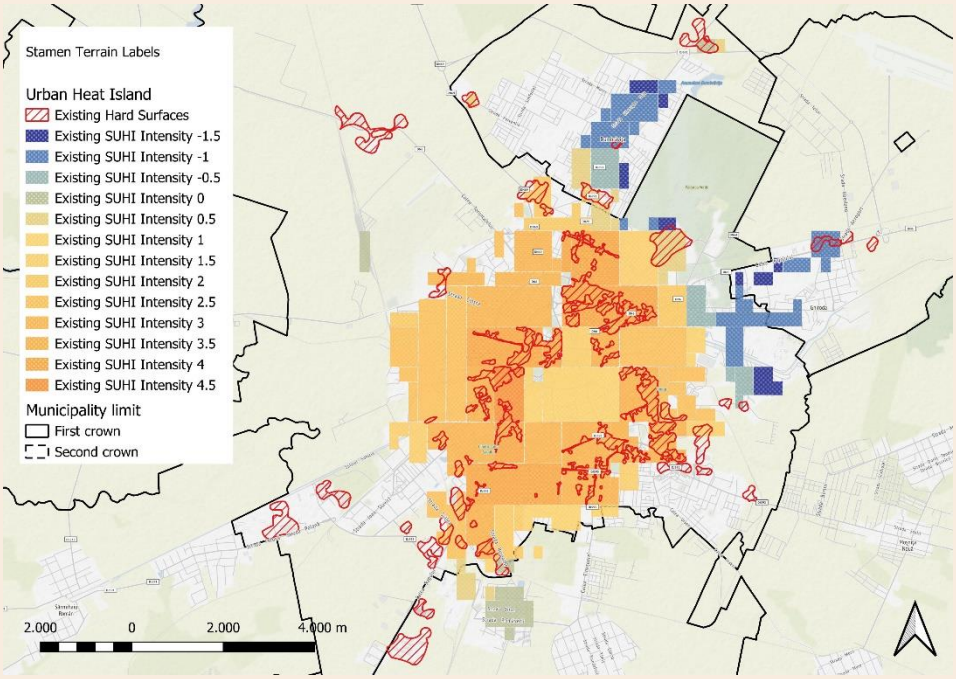


Figure 22 The Surface Urban Heat Islands (SUHI) and the extended hard surfaces in Timișoara

Action description

The most effective measure in order to limit surface temperatures and keep the city cool is to limit the paved surfaces or to shade them with an extended tree canopy network. Building on the existing network of green areas across the Bega canal, the eastern channel, and also the small parks in the neighbourhoods, the city will establish new green areas and green pedestrian commuting corridors.

Three types of measures will be implemented: (1) tree canopy for heat islands and (2) tree canopy on pedestrian and micro-mobility corridors and (3) installing green rooftops.

Shading by planting trees on squares, parking lots, traffic roads, and on private properties reduces the overall thermal discomfort in the city. The city will be analysed from the perspective of the experienced heat during summertime. In addition pedestrian and micro-mobility commuting needs/potential will be assessed to establish which of the proposed corridors would generate the most benefits for the citizens. The identified corridors will be fully redesigned to comfortably accommodate large numbers of commuters and to ensure pedestrian only access on the sidewalks, therefore increasing the overall safety and walkability of the city. The redesign process should be done in a holistic approach, according to the priorities established in Transport Action 5. This will be carried out in a participatory way, simultaneously or separately with the study of other climate vulnerabilities such as flood risks.

New functional green areas will be established in the neighbourhoods with reduced access to such zones. The southern part of the city, especially the southeastern industrial area would benefit from new green areas which currently are scarce. Furthermore, these areas could later be connected through the existing micro-mobility infrastructure to the centre and the Bega canal.

Policies (as described in Land Use Action 34) are required to reprioritize functional green space planning, risk-informed planning to retrofit urban areas, urban solutions with more greenery, more trees, green roofs, less paving, and the use of materials with a high albedo.

Through **investments**, concrete action can be taken to increase green areas in the city and make use of their ecosystem services to mitigate the heat island effect. These measures are applicable at the level of buildings, roads, and squares, although the implementation needs to tackle entire neighbourhoods with mixed actions in order to have significant impacts on reducing heat islands.

All the planning, design, and participatory activities could be performed through the engagement of the architecture and urban development students at the Technical University, in order to allow the city to capitalize on the already existent local expertise.

Concrete actions can include:

- Shadowing pedestrian areas, micro-mobility corridors, and heat islands with an extensive tree canopy area – potential pilot areas are the Ronat neighbourhood and Calea Șagului.
- Installing green roofs and green walls on buildings – most blocks of flats along the major transport arteries present flat rooftops on which gardens can be installed. Likewise, most major retailers in the city have large rooftops that can be redesigned with green roofs, e.g. Calea Sagului, Calea Buziasului industrial area, major retailers and companies such as Kaufland, Dedeman, Nokia and Continental.

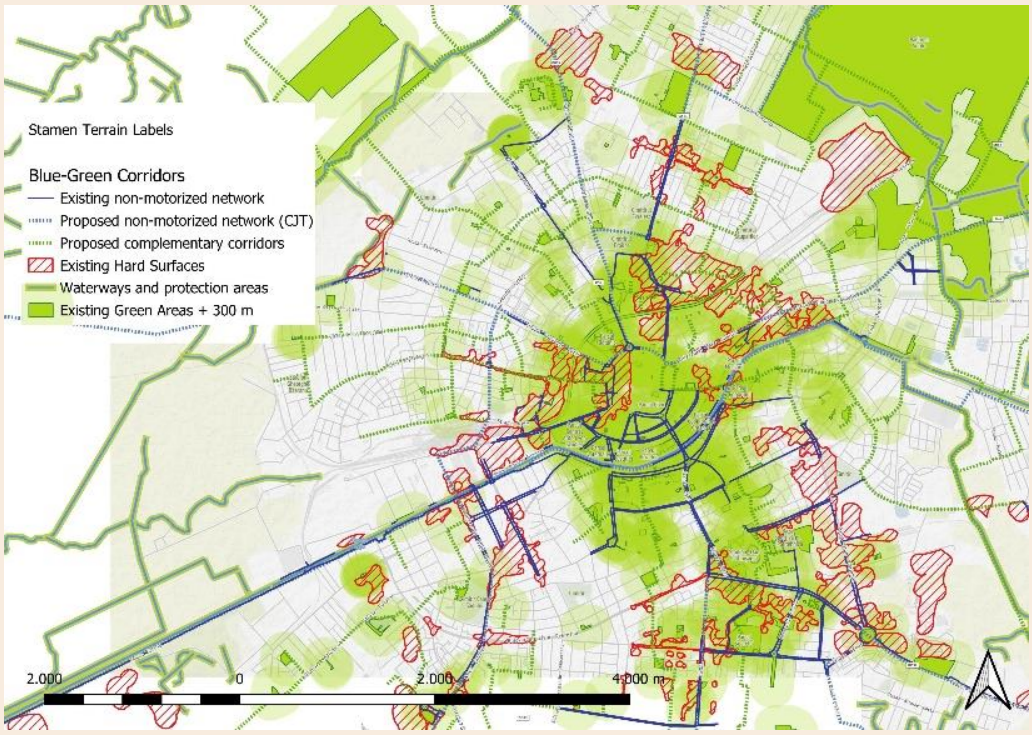


Figure 23 Existent green areas and non-motorized corridors together with a proposal for network expansion

The emergence of green roofs citywide will be promoted through an incentive scheme for citizens and companies. Compared with traditional roofs, green roofs have several benefits, including decreased energy costs with natural insulation, creating retreats for people and animals, improving air quality, and decreasing the urban heat island effect. Green roofing will be implemented on major hard surfaces such as supermarkets, commercial halls, hotels, blocks of flats, and even hospitals or schools.

The building stock retrofit programme should be correlated with green roof integration. Several big blocks of flats were built during the communist era using a similar building plan, indicating that a rehabilitation/green roofing installation could be implemented using the same technical and financial plans across those buildings, therefore accelerating the process and reducing costs. The following images present potential green roof implementations.

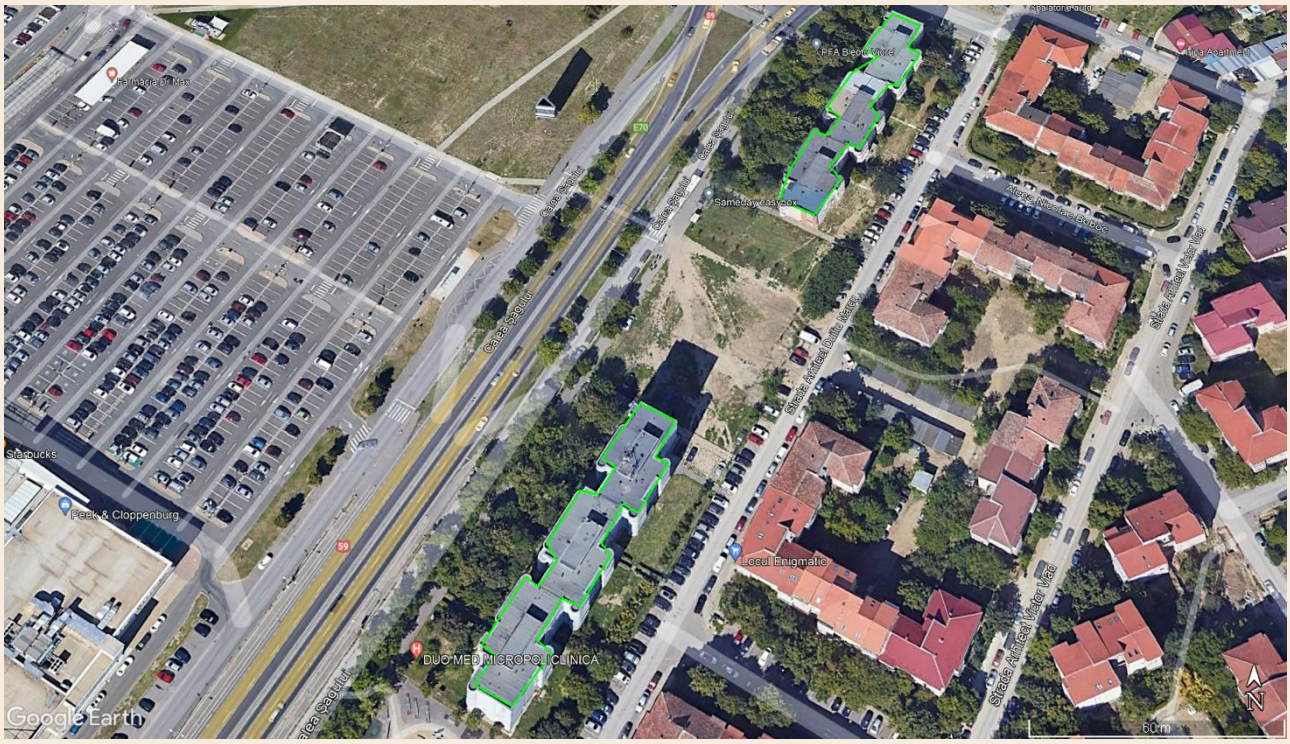


Figure 24 Similar blocks of flats on Șagului road, in the vicinity of a large retail centre - approx. 2,000 sqm available (Source: Google Earth)

Figure 25 Șagului road, near a busy street - approx. 1,200 sqm available (Source: Google Earth)

Figure 26 Șagului road - 6 similar buildings, some of which also need a deep retrofit, approx. 3,300 sqm (550 sqm/building) available (Source: Google Earth)

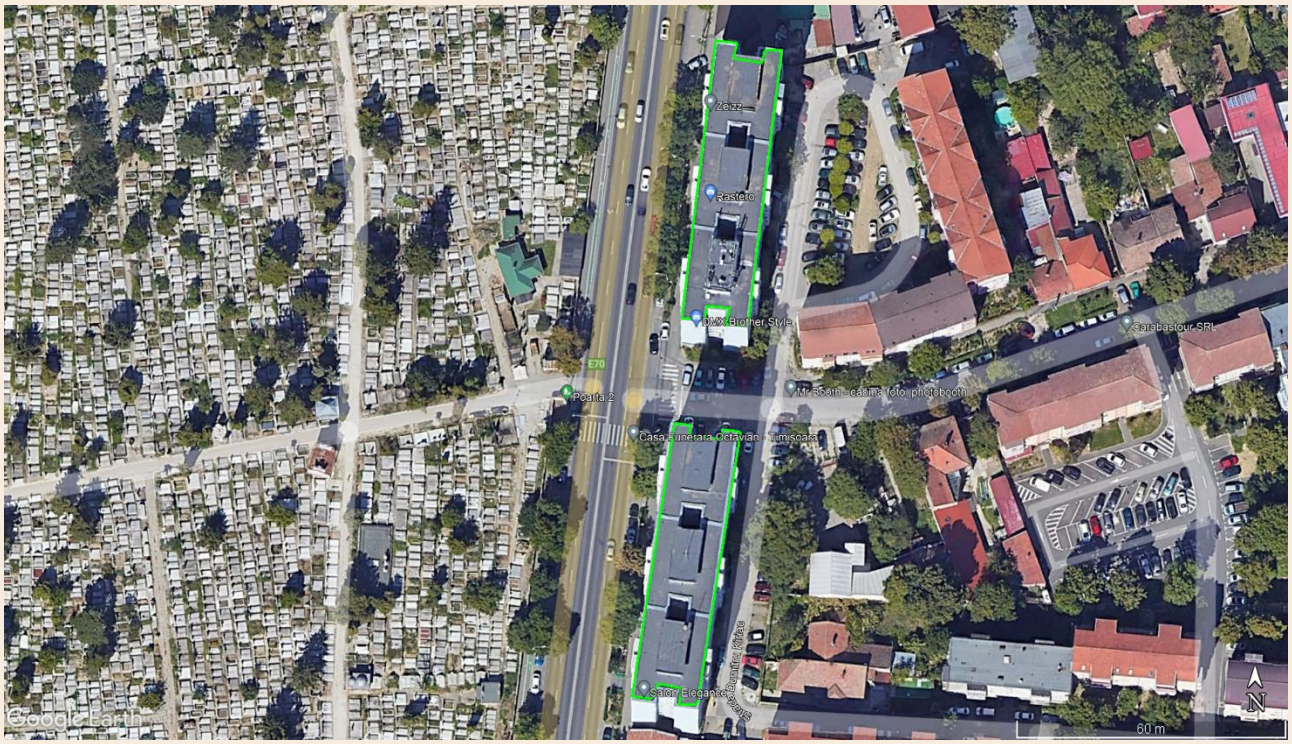


Figure 27 Șagului road, close to the cemetery, approx. 1,700 sqm available (Source: Google Earth)

The block of flats profile in the Circumvalatiunii neighbourhood also facilitates the adoption of green roofs. Large flat roofs with similar building profile were identified in the neighbourhood, thus facilitating easy and fast replicability.

Figure 28 Circumvalatiunii neighbourhood (Source: Google Earth)

Implementation steps

1. Identify and map heat island areas and micro-mobility corridors prone to thermal discomfort due to a lack of shading through a participatory process; define targeted actions for these areas. Identify and map buildings within heat islands along major hard/grey infrastructure that have large, flat rooftops.
2. Decide on the location of 5 to 10 pilot projects that should be done as a priority based on the mapping exercise and through the engagement of the citizens.
3. Implement pilot projects for **increasing green space** with the goal of reducing the heat island effect and thermal discomfort in the pilot areas of Ronat neighbourhood and Calea Șagului area and **rooftop greening** in Calea Șagului and Buziașului area (to be done in parallel with step 1 above).
4. Launch tender for urban redesign and implementation of green projects of up to 10 pilot locations and 50 buildings for green roof development. Communicate regularly to citizens and stakeholders during design and implementation.
5. Define, approve and enforce urban regulations and incentives for resilient construction and retrofitting to reduce heat island effects, prioritizing solutions such as shading, less paving, heat reflective materials, etc.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Mapping heat islands, micro-mobility corridors subject to thermal discomfort and infrastructure on major roads to identify greening needs	60,000	N/A
Define and implement pilot projects for shading and green rooftop installations	300,000	5,000
Design and implementation of up to 10 pilot projects	3,000,0000	25,000
Installing green rooftops on 50 buildings	1,250,0000	N/A
Enforcement of urban regulation for heat island reduction in construction and infrastructure development, with incentives	N/A	25,000

Source of financing

For greening streets, the local budget, National Government, Environmental Funds, IFIs, and crowdfunding are most relevant. Green roofs may be facilitated by the Municipality raising money through well-designed property taxes and development fees for subsidizing such green infrastructure.

Action 32
Integrating green and social infrastructure in new developments and the metropolitan area

Land Use

TYPE OF ACTION

Policy

ABSTRACT

Through this action, urban development regulations for new and modernized areas and the metropolitan area will be developed to include all the necessary infrastructure, thus reducing the need for daily cross-city commuting. The new climate-robust neighbourhoods will include social, cultural, economic infrastructure and blue-green elements for a high quality of life.

CHALLENGE/VULNERABILITY ADDRESSED

- Insufficient and discontinuous green spaces, which are under pressure as a result of climate change characterized by increasing average temperatures, heat waves, prolonged droughts, or other extreme weather events
- Insufficient development of the basic infrastructure for the quality of life in the metropolitan area (green areas, services, access to utilities)
- Lack of quality green areas within the neighbourhoods
- Reduced access to basic need amenities within the neighbourhoods creating the need for cross-city commuting

STRATEGIC OBJECTIVES

SO1 SO4 SO5

BENEFITS

- Increased health and general well-being of residents: physical exercise, less stress, and benefits with nearby green areas
- New developments and urban improvements realized in both poorer and richer neighbourhoods, avoiding eco-gentrification
- Less costly transportation investments over time due to equitable planning decisions (as pedestrian and cyclist infrastructure is cheaper)

TARGETS

- Access to quality green space at a maximum of 1,000 m distance for 100% of citizens
- Access to public transport at a maximum of 500 m distance for 100% of inhabitants in the metropolitan area
- All neighbourhoods connected to the city through micro-mobility
- Access to social infrastructure at walkable distance for 50% of the citizens

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2025	N/A	300,000 EUR

Context

Due to the evolution of built-up areas and economic development in the last decades, certain districts, newly developed areas and a number of the localities in the metropolitan areas are lagging behind in terms of quality of life. While the population of the city proper has decreased from 2011 to 2022 with over 50,000 people and currently stands at 250,000 residents, the villages in the metropolitan area have doubled or tripled their population.

Surrounding settlements, especially in the northern and northwestern part of the city, including Dumbrăvița, Giarmata, Ghiroda and Moșnița Nouă developed exponentially, but the availability of public infrastructure and amenities was not prioritized. The areas were developed in a car-friendly manner, with no sidewalks or green areas provided, while reaching day-to-day amenities and workplaces require long commuting times. Also, large areas in the western and northern parts of the city are still available for development.

Other areas identified in the Local Development Strategy such as the Kuncz neighbourhood, Dorobanților street, and some areas of the Traian, Matasilor and Fridorf districts are marginalized, as socially and economically vulnerable groups live there with limited access to amenities and green spaces. In general, in terms of access to urban green space in the city, large green areas are located along the Bega canal, as well as towards the historic neighbourhoods of Iosefin, Fabric and Elisabetin. However, in the northern area of the city access of the citizens to quality green space is limited.

This uneven development of the urban fabric in Timișoara and its metropolitan area puts pressure on the city due to the need for commuting from these neighbourhoods towards the centre.

Action description

The Municipality has invested and continues to prioritize investment in utilities and infrastructure in these areas which for one reason or other are less developed or less endowed. Investments in the Kuncz neighbourhood for example include public transport, road infrastructure, social and cultural facilities, and the development of green spaces.

The establishment of equal requirements in local zonal urban plans (ZUP) over all ATUs and the city can ensure similar quality-of-life standards across the whole metropolitan area. This can be done more easily in new developments and requires more effort in the already densely urbanized areas which may involve expropriations and demolitions.

The harmonious development will need concerted action in the metropolitan area to develop and update ZUPs along the following lines:

- City maximum distance rules have to be assessed and implemented aiming to ensure access to each type of facility including social, economic, public transport and other urban services, cultural facilities, green space and recreational amenities.
- Ensuring connection with green areas through blue-green corridors and micro-mobility; allocation of space for green and blue networks.
- Establishment of micro-mobility corridors.

- Developing a digital database and real-time data collection for urban planning in order to create a Digital Twin of the Timișoara metropolitan area

Other development aspects:

- Including and incentivizing shared amenities based on the "product as service" business model, i.e. car sharing, city bike network, etc.
- Including demand-side management aspects in planning related to transport and energy consumption (avoiding peaks).

The current action will be implemented in an area which will be defined during the mapping exercise, but it is expected to be in the northern outskirts of the city.

Implementation steps

1. Following consultations with the metropolitan ATUs establish the local regulation requirements that need to be captured in ZUPs; anchor these in the General Urban Plan as well. The process is best facilitated by a team of external and impartial urban development experts, with architects, landscape architects, biologists, and micro-mobility specialists in the team.
2. Map problem areas and identify priority areas for intervention with the aim of reducing eco-gentrification with a high impact in terms of the number of beneficiaries.
3. Enforce local regulations established in the ZUP and General Urban Plans.

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Mapping problem areas, selection of priority projects	300,000	N/A
Enforcement of local regulation on the integration of green and social infrastructure	N/A	24,000

Source of financing

Municipality budget, Regional Operational Programme of the EU, National Government, Environmental Fund, IFIs.

Action 33
Implementation of blue-green infrastructure for connecting Moșnita with Pădurea Verde

Land Use

TYPE OF ACTION

Investment

ABSTRACT

The existing water stream that stretches between Moșnița Nouă community and Pădurea Verde will be rehabilitated and will serve as a good practice example of functional blue-green infrastructure that brings benefits both for nature and the community. This action will focus on redesigning the existing water stream in order to maximize the ecosystem services it provides. The project is enriched by various elements such as micromobility pathways and parks, including an Agro-park.

CHALLENGE/VULNERABILITY ADDRESSED

- Insufficient and discontinuous green spaces, which are under pressure as a result of climate change causing increased average temperatures, heat waves, prolonged droughts or other extreme weather
- No continuous network of blue-green areas in the metropolitan area

STRATEGIC OBJECTIVES

SO1 SO4 SO5

BENEFITS

- Improved air quality in the city centre and reduced number of complaints related to air quality in this area
- Decreased CO_2 emissions due to a decrease in the use of private cars
- Improved quality of life and health due to a softer city centre

TARGETS

- 5 km of rivers/canals redesigned as blue-green corridor
- Blue-green infrastructure created along the rehabilitated area – bike and walking paths, urban furniture, bridges, etc.
- Agro-park of about 10 ha fully functional

TIMEFRAME

2024–2028

GHG SAVINGS / YEAR

7,017 tCO_2eq

CAPEX

8,650,000 EUR

Context

A good practice guideline for the development of blue-green corridors[6] is available in Timișoara since 2019. This guideline was prepared with the aim of having a tool which can be easily used by the local authorities in their efforts to define blue-green infrastructure investment opportunities both in Timișoara and the surrounding ATUs. The guideline includes the general and specific principles used when defining blue-green corridors and the ecosystem services provided by such areas. In order to enable implementation, the Municipality plans to approve it in the City Council and developed a pre-feasibility study for it.

Timișoara has a unique geographical setup with many drainage canals and other small water streams crossing the city, all of them having a high potential for becoming blue-green corridors. For example, the figure below presents a snapshot of the southeastern part of Timișoara where the water canal network can be easily noticed.

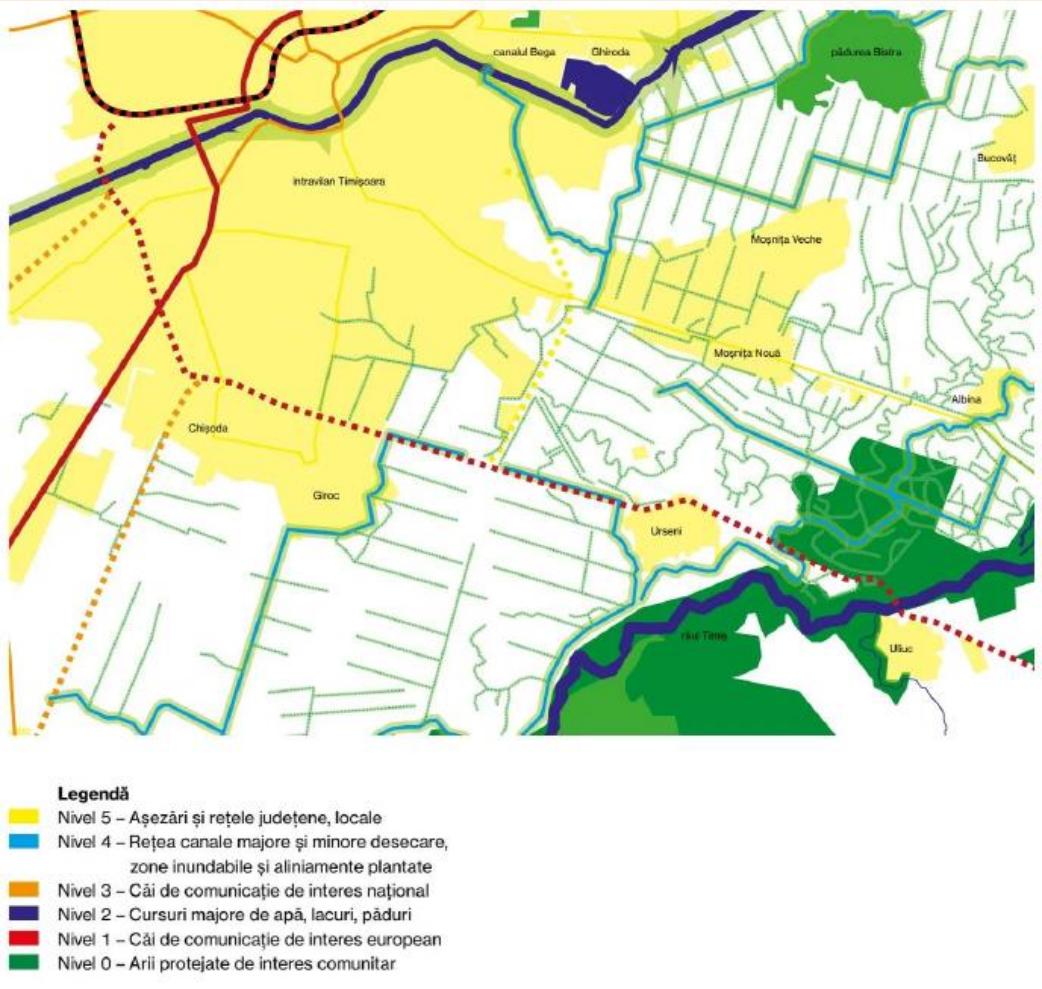


Figure 29 Timișoara - blue network

The water canals are currently under the management of the National Agency for Land Use, and are not properly maintained or used. Urban sprawl is impacting these water

[6] The guideline is available here: https://issuu.com/loredanagaita/docs/tmva_v2_issuu

canals, and the constructions are getting closer and closer to them, with some areas where construction works done very close to such canals.

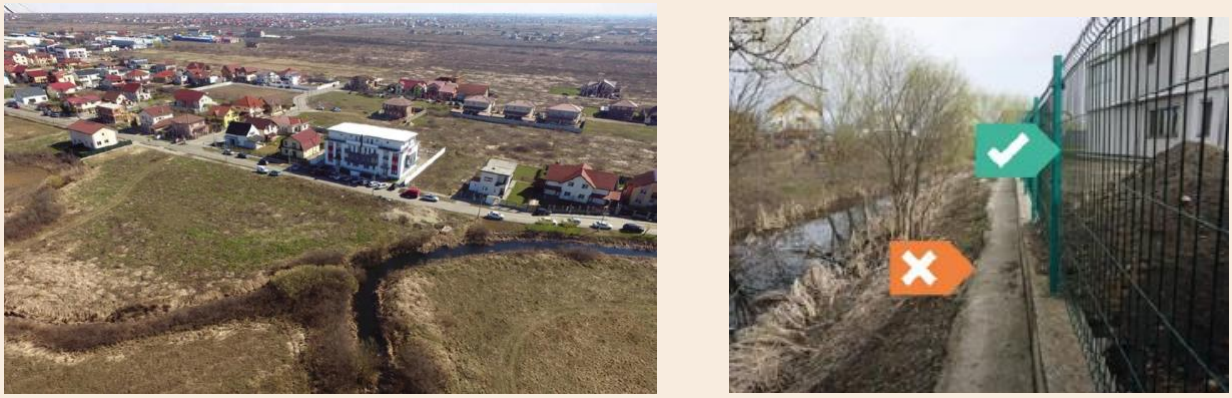


Figure 30 Example of water drainage canals in Timișoara

Action description

The Municipality will start the rehabilitation of one of the small water streams in Timișoara. The Behala water stream is situated in the eastern part of the city and connects Moșnița Nouă community with Pădurea Verde (largest green area of Timișoara). This stream crosses the Bega canal and stretches for approximately 7 km. It has a very high potential of becoming the secondary blue-green corridor of the city designed for the well-being of citizens and nature, beside the Bega canal which is the primary blue-green corridor of the city.

Figure 31 Behala River - proposal for rehabilitation[7]

The current action includes the following measures:

- Development of a pre-feasibility study on the transformation of the Behala water stream into a blue-green corridor. The document will elucidate the legal status of each land segment along the planned route of the blue-green corridor, the legal actions required to secure all possible areas to be integrated into the blue-green corridor, and the project types that can be implemented on the different land use categories. This study will rely on the principles set out in the referred Good Practices Guideline for Designing Ecological Corridors in Timișoara Growth Pole.

[7] Source: https://issuu.com/loredanagaita/docs/tmva_v2_issuu

- Rehabilitation of approximately 5 km of water stream area with the intention of transforming it into a blue-green corridor. This will have multi-functional purposes, such as leisure and water drainage, educational, cultural, and social. The rehabilitation works will include, but will not be limited to, cleaning up of water courses and riverbanks, planting trees or other vegetation specific to that area, and redesigning dikes that are currently improper.
- Construct bike and pedestrian paths along the rehabilitated areas. The bike lanes will be on both sides of the river, and one will be included in the high-speed bike lane network developed by Timișoara (see action 3 under Transport sector).
- Construct bridges and install other infrastructure for leisure, sports, social and cultural life, birdwatching, etc. (e.g. wooden suspended areas above the water stream, open-air amphitheatres, etc.).
- Develop the Agro-park as part of a network with multiple satellites in public property, such as the Dumbrăvița Lake, the Green Forest, the Zoo, the USVT fish farm, the USVT Young Naturalists Station and the park in Ciarda Roșie. Of the 10 ha land owned by the Municipality and located at the southern end the planned blue-green corridor (called Agro-park), create an urban gardening centre of 2 ha. This centre will be run by a specialized NGO, and will showcase climate smart urban agriculture practices, involve the wider community, produce healthy vegetables, allow for connecting to nature, reinforce the sense of belonging, and contribute to raising awareness on sustainable urban development pathways.
- Prepare materials and conduct awareness-raising campaigns to present the benefits of the blue-green corridor and the urban gardening centre for the city, nature, and community. Special events could be organized with representatives of educational institutions where students and pupils could come to observe the way a blue-green corridor functions.

Implementation steps

1. Prepare the pre-feasibility study for transforming the Behela water stream into a blue-green corridor.
2. Based on the outcomes of the pre-feasibility study, prepare the terms of reference for the established priority projects along the canal for the acquisition of construction works and equipment necessary for the development of Behala blue-green corridor.
3. Carry out the construction works, including the acquisition of seeds and saplings for planting and planting activities. This also includes bridges and installing other infrastructure for leisure, sports, social and cultural life, birdwatching, etc. (e.g. wooden suspended areas above the water stream, open-air amphitheatres, etc.).
4. Work on partnerships and defining projects further for segments of the channel owned by third parties.

5. Develop the Agro-park composed of 8 ha designated for a park and 2 ha designated for urban gardening on the Municipality owned plot of land situated near the Ciarda Roșie neighbourhood, at the southern end of the corridor. Designate an NGO to manage the urban gardening centre within the Agro-park.
6. Launch an awareness raising campaign for promoting the benefits of blue-green corridors.

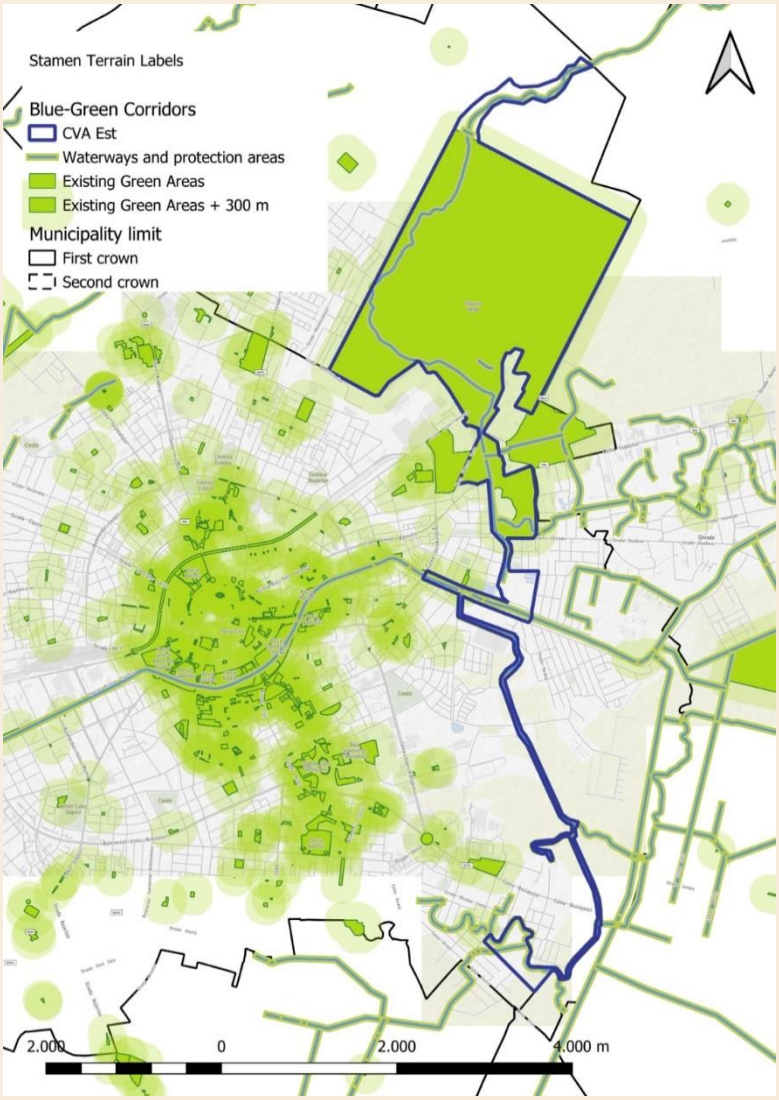


Figure 32 The area proposed to be transformed into a blue-green corridor

Estimated costs

Activity	CAPEX (EUR)	OPEX (EUR/Y)
Pre-feasibility study	150,000	N/A
Construction works	5,000,000	100,000
Bike and pedestrian paths	3,000,000	100,000
Establishment and development of the Agro-park, and of the urban gardening centre within	500,000	20,000

it (costs related to fencing, soil amendment, seeds and plants, equipment)		
Awareness-raising campaigns (1/year during project implementation)	N/A	20,000

Source of financing

The Municipality could raise money through well-designed property taxes and development fees for funding green infrastructure; National Government, Environmental Fund, IFIs, and crowdfunding.

Action 34
Developing the new Metropolitan Green Space Strategy

Land Use

TYPE OF ACTION

Policy

ABSTRACT

The new Metropolitan Green Space Strategy will be developed to maximize the multifunctional potential and benefits of these areas, for climate proofing against heat and extreme weather events, recreational areas, micro-mobility, and nature-based solutions for air, soil, and water contaminations. The new strategy will include the newly established ambitious green space requirements by the European Council on nature restoration, establishing no net loss in urban ecosystems unless the green spaces already constitute 45% of the city area.

CHALLENGE/VULNERABILITY ADDRESSED

- Outdated Green Space Strategy, written in 2009
- Insufficient and discontinuous green spaces, which are under pressure as a result of climate change characterized by increasing average temperatures, heat waves, prolonged droughts, or other extreme weather events
- No continuous network of blue-green spaces in the metropolitan area

STRATEGIC OBJECTIVES

SO1 SO4 SO5

BENEFITS

- Improved air, soil and water quality
- Improved recreational areas and space for micro-mobility with a positive health impact
- Nature-based solutions for climate proofing

TARGETS

- Metropolitan Green Space Strategy approved, including management plans

TIMEFRAME	GHG SAVINGS / YEAR	CAPEX
2024–2025	N/A	260,000 EUR

Context

The Green Space Strategy of Timișoara was developed in 2009, therefore it is outdated and is lacking mechanisms for implementation. The green spaces that are not registered are the first ones sacrificed for other needs, such as parking, mobility, or infrastructure development.

The Municipality is undertaking the census of green spaces and trees to be digitalized and included in the urban planning, this will serve as a good base for the development of the future strategy. The figure below presents the current status of the green spaces in the metropolitan area of Timișoara.

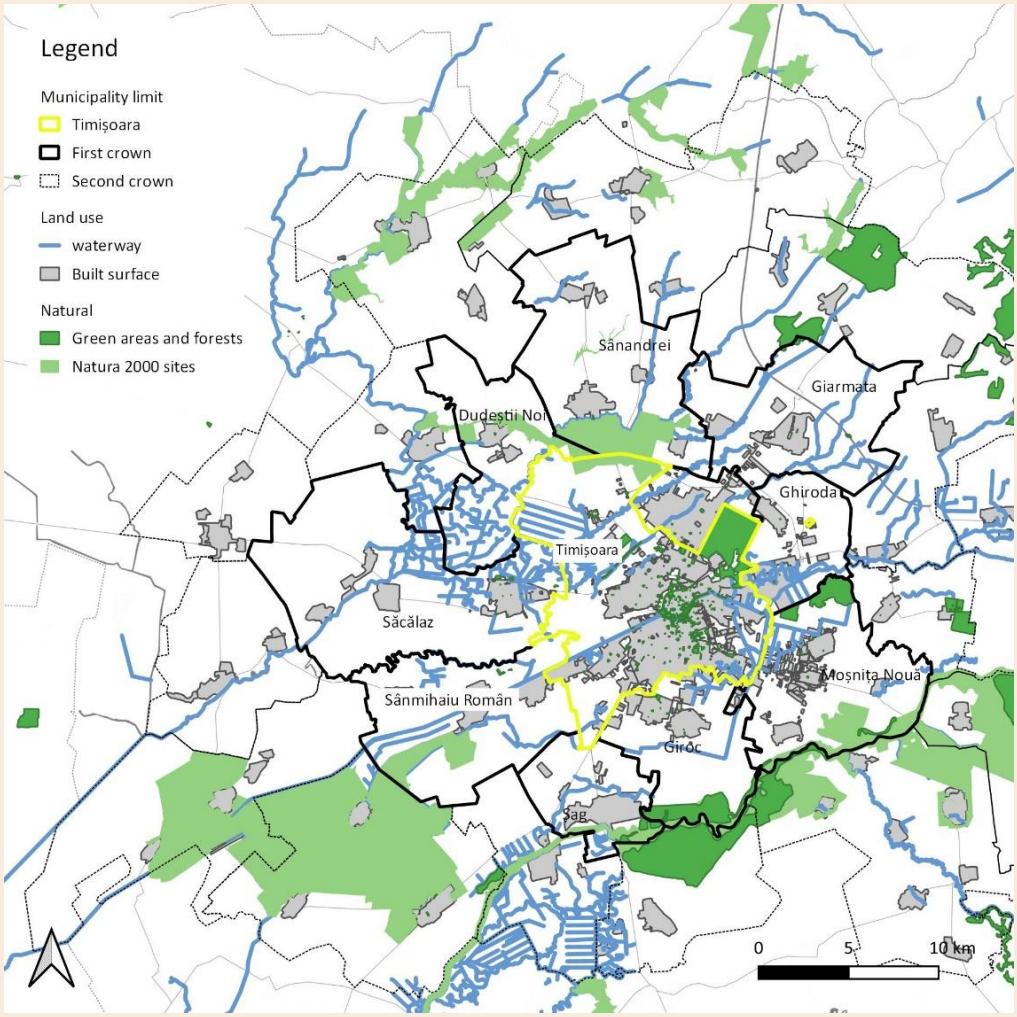


Figure 33 Green spaces in the metropolitan area of Timișoara

Timișoara, due to its geographical conditions and the Bega canal, has considerable green areas that are situated in the city centre and around the city but lacks such areas in the neighbourhoods. The green areas of Timișoara are connected to other green areas situated in the surrounding ATUs. Thus, there is a very high potential for the development of connected networks of green areas in the metropolitan zone of Timișoara.

Action description

The development of the new strategy will begin with an assessment of the existing policies, through which all the shortcomings in terms of international targets/regulation changes and enforcement should be identified and properly addressed.

Existing green spaces will be evaluated from the perspective of how to ensure multiple functions:

- Where can extra green bring a cooling effect? Where can it mitigate floods during rain events? (Findings from Actions 30 and 31 in this sector will be taken into account.)
- Where does it bring improved air and water quality?
- Is it sufficient and sufficiently connected to safeguard biodiversity?
- Are invasive plants or endemic species prioritized? The management needs and costs of the green areas will be considered in planning and greening will be selected having in mind cost-efficiency. Ornamental green is often maintenance intensive.
- Are sustainable ecological alternatives possible?
- What irrigation and maintenance needs are there?

Assessment of green areas will be done also in the metropolitan area, ensuring coherence, connectivity and creation of valuable recreational areas for Timișoara's citizens.

This translates into three measures:

1. Categorise the registered green areas by quality and functionality.
2. Analyse green space requirements from the point of view of multifunctionality.
3. Devise appropriate and ecological management of the blue-green infrastructure.

Ecological and cost-effective management extends the life of green spaces. Green area management includes the pruning of young trees along the roadside, maintenance of green verges, addressing issues with invasive species, and avoiding pesticides. This may be generated by a digital tool for green space management that is being planned together with the business community of Timișoara (see also Action 19 in the Industry sector). Such a tool would allow for planning, monitoring, improving efficiencies, and also the division of work.

Ecological management, such as minimal mowing of grass, will be a win-win for biodiversity and budget. Less mowing and aiming for nutrient-poor conditions allow for a more diverse setting of plants to develop. Less mowing also reduces the likelihood of the grass drying out, which requires less irrigation in summer.

Green as well as blue elements will be kept free from litter, e.g. by providing enough litter bins, organizing clean-up actions, and by general sensitization.

Implementation steps

1. Develop the Metropolitan Green Space Strategy, including the appropriate management plans for specific zones (forest, small green areas, blue-green infrastructure, etc.).
2. Develop an app for the maintenance and budgeting of green space in partnership with the business community.
3. Implement and monitor strategy through international best practice Key Performance Indicators (KPIs).
4. Raise awareness among the community of green space benefits, protection of nature and of urban biodiversity.

Estimated costs

Activity	CAPEX, EUR	OPEX, EUR
Metropolitan Green Space Strategy	250,000	N/A
App for green space management (in partnership with the business community)	5,000	N/A
Awareness raising materials	5,000	10,000

*maintenance of green spaces to be determined and budgeted later

Source of financing

Municipality's own budget, local business community for the app, Regional Operational Plan Cohesion Funds, EU financing for green strategy development for the Urban Agenda, National Government, Environmental Fund, IFIs.

Summary of GCAP actions and financial details

Total investment needs defined by the GCAP for the 2024–2028 period is estimated at the amount of EUR 782 million.

Transport

Most substantial investment is envisaged in the transport sector. The establishment of coherent public transport corridors is a major action, with integrated measures in renovation of public transport vehicles and trolleybus clamping net, development and modernization of regional public transport terminals and public transport interchanges and the bus stops, for which co-funding is planned through EBRD loan and National Recovery and Resilience Plan.

The National Program of Constructions of Public or Social interest[8] could be accessed for securing finance for the two other major actions in interventions and enlargement of inner circular roads 1 and 2 and for modernizing circular city road 4. Concessional finance from IFIs is an alternative option.

The extension and modernization of the cycling infrastructure can be financed by the Cycle Track Construction Programme of the Administration of the Environmental Fund.

Energy

The rehabilitation and upgrading of the district heating network is the most demanding measure with potential funding from the Modernization Fund. Alternative financing options are other national programmes or IFIs' concessional finance.

Flexible, high-efficiency and hydrogen-ready CHP is planned to replace existing coal-based energy plant, financing of which can be sought also from the Modernization Fund. The national industrial decarbonization strategy is expected to propose additional support schemes.

The Administration of the Environmental Fund, the National Energy Efficiency fund as well as soft loans are potential sources for funding of smart and efficient large scale public lighting programme and for installing electric vehicle charging stations.

Buildings

The financing of deep energy retrofit of blocks of flats is the major investment planned for the sector to be implemented through National Recovery and Resilience Plan (Renovation wave – Moderate or deep energy renovation of multi-family residential buildings[9]). Retrofitting of public buildings coupled with the modernization of heating and hot water systems and small-scale renewable energy is also implementable through the National

[8] https://www.adrnordest.ro/wp-content/uploads/2023/07/catalog_surse_finantare_nr_34.pdf, subprogram "Roads of local interest and roads of county interest"
[9] Valul renovării – Renovarea energetică moderată sau aprofundată a clădirilor rezidențiale multifamiliale

Recovery and Resilience Plan. Services offered by specialized companies in the field (ESCO) through long-term energy performance contracts could contribute to accelerating the rate of renovation and energy efficiency of public and private buildings.

The New European Bauhaus and nZEB building Pilot Projects action incorporates the creation of a centre for arts, technology and innovation, MultipleXity, which is the winner project in the contest for solutions organized by the Municipality and the Romanian Order of Architects due to its potential to fully demonstrate NEB principles, and co-creation of the NEB demonstrator concept for the Round Block, including building functions as a community hub for innovation and seeking financing solutions.

National Recovery and Resilience Plan (PNRR) or Environmental Fund Administration could be approached for funding of heat pumps and solar heating programme.

The One-stop-shop for building retrofit, including local financing facility for energy efficiency and renewable energy measures may be financed by Zero Carbon Cities, European Urban Initiative, URBACT or from the Municipality's own budget.

Industry

Private funding, URBACT program, as well as municipal budget may provide funds for the implementation of actions in the industry sector.

Water

Rehabilitation and expansion of water and wastewater networks is the major action within the water sector. EU funds provided via the Operational Program for Sustainable Development (PODD) 2021-2027 and IFIs' concessional finance are considered as main financing sources for the implementation of actions in the water sector.

City climate resilience and flood protection measures may by co-financed by municipal budget and private investors, promoting public-private partnerships.

Waste

Financing for the construction of the anaerobic digestion plant is to be sought through the Operational Programme for Sustainable Development (PODD) 2021-2027.

Other actions in improved waste management require relatively small investments that can be financed by the private sector and/or by the municipal budget.

Land use

Municipal budget and crowdfunding are most relevant for financing development of green infrastructure. Green roofs may be facilitated by municipal property taxes / development fees.

Conclusion

There are substantial funds that can be accessed through EU funded programmes, while co-funding may be secured through national and IFI's concessional loans.

Opportunities to secure finance for GCAP actions are many, including green bonds, power purchase agreements and EBRD Corporate Climate Governance Facility.

The City's additional borrowing capacity may be utilised if needed. Average annual own municipal revenues are of the amount of 188 million EUR and anticipated annual debt repayments of 5-10 million EUR for the period 2024-2027, represent up to 5% of own revenue, while the ceiling for municipal indebtedness is 30%, according to Art. 63 of Law 273/2006 on public finance.

Sector	No	Title	P and /or I*	CAPEX [EUR]	OPEX / Y [EUR]	TIMEFRAME				
						2024	2025	2026	2027	2028
Transport	1	Transforming the inner-city circular roads 1 and 2 into multimodal smart transport corridors	I	53,000,000	10,000	2,000,000	5,000,000	10,000,000	15,000,000	21,000,000
	2	Updating the Sustainable Urban Mobility Plan (SUMP) and strengthening institutions	P	500,000		250,000	250,000			
	3	Extending and modernizing the cycling infrastructure in Timișoara	I	12,700,000	120,000	200,000	2,700,000	3,000,000	3,000,000	3,800,000
	4	Establishing coherent public transport corridors	I	178,300,000	10,199,000	35,000,000	35,000,000	35,000,000	35,000,000	38,300,000
	5	Expanding and improving pedestrian areas	P&I	8,230,000	122,500	10,000	2,150,000	3,000,000	3,000,000	
	6	Modernizing the circular city road 4 and resolving conflicts with radial roads	I	80,000,000	1,000,000	10,000,000	15,000,000	15,000,000	20,000,000	20,000,000
Energy	7	Smart and efficient, large-scale public lighting programme	I	8,250,000	122,500	20,000	2,500,000	2,500,000	3,230,000	
	8	Rehabilitating and modernizing the District Heating (DH) network	I	80,000,000	2,250,000	5,000,000	15,000,000	20,000,000	20,000,000	20,000,000
	9	Flexible, high-efficiency and hydrogen-ready CHP	I	69,500,000	3,500,000	2,000,000	10,000,000	20,000,000	20,000,000	17,500,000
	10	In-depth energy efficiency awareness-raising programme	P	250,000	40,000	250,000				
	11	Installing electric vehicle charging stations enabled through smart grid upgrades	I	8,425,000	200,000	100,000	2,325,000	2,000,000	2,000,000	2,000,000
Buildings	12	Improving One-stop-shop for building retrofit v2.0. including local financing facility for energy efficiency and renewable energy measures	P	450,000	120,000	150,000	75,000	75,000	75,000	75,000
	13	Implementing deep energy retrofit of block of flats	I	75,000,000		15,000,000	15,000,000	15,000,000	15,000,000	15,000,000
	14	Implementing EE and small-scale RES programme for non-historic public buildings and facilities	I	15,615,000	150,000	615,000	3,000,000	4,500,000	4,500,000	3,000,000
	15	Implementing New European Bauhaus and nZEB building Pilot Projects	I	35,050,000	35,000	9,550,000	14,000,000	11,500,000		
	16	Establishing renewable energy communities to reduce energy poverty	P&I	360,000		360,000				
	17	Heat pumps and solar heating programme for residential buildings in areas not connected to DH	P&I	3,550,000	5,000	250,000	1,100,000	1,100,000	1,100,000	
Industry	18	Developing logistics hubs to optimize freight and traffic flows in and around the city	P&I	2,210,000	65,000	60,000	600,000	600,000	600,000	350,000

Sector	No	Title	P and /or I*	CAPEX [EUR]	OPEX / Y [EUR]	TIMEFRAME				
						2024	2025	2026	2027	2028
	19	Creating and running a platform for partnerships in green urban innovation	P	700,000	10,000		50,000	300,000	300,000	50,000
	20	Enhancing the air quality monitoring network, especially in the proximity of industrial sites	P&I	300,000	6,000	60,000	60,000	60,000	60,000	60,000
Water	21	Continuing the rehabilitation and maintenance of drinking water and sewage network with a focus on the Metropolitan area	I	36,500,000	365,000	500,000	16,000,000	20,000,000		
	22	Water circularity	P&I	31,950,000	100,000	5,450,000	6,150,000	6,450,000	7,450,000	6,450,000
	23	Streamlining sponge city solutions into city-wide planning for climate resilience and flood protection	P&I	10,270,000	105,000	270,000	2,000,000	2,000,000	3,000,000	3,000,000
Waste	24	Piloting pay-as-you-throw systems	P&I	520,000	30,000	260,000	260,000			
	25	Feasibility Study for the establishment of a biowaste management system	P	300,000		300,000				
	26	Developing green waste composting in Timișoara	I	1,470,000	50,000		735,000	735,000		
	27	Establishing an anaerobic digestion plant	I	48,800,000	500,000	12,200,000	12,200,000	24,400,000		
	28	Developing a recycling plant for construction and demolition waste	I	2,665,000	205,000	1,000,000	1,665,000			
	29	Boosting circularity in the region by attracting recycling companies	P	90,000	5,000	50,000	20,000	20,000		
Land use	30	Converting hard surfaces into green areas for improved drainage	I	3,050,000	25,000	550,000	500,000	500,000	500,000	1,000,000
	31	Establishing green urban spaces to address localized heat island effect	P&I	4,610,000	55,000	60,000	950,000	800,000	800,000	2,000,000
	32	Integrating green and social infrastructure in new developments and the metropolitan area	P&I	300,000	24,000		300,000			
	33	Implementation of blue-green infrastructure for connecting Moșnita with Pădurea Verde	I	8,650,000	240,000	1,000,000	1,000,000	150,000	3,500,000	3,000,000
	34	Developing the new Metropolitan Green Space Strategy	P	260,000	10,000	260,000				
		TOTAL		**781,725,500**	**19,956,500**	**102,755,000**	**165,590,000**	**198,690,000**	**158,105,000**	**156,585,000**

**P and/or I: Policy and/or Investment*

Monitoring framework, evaluation and reporting

3

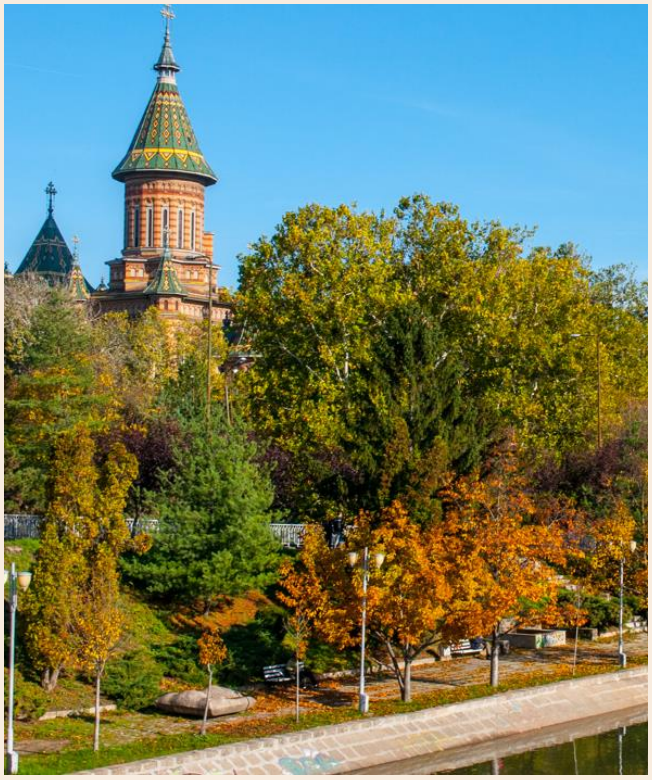
Monitoring framework

Monitoring and evaluation of GCAP implementation is designed to understand and assess the results and outcomes of implementing the plan. It aims to identify the most effective actions and inform the implementation team on how to adjust the ones that are not producing enough results. The main purpose is to measure the impact GCAP actions on the quality of environmental factors in Timișoara. Also, it measures the progress toward achieving the established targets for each action. Thus, both progress and impact of implementation will be monitored.

For ease of use, the monitoring framework is designed in an MS Office Excel file and detailed in Annex 1. The framework includes three main parts:

- The first part consisting of one spreadsheet illustrated below presents overarching indicators that are aligned and relate to our vision and targets for GCAP implementation. The main indicators reflecting the progressive implementation of the GCAP are represented by the number of GCAP actions/measures initiated (per different stages - feasibility studies developed, tendering process completed, ready for implementation, under implementation, completed) and an assessment of the updated database with state and pressure indicators - see the third part of the monitoring framework.
- The second part consists of seven separate spreadsheets, referring to actions per GCAP sectors and steps to be implemented. If the implementation process starts for one action/measure, we will use the supplementary indicators included in the spreadsheets designed for every GCAP sector. All the indicators will enable us to understand the progress and impact of each action/measure. For each indicator, we have defined the format and measurement unit in which the data should be collected and processed, referred to the timeframe for accomplishment of related targets and/or defined frequency for data collection.
- The third part, consisting of one spreadsheet, refers to environmental indicators that have to be monitored during GCAP implementation. These include the state and pressure indicators, helping the implementation team to observe the progress towards improving the environmental conditions in the city as compared with the baseline dataset that we have collected while developing the GCAP.

A total number of 145 indicators have been defined to monitor the GCAP vision and the 5 strategic objectives. The overarching indicators refer to all strategic objectives due to the synergy between the vision, strategic objectives and actions defined within this GCAP. Additionally, 91 environmental indicators were established to monitor the overall environmental performance of the city and corelate it with the GCAP development.



1 vision

5 strategic objectives

34 actions

91 environmental indicators

145 GCAP actions indicators

The Monitoring Framework for GCAP implementation is a dynamic tool and allows tracking down the progress in the implementation of each action and corresponding measures. An example of the monitoring of the first action from the GCAP is presented in the figure below.

Transport				Values							Additional Information	
No.	Action	Monitored indicators	Measurement unit	GCAP reference values	GCAP objectives	Achievements – 2024	Achievements – 2025	Achievements – 2026	Achievements – 2027	Achievements – 2028	Important aspects	Total EUR invested in the period 2024-2028 in Mil. EUR
1	Transforming the inner-city circular roads 1 and 2 into multimodal smart transport corridors	km of road constructed/redesigned for RR2	km/year		1.62 km construction 0.54 km redesigned						The action is not being implemented.	
		km of road redesigned for RR1	km/year									
		Traffic volume in the city centre	#cars/hour		20% decrease							
		Public transport usage in the city centre	#commuters in the centre/year		15% increase							
		Electric Vehicle charging stations	#stations/year		10							
		Traffic Management System	qualitative assessment		functional by 2028							
		Low emission zones established	#of LEZs									

Figure 34 Monitoring indicators for the first GCAP Action

Evaluation and reporting

Within the Municipality, GCAP implementation will be closely supervised and evaluated by a Steering Committee (SC), while the daily monitoring and evaluation activities will be under the direct responsibility of the Project Implementation Unit (PIU).

The PIU will compile all the data received from sectoral departments and will produce an annual progress report for the GCAP implementation period.

The monitoring and evaluation of the GCAP implementation process require well trained and skilled staff. The PIU team will benefit from trainings and technical support during the first monitoring exercise.

Additionally, two types of audits are foreseen during the first 5-year period of GCAP implementation:

- Internal audits – yearly, based on internal procedures. These will focus on understanding whether the internal procedures have been properly followed and if the specific established targets at the level of the Municipality have been reached.
- Third-party audits – once in 5 years. These will focus on conducting a full assessment of the GCAP implementation process, taking into consideration all elements, such as technical and financial aspects, respectively the use of resources.

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GREEN CITY ACTION PLAN
TIMIȘOARA