Developed within M100 HUB

CLIMATE CITY CONTRACT

M100
Mirror Mission
Cities Hub Romania

Inspired by the EU Mission for Climate-Neutral and Smart Cities
Aligned with the NetZeroCities approach

2035

CLIMATE CITY CONTRACT

BUCHAREST MUNICIPALITY

DISCLAIMER

This document, which was developed through the Mirror Mission Cities Hub Romania, draws inspiration, both in its structure and content, from the methodology developed by the European Commission for elaborating the documents pertaining to the Climate City Contracts (the Climate Neutrality Action Plan, Investment Plan and Commitments) for the 112 cities which officially participate in the EU Mission for Climate-Neutral and Smart Cities. By aligning the M100 Climate City Contract with the model set forth by the European Commission, we aim to ensure that this document is in line with European strategic priorities and directives regarding the transition towards climate neutrality.

CONTENT

ACRONYMS

AFOLU (Agricultural, Forestry, and Land Use)
BWMP (Bucharest Waste Management Plan)
BMAIDA (Bucharest Metropolitan Area Intercommunity Development Association)
CCC (Climate City Contract)
CCO (Chief Climate Officer)
CNAP (Climate Neutrality Action Plan)
CSDP (County Spatial Development Plan)
CO_2 (Carbon)
EEA Grants (Iceland, Liechtenstein and Norway Grants)
e.g. (For example)
GEI (Google Environmental Insights)
PUG - General Urban Plan
EU (European Union)
EUI (European Urban Initiative)
GCAL (Gigacalorie)
GCAP (Green City Action Plan)
GHG (Greenhouse Gas)
IDA (Intercommunity Development Association)
IE (That is)
IPPC (Intergovernmental Panel on Climate Change)
IPPU (Industrial Process and Product Use)
IUDS (Integrated Urban Development Strategy)
JRC (Joint Research Centre)
LMS
MWh (Megawatt-hour)
NBS – nature based solutions
NDUI
NP (National Programme)
NUTS2
OP (Operational Programme)
RP (Regional Programme)
RDA (Regional Development Agency)
SACET – Integrated Centrilised Thermal Energy Supply system
SEAP (Sustainable Energy Action Plan)
SECAP (Sustainable Energy and Climate Action Plan)
T (Ton)
TOC (Theory of Change)

I. COMMITMENTS
FORMAL AMBITION

Globally, urban development and the associated process of urbanization are unfolding amidst significant planetary changes; over the past 50 years, the global urban population has quadrupled, coinciding with a 1.2°C rise in Earth's surface temperature (above the pre-industrial levels). This warming has been accompanied by an increase in the frequency of extreme weather events, as well as rising sea levels. Among the most significant adverse impacts of climate changes are the floodings, droughts and extreme heats (which are furtherly exacerbated by the urban heat island effect). These challenges extend beyond the economic repercussions, affecting public health, the overall quality of life and the well-being of the environmental systems.

The urban polluting emissions worldwide continue to rise, underscoring the critical role that the cities can play, by partering with their communities and stakeholders, in driving the transformative change needed for effective climate change mitigation.

At the European level, cities, despite occupying only 4% of the EU's land area, are home to three-quarters of its population and contribute to over 70% of the CO_2 emissions, which furtherly exacerbate and intensify the negative effects of climate change. Overall, the rapid urban growth and the emissions generated by human activities heighten the vulnerability to the climate change impacts, such as the extreme heat; this exposure is further amplified by factors such as the dark urban surfaces, the heat-retentive urban designs and the limited vegetation and emissions generated by human activities.

In this context, whether at the global, European, or national level, cities have both the greatest need and the strongest capacity to address climate change.

Accordingly, Bucharest, as the capital of Romania and a national leader in sustainable and innovative development, commits, through its Climate City Contract (CCC), to implementing climate mitigation actions, aiming to achieve climate neutrality by 2035. Both the Municipality and its 6 Districts are dedicated to implementing immediate measures to counteract the climate change, aiming to bring the local greenhouse GHG emissions close to net zero. The comprehensive CCC documentation reflects the Municipality's commitment to strategic, spatial and financial urban planning informed by climate considerations, as this integrated approach to urban development is essential for reducing the emissions across all scales, from the individual buildings and neighborhoods to the city and metropolitan levels.

Through the Climate Neutrality Action Plan (CNAP), Bucharest and its 6 Districts demonstrate a strong commitment to advancing a low-carbon and resilient urbanization, as a decisive step forward, where climate investments are no longer treated as a separate category, but are fully integrated into the urban development process across all the Districts, the Municipality as a whole and Bucharest's Metropolitan Area.

Beyond directly reducing the CO_2 emissions, Bucharest envisions these climate-focused investments as pivotal to transforming the city into a cleaner, smarter, healthier and more inclusive environment. In the medium and long term, the efforts towards climate neutrality aim to safeguard the property, public health and economic activity from climate-related risks, while delivering additional benefits to the community and stakeholders: lower energy costs for households and public services, reduced air pollution, enhanced health outcomes, improved quality of life and better operating conditions for the private sector.

The Climate City Contract represents the culmination of the collaborative efforts pursued by the General City Hall and the 6 District City Halls, working together to advance Bucharest's transformation into a smart and climate-neutral capital by 2035, within the framework of the M100 National Hub.

In 2024, Bucharest was selected as one of the 10 Romanian cities through the M100 Platform's call for Expressions of Interest, securing its position in the M100 Cohort, to further accelerate its path to climate neutrality. This milestone is also inspired by the achievements of District 2, which received the EU Mission for Climate-Neutral and Smart Cities Label.
Bucharest's ambition to reduce the CO_2 emissions is firmly rooted in the Municipality's 2021–2030 Integrated Urban Development Strategy (IUDS). This key strategic document, which is grounded in a thorough analysis of the local context, envisions Bucharest in 2050 as a competitive European capital with an international reputation as a regional economic and financial hub. The IUDS positions the city as the most attractive bridge between the European West and the East, celebrated for its diversity and dynamism in a clean, carbon-free environment. Its vision outlines a future city where the economic, social, and environmental challenges assign new responsibilities to all the urban stakeholders, which are engaged in transforming this vision into reality. The core elements of the IUDS seamlessly power the Climate Neutrality Action Plan, driving a bold and dynamic evolution, fueled by innovation and competitiveness—all while actively cutting the pollution, instead of adding to it. The CNAP champions a socially inclusive transition, which embodies the essence of climate justice.

The CNAP framework redefines the CO_2 reduction process as more than a technical task; it is a shared mission, a collective journey uniting everyone touched by Bucharest's transformation, from public institutions and businesses to NGOs and everyday citizens.

At the same time, the CNAP is seamlessly integrated with other key local strategies, such as the SUMP, SEAP and BWMP, drawing support from the most relevant local policies and programs. Another major source of inspiration for the CNAP is the Green City Action Plan (GCAP), developed with EBRD support. The GCAP is designed to guide the city in addressing its environmental challenges and enhancing its adaptation to climate change, thereby laying the groundwork for the CNAP. According to the GCAP, "by 2040, Bucharest will become a green and comfortable city to live in, with clean air and good public transport, alongside non-motorized transport infrastructure to allow travel in the day-to-day life, friendly with its inhabitants and visitors, caring for its most vulnerable citizens, with plenty of welcoming and vibrant public spaces, governed by all concerned administrative authorities working together in an integrated manner and in collaboration with the citizens, the private sector and the NGOs, using an expanded digital infrastructure and database system".

Building on the IUDS and GCAP foundation, the CNAP goes a step further, by outlining specific actions to reduce and capture the CO_2 emissions throughout the city.

The foundation of the Climate Neutrality Action Plan is built upon the CO_2 emissions inventory conducted for the base year 2021, which reveals a concerning state of greenhouse gas pollution.

In 2021, a total of 8.154.548,06 tons of CO_2 emissions (equivalent to 32.208.841,66 MWh/year of energy) were generated locally, distributed as follows: 54,79% from the buildings sector, 21,29% from transport, 19,55% from IPPU, 4,18% from waste and 0,19% from AFOLU.

In the buildings' sector, the largest share of CO_2 emissions is attributed to the residential buildings, which are followed by the tertiary buildings, with the public buildings contributing the smallest percentage. In the transport sector, the highest emissions are generated by private and commercial transport, followed by public transport, public lighting and municipal transport, in descending order of emission volume. In the waste sector, the largest contributions to emissions come from biological treatment and landfilling, followed in descending order by waste valorization/recycling, wastewater treatment, sorting and composting. In the IPPU sector, the majority of emissions are generated by the Centralized Thermal Energy Supply System. Lastly, in the AFOLU sector, the primary source of CO_2 emissions is related to the activities from parks and other green spaces, with emissions from crop and animal production following.

This situation demands swift and strategic, well-structured interventions, to be executed efficiently and systematically, through the simultaneous activation of multiple levers of change.

As such, by 2035 Bucharest aims to reduce the local carbon dioxide emissions by 80,24%, which translates to a reduction of 6.604.080,91 tons of CO_2.

The remaining emissions (1.611.127,20 tons) will be tackled in the short and medium term through carbon capture measures, in line with the CNAP's focus on green infrastructure and nature-based solutions. Looking ahead, long-term efforts will center on exploring and testing innovative solutions for addressing the residual emissions, including carbon storage technologies.

The Climate Neutrality Action Plan outlines 16 key actions, comprising 101 interventions across all the fields of action defined in the M100 CCC Methodology, in line with the framework developed by the EU Mission for Climate-Neutral and Smart Cities.

These actions focus on both reducing and capturing the CO_2 emissions by 2035, addressing hard investments (mobility and transport, built environment, waste and circular economy, green infrastructure and nature-based solutions), as well as soft measures (related to organizational, governance and social innovation).

The total investment required for the CCC's core actions is approximately 16 € billion.

However, implementing the Climate Neutrality Action Plan is far more than a commitment to reducing the CO_2 emissions, as its framework serves as a transformative blueprint for shaping a vibrant, sustainable and inclusive future for Bucharest's residents.
By tackling the climate-related challenges holistically, the CNAP will also generate a range of interconnected co-benefits, which will drive economic growth, enhance the quality of life in an inclusive manner and ensure environmental resilience.

With cleaner air, reduced noise pollution and enhanced public safety, the local community will enjoy improved health, expanded recreational opportunities and an overall enhanced quality of life. The streamlined and less polluting transport systems will also deliver smoother traffic flows, fewer accidents and faster connections between key city hubs, ensuring more efficient, sustainable and accessible mobility. The urban aesthetics will be transformed through revitalized, greener public spaces and buildings which will combine the modern, visually appealing facades with advanced energy efficiency. At the same time, the proposed actions will carefully cater for the preservation and sustainable use of natural ecosystems, acknowledging their role in enhancing the urban well-being and supporting the climate change mitigation and adaptation efforts.
The Climate Neutrality Action Plan will also generate significant economic advantages, including reduced mobility and utility costs for households and businesses and increased tax revenues and savings in the public spending. It will also stimulate job creation, foster entrepreneurial opportunities and attract private investment to support new projects.
The Climate Neutrality Action Plan will also champion community empowerment, stakeholder participation and climate justice, by actively engaging the local entities, fostering civic innovation and advancing social inclusion for the disadvantaged communities (including the efforts to combat energy poverty).
The local and metropolitan governance will be significantly improved through the strengthened cooperation between the General City Hall, the 6 Districts and the Local Administrative Units of the metropolitan area. The Climate Neutrality Action Plan will also consolidate the overall administrative capacity, by fostering greater transparency, advancing the digital transformation and the absorption of smart city solutions and enhancing the institutional visibility on both the national and international levels. All of these advancements will ensure the delivery of higher-quality public services and foster a more supportive and efficient working environment for the public staff.

Figure 1. Climate neutrality actions

GUIDING PRINCIPLES

The Climate Neutrality Action Plan for Bucharest has been developed as a comprehensive response to the city's climate challenges and strategic vision for achieving neutrality by 2035. The guiding principles behind its design and implementation reflect the city's commitment to accountability, inclusivity and innovation, ensuring a robust and adaptive approach to addressing climate change. By adhering to these principles, Bucharest's CNAP provides a solid foundation for achieving its ambitious climate neutrality goals, ensuring sustainable urban development while addressing the pressing environmental, social, and economic challenges faced by the city.

Design Principles

1. **Alignment with Existing Strategies**: The CNAP aligns with Bucharest's Integrated Urban Development Strategy (IUDS) and relevant European and national frameworks. This ensures coherence with existing policy and leverages previous work to create a unified pathway toward climate neutrality.
2. **Systemic and Theory-of-Change Approach**: The CNAP incorporates a systemic perspective, understanding that climate neutrality requires interconnected solutions. Using a Theory of Change (ToC) framework, the plan organizes interventions into "Impact Pathways" that activate systemic levers, providing clarity on their contributions to the broader goals of net-zero emissions.
3. **Stakeholder Engagement and Co-Creation**: A participatory approach involving public administration, private entities, civil society, and residents was integral to the CNAP's design. This co-creation process ensures that the plan reflects diverse perspectives and fosters buy-in from all stakeholders.
4. **Measurable, Reportable, and Verifiable Actions**: Establishing a greenhouse gas (GHG) emissions baseline allowed for targeted and measurable interventions. Each action is developed with detailed technical and financial specifications to ensure effective implementation and monitoring.

Implementation and Monitoring Principles

1. **Accountability and transparency**: The CNAP emphasizes a transparent implementation process. Regular monitoring reports and updates will be publicly available to ensure accountability to all stakeholders.
2. **Innovation and adaptability**: Recognizing the dynamic nature of climate challenges, the CNAP fosters innovation by encouraging the adoption of new technologies and methodologies. The plan also incorporates a flexible framework for integrating emerging opportunities and interventions.
3. **Demand-driven and inclusive actions**: The plan prioritizes interventions that directly address the needs of Bucharest's residents and communities, ensuring equitable access to the benefits of climate action.
4. **Rigorous monitoring and evaluation**: The CNAP establishes a comprehensive monitoring framework based on indicators proposed by the European Commission. A digital dashboard and periodic updates will track progress, facilitating evidence-based decision-making and iterative improvements.
5. **Multi-actor collaboration**: Implementation involves strong governance through collaboration between the General City Hall, District City Halls and the Climate Neutrality Division. Partnerships with local stakeholders, businesses, and international entities will further support effective execution.
6. **Collaborative Learning**: Continuous learning opportunities, including capacity-building programs and knowledge exchange with other cities, will enhance the expertise of public administrators and stakeholders, driving long-term success.

SIGNATORIES

We, the undersigned, pledge to actively support Bucharest Municipality's and all its Districts' climate neutrality goals by 2035, as outlined in this Climate Neutrality Action Plan. We commit to collaborative efforts aimed at substantial greenhouse gas emission reductions and fostering systemic change, in line with the objectives set forth in this document.

INSTITUTION	SECTOR	REPRESENTATIVE	POSITION	SIGNATURE DATE
BUCHAREST CITY HALL	public administration	Nicuşor DAN	General Mayor	2024
DISTRICT 1 CITY HALL	public administration	Clotilde-Marie Brigitte ARMAND	Mayor	2024
DISTRICT 3 CITY HALL	public administration	Robert Sorin NEGOIȚĂ	Mayor	2024
DISTRICT 4 CITY HALL	public administration	Daniel BĂLUȚĂ	Mayor	2024
DISTRICT 5 CITY HALL	public administration	Cristian Victor POPESCU PIEDONE	Mayor	2024
DISTRICT 6 CITY HALL	public administration	Ciprian CIUCU	Mayor	2024
Intercommunity Development Association Bucharest Metropolitan area - ADI ZMB	associative structure of local public authorities - NGO	Gianina PANATAU	General Manager	2025
Bucharest-Ilfov Regional Development Agency - ADR Bucharest-Ilfov	public utility NGO / managing authority	Dan NICULA	General Manager	2025
Străzi pentru Oameni Associations	NGO	Teodora ȘTEFAN	President	2025
Bucharest Community Foundation	NGO	Alina KASPRVSCHI	President	2025
UrbanizeHub Association	NGO	Grațian MIHĂILESCU	President	2025
Nomad Multisport Asociation	NGO	Daniel SARDAN	President	2025
Bucharest Natural Park Association	NGO	Dan BĂRBULESCU	General Manager	205
Business Development Group SRL	Private company	Ciprian NANU	General Manager	2025
Climatosfera Association	NGO	Charles BERVILLE	President	2025
Reper 21 Association	NGO	Ana-Maria PĂLĂDUȘ	President	2025
Association for Sustainable Development Ecopolis	NGO	Oana NENECIU	President	2025
Ecoteca Association	NGO	Raul POP	President	2025

II. ACTIONS
INTRODUCTION

The Climate Neutrality Action Plan (CNAP) for Bucharest is developed in response to the multifaceted challenges and opportunities faced by the city, aligning with its strategic commitment to achieving climate neutrality by 2035. As the capital of Romania and a pivotal urban hub within the European Union, Bucharest plays a critical role in advancing sustainable urban development and addressing climate-related issues. This document is framed within the context of Bucharest's Integrated Urban Development Strategy (SIDU), the Green City Action Plan (GCAP), and relevant European and national frameworks for urban climate action, drawing inspiration from the European Commission's methodology for Climate City Contracts under the EU Mission for Climate-Neutral and Smart Cities.
Bucharest spans 240 km^2 and serves as the economic, cultural, and administrative nucleus of Romania. It is part of the Bucharest-Ilfov development region, which includes over 2.2 million inhabitants, with significant daily transit contributing to a broader metropolitan population of approximately 3 million. The city's rapid urbanization and industrial growth have brought about challenges related to greenhouse gas (GHG) emissions, air quality, waste management, and transportation.

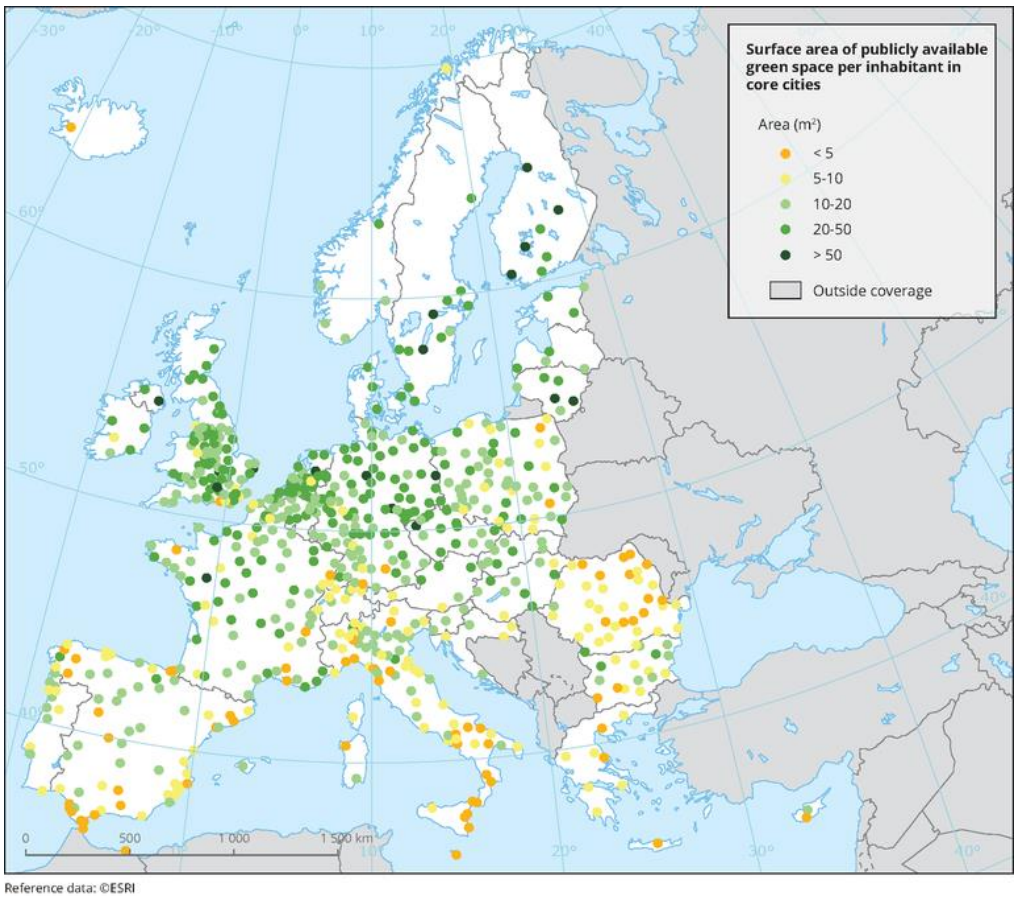
SOCIO-ECONOMIC DEVELOPMENT FACTORS

Bucharest, the capital of Romania, is the country's largest city and its primary growth engine and economic hub. With a population of over 2 million residents, Bucharest generates approximately 25% of Romania's GDP. In recent years, the economic growth of the city has been on a significant upward trend. Bucharest, together with Ilfov County, forms the most developed region in Romania, known as the Bucharest-Ilfov Region (NUTS 2). This region ranks 25th among the European Union regions in terms of GDP per capita (PPS), reaching 145% of the EU-28 average in 2017.
Bucharest boasts a diverse economy with significant contributions from sectors such as services, industry, IT and commerce. However, the city also faces challenges related to income disparity and infrastructure deficits, exacerbated by inefficient investments over the past decades. Moreover, rapid urban growth and economic activities have also led to increased environmental strain, particularly in terms of air quality and urban infrastructure, thus highlighting the necessity of prioritizing green infrastructure, sustainable mobility and energy efficiency as part of an integrated urban strategy.

ENVIRONMENTAL CONDITIONS

Bucharest faces several environmental challenges, including high levels of air pollution, traffic congestion, and inadequate waste management. The city's geographical location, coupled with its dense urban fabric, exacerbates these issues. Seasonal variations also impact the city's environmental conditions, with winter smog episodes and summer heatwaves becoming more frequent.
Bucharest offers less than 10 sqm of green space per resident, significantly below the European Union's recommendation of at least 26 sqm and the World Health Organization's ideal of 50 sqm. In contrast, Vienna had 120 sqm per resident in 2012, Helsinki 100, and Stockholm 86. The Figure below shows the map of the green spaces per capita across European cities.
The lack of green spaces in Bucharest further constrain the city's ability to mitigate urban heat island effects and provide recreational areas for residents.

Figure 2. Surface area of publicly accessible green space per inhabitant in Europe



Source : https://www.eea.europa.eu/en/analysis/maps-and-charts/surface-area-of-publicly-accessible

CLIMATE CONSIDERATIONS

Climate change poses a significant risk to Bucharest, necessitating proactive measures to enhance the city's resilience. Rising temperatures, increased frequency of extreme weather events, and shifting precipitation patterns are some of the anticipated impacts.

Bucharest's temperate continental climate is marked by increasingly hot summers and mild winters, with annual rainfall of 500-600 mm. This climate profile, coupled with urban heat islands and limited green infrastructure, has heightened the city's vulnerability to climate impacts, such as extreme heatwaves and flooding. The IUDS and GCAP emphasizes the critical need for enhanced green spaces, improved water management, and climate adaptation measures to mitigate these risks.

CNAP aims to address these challenges by implementing strategies that reduce greenhouse gas emissions, enhance energy efficiency, and promote sustainable urban development.

RELEVANT LOCAL STRATEGIES AND POLICIES

The alignment with the EU's climate neutrality goals underscores Bucharest's ambition to contribute to the European Green Deal and the Nationally Determined Contributions (NDCs) under the Paris Agreement. Furthermore, the CNAP reflects the methodologies and principles of the EBRD Green Cities Framework, which emphasizes multi-sectoral integration and stakeholder co-creation.

The development of the CNAP is closely aligned with several key local strategies and policies:

- Integrated Urban Development Strategy (IUDS/SIDU): Prepared by the World Bank, this strategy serves as a comprehensive framework for Bucharest's urban development, focusing on sustainable growth and enhanced quality of life for residents. IUDS 2020-2030 has been updated for approval at the 2025 level by a PMB working group.
- The Mobility Plan (SUMP/PMUD) outlines the municipality's strategies to enhance mobility and reduce transport emissions. It focuses on key actions such as promoting alternative (non-motorized) and public

transportation, developing intermodal hubs, and systematizing street infrastructure. These measures aim to improve overall transport efficiency and sustainability in the city

- The General Urban Plan of Bucharest (PUG): update elaborated by an international consortium lead by “Ion Mincu” University of Architecture and Urbanism, focusing on sustainable development, accessibility to public services and increasing the quality of life for all its users (residents, tourists, business etc)– currently being updated
- Green City Action Plan (GCAP/PAOV): Developed by the European Bank for Reconstruction and Development, the GCAP outlines specific actions to improve environmental performance and resilience in Bucharest. GCAP is being prepared for strategic environmental endorsement.
- Districts’ Strategic Planning Documents: These include various local and sustainable development strategies, energy efficiency improvement programs, and other thematic strategies that guide Bucharest's transition to climate neutrality.

THE GENERAL GAP ADDRESSED BY THE CNAP

The primary gap that the CNAP seeks to address is the lack of a cohesive, city-wide approach to achieving climate neutrality. While individual strategies and initiatives exist, they often operate in silos, leading to fragmented efforts and suboptimal outcomes. The CNAP aims to integrate these diverse efforts into a unified framework, ensuring coordinated actions, efficient resource use, and measurable progress toward climate neutrality by 2035. It also seeks to enhance stakeholder engagement across all sectors, fostering a collaborative environment for sustainable urban transformation.

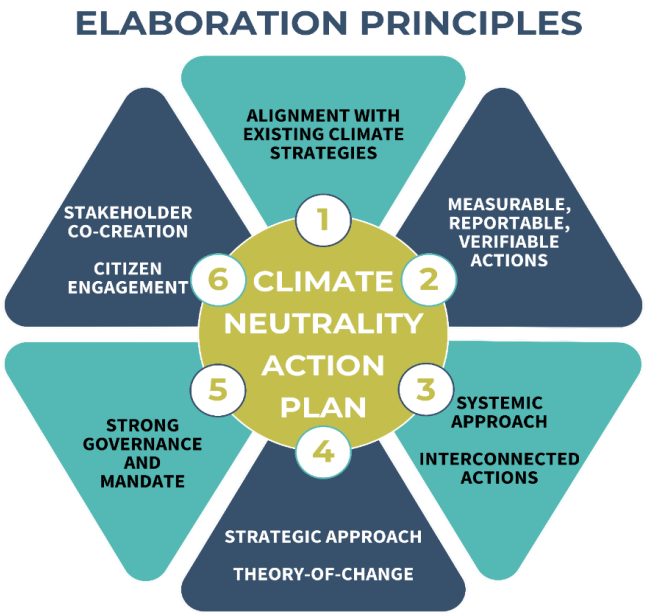
The CNAP aims to bridge these gaps by:

- Reducing GHG emissions: Building on the 2021 baseline, which reported emissions of over 8 million tons of CO_2-equivalent, with buildings and transport as primary contributors.
- Enhancing Climate Resilience: Through nature-based solutions and systemic infrastructure upgrades, particularly in waste management and public transportation.
- Integrating Community Participation: Leveraging the city’s robust civic engagement platforms to foster inclusivity and innovation in urban climate governance.

OVERALL APPROACH

The Climate Neutrality Action Plan (CNAP) of Bucharest Municipality has been developed in accordance with, and will continue to follow, the methodology established by the European Commission within the framework set by the EU Mission for Climate-Neutral and Smart Cities, as referenced by the M100 National Hub.
As a result, the CNAP's life cycle (preparation – implementation – monitoring) aligns with the key stages defined at the European level: outlining the vision for achieving climate neutrality by 2035, establishing the governance structure to support its realisation, developing the GHG emission baseline, setting clear and measurable emission reduction targets, identifying and coordinating the necessary actions to achieve a carbon-neutral city, effectively launching and implementing the CNAP and concurrently monitoring and evaluating the CNAP's progress and impact, with updates provided as necessary.

Figure 3. Elaboration principles



Similarly, the development of the CNAP closely adhered to the principles recommended by the EU Mission for Climate-Neutral and Smart Cities and endorsed by the M100 National Hub, as outlined below:

ALIGNMENT WITH EXISTING CLIMATE STRATEGIES: The entire documentation process was grounded in the Bucharest's Integrated Urban Development Strategy (IUDS) and the Green City Action Plan (GCAP), which served as primary reference documents for modelling and guiding Bucharest's transition to climate neutrality by 2035. Additionally, Bucharest's Districts' strategic planning documents were also considered, particularly their local / sustainable development strategies, but also other sectoral documents, such as the energy efficiency improvement programmes and various other thematic strategies.

MEASURABLE, REPORTABLE AND VERIFIABLE ACTIONS: The first efforts to develop the CNAP focused on establishing the GHG emissions baseline. The baseline provided a comprehensive view of the impact each emissions sector has on pollution in Bucharest, enabling targeted actions to be proposed for each sector in order to reduce the emissions or, where applicable, to capture/store them. Once these actions were identified, taking into account the GHG emissions baseline and the emissions reduction target (which supports Bucharest's climate neutrality vision), they were further developed, by compiling the technical and financial details for each action.

SYSTEMIC APPROACH TO INTERCONNECTED ACTIONS: The actions covered within the CNAP are all interconnected, in order to achieve a unified goal: an urban future with net-zero CO_2 emissions. Accordingly,

the CNAP extends beyond the infrastructural and technological solutions, by also including interventions focused on organizational, governance and social innovation. It closely aligns with the visions set forth by the IUDS and GCAP, and carefully considers the specific needs and short-, medium-, and long-term objectives of each target group of beneficiaries - citizens, businesses, public institutions, NGOs.

STRATEGIC, THEORY-OF-CHANGE APPROACH: To ensure a strategic and integrated approach, the actions were organized into Impact Pathways, based on the Theory of Change (ToC) framework developed by NetZeroCities. Depending on the interventions involved and the systemic levers they activate, the ToC facilitates a clearer understanding of the journey towards climate neutrality. It also enables the estimation (and subsequent evaluation and monitoring) of the CNAP's impact, by illustrating the interconnections among all the action categories, from infrastructure-related measures to softer activation components.

STRONG GOVERNANCE AND MANDATE: The development and subsequent implementation of the CNAP represent one of the most complex collaborative efforts between the General City Hall and all the District City Halls in Bucharest, showcasing the extensive political support which this document has garnered across the entire city. This collaborative process started with the launch of the M100 Selection Call for Expressions of Interest. At that time, the General City Hall, in partnership with the District City Halls, established a Partnership Agreement to manage the application process for the M100 Selection Call and subsequently, for Bucharest's participation in the M100 Cohort. As a result, specialized experts from each City Hall were designated to work together towards the goal of achieving climate neutrality for the entire city of Bucharest - the team composed by these experts will henceforth be mentioned as the Climate Neutrality Division. While currently in its early stages, the Division will strengthen its activities, position and impact with the implementation of the Climate Neutrality Action Plan (especially as the CNAP foresees dedicated Governance Innovation interventions, which will contribute to the advancement of the Division).

STAKEHOLDER CO-CREATION AND CITIZEN ENGAGEMENT: The collaborative effort extends beyond the public administration, by also involving the active participation of the relevant stakeholders and the community in developing this document. The key stakeholders were constantly consulted throughout the CNAP's creation, allowing the CNAP representatives to transform this process into a participatory co-design exercise for strategic planning. Notably, both the IUDS and the GCAP, which serve as foundational guides for the CNAP, were developed through public consultations, and their insights are inherently reflected in the CNAP. It is important to also highlight that the CNAP was developed in close alignment with GCAP, ensuring that the actions proposed in these two strategic documents which outline Bucharest's sustainability pathways are mutually coordinated. The GCAP itself was formulated through a participatory process[1], incorporating consultations with the City and its stakeholders. The priority environmental challenges identified in each sector were mapped out through this process and the proposed shortlist of actions for implementation was informed by sectoral consultations with stakeholders at the City level, expert opinions from consultants and a broad stakeholder survey that included input from Bucharest's citizens.

COMPLETED STAGES

ELABORATION

The comprehensive process of developing the Climate Neutrality Action Plan, alongside its Investments and Commitments components, was undertaken and completed through the close collaboration between representatives of the General City Hall and the City Halls of Bucharest's Districts. Consequently, the process was coordinated by a team of internal technical experts who, within their respective City Halls, oversee various relevant departments and offices, particularly those responsible for strategic planning, project development, urban planning, environmental management, finance and budgeting.

[1] Over 4,000 stakeholders were engaged in the development of the GCAP through interviews, meetings, surveys, workshops and written correspondence. The participants included representatives from the City and its 6 Districts, municipal utilities, regional and national institutions, academia, businesses, civil society organizations, local associations and individual citizens.

STAKEHOLDER CONSULTATION: Throughout the development of the CNAP, constant consultations were conducted with the most relevant stakeholders (including experts in urban development, strategic planning, climate change mitigation and adaptation, civil society engagement), and the broader community. This participatory co-creation process involved requesting and integrating the input and feedback collected by consulting these actors.

COMPLIANCE WITH THE EUROPEAN FRAMEWORK: All the preparatory steps for the CNAP strictly adhered to the methodology (general principles, definitions and calculation formulas, technical concepts, processes) established under the EU Mission for Climate-Neutral and Smart Cities for its member cities and subsequently adopted by the M100 National Hub. In this regard, discussions were also held with Bucharest District 2 (which holds the EU Mission label), in order to gather input and suggestions from their team, ensuring that the CNAP aligns with the EU model and that Bucharest's transition to climate neutrality the meets EU standards for planning this complex journey.

ALIGNMENT WITH THE NATIONAL DIRECTIVES: In developing the CNAP, consideration was given not only to the climate neutrality transition model promoted by the M100 National Hub, but also to other key national documents, particularly the Romanian National Urban Policy and the Country Climate and Development Report for Romania.

FUTURE ANTICIPATED STAGES

IMPLEMENTATION

IMPLEMENTATION OF THE ACTIONS CONTAINED IN THE CNAP: The actions outlined in the CNAP will be implemented through 2035, by securing the public and private financing needed to support their execution. In addition to the allocations from the local budgets, efforts will be dedicated to also securing the available non-reimbursable financing sources: the funds designated for the M100 Cohort cities from various sources (e.g., EU Funds, EEA Grants and the Norwegian Mechanism, the Swiss-Romanian Cooperation Programme), funding from the Bucharest-Ilfov Regional Programme and other relevant Operational Programmes (e.g., Sustainable Development OP, Transport OP, Education and Employment OP), other government funds (e.g., those managed by the Ministry of Development, Public Works and Administration for public investments; the Ministry of Environment, Water and Forests for green projects; the Ministry of Energy for clean energy and energy efficiency; the Ministry of Research, Innovation and Digitization for digitisation and smart city projects). Additionally, the relevant EU-managed funding programmes (e.g., LIFE, European Urban Initiative, Horizon Europe) and other European initiatives which provide non-reimbursable funds (e.g., NetZeroCities, Driving Urban Transitions) will also be accessed. Simultaneous efforts will be directed towards attracting private capital to support Bucharest's transition to climate neutrality, particularly from the companies operating within the city and, potentially, from community contributions through mechanisms such as crowdfunding.

SCALING-UP OF THE INTERVENTIONS COVERED BY THE CNAP: In addition to the actions which are already outlined in the CNAP documentation, various new opportunities will emerge over time, to implement additional interventions which will contribute to Bucharest's climate change mitigation, either by reducing the CO_2 emissions or by capturing them. Although these opportunities are not yet known, they will be identified and incorporated as integral components of the CNAP in the future (as they arise, they will be included into the CNAP's updated versions, based on its periodic revisions).

MONITORING, EVALUATION, LEARNING

MONITORING AND EVALUATION: Throughout the implementation of the CNAP, the undertaken actions will be closely monitored, in order to ensure, in line with the MEL indicators model proposed by the European Commission through NetZeroCities, the assessment of the relationship between the allocated funds and the achieved impact (both the direct impact - CO_2 emission reductions and indirect outcomes - co-benefits and potential co-risks. As a result, alongside tracking the real-time progress towards climate neutrality, evidence-

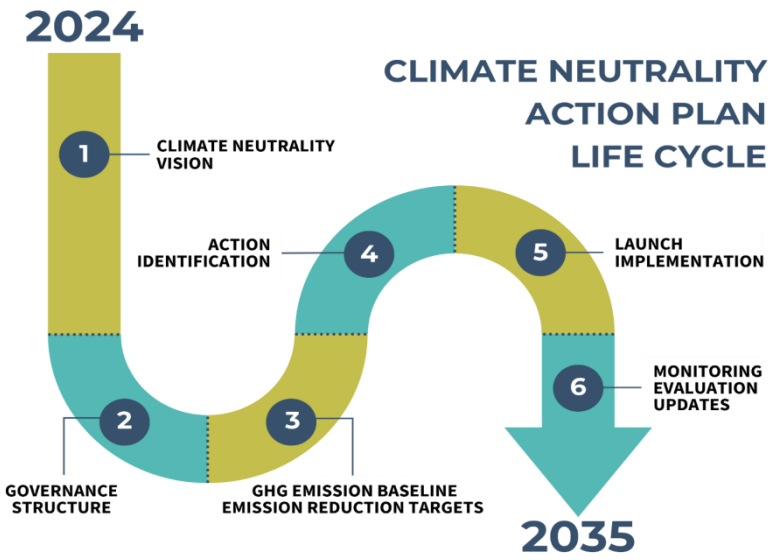
based decision-making will be enabled, in order to inform the updates of the CNAP during its reiteration phases. Monitoring reports for the MEL indicators will be prepared on a biannual basis, with the exception of the GHG emissions inventory, which will be updated every two years. In support of the monitoring activities, the CNAP also foresees the development of an interactive digital monitoring platform, which will feature a digital dashboard to track the progress toward climate neutrality, along with a mobile application for citizens. This platform will be integrated into a monitoring application for all strategies at municipality level and will be managed by the M100 /SIDU responsible at General City hall level. We will collect data together with our partners through the Municipality Urban Data Bank. Additionally, the technological solutions for calculating and presenting the carbon footprints, which are also proposed for adoption during the implementation of the CNAP, will be incorporated into the monitoring process.

REITERATION AND UPDATE: The CNAP will be updated every two years through collaborative reiteration sessions, in conjunction with the GHG emissions inventory update (or more frequently if necessary, depending on the circumstances). These updates will reflect the results identified through the monitoring and evaluation processes and will also incorporate any significant changes, such as the completion of specific actions or the addition of new actions, which were not originally planned.

LEARNING: In addition to the lessons implicitly gained from the implementation of the CNAP, the team responsible for its execution will also access various learning opportunities. The main priority will revolve around the knowledge and experience exchanges with the M100 Cohort cities and the Romanian cities labeled by the EU Mission for Climate-Neutral and Smart Cities label (Cluj-Napoca, Suceava). Additionally, the team will seek to engage with other European cities involved in the EU Mission, but also with cities in Norway, Iceland, Liechtenstein and Switzerland (particularly through the opportunities offered by the EEA Grants and Norwegian Mechanism, and the Swiss-Romanian Cooperation Programme). Additionally, the CNAP outlines specific interventions aimed at fostering learning. At the public administration level, the most notable intervention is the climate neutrality capacity-building program for public servants. Regarding the local stakeholder ecosystem, the CNAP proposes (post)university programs focused on climate neutrality, alongside various awareness, education and information campaigns, which will address topics related to the main emission sectors.

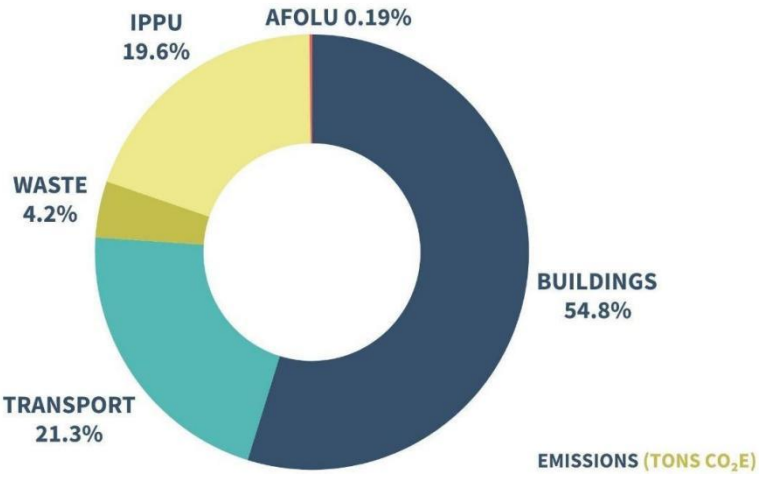
The relevant local stakeholders, including those from the public entities, private sector, civil society and the community, will be involved not only in the implementation phase of the CNAP but also in its monitoring and evaluation. Additionally, they will be invited to participate in the learning opportunities where they qualify as beneficiaries / target groups.

Figure 4.Climate neutrality action plan life cycle


2024
CLIMATE NEUTRALITY ACTION PLAN LIFE CYCLE
1
CLIMATE NEUTRALITY VISION
ACTION IDENTIFICATION
4
5
LAUNCH IMPLEMENTATION
6
MONITORING EVALUATION UPDATES
2
3
GOVERNANCE STRUCTURE
GHG EMISSION BASELINE EMISSION REDUCTION TARGETS
2035

GREENHOUSE GAS EMISSIONS BASELINE INVENTORY

Figure 5. Baseline emissions inventory - Bucharest



BUILDINGS 2021
17.827.221,26 MWh/year energy equivalent with 4.467.616,06 tons CO_2/year

RESIDENTIAL BUILDINGS 2021 - 9,760,821 MWH/YEAR ENERGY EQUIVALENT WITH 2.293.116,88 TONS CO_2/YEAR

Energymap.ro estimates the total electrical energy use for home consumers in Bucharest for the year 2021 at 1,633,958 MWh/year. The same website estimates that all the prosumers have an installed capacity of 5.658 MW that could generate approximately 9,293.27 MWh per year under typical sun exposure conditions (4.5 hours/day on average). This results in a Scope 1 electrical energy requirements for residential buildings of 9,293.27 MWh/year associated with green electrical energy and a Scope 2 electrical energy requirements of 1,624,664.73 MWh/year associated with energy from the grid. This results in 651,490.56 tons CO_2/year associated with the Residential buildings sector. The same source estimates the total natural gas consumption for residential buildings at approximately 4,949,983 MWh/year equivalent to 999,896.57 tons CO_2/year associated with residential buildings. According to the *Strategy for supply of thermal energy in a centralized system for Bucharest municipality* 2023, page 205, the central heating system, S1, consumed in 2021 a total of 10,016,495 MWh of natural gas and 52,439.18 MWh of electrical energy (page 135) to generate thermal and electrical energy for the grid. According to the same document (page 140), the S2 part of the same system required in 2021 a total of 227,718 MWh of natural gas and 5,235.916 MWh of electrical energy to operate. In total, the SACET System (S1+S2) required a total of 10,244,213 MWh of natural gas and 57,675.10 MWh of electrical energy to operate. Out of this total energy need, the S1 system produced a total of 5,432,897 MWh of thermal energy and 2,309,000 MWh of electrical energy (page 204), and after accounting for losses, it distributed 2,427,000 MWh thermal energy as heat and 839,000 MWh of thermal energy as hot water to consumers. The S2 system distributed to consumers 123,000 MWh of thermal energy as heat and 27,000 MWh of thermal energy as hot water to consumers (page 145). In total, the SACET system distributed in 2021 a total of 3,416,000 MWh of thermal energy to consumers and 2,309,000 MWh of electrical energy to the grid.
Information on the categories of users is available in the same document (page 173). 93% of the consumers are households, and the remaining 7% are public institutions, economic agents and green houses. As such, 93% of the total thermal energy, or 3,176,880 MWh, will be attributed to the Residential buildings sector and the remaining 239,120 will be distributed to other sectors.

PUBLIC BUILDINGS 2021 - 456.704,38 MWH/YEAR ENERGY EQUIVALENT WITH 129,045.36 TONS CO_2/YEAR

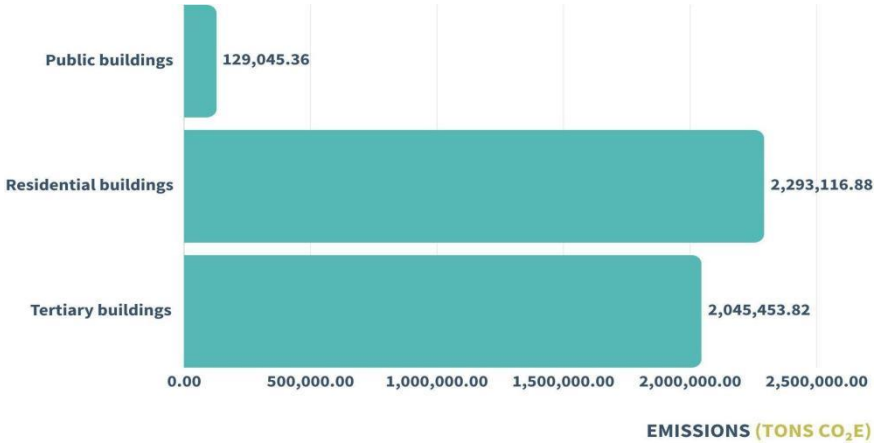
All public buildings in Bucharest were mapped according to the list extracted from the General Urban Plan of the Municipality of Bucharest and their total gross floor area was determined **(ANNEX 1)**. After that, different studies were

conducted to determine the general share of energy per square meter for different building types. By multiplying the total area for each building type with the share of energy and the estimated energy requirement per square meter per year, the total energy requirement was calculated. As such, public buildings in Bucharest were estimated to have required in 2021, a total of 184,879.76 MWh of electrical energy, 175,325.13 MWh of natural gas and 96,499.50 MWh of thermal energy.

TERTIARY BUILDINGS 2021 - 7.609.695,87 MWH/YEAR ENERGY EQUIVALENT WITH 2.045.453,82 TONS CO_2/YEAR

EnergyMap.ro estimates the total non-home energy consumption for the entire city for the year 2021 at approximately 3,502,884 MWh of electrical energy and 15,340,206 MWh of natural gas. The total electrical energy requirements for the tertiary buildings sector was calculated at approximately 2,554,247.50 MWh/year, by deducting all the electrical energy requirements for all non-home use from the different sectors from the total energy requirements from EnergyMap.ro (Tertiary Buildings Electrical energy = All non-home use energy - electrical energy for public buildings - electrical energy for the transport sector - electrical energy for waste sector - electrical energy for the IPPU sector - electrical energy for the AFOLU sector). The same logic was used to estimate the total natural gas requirements at approximately 4,920,667.87 MWh/year. According to the Strategy for supply of thermal energy in a centralized system for Bucharest municipality 2023, an estimated 239,120 MWh/year was distributed to public institutions, economic agents and green houses. As such the total thermal energy requirements for the tertiary buildings sector was calculated at 134,780.50 MWh/year by deducting the thermal energy required for public buildings and the AFOLU sector from that amount (Thermal energy tertiary buildings = 239,120 MWh - thermal energy for public buildings - thermal energy for the AFOLU sector).

Figure 6. Emissions from buildings (tons CO_2)



IPPU 2021
7.596.179,75 MWh/year energy equivalent with 1.594.516,64 tons CO_2/year

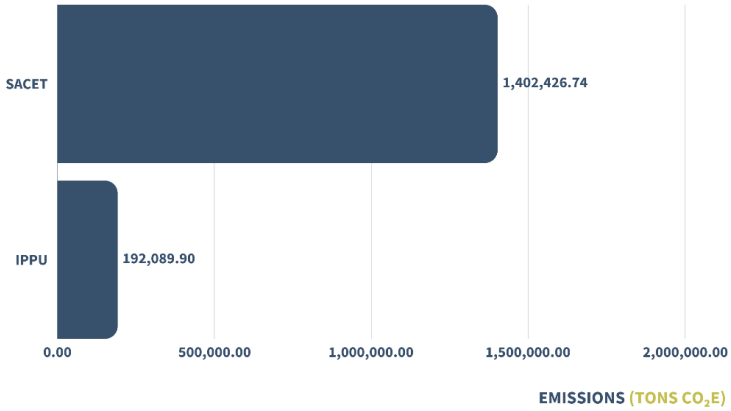
SACET 2021 - 6.885.888,10 MWH/YEAR ENERGY EQUIVALENT WITH 1.402.426,74 TONS CO_2/YEAR

The *Strategy for supply of thermal energy in a centralised system for Bucharest municipality* 2023, offers the energy requirements for the SACET facility. The facility was estimated to have required in 2021 a total of 57,675.10 MWh of electrical energy and 10,244,213 MWh of natural gas to produce thermal energy and electricity. The same document indicates that the conversion factor for natural gas and thermal energy is the same, more precisely 0.202. As such, it was calculated that out of the total energy consumption of the SACET facility, after accounting for the thermal energy that was distributed to consumers, a total of 6,828,213 MWh of natural gas was left unaccounted for. In other words, if the facility required a total of 10,244,213 MWh of natural gas that was used to generate electrical and thermal energy, a total of 3,416,000 MWH thermal energy was distributed to consumers. According to the documents the natural gas and thermal energy have the same conversion factor, which means that a total of 6,828,213 MWh of natural gas was attributed to Scope 3 emissions for the SACET facility.

REST OF IPPU - 710.291,65 MWH/YEAR ENERGY EQUIVALENT WITH 192.089,90 TONS CO_2/YEAR

Information related to other entities in the IPPU sector for Bucharest was not available in the strategic documents consulted. For this reason, the Metroverse database was consulted to determine the sub sectors that fall under this sector. The database offered, for each sub sector, a percentage share of the total economy of Bucharest in 2021. The total energy required by the SACET facilities was subtracted from the total energy use for non-home consumers from EnergyMap.ro. After that, for each sub sector, different studies were consulted to determine the general percentage of electrical energy versus the percentage of natural gas use. To estimate the energy use of each sub-sector, the share of the local economy was multiplied with the percentage of energy used in that sub sector with the remaining energy after deducting the energy use of the SACET facilities **(ANNEX 2)**. This resulted in an estimated energy requirement of the IPPU sector of 244,276,34 MWh electrical energy and 466,015.31 MWh natural gas. In total, the IPPU sector (including SACET) was estimated to have required in 2021, a total of 301,951.44 MWh of electrical energy and 7,294,228.31 MWh of natural gas.

Figure 7. Emissions from IPPU (Tons CO_2)



AFOLU 2021
53,270.92 MWh/year energy equivalent with 15,189.67 tons CO_2/year

CROP PRODUCTION - 18,081 MWH/YEAR ENERGY EQUIVALENT WITH 5,687.52 TONS CO_2/YEAR

According to the National Statistics Office, in the year 2020, there were a total of 9 Ha of land dedicated to tomato crops that produced a total of 664 tons of tomatoes, with an estimated total of 73,778 kg/Ha. According to the technological framework estimate from the Ministry of Agriculture (**ANNEX 3)**, such a production would require approximately 182.43 liters of diesel for a production of 85,000 kg tomatoes in greenhouses for 6 months, resulting in a total of 158.34 liters of diesel per 73,778 kg/Ha. The same technical framework estimates a total of 70 days per year that would require heating of the greenhouses. According to the "Energy Consumption Prediction of a Greenhouse and Optimization of Daily Average Temperature" report, a greenhouse would require approximately 0.007 MWh/sqm of energy per day to function. The "Heating and cooling of greenhouses" report from Perdue University estimates that approximately 80% is thermal energy and 20% electrical energy. This results in a daily total of 0.0056 MWh/sqm for thermal energy and 0.0014 MWh/sqm for electrical energy. Information related to how many tomatoes were harvested from greenhouses was not available, thus we assume that only 2 Ha were used for greenhouses.
The following can be estimated:
Tomatoes in greenhouses energy requirements for 2 Ha are equal to 316.68 liters of fuel or 3.2 MWh of diesel. Besides this, the thermal energy required to heat 2 Ha of green houses for 70 days per year accounts for approximately 7,840 MWh and the electrical energy accounts for approximately 10,220 MWh/year.
Tomatoes produced outside would require a total of 11.2 MWh of diesel.
For perennial fodder, the National Institute of Statistics estimates the total production at approximately 161 tons. The technological framework from the Ministry of Agriculture (see **ANNEX 3)** estimates a total of 61.1 liters of diesel for a production of 14,891 kg. This results in a total of 6.68 MWh of diesel.

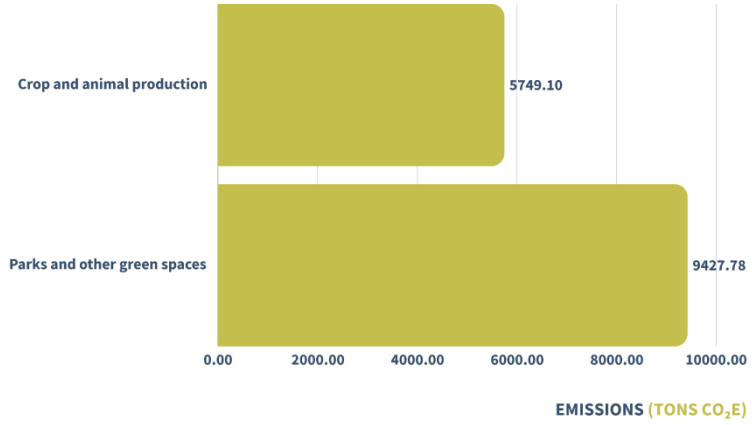
ANIMAL PRODUCTION - 208.29 MWH/YEAR ENERGY EQUIVALENT WITH 61.56 TONS CO_2/YEAR

The National Institute of Statistics estimates that a total of 6,000 hectoliters of milk was produced in Bucharest in 2020. According to the Good Practice Manual for raising Cattle 2015 (see **ANNEX 3)**, the total electrical energy consumption is approximately 3,78 KWh / hectoliter of milk and 2.7 liters diesel per hectoliter of milk. This results in a total energy consumption of 22.68 MWh of electrical energy and 163.86 MWh of diesel.
The *Assessment of Energy Consumption in a Meat-Processing Plant—a Case Study* report estimates that meat processing would require approximately 435 KWh electrical energy per metric ton of meat. The National Institute of Statistics estimated the total meat production at 50 tons, resulting in a total energy requirement of 21.75 MWh of electrical energy.

PARKS AND GREEN SPACES - 33,803.95 MWH/YEAR ENERGY EQUIVALENT WITH 9,427.78 TONS CO_2/YEAR

The *Sustainability of Urban Parks: Applicable Methodological Framework for a Simple Assessment* study assesses that maintenance of public parks requires on average 15,000 KWh/ha electrical energy/year and approximately 750 liters diesel / ha per year. According to INS, in 2020 there were 4,506 Ha of green spaces in Bucharest. Out of this, a total of 50.05 ha are parks that can be estimated to require approximately 750 MWh of electrical energy and 379.69 MWh of diesel. Extrapolating the diesel consumption to all of the remaining green spaces, it results in a total of 33,803.95 MWh of diesel.
Overall, Scope 3 diesel requirements to bring in all the diesel fuel for the whole AFOLU sector was calculated at approximately 47.91 MWh diesel that can be translated to approximately 12.76 tons CO_2 per year associated with Scope 3 emissions for the total AFOLU sector.

Figure 8. Emissions from AFOLU (Tons CO_2)



TRANSPORT

6,540,042.45 MWh/year energy requirement, equivalent to 1,736,277.21 tons CO_2/year

The transport sector is an important source of emissions, accounting for 21.3% of the total CO_2 emissions in Bucharest. Below, the energy requirement and CO_2 estimations are presented for each category of transport. For each category, emissions were assigned to either **Scope 1** (transport within the city boundary), or **Scope 2** (outside the city boundary due to the use of grid-supplied electricity used to charge vehicles that run on electricity). The totals for each subcategory of the Transport sector are presented for Scope 1 and Scope 2 emissions. Additionally, **Scope 3** emissions were partially estimated based on the fuel consumption associated with transport from refineries outside of Bucharest to fuel stations. For detailed explanations and calculations for the transport sector, see *Annex 4.*
Estimating CO_2 emissions in the transport sector requires a detailed analysis of energy consumption and associated emissions based on vehicle types and total distances travelled. The Bucharest transport sector's energy demand and emissions profile were estimated using official vehicle registration data, reports of public transport companies, travel metrics, and standard conversion factors.

PRIVATE AND COMMERCIAL TRANSPORT - 5,909,433.27 MWH/YEAR ENERGY EQUIVALENT WITH 1,526,572.94 tons CO_2/YEAR

The calculation started with the distribution of private and commercial vehicles by type and power source, according to the General Directorate of Driving Permits and Registrations (DRPCIV). In 2021, Bucharest had 1,215,988 registered automobiles, with 53.37% running on gasoline, 42.98% on diesel, 3.14% being hybrids, and 0.51% electric. Motorcycles and mopeds totalled 30,802 vehicles. These vehicles travelled a combined total of 7,429,261,967 kilometers in 2021, as estimated by Google Environmental Insights. Energy requirements and emissions were assessed for each category based on estimated distances travelled, fuel consumption rates and emission intensities specific to each fuel type.

For **gasoline cars,** representing 53.37% of the total number of cars registered in Bucharest, the estimated annual travel distance is approximately 3.97 billion kilometers. Using an average fuel consumption rate of 7.6 liters per 100 kilometers (*Long Term Strategy for Romania*, page 96, based on the JRC-EU-TIMES Model), this translates to an annual fuel use of 301.35 million liters of gasoline. From this amount, the fuel consumption of gasoline cars of the public fleet (see Municipal Transport section) was subtracted, resulting in about 300,75 million liters. The weight of this fuel is converted to tons using a factor of 0.00074 tons per liter, resulting in 222,558.86 tons of gasoline consumed. Multiplying this by the net calorific power of gasoline (12.3 MWh per tonne) yields an energy requirement of approximately 2.73 million MWh per year. Applying a CO_2 conversion factor of 0.249 tons per MWh, gasoline cars emitted an estimated **680,285** tons of CO_2 / year.

Diesel vehicles, accounting for 42.98% of the total, travelled 3.19 billion kilometers in 2021. With an average fuel consumption of 6.9 liters per 100 kilometers (*Long Term Strategy for Romania*, page 96, based on the JRC-EU-TIMES Model), these vehicles consumed approximately 220.33 million liters of diesel. From this amount, the fuel consumption of diesel cars of the public fleet (see Municipal Transport section) was subtracted, resulting in 219,49 million liters. Converting this volume to tons (using 0.00085 tons per liter) results in 186,570 tons of diesel consumed. The energy requirement for diesel vehicles, calculated using the net calorific power of diesel (11.9 MWh per tonne), is about 2.21 million MWh per year. Based on a conversion factor of 0.267 tons of CO_2 per MWh for diesel, these vehicles generated **590,537.81** tons of CO_2 in 2021.

Electric cars, though a small fraction of the fleet (0.51%), travelled approximately 38.05 million kilometers in 2021. With an assumed energy consumption of 0.2 KWh per kilometer (See *Annex 4*), their total energy requirement was 7,610 MWh. From this amount, the energy requirement of electric cars in the public fleet (see Municipal Transport section) was subtracted, resulting in 7,451.78 MWh / year. Using a conversion factor of 0.401 tons of CO_2 per MWh for electricity, these vehicles contributed **2,541** tons of CO_2 / year.

Hybrid cars, comprising 3.14% of all cars, covered an estimated 232.94 million kilometers. With an average fuel consumption of 5 liters per 100 kilometers, they consumed 11.65 million liters of gasoline in 2021, equating to 8,619 tons. The corresponding energy requirement was 106,009 MWh, and the resulting emissions were **26,396** tons of CO_2.

The CO_2 emissions of **private and commercial buses** was estimated based on the total distance travelled (302,078,125.5 km in 2021), excluding public transport buses operated by STB. Using average fuel consumption rates for diesel, hybrid, gasoline, and electric buses, the energy requirements and emissions were derived (See *Annex 4*). The annual energy consumption was calculated at 783,478.65 MWh, resulting in total emissions of **209,118.13** tons CO_2e, with diesel buses contributing the largest share.

In 2021, there were 30,802 **motorcycles and mopeds** registered in Bucharest (DRPCIV), which travelled an estimated 166.05 million kilometers in total. This distance was calculated by multiplying the number of vehicles with the average distance travelled by motorcycles in 2019, which was 5,391 km (*Long Term Strategy for Romania*, page 95; the estimation is based on Eurostat and INS data). Assuming an average fuel consumption of 4 liters per 100 kilometers (*Long Term Strategy for Romania*, page 96, based on the JRC-EU-TIMES Model), their fuel use was 6.64 million liters of gasoline, or 4,915 tons. The energy requirement for these vehicles was 60,457 MWh, leading to **15,054** tons of CO_2 emissions in 2021.

PUBLIC TRANSPORT - 549,194.36 MWH/YEAR ENERGY EQUIVALENT WITH 179,011 tons CO_2/YEAR

Calculating the CO_2 emissions of Bucharest's public transport system requires a detailed breakdown by mode of transport, with energy consumption and emissions factors applied for buses, metro, trams, and trolleybuses. Using data from municipal authorities and official reports, energy consumption and emissions for each category are presented below.

Based on data provided by the Bucharest City Hall Transport Department for 2022, the **public bus fleet** consisted of 1,518 buses, including EURO III, IV, and VI diesel models, as well as hybrid EURO VI vehicles. The bus fleet consumed 25,812 tons of diesel, equating to an energy demand of 307,169 MWh by using the net calorific power of diesel (11.9 MWh per tonne). This fuel consumption resulted in CO_2 emissions of **82,014** tons, calculated using the standard conversion factor for diesel of 0.267 (see *Annex 4* for a detailed breakdown of the fleet composition and calculations). .

The Bucharest **metro system** had an energy consumption of 175,720 MWh in 2021, according to data reported by the METROREX SA public company. Using the CO_2 conversion factor of 0.401 tons per MWh, the metro system generated **70,464** tons of CO_2 emissions.

Several national and international data sources were used for calculating the CO_2 emissions associated with **tram public transport.** Data on tram energy consumption and the number of trams in use in Bucharest and their age was correlated with the distance travelled by trams in Bucharest in 2021, provided by the Bucharest Transport Company (STB). According to STB, trams in Bucharest travelled 18,749,851 kilometers in 2021. Based on data from similar systems, an average energy consumption of 2.84 KWh per kilometer was used to calculate the energy demand (see *Annex 4*). The tram network required approximately 53,250 MWh of electricity in 2021, resulting in CO_2 emissions of **21,353.08 tons**, using the 0.401 conversion factor for electricity.

As in the case of trams, both national and international data sources were used for calculating the CO_2 emissions associated with public transport by **trolleybuses** (data from the Bucharest Transport Company STB, media, CIVITAS report). The trolleybus fleet is estimated to have travelled a distance of 9,725,414 kilometers in 2021. With an average energy consumption of 1.3 KWh per kilometer (CIVITAS, *Possibilities of energy demand reduction in trolleybus transportation*, page 26), trolleybuses required an estimated 12,643 MWh of electricity. This consumption corresponds to **5,069.86 tons** of CO_2 emissions.

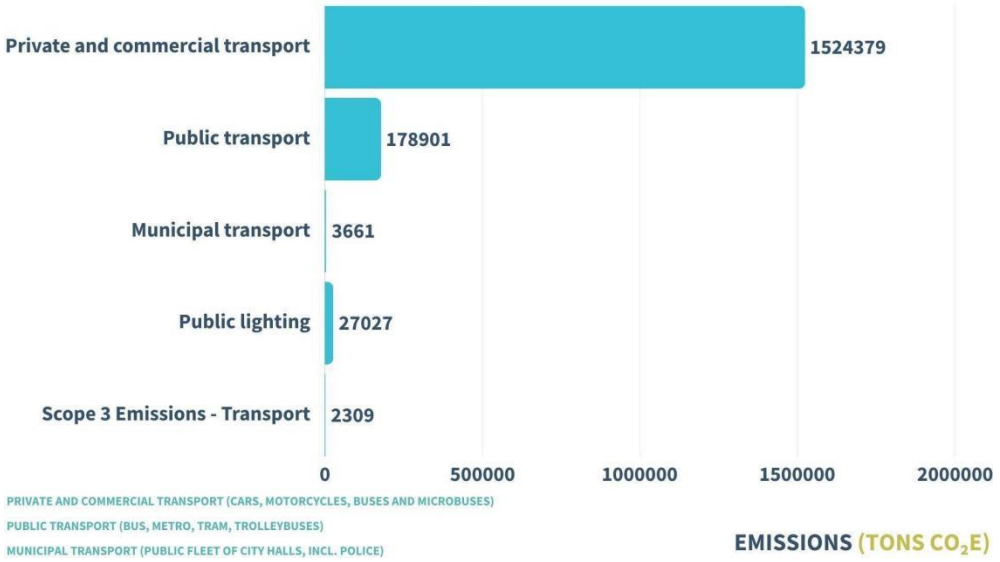
MUNICIPAL TRANSPORT - 14,014.81 MWH/YEAR ENERGY EQUIVALENT WITH 3,665.87 TONS CO_2/YEAR

Data on the number of vehicles for the calculation of the CO_2 emissions from **municipal transport** was not readily available, so an estimation was run based on a comparative approach. Data from the Oradea *Sustainable Energy Action Plan* was correlated with the number of employees of the Bucharest City Hall and District City Halls, and subordinated institutions (employee-to-vehicle ratios, scaled to Bucharest's approximately 70,000 municipal employees, and average fuel consumption per year). An estimation of the electric cars in use in 2021 was based on the reports of City Halls and media sources, indicating a total 44 vehicles. The remaining number of vehicles was assumed to be 50% gasoline and 50% diesel (328 vehicles each). As the average distance travelled was not available, an average distance of 18,000 km was used based on data reported by Constanța Municipality.
Based on these assumptions, the energy requirement was calculated for each category (See *Annex 4)*. The municipal transport fleet in Bucharest, including the local police fleet, is estimated to produce 3,660.7 tons of CO_2 emissions annually (estimated by multiplying the energy requirement with the specific conversion factors for gasoline, diesel and electricity). Exact data based on the fleet information for each of Bucharest's six districts should be used to replace existing estimations, once available.

SCOPE 3 Emissions - 8,648.93 MWh/year energy equivalent with 2,309.26 tons CO_2/year
In addition to Scope 1 (diesel and gasoline, within city boundary) and Scope 2 emissions (electricity - within city boundary,) Scope 3 emissions (outside city boundary) were estimated based on the energy required for fuel transport to Bucharest. This was calculated based on distances from refineries, tanker fuel consumption, and the number of

tankers needed. Annually, an estimated 869,724.28 liters of diesel are required to transport fuel to stations. This results in an energy requirement of 8,648.93 MWh and equivalent emissions of 2,309.26 tons CO_2.
These emissions were distributed across municipal, public, and private transport based on their share of fuel consumption (private and commercial transport - automobiles: 81.78%, private and commercial transport - buses and microbuses: 12.18%, private and commercial transport - motorcycles and mopeds: 1.04%, public transport - buses: 4.77%, municipal transport - public fleet: 0.22%).

Figure 9. Emissions from transport and public lighting (tons CO_2)



PUBLIC LIGHTING - 67,400 MWH/YEAR ENERGY EQUIVALENT WITH 27,027.40 TONS CO_2/YEAR

The emissions associated with public lighting are included in the Transport sector, as public lighting is one of the main contributors to transportation safety. The annual current consumption of the lighting network in Bucharest in 2021 was about 67,400 MWh, according to the information provided by the Bucharest City Hall at the request of spotmedia.ro[2]. Using the standard IPCC conversion factor of 0.401 tCO_2 per MWh, this resulted in emissions of 27,027.40 tons CO_2.

WASTE

192,127.29 MWh/year energy requirement and 9.850,6 tons CH_4 /year landfill emissions, equivalent to a total 340,948.48 tons CO_2/year

The Waste sector accounts for 4.18% of the total CO_2 emissions in Bucharest. Estimations included energy requirements of waste collection, treatment, recycling, composting and landfilling facilities, as well as landfill gas related emissions. Specific energy requirements were assigned to Scope 1, Scope 2 or Scope 3 emissions. Scope 3 emissions consist of emissions from the waste generated within the city boundary but managed/sent to landfills outside the city boundary and were calculated based on the locations of the treatment of landfilling facilities). The baseline year is 2019, for which a detailed breakdown of quantities was available in the *Bucharest Waste Management Plan 2020-2025* (page 26). For all sources of data and detailed calculations, please see *Annex 5*.

WASTE MANAGEMENT - 150,093.69 MWH/YEAR ENERGY EQUIVALENT WITH 324,093.01 TONS CO_2/YEAR

- ➔ In 2019, **waste collection** involved transporting 1,062,073 tons of waste. For garbage trucks, an average capacity of 18-tons was assumed, travelling an average of 40 km per trip (estimated in the AEA Technology

[2] https://spotmedia.ro/stiri/social/cat-costa-iluminatul-stradal-in-marile-orase-din-romania-si-ce-fac-primariile-din-bucuresti-oradea-cluj-napoca-brasov-si-iasi-ca-sa-isi-scada-consumul-de-curent

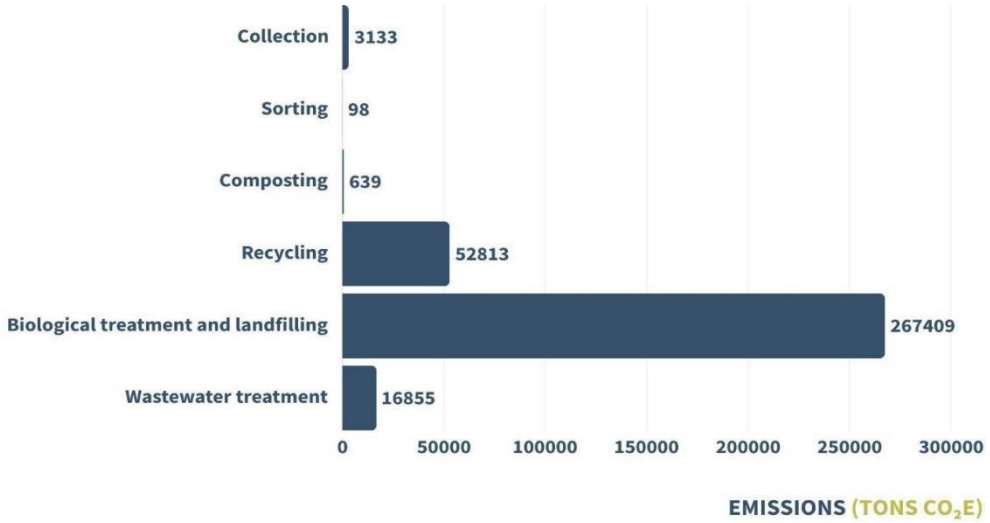
study for DG Environment, *Waste management options and climate change*, page 87). This resulted in a diesel consumption of 1,180,000 liters per year, equivalent to 11,735.26 MWh/year (**3.133,3 tCO_2**).

- **Waste sorting** stations processed 337,084.4 tons of waste, consuming an estimated 245.06 MWh of electricity annually (**98.3 tCO_2**). To estimate the electrical energy consumption per tonne for the sorting process, data from an *Environmental Impact Study for the Integrated Waste Management System of Covasna county* (page 23) was used. The planned sorting station for which average energy requirement was estimated has similar parameters and processes to the ones operating in Bucharest/Ilfov (see *Annex 5*).
- **Composting green waste** activities at the station owned by the Administration of Lakes, Parks and Recreation Bucharest (ALPAB) required 2.92 MWh of electricity and 294.95 MWh of diesel for 35,006 tons of green waste. These amounts are equivalent to **80 tCO_2.** The calculation was based on average energy requirements for composting stations provided in the same environmental impact study (0.0833 kWh per tonne of waste from electricity, and 0.833 liters of diesel per tonne of waste).
- **Composting biodegradable waste** used 1,394.57 MWh of electricity (**559,22 tCO_2)**. Several studies cited by Slorach et al. estimate an average electricity consumption of composting food waste ranging from 93 to 30 KWh/t (best case). For practical reasons, an average of 61.5 kWh/t was used to estimate the electricity consumption associated with the composting of biodegradable waste (0.0615 MWh/tonne).
- Considering the quantity of recycled waste of 263,406 tons, the energy requirement associated with **waste recycling** (mechanical and physical technologies) was estimated using an average of 0.5 MWh/tonne. This corresponds to 131,703 MWh **(52.812,9 tCO_2)**.
  Note: While recycling and composting processes are associated with an energy requirement, increasing their rates is critical to reduce emissions associated with landfilling. By diverting waste from landfills through recycling and composting, the need for new raw materials is reduced, and the release of greenhouse gases typically associated with landfilling is prevented.
- **Biological treatment**: biodegradable waste is subjected to the biological treatment process (aerobic fermentation) at the biological treatment facility owned by a private company. Information on electricity consumption is provided as a total for the activity within the facility, which also included landfilling operations (see section below).
- **Landfilling operations,** which involve waste compaction and covering, consumed 331,054 liters of diesel annually within the two active landfills in 2019, translating to 3,348.61 MWh (**894.07 tCO_2).** The AEA Technology Study prepared for DG Environment (page 94) indicates that a large landfill site in the UK uses 975,000 liters of diesel fuel per year and handles 2.2 million tons of waste. Based on this amount, an estimated 0.4432 liters of diesel / tons of waste / year is required. Additionally, electricity consumption at landfill facilities amounted to 1,369.31 MWh/year (**549.09 tCO_2**), based on officially reported consumption data. In total, landfill operations generate **1.443,16 tCO_2**.
- In addition to these, **methane emissions from landfill gas (9.850,6 t CH_4)** were estimated as equivalent to **265,966.2 tCO_2**, after accounting for a 75% recovery rate (as per the *Environmental report for the National Waste Management Plan and the National Waste Prevention Plan*, page 117).
  Note: The energy production from recovered landfill gas generated 10,049.35 MWh, which substituted fossil fuel consumption. Avoided emissions associated with energy production were not subtracted from the total emissions for the Waste sector, but were reflected in an estimation of the total energy production of Bucharest (*see Annex 6 for a more information on the total energy production in Bucharest, including energy produced within the district heating system, solar panels etc.)*

WASTEWATER TREATMENT - 42,033.60 MWH/YEAR ENERGY EQUIVALENT WITH 16,855.47 TONS CO_2/YEAR

For **wastewater treatment,** the energy demand for the 175.14 million m^3 of wastewater processed in 2021 (according to official data reported by APA NOVA for 2021) was estimated at 42,033.6 MWh, resulting in **16,855.47 tons of CO_2e**. Activities took place at the Glina facility outside Bucharest, classifying these emissions under Scope 3.

Figure 10. Emissions from waste (tons CO_2)



Measures for improving future data collection require better tracking of energy use in waste management processes to refine Scope 1 and Scope 2 estimates. Annual energy consumption data should be collected for all waste management facilities, including sorting stations, composting and recycling facilities, biological treatment stations, and landfills. The *Bucharest Waste Management Plan* should be regularly updated with post-2021 data to ensure consistency in emissions reporting, with annual public reports providing a detailed breakdown of waste management processes. Methane recovery rates and energy offsets from landfill gas should be monitored and transparently included in the updated waste strategy.

Additionally, wastewater treatment emissions should also account for methane and CO_2 equivalents, with these data contributing to Scope 3 emissions inventories, given the plant's location outside the city boundary. Moreover, methane emissions attributed to the wastewater infrastructure also released at street level, as indicated by a recent study on Bucharest and Ploiesti[3]. The study estimated a city emission rate of about 1,832 tons CH_4 / year, out of which up to 63% is generated from the wastewater system (1.154,16 t, equivalent with over 30,000 tons CO_2).

FINAL ENERGY USE BY SOURCE SECTORS

Indicate the base year: 2021
Indicate the used unit: MWh

Table 1. Final energy use by source sectors

	SCOPE 1	SCOPE 2	SCOPE 3	TOTAL
BUILDINGS	**9,293.27**	**17,817,927.99**	**0.00**	**17,827,221.26**
FUEL TYPE / ENERGY USED	9,293.27 MWh electrical energy RES generated	4,363,791.99 MWh electrical energy 10,045,976.00 MWh natural gas 3,408,160.00 MWh thermal energy	-	9,293.27 MWh electrical energy RES generated 4,363,791.99 MWh electrical energy 10,045,976.00 MWh natural gas 3,408,160.00 MWh thermal energy
TRANSPORT	6,214,737.99	316,655.52	8,648.93	6,540,042.45
FUEL TYPE / ENERGY USED	3,306,628.91 MWh diesel	316,655.52 MWh electrical energy	8,648.93 MWh diesel	316,655.52 MWh electrical energy

[3] J.M. Fernandez, et al., *Street-level methane emissions of Bucharest, Romania and the dominance of urban wastewater*, Atmospheric Environment: X, Volume 13, 2022

	SCOPE 1	SCOPE 2	SCOPE 3	TOTAL
	2,908,109.08 MWh gasoline			3,315,277.84 MWh diesel 2,908,109.08 MWh gasoline
WASTE	**13,495.03**	**134,135.36**	**44,496.90**	**192,127.29**
FUEL TYPE / ENERGY USED	13,495.03 MWh diesel	134,135.36 MWh electrical energy	42,613.10 MWh electrical energy 1,883.79 MWh diesel	176,748.46 MWh electrical energy 15,378.83 MWh diesel
INDUSTRIAL PROCESS AND PRODUCT USE (IPPU)	**0.00**	**767,966.75**	**6,828,213.00**	**7,596,179.75**
FUEL TYPE / ENERGY USED	-	301,951.44 MWh electrical energy 466,015.31 MWh natural gas	6,828,213 MWh natural gas	301,951.44 MWh electrical energy 7,294,228.31 MWh natural gas
AGRICULTURAL, FORESTRY, AND LAND USE (AFOLU)	**34,368.58**	**18,854.43**	**47.80**	**53,270.92**
FUEL TYPE / ENERGY USED	34,368.58 MWh diesel	11,014.43 MWh electrical energy 7,840 MWh thermal energy	47.80 MWh diesel-	11,014.43 MWh electrical energy 7,840 MWh thermal energy 34,368.58 MWh diesel

EMISSION FACTORS APPLIED

Indicate the primary energy type and greenhouse gas (GHG) emission factor in accordance with the methodology used: CO_2
Indicate the used method, e.g., GPC, IPCC, CRF, national etc.: IPPC

Table 2. Emission factors applied

PRIMARY ENERGY/ ENERGY SOURCE	CARBON DIOXIDE (CO_2)	METHANE (CH_4)	NITROUS OXIDE (N_2O)	F-GASES (HYDROFLUOROCARBONS & PERFLUOROCARBONS)	SULPHUR HEXAFLUORIDE(SF_6)	NITROGEN TRIFLUORIDE(NF_3)
ELECTRICAL ENERGY	0,401					
NATURAL GAS	0,202					
DIESEL	0,267					
GASOLINE	0,249					
GPL	0,231					
WOOD [1]	0,101					
RENEWABLE ENERGY (SOLAR)	0					
GEOTHERMAL ENERGY [2]	0,0143					

PRIMARY ENERGY/ ENERGY SOURCE	CARBON DIOXIDE (CO_2)	METHANE (CH_4)	NITROUS OXIDE (N_2O)	F-GASES (HYDROFLUOROCARBONS & PERFLUOROCARBONS)	SULPHUR HEXAFLUORIDE(SF_6)	NITROGEN TRIFLUORIDE(NF_3)
MUNICIPAL WASTE	0,33					
THERMAL ENERGY [3]	0,202					
ELECTRICAL ENERGY 2035 [4]	0,176					
THERMAL ENERGY 2035 [5]	0,1616					

1. LCA emission factor
2. IPPC standard calculated based on a 14,3 g CO_2/kWh
3. Strategy for supply of thermal energy in a centralised system for Bucharest municipality 2023
4. JRC Scientific Information System and Database Report 2022
5. Emission factor calculated based on investments planned for the SACET system

The conversion formula utilized was: **Energy Consumption (MWh/year of specific energy type) * Conversion Factor (for specific energy type) = CO_2 emissions (tons CO_2/year)**
In the public documents consulted, some of the numbers associated with energy consumptions were not expressed in MWh/year, so different conversions were made. Other similar documents were consulted at the national level and the following conversions were utilised in all calculations:
1 tep = 11.63 MWh – in accordance with IEA / OECD standards

Thermal energy expressed in giga calorie: MWh/Gcal = 1.1629 =>
MWh thermal energy = Gcal * 1.1629
(this factor was derived using information from page 204 of the *Strategy for supply of thermal energy in a centralised system for Bucharest municipality,* 2023)

Natural gas energy expressed in cubic meters: MWh/cubic meter of natural gas = 0.0095361 =>
MWh natural gas = cubic meters * 0.0095361
(calculations for a natural gas density of 0.717 kg/m3 and a net caloric power of 13.3 MWh/tone taken from PAED Oradea page 78)

Diesel energy expressed in tons/year: MWh / tone diesel = 11.9 =>
MWh diesel = tons diesel per year * 11.9
(net caloric power taken from PAED Oradea page 78)

Gasoline energy expressed in tons/year: MWh / tone gasoline = 12.3 =>
MWh gasoline = tons gasoline * 12.3
(net caloric power taken from PAED Oradea page 78)

Other Net caloric power for different types of fuel taken from PAED Oradea page 98

Fuel	**Net caloric power [MWh\t]**
Liquid natural gas	12,3
Gasoline	12,3
Diesel	11,9
Liquified petroleum gas	13,1
Natural gas	13,3
Municipal waste (not biomass)	2,8

GHG EMISSIONS BY SOURCE SECTORS

Indicate the base year: 2021
Indicate the unit: tons CO_2/year

Table 3. GHG emissions by source sectors

	SCOPE 1	SCOPE 2	SCOPE 3*	TOTAL
BUILDINGS	0.00[1]	4,467,616.06	0.00	**4,467,616.06**
TRANSPORT	1,606,989.08	126,978.86	2,309.26	**1,736,277.21**
WASTE	3,603.17	53,788.28	17,590.83	**340,948.48[2]**
INDUSTRIAL PROCESS AND PRODUCT USE (IPPU)	0.00	215,217.62	1,379,299.03	**1,594,516.64**
AGRICULTURAL, FORESTRY AND LAND USE (AFOLU)	9,176.41	6,000.47	12.76	**15,189.67**
TOTAL	**1,619,768.67**	**4,869,601.29**	**1,399,211.91**	**8,154,548.06**

1. Although the Buildings sector had a Scope 1 electrical energy consumption, that was energy produced from solar panels locally, so the emissions associated with that energy are 0.
2. The total emissions associated with energy consumption for the waste sector are 74,982.28 tons CO_2/year. However, the landfill where the waste was deposited generated an additional 265,966.20 tons CO_2/year that is not associated with energy consumption. That amount was factored into the total emissions resulting in a total of 340.948,48 tons CO_2/year.

PLANNED ACTIONS BY SOURCE SECTORS

Table 4. Planned actions by source sectors

BASE YEAR: 2035	SCOPE 1 tCO2/year	SCOPE 2 tCO2/year	SCOPE 3 tCO2/year
BUILDINGS	0.00	4.112.194,42	0.00
Retrofit of public buildings	0	97.782,37	0
Moderate or deep energy renovation of private residential buildings	0	1.618.821,41	0
Urban renewal of public spaces to reduce UHI effect	0	3.195,49	0
Development of a energy efficient district heating system	0	810.823,18	0
Developing green-blue infrastructure for carbon storage	0	1.397.256,25	0
RES Generation	0	67.995,62	0
Consolidation of climate governance at urban and metropolitan level	0	5.934,37	0
Local NetZero Coalition	0	5.317,44	0
Enhancing community engagement for climate neutrality	0	12.407,37	0
Public art for climate-neutral neighbourhoods	0	1.772,48	0
Green Solutions Markets & Climate-neutrality hackathons	0	5.317,44	0
TRANSPORT	1.404.943,66	-37.551,94	1.238,30

BASE YEAR: 2035	SCOPE 1 tCO2/year	SCOPE 2 tCO2/year	SCOPE 3 tCO2/year
Development and modernization of green public transport	768.010,65	-82.254,46	1.051,05
Promoting of low-carbon urban mobility, especially cycling and walking	107.928,30	0.00	150,42
Parking and traffic management systems to limit transport-related GHG emissions	10.806,35	13,72	15,07
Urban renewal of public spaces to reduce UHI effect	10.291,76	0.00	14,35
Modernization of the public lighting system to reduce energy consumption	1.029,18	4.975,90	1,43
Developing green-blue infrastructure for carbon storage	502.589,19	39.712,90	0.00
Local NetZero Coalition	1.029,18	0.00	1,43
Enhancing community engagement for climate neutrality	1.886,82	0.00	2,63
Public art for climate-neutral neighbourhoods	343,06	0.00	0,48
Green Solutions Markets & Climate-neutrality hackathons	1.029,18	0.00	1,44
WASTE	**1.439,46**	**57.328,52**	**734,57**
Completion and consolidation of the circular economy system	309,68	39.939,69	712,39
Developing green-blue infrastructure for carbon storage	1.126,90	16.822,40	0.00
Local NetZero Coalition	2,16	424,83	0.00
Enhancing community engagement for climate neutrality	0,72	141,61	22,19
INDUSTRIAL PROCESS AND PRODUCT USE (IPPU)	**0.00**	**135.344,82**	**860.160,11**
Development of a energy efficient district heating system	0.00	0.00	731.847,79
RES generation	0	0	28.312,32
Developing green-blue infrastructure for carbon storage	0.00	67.309,76	0
Local NetZero Coalition	0.00	58.315,77	100.000
Enhancing community engagement for climate neutrality	0.00	9.719,29	0.00
AGRICULTURAL, FORESTRY AND LAND USE (AFOLU)	**2.876,37**	**4.708,55**	**4,01**
Developing green-blue infrastructure for carbon storage	2.869,94	1.876,66	4,00
Local NetZero Coalition	5,51	2.477,66	0,01
Enhancing community engagement for climate neutrality	0,92	354,23	0.00

Annex 7 contains explanations regarding the estimated energy and CO_2 reductions for each individual action.

Table 5. Emissions gap

	BASELINE EMISSIONS 2021		BASELINE EMISSIONS REDUCTION TARGET 2035		EMISSIONS REDUCTION FROM ACTION PLAN		RESIDUAL EMISSIONS (EMISSIONS 2035)		Target achievement
	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)
BUILDINGS	4,467,616.06	54.79%	3,574,092.85	80%	4,112,194.42	**92.04%**	355,421.64	22.06%	538,101.57
TRANSPORT	1,736,277.21	21.29%	1,389,021.77	80%	1,368,630.03	**78.83%**	367,647.18	22.82%	-20,391.74
WASTE	340,948.48	4.18%	272,758.78	80%	59,502.56	**17.45%**	281,445.92	17.47%	-213,256.22

	BASELINE EMISSIONS 2021		BASELINE EMISSIONS REDUCTION TARGET 2035		EMISSIONS REDUCTION FROM ACTION PLAN		RESIDUAL EMISSIONS (EMISSIONS 2035)		Target achievement
	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)
INDUSTRIAL PROCESS AND PRODUCT USE (IPPU)	1,594,516.64	19.55%	1,275,613.32	80%	995,504.93	**62.43%**	599,011.72	37.18%	-280,108.39
AGRICULTURE, FORESTRY AND LAND USE (AFOLU)	15,189.67	0.19%	12,151.74	80%	7,588.93	**49.96%**	7,600.75	0.47%	-4,562.81

After implementing the actions proposed in this plan, the following conclusions can be drawn:

- BUILDINGS: The total reduction exceeds the 80% target by 538,101.57 tons CO_2, resulting in 355,421.64 tons CO_2 residual emissions for this sector.
- TRANSPORT: The total reduction falls short of the 80% target by 20,391.74 tons CO_2, resulting in 367,647.18 tons CO_2 residual emissions for this sector.
- WASTE: The total reduction falls short of the 80% target by 213,256.22 tons CO_2, resulting in 281,445.92 tons CO_2 residual emissions for this sector.
- IPPU: The total reduction falls short of the 80% target by 280,108.39 tons CO_2, resulting in 599,011.72 tons CO_2 residual emissions for this sector.
- AFOLU: The total reduction falls short of the 80% target by 4,562.81 tons CO_2, resulting in 7,600.75 tons CO_2 residual emissions for this sector.

Overall: All actions combined exceed the 80% target by 80,442.46 tons CO_2, resulting in 1,550,467.15 tons CO_2 residual emissions to be tackled in order to achieve full net-zero status.

Figure 11. Current policies and strategies supporting climate neutrality goals

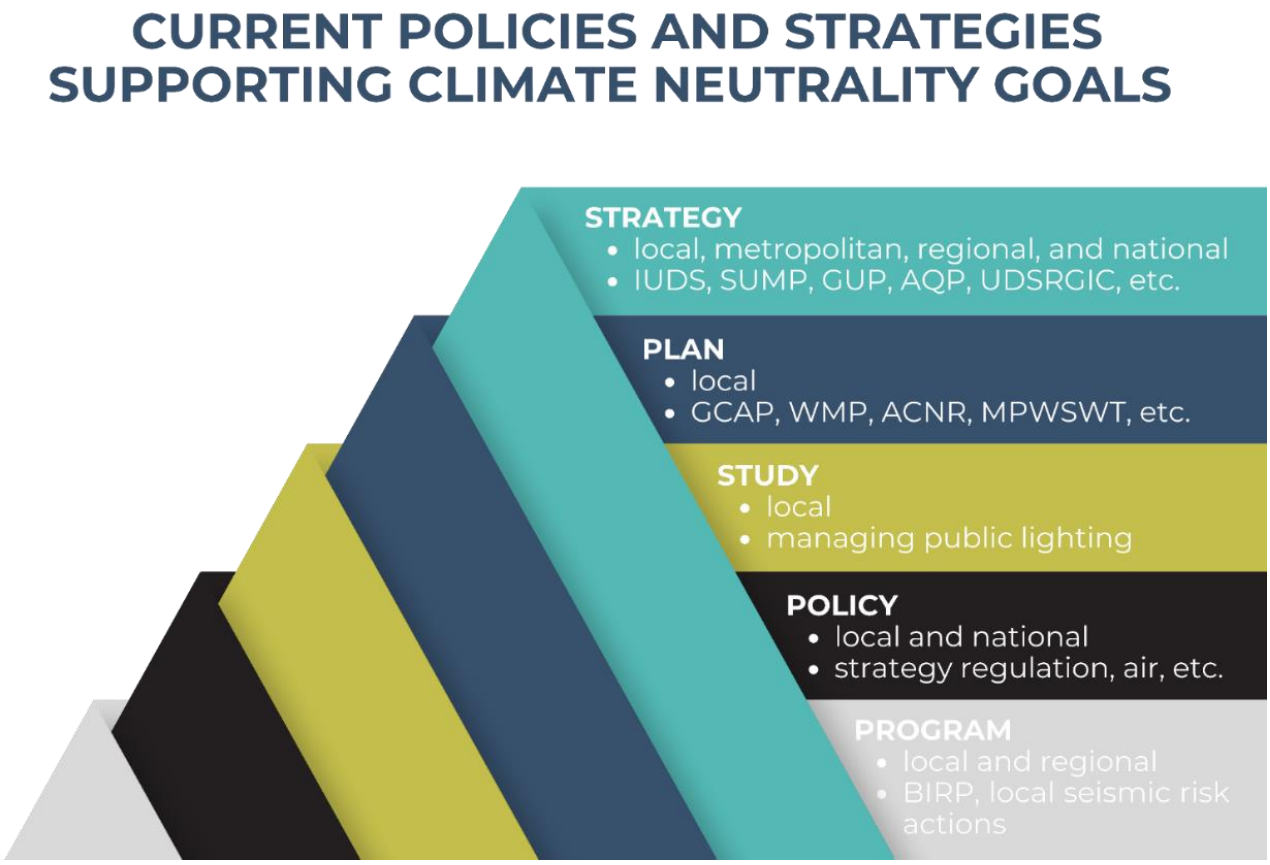


Table 6. Current policies and strategies

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
STRATEGY	LOCAL / METROPOLITAN	INTEGRATED URBAN DEVELOPMENT STRATEGY (IUDS) 2021-2030	The purpose of the IUDS is to identify the best solutions for aligning the capital with the standards of major European and global metropolises. It identifies needs, sets strategic objectives and proposes interventions with short, medium, and long-term impacts. The IUDS was developed at the level of the metropolitan area and places a strong emphasis on the transition to climate neutrality. The strategy formulates a vision for Bucharest in 2050, in which the city will be a competitive European capital, renowned internationally as a regional economic and financial hub, and the most attractive bridge between the West and the East, promoting its diversity and dynamism in a clean, carbon-free environment.	Specific Objective 3 (Sustainable City - Conservation of natural heritage, reduction of pollution and greenhouse gas emissions, and limitation of risk impacts) is directly relevant to the Climate Neutrality Action Plan. The key areas of intervention are: Improving the energy performance of public and private buildings, rehabilitation of the district heating system, modernisation of public lighting systems, efficient waste management and promoting the transition to a circular economy, reducing pollution and improving air, water, and soil quality, conservation of natural heritage and development of green infrastructure, enhancing the capital's capacity to adapt to climate change, risk prevention, and emergency management.	The IUDS provides strategic direction for achieving a climate-neutral metropolitan area, but there is a major gap in terms of linking investments with their impact on reducing CO_2 emissions. Therefore, a comprehensive inventory of baseline emissions was established, and the contribution of interventions included in the Climate Neutrality Action Plan to reduce emissions was estimated. Considering limitations in the availability of data, the Plan also highlights recommendations for future data collection, requiring high granularity, as well as extending the inventory to include all types of Scope 3 emissions, by 2035.
STRATEGY	LOCAL	GENERAL URBAN PLAN OF BUCHAREST (1999) - CURRENTLY UNDER UPDATE	The GUP defines land use, zoning regulations, infrastructure, housing, transportation, and green spaces, aiming to guide urban growth in a sustainable manner. As the GUP dates back to 1999, an updated version is expected to be completed in 2025.	The General Urban Plan provides key information on land use and functions, as well as an inventory of public buildings, organised by their functions. The comprehensive list of public buildings provided by the GUP was used to estimate emissions, in correlation with data on total energy consumption for the Buildings sector.	The General Urban Plan Is currently undergoing an update (expected completion in 2025). Updated data on land use and public buildings should be built into an integrated GIS database, to support the monitoring of emissions from the Buildings sector. Measures proposed by the Climate Neutrality Action Plan to reduce emissions focus on sustainable mobility and integrated planning at metropolitan level.

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
PLAN	LOCAL	GREEN CITY ACTION PLAN (2023)	Green Cities Action Plans (GCAP) are a part of the EBRD's efforts to support the sustainable development of cities. It supports cities to identify, benchmark, prioritize and invest in Green City measures to improve urban environmental performance.	The plan identifies specific challenges related to sustainable development and provides a political and economic plan for investments and policies. It also highlights the need for a comprehensive inventory of emissions by sector, and of an action plan for reducing emissions at the level of Bucharest Municipality.	The Climate Neutrality Action Plan will develop the baseline inventory of CO_2 emissions (based on energy requirements / sector) estimated in the Green City Action Plan, a set of interventions and their impact on reducing emissions. It is also accompanied by an Investment Plan.
POLICY	LOCAL	CONSERVATION OF NATURAL HERITAGE AND DEVELOPMENT OF GREEN INFRASTRUCTURE	The policy substantiates the Strategic Objective 3 (Sustainable city) of the Integrated Urban Development Strategy of Bucharest 2021-2030.	The sectoral policy provides for actions regarding the protection and sustainable exploitation of protected natural areas and degraded ecosystems and the expansion of the network of green spaces, including through the reconversion of degraded/abandoned lands.	The policy is an integral part of the Climate Neutrality Action Plan. In addition, the contribution of key sectoral interventions included in the CNAP to reduce CO_2 emissions was estimated.
POLICY	LOCAL	IMPROVING THE ENERGY PERFORMANCE OF PUBLIC AND PRIVATE BUILDINGS	The policy substantiates the Strategic Objective 3 (Sustainable city) of the Integrated Urban Development Strategy of Bucharest 2021-2030.	The sectoral policy provides for actions regarding the rehabilitation of public and private buildings.	The policy is an integral part of the Climate Neutrality Action Plan. In addition, the contribution of key sectoral interventions included in the CNAP to reduce CO_2 emissions was estimated.
POLICY	LOCAL	MODERNIZATION AND INCREASE OF ENERGY EFFICIENCY OF THE PUBLIC LIGHTING SYSTEM	The policy substantiates the Strategic Objective 3 (Sustainable city) of the Integrated Urban Development Strategy of Bucharest 2021-2030.	The sectoral policy provides for actions regarding the modernization of the public lighting infrastructure in order to reduce energy consumption and increase the quality of the service, and expansion and modernization of the architectural lighting infrastructure.	The policy is an integral part of the Climate Neutrality Action Plan. In addition, the contribution of key sectoral interventions included in the CNAP to reduce CO_2 emissions was estimated.
POLICY	LOCAL	ENSURING EFFICIENT WASTE MANAGEMENT AND PROMOTING THE TRANSITION TO	The policy substantiates the Strategic Objective 3 (Sustainable city) of the Integrated Urban Development Strategy of Bucharest 2021-2030.	The sectoral policy provides for actions regarding improving preparation for the reuse and recycling of collected municipal waste, developing municipal waste treatment capacities	The policy is an integral part of the Climate Neutrality Action Plan. In addition, the contribution of key sectoral interventions included in the CNAP to reduce CO_2 emissions

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
		A CIRCULAR ECONOMY		and improving public sanitation services.	was estimated.
POLICY	**LOCAL**	**REDUCTION OF POLLUTION AND IMPROVEMENT OF AIR, WATER AND SOIL QUALITY**	The policy substantiates the Strategic Objective 3 (Sustainable city) of the Integrated Urban Development Strategy of Bucharest 2021-2030.	The sectoral policy provides for actions regarding improved air quality, enhanced surface and groundwater quality, reduced noise pollution, and improved water supply and wastewater management services.	The policy is an integral part of the Climate Neutrality Action Plan, in particular through transport related actions that contribute to better air quality. In addition, the contribution of key sectoral interventions included in the CNAP to reduce CO_2 emissions was estimated.
POLICY	**LOCAL**	**IMPROVING THE CAPACITY TO ADAPT TO CLIMATE CHANGE, RISK PREVENTION AND EMERGENCY MANAGEMENT**	The policy is included in the Integrated Urban Development Strategy of Bucharest 2021-2030, Strategic Objective 3. Sustainable city.	The sectoral policy provides for actions regarding increasing resilience to extreme weather phenomena associated with climate change, flood risk prevention, and improving emergency response capacity.	The policy is an integral part of the Climate Neutrality Action Plan. In addition, the contribution of key sectoral interventions included in the CNAP to reduce CO_2 emissions was estimated.
PROGRAM	**LOCAL**	**LOCAL ACTION PROGRAMS FOR CONSOLIDATION OF BUILDINGS WITH SEISMIC RISK**	The development of Local Action Programs is the responsibility of the Municipal Administration for the Consolidation of Buildings with Seismic Risk. The programs are financed from the local budget of the Municipality of Bucharest, from its own revenues, as well as, as the case may be, from funds from the state budget, established by Decision of the General Council of the Municipality of Bucharest.	Bucharest is among the top ten cities in the world with the highest vulnerability to seismic risk. The database of the Municipal Administration for the Consolidation of Seismic Risk Buildings there are 2,794 buildings classified in the first, second or emergency seismic risk class (2024). However, a comprehensive rapid evaluation is envisioned at national level by the National Strategy for the Reduction of Seismic Risk (adopted in 2022). The implementation of the consolidation program comes with major co-benefits for CO_2 emissions reduction, as well as affordability, and comfort for residents.	The implementation of the consolidation program is critical to achieving climate neutrality in the buildings sector. Interventions in the CNAP include the consolidation, rehabilitation and increase of energy efficiency of public healthcare buildings with seismic risk, along with moderate or deep energy renovations of public and cultural buildings, educational institutions, and private residential buildings.
STRATEGY	**REGIONAL**	**SUSTAINABLE URBAN MOBILITY PLAN - BUCHAREST-ILFOV REGION 2016-2030**	The Mobility Plan outlines the municipality's strategies to enhance mobility and reduce transport emissions. It	Bucharest is the city with the highest congestion levels in Europe (TomTom, 2014), with a 53.5% modal share of cars in 2015. In addition to in-boundary	Acknowledging the critical state of mobility in Bucharest and its impact on air quality and overall health (in particular due to

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
			focuses on key actions such as promoting alternative (non-motorized) and public transportation, developing intermodal hubs, and systematizing street infrastructure. These measures aim to improve overall transport efficiency and sustainability in the city.	traffic, the SUMP highlights that a significant number of vehicles from Ilfov County or from outside the region enter Bucharest daily, resulting in high traffic volumes and congestion. The plan includes measures such as park and rides, extending and improving tram, metro and bus transport, as well as extending and improving cycling lanes for transport purposes.	extensive car reliance), the CNAP includes new infrastructure projects that are expected to have a significant effect on reducing GHG emissions and congestion. These include interventions such as the construction of new subway lines or the operationalization of the Bucharest-Ilfov metropolitan train.
STRATEGY	LOCAL	INTEGRATED AIR QUALITY PLAN IN THE CITY OF BUCHAREST - PICA (2018-2022) AND PLAN FOR MAINTAINING OF AIR QUALITY FOR BUCHAREST MUNICIPALITY (2018 – 2022)	The plan is part of a legal requirement under national legislation, which mandates municipalities to implement an integrated air quality plan and a plan for maintaining air quality. However, the adoption of new plans is required, as their implementation timeframe has expired. The new PICA 2025-2029 is being updated.	Air quality is a critical issue in Bucharest, as it directly affects public health and the environment. The city's high levels of particulate matter (PM10) have led to legal action by the EU, which referred Romania to the European Court of Justice for non-compliance with air quality standards.	The Climate Neutrality Action Plan targets all sectors that contribute to low air quality in Bucharest. Of particular relevance are the Transport and Waste sectors, with key interventions aimed at reducing traffic congestion and landfilling also expected to have a positive impact on air quality.
PLAN	LOCAL	WASTE MANAGEMENT PLAN OF THE MUNICIPALITY OF BUCHAREST (2019 – 2025)	As the main planning tool for ensuring effective local waste management, the Plan focuses on ensuring minimal environmental and human health impact, and minimal resource and energy consumption. It follows the waste hierarchy at the operational level, involving: waste prevention, preparation for reuse, recycling, recovery, and, as the least preferred option, disposal (including landfilling and incineration without energy recovery).	The Bucharest Waste Management Plan offers detailed information on the quantities of waste collected, treated and landfilled, with 2019 as a baseline year. The waste flow diagram was used to estimate energy requirements and emissions associated with the different processes (collection, sorting, composting, recycling, biological treatment, and landfilling).	Taking into account the stringent targets at EU level and building on the sectoral strategies and master plan, the Climate Neutrality Action Plan outlines a combination of practical and strategic measures. These included strengthening the circular economy (thus reducing quantities of generated waste) and promoting sustainable waste management, including the creation of voluntary intake centres for specific waste types. Digital tools will be introduced
PLAN	LOCAL		The Master Plan	The Master Plan highlights	

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
		MASTER PLAN FOR THE INTEGRATED WASTE MANAGEMENT SYSTEM IN BUCHAREST (2017-2046)	proposes a strategy for Bucharest's waste management, including a long-term investment plan to meet the targets outlined in Romania's EU Accession Treaty.	that although Bucharest represents about 9% of Romania's population, it generates 20% of the total national waste. Municipal waste generation stands at 0,9 kg per capita per day (national urban average: 0,66 kg). Additionally, the annual municipal waste generation per capita in Bucharest is 562 kg (EU-28 average: 476 kg)	to optimise waste collection and processing, contributing to a reduced rate of landfilled waste and less energy demand for waste management processes. To support the monitoring of the Climate Neutrality Action Plan, strategies and plans for the Waste sector should be updated with post-2021 data to ensure consistency in emissions reporting, with annual public reports providing a detailed breakdown of waste management processes.
STRATEGY	LOCAL	THE MEDIUM- AND LONG-TERM DEVELOPMENT AND OPERATION STRATEGY FOR THE SANITATION SERVICE 2014-2030	The strategy establishes the development directions for the sanitation service in Bucharest for 2014-2030 and builds on other strategic documents, including the Waste Management Plan for the Municipality of Bucharest.	Among key interventions by 2025, the strategy focuses on increasing separate collection rates and an integrated collection and transport system based on a minimum of 4 fractions (biodegradable waste, paper-cardboard waste, plastic waste, and glass/metal waste).	
STRATEGY	LOCAL	ENERGY STRATEGY OF THE MUNICIPALITY OF BUCHAREST (2007-2030)	The Energy Strategy includes an analysis of the current situation, recommended strategic solutions and demand forecast. Special attention is given to the areas of energy supply, where the Bucharest City Hall is considered responsible, namely the heating system and urban transport.	The strategy estimates the energy demand for heating (centralised heating system, individual systems powered by natural gas, and other individual heating solutions), electricity, energy for transportation and other types of consumed energy. It focuses on the parameters that impact demand and provides three scenarios. Considering that data was collected in 2007, it was a secondary resource for developing the Climate Neutrality Action Plan.	The Energy Strategy for Bucharest was developed in 2007 and provided an overview of the city's energy situation and long-term consumer needs, outlining municipal objectives and development targets to be achieved. An updated baseline of energy demand was developed as part of the CNAP, following the methodology of the M100 Mirror Mission Hub. For establishing the baseline, a detailed analysis was performed at sectoral level, supported by local, national and international strategic documents.
STRATEGY	LOCAL	STRATEGY FOR THE SUPPLY OF THERMAL ENERGY IN A CENTRALIZED	The strategy outlines actions to meet short, medium, and long-term objectives for thermal energy supply	The Strategy analyses the district heating system of Bucharest and provides information on the energy requirement of the	Data on the energy requirement of the district heating system and consumer categories, cross-

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
		SYSTEM FOR CONSUMERS IN THE MUNICIPALITY OF BUCHAREST (2018-2028-2038)	management in Bucharest. Key goals include ensuring continuous, high-quality energy supply, improving efficiency, modernising the heating system using various funding sources, decarbonising the system, incorporating renewable resources, and promoting private investment in the centralized heating network (SACET).	centralised district heating system of Bucharest in 2021 and consumer categories. It comprises the key investment objectives for modernizing the network, analyses the thermal energy demand of the city and renewable energy resources, as well as the thermal rehabilitation of residential buildings. Long, medium and short term measures are formulated.	referenced with additional data on energy consumption enabled the estimation of the energy requirements for the residential, public and tertiary buildings in 2021, as part of the CNAP. Collaboration with energy distributors and auditors is essential to determine the average annual energy requirements per sqm for various building types, providing a comprehensive understanding of energy use patterns.
STUDY	LOCAL	STUDY REGARDING THE WAY OF MANAGING THE PUBLIC LIGHTING SERVICE IN THE MUNICIPALITY OF BUCHAREST (2019)	The study outlines the technical, legal and economic aspects related to the management of the public lighting system. The objective is to identify the most optimal management solutions. The study also covers strategic planning, investment programs and infrastructure modernisation.	The study provides information on the total energy consumption of all lighting points in Bucharest in 2016, detailing their technologies (sodium, mercury, halogen, and LED).	Public lighting is not a major source of emissions but is one of the areas where public authorities have a direct impact. Updated information on total energy consumption of lighting points is required for monitoring, as systems are modernised.
PLAN	LOCAL	MASTER PLAN FOR THE WATER SUPPLY AND WASTEWATER TREATMENT IN BUCHAREST, INCLUDING THE LONG-TERM INVESTMENT PLAN 2019 – 2049	The plan outlines key actions for improving water supply and wastewater treatment in Bucharest. It focuses on ensuring continuous, hazard-resistant water supply, reducing pipeline losses, and achieving full coverage for drinking water. In wastewater treatment, priorities include addressing flooding, extending the sewage system to new areas, reducing infiltration, and enhancing environmental protection.	The recommendations of the Master Plan related to wastewater treatment (relevant for the Waste sector of this Action Plan) include expanding the sewage system to newly developed areas in Bucharest, reducing infiltration levels in the system, and enhancing environmental protection.	In addition to the energy demand of wastewater treatment processes referenced in the Climate Neutrality Action Plan, particular attention should be given to account for associated methane emissions. Collaboration with the operators of the water treatment facility will be key to ensure that methane emissions are monitored transparently and limited to the greatest extent possible.

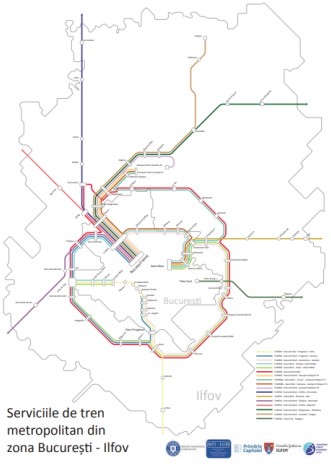
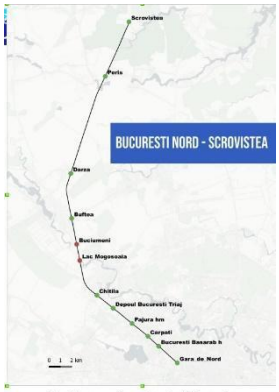
TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
PLAN	LOCAL	ACTION PLAN FOR NOISE REDUCTION IN THE MUNICIPALITY OF BUCHAREST	The action plan outlines noise reduction solutions based on noise sources, conflict zones, and areas with significant exceedances of acoustic limits. It includes noise maps for road and rail-tram traffic, estimating the number of people benefiting from noise reduction measures based on exposure levels to environmental noise.	The Plan includes solutions for reducing noise related to transport, including reducing speed limits, narrowing of lanes, developing the public transport system, and diverting heavy traffic, and measures for conserving quiet areas. Therefore, the implementation of the Action Plan for Noise Reduction directly contributes to reducing CO_2 emissions.	The Climate Neutrality Action Plan includes several interventions in the Transport sector that will also support the achievement of noise reduction objectives.
PROGRAM	REGIONAL	BUCHAREST ILFOV REGIONAL PROGRAMME 2021-2027	The BI Regional Programme 2021-2027 builds on a vision to enhance the competitive potential by fostering a sustainable, inclusive, and attractive environment for residents and businesses.	The programme guides investments from EU funds in climate neutrality by increasing energy efficiency, reducing CO_2 emissions, and addressing climate challenges. It details the priorities, objectives, actions, and indicators required to achieve the development vision for the region.	While the Climate Neutrality Action Plan was developed at the level of the Municipality of Bucharest, interventions are intrinsically linked with regional development objectives. Waste management facilities, development and enhancement of the fortification ring, Colentina and Dambovita corridors, large scale protected areas, the city's green belt, water supply and transport infrastructure projects, have a clear supra-local impact and are expected to support the sustainable development of the region. To promote this alignment, working closely with regional actors, starting with the Regional Development Agency, will be key for the implementation of
STRATEGY	REGIONAL	. REGIONAL DEVELOPMENT PLAN OF THE BUCHAREST-ILFOV REGION. BUCHAREST ILFOV REGIONAL DEVELOPMENT STRATEGY	The Regional Development Plan of the BI Region is a programming and coordination instrument that sets the development priorities. The Bucharest-Ilfov Regional Strategy 2021-2027 is a component of the RDP. The vision of the strategy is to build on the role of the Bucharest-Ilfov Region as an engine of Romania's economic and social development, consolidating the territory's position among the capital Regions of Europe.	The RDP sets the strategic foundation for integrating regional measures and projects into future funding programmes. It aligns with the programming period for EU Structural Funds which will be key to implementing the interventions in the Climate Neutrality Action Plan. The CNAP is also aligned with the development vision of the region. By 2030, the Bucharest-Ilfov Region aims to have a more competitive and innovation-oriented economy, based on a greener, sustainable and energy-efficient development model. This vision is supported by five strategic objectives connected to key regional challenges, including *A*	

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
				greener and resilient region.	the Plan.
STRATEGY	NATIONAL	NATIONAL INTEGRATED URBAN DEVELOPMENT STRATEGY FOR RESILIENT, GREEN, INCLUSIVE AND COMPETITIVE CITIES 2022-2035 (ROMANIA URBAN POLICY)	The first Urban Policy of Romania (RUP) was adopted in 2021, transposing the new Leipzig Charter through its four objectives (green & resilient, just & inclusive, competitive & productive & well governed cities).	The second priority of the RUP is 'Creating liveable and climate-smart cities, by developing green-blue infrastructure to mitigate and adapt to urban risks'. The RUP includes measures related to climate adaptation and mitigation, reducing air pollution and improving sustainable urban mobility.	All planned interventions for Bucharest are fully aligned with the objectives and priorities outlined in Romania's Urban Policy.
POLICY STRATEGY REGULATION	NATIONAL	SEE GCAP - POLICY AND URBAN FRAMEWORK REPORT	The Green City Action Plan includes a screening of national policies, strategies and regulations based on specific indicators.	The national framework has a direct impact on local regulations, programs and policies, as well as investments. While national targets for reducing emissions, a plan estimating the emissions baseline and reduction targets for the Municipality of Bucharest was missing.	Romanian cities do not have binding emissions reduction targets but are influenced by sectoral policies like the Long-Term Strategy and the National Energy and Climate Plan. The development of the CNAP reflects a voluntary effort, following the expression of interest and selection of the city as part of the M100 Mirror Mission Cities Hub.

ACTION PORTOFOLIO

Table 7. Individual actions

ACTION TITLE	**1. DEVELOPMENT AND MODERNIZATION OF GREEN PUBLIC TRANSPORT**
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Metropolitan area
FIELD OF ACTION	MOBILITY AND TRANSPORT
SYSTEMIC LEVER	Technology/ Infrastructure
EMISSION DOMAIN(S)	Transport
COVERED INTERVENTIONS	Development and modernisation of surface green public transport 1. Implementation of the Bucharest - Ilfov metropolitan train project 2. Modernizing the existing tram / trolleybus / bus depots and increasing the parking capacity for public transport 3. Passenger information system in public transport stations 4. Integrated ITS system for public transport in the Bucharest-Ilfov region (public transport management) 5. Ticketing system for implementing the MaaS concept, including mobile interface 6. Making public transport stations accessible for people with motor disabilities 7. Fast charging stations for electric buses

	8. Modernization of public transport fleet 9. Modernization and expansion of the trolleybus network on several sections 10. Modernization and extension of Bucharest's tram network (line and public stations) Development and modernisation of underground green public transport 11. Construction of M4 (second phase) and M6 metro lines, including rolling stock
BRIEF DESCRIPTION	**Development and modernisation of surface green public transport** The implementation of the **Bucharest-Ilfov metropolitan train action** involves modernising existing stations, establishing new stations and transforming them into intermodal hubs. The project, initiated by TPBI[4], has the following objectives: 1. Use of the existing railway infrastructure; 2. Reconstruction of disused railway lines located on public state-owned land and construction of new railway lines to ensure balanced service coverage across the city. Preparations are underway to start developing services on parts of the northern rail ring. Additionally, the phased acquisition of rolling stock suitable for metropolitan train services on prioritized routes is planned.  Serviciile de tren metropolitan din zona București - Ilfov   Harta traseului prioritar București Gara de Nord – Chitila – Scrovistea **Modernizing the existing tram / trolleybus / bus depots and increasing the parking capacity for public transport action** seeks to modernize the existing tram, trolleybus, and bus depots in Bucharest, with the goal of expanding parking capacity and upgrading infrastructure to support the growing fleet of electric public transport vehicles. By 2024, 100 new trams, 100 new trolleybuses and 100 new electric buses have been put into operation, creating the need for expanded and modernized depot facilities to accommodate the new fleet. The modernization will focus on enhancing operational efficiency, improving maintenance capabilities and ensuring the long-term sustainability of the public transport system. Additionally, the project will increase parking capacity at the depots, enabling the optimal management and storage of the expanded electric vehicle fleet, while furthering the city's commitment to promoting cleaner and more sustainable public transport options. **Passenger information system in public transport stations** seeks to implement a comprehensive Passenger Information System (PIS) across public transport stations in Bucharest. This system will deliver real-time information to passengers regarding the arrivals, departures and schedules of trams, trolleybuses and buses. The primary objective is to enhance the passenger experience by providing accurate, up-to-date information on transport services, improving accessibility and fostering better communication within the public transport network. The installation of digital displays, automated announcements and other technological solutions will enhance efficiency, transparency and convenience for passengers, supporting the city's broader efforts to modernize and improve public transport infrastructure. **Integrated ITS system for public transport in the Bucharest-Ilfov region (public transport management) -** the action aims to implement an Intelligent Transport System (ITS) to optimise

[4] https://tpbi.ro/file/2021/09/TMBIfPrezentare_StadiuProiectAugust2021.pdf

and enhance the efficiency of public transport services within the Bucharest-Ilfov region. The ITS solutions will facilitate real-time monitoring, management and coordination of public transport operations by employing modern technologies such as GPS tracking systems, automated dispatching, fleet management and passenger information systems.

The implementation of this project will contribute to the modernisation of transport infrastructure in the region, facilitating urban mobility and encouraging the use of public transport as a sustainable alternative to private vehicles.

Ticketing System for the Implementation of the MaaS Concept, including mobile interface - the action centres on the development of an advanced ticketing system to facilitate the implementation of the Mobility as a Service (MaaS) concept. By integrating various modes of transport into a single, unified platform, it offers users a seamless and efficient travel experience. A key feature of the project is the mobile interface, which enables users to easily plan, book and pay for multimodal journeys. This initiative marks a significant step towards creating a smart and interconnected transport ecosystem, promoting the adoption of efficient, flexible and environmentally sustainable mobility solutions.

Making public transport stations accessible for people with motor disabilities - the action aims to enhance the accessibility of public transport stations, ensuring they are fully adapted to meet the needs of individuals with motor disabilities. Key measures include the installation of ramps, lifts, tactile paving and other assistive infrastructure to enable safe and independent access to stations and vehicles. This initiative promotes inclusive mobility, providing equal opportunities for all passengers to use public transport comfortably and efficiently, while supporting a more accessible and equitable urban transport system.

Fast charging stations for electric buses - the action focuses on the development and deployment of fast charging stations to support the operation of electric buses. These stations are specifically designed to reduce charging times, ensuring efficient fleet management and uninterrupted service. This initiative plays a key role in the decarbonisation of public transport, promoting cleaner, more sustainable mobility solutions while enhancing the efficiency and reliability of electric bus operations.

Modernization of public transport fleet - the action involves the acquisition of **modern trams**, alongside the purchase of **non-polluting buses** and **autonomous trolleybuses**. These new vehicles are designed to enhance the efficiency, reliability and sustainability of public transport services.

Modernization and expansion of the trolleybus network on several sections - the action focuses on the modernization and expansion of the trolleybus network on several key routes. It includes infrastructure modernization, expansion of coverage to the served areas and increasing operational efficiency.

The expansion of Bucharest's tram network is part of an ambitious initiative to modernize public transportation and enhance urban mobility. Several key interventions are included in this action:

The **south-east middle ring tram line extension** focuses on expanding the tram network along the Southeast Middle Ring, involving the development of new tram lines and stations to link key routes. This extension is a vital part of Bucharest's efforts to reduce congestion and enhance transportation accessibility for its residents.

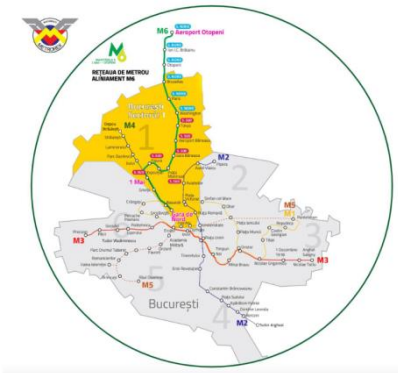
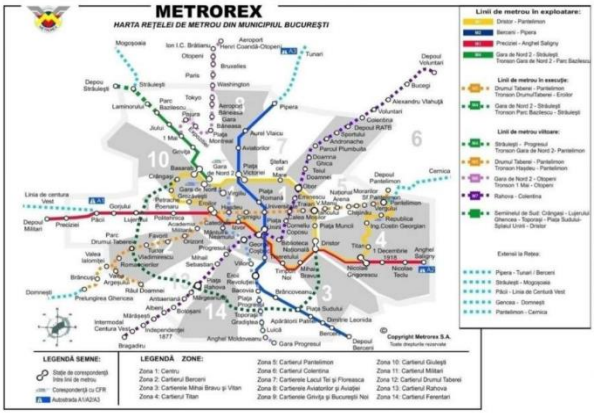
Extension of tram line to Băneasa shopping complex involves extending the tram line from Grațioasă street to the Băneasa shopping complex. This will improve connectivity to a major commercial area, reducing dependence on car travel for both residents and visitors.

Modernization of 50 km of tram infrastructure, action that aims to modernize 50 kilometers of existing tram lines across Bucharest. The focus is on upgrading both the infrastructure and the rolling stock to provide smoother, faster and safer tram services.

Specific extensions are planned for areas such as **Unirii, Gratioasa, Mezes, Median Ring, Delfinului and Doamna Ghica**. These extensions are designed to improve service coverage, providing enhanced connectivity and better serving the urban population.

The **widening of Dimitrie Pompeiu Blvd.** and the expansion of tram infrastructure involve the enlargement of the boulevard to support the enhanced tram network. Additionally, the action includes a breakthrough along Barbu Văcărescu Blvd. and the construction of a connecting road between Pipera and the area near Fabrica de Glucoză.

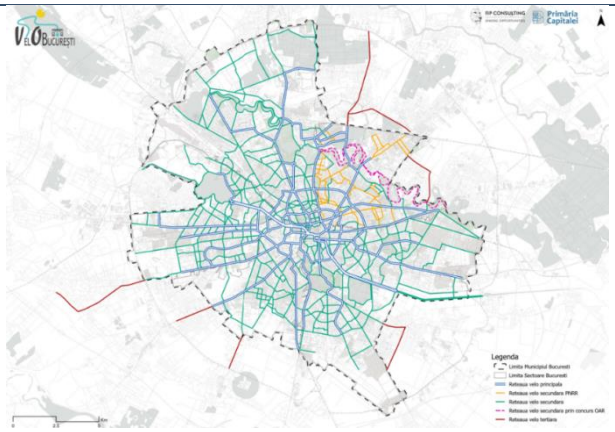
These interconnected actions represent a holistic approach to modernising and expanding

	Bucharest's public transport infrastructure, with a strong emphasis on sustainability, accessibility of all residents and efficiency. The introduction of advanced technologies, including the Integrated ITS and MaaS ticketing system, will optimize transport services further, improving real-time management and fostering a more user-friendly experience. In addition, the acquisition of electric buses, trams and the expansion of fast-charging infrastructure underscores the commitment to cleaner and more sustainable public transport solutions. **Development and modernisation of underground green public transport** **Construction of M4 (second phase) and M6 metro lines, including rolling stock** action includes: **Construction of M6** to connect the metro network with Henri Coanda International Airport **-** this action entails the expansion of Bucharest's metro network through the construction of Line 6, which will provide a direct connection between the city and the airport in Otopeni. The line will span 14,2 km and feature 12 planned stations, ensuring fast and efficient access to the capital's main airport. The project also includes the procurement of 12 new, modern trains to enhance passenger comfort and ensure efficient transportation services. The construction is divided into two phases: Phase 1: From 1 Mai to Tokyo Station (Băneasa shopping complex). Phase 2: From Tokyo Station to Henri Coandă International Airport. This new metro line aims to offer a rapid and sustainable alternative to road transportation, helping to alleviate heavy traffic congestion in northern Bucharest. **The second phase of M4** focuses on extending the metro system between North Station and Progresul Station, improving connectivity between the northern and southern parts of Bucharest. This extension will enhance urban mobility by reducing both road traffic and travel times. The action includes the acquisition of modern, energy-efficient trains, designed to meet increasing transport demands and provide improved travel conditions for passengers.   *Source: magistrala6.ro webpage*[5]
OUTCOME	Higher modal split of surface public transport Better integration of public transport Revitalisation of railway transport for daily commuting purposes Higher modal split of underground public transport Reduced air pollutants (NOx and PM2.5)
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest Municipality (PMB) Bucharest Districts (District 1-6) Romanian Railways (CFR SA) Ministry of Transport and Infrastructure of Romania (MTI) Subway Company (Metrorex SA) Ilfov County Council (CJ Ilfov)
INVOLVED STAKEHOLDERS	Bucharest Transport Company (STB SA) Public domain administrations (PMB & districts) Bucharest – Ilfov Intercommunity Development Association for Public Transport (TPBI) Bucharest Metropolitan Area Intercommunity Development Association (ADIZMB) Metropolitan Building Trust (TCM)

[5] https://magistrala6.ro/en/the-northern-section-of-metro-line-6-has-received-the-building-permit/

	Bucharest-Ilfov Regional Development Agency (ADR BI) Ministry of European Investments and Projects (MIPE) Bucharest Airports National Company (CNAB) National Agency for Environment and Protected Areas (ANMAP) National Environmental Guard (GNM) National Institute for Research and Development in Construction, Urban Planning and Sustainable Territorial Development (URBAN-INCERC) Energy and electric infrastructure & utility companies Private construction companies Universities Citizens Civil society (eg. Metrou Uşor association, mobility, cycling, environmental advocacy groups)
TOTAL BUDGET	€ 7.535.605.130
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	686.807,24 tons CO_2 / year from the Transport Sector
% OF TOTAL CO_2 REDUCTION	10,5%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Transport 1.355.853,4 MWh/year diesel from Scope 1 1.283.023,75 MWh/year gasoline from Scope 1 -282.625,52 MWh/year electrical energy from Scope 2 (increase in electrical energy demand) 3.611,41 MWh/year diesel from Scope 3
TIMELINE (START - END)	2026 - 2035

ACTION TITLE	**2.PROMOTING OF LOW-CARBON URBAN MOBILITY, ESPECIALLY CYCLING AND WALKING**
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Metropolitan Area
FIELD OF ACTION	MOBILITY AND TRANSPORT, blue-green corridor, NBS
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Transport
COVERED INTERVENTIONS	1. Bicycle network extended according to the Master plan, including complementary infrastructure (parking lots, rakes etc.) 2. Establishing a car-sharing system 3. Redevelopment of the Lujerului Railway Crossing by creating a green pedestrian promenade, dedicated to alternative transport 4. Development of the municipal network of recharging stations for EVs (public & private) 5. Expanding pedestrian zones around the city 6. Low Emission Zone
BRIEF DESCRIPTION	The extended **Bicycle network in Bucharest**, as detailed in the Velo Master Plan, focuses on developing 150 km of primary and 415 km of secondary cycling lanes. It also includes complementary infrastructure such as bike parking facilities and repair stations, which aim to support cyclists by providing secure parking and maintenance services. This initiative is designed to promote sustainable urban mobility, enhance the cycling experience and encourage more people to choose cycling as an alternative to car travel.

	 *Source: Bucharest city hall webpage*[6] The **establishment of multiple car-sharing systems** aims at alleviating traffic congestion, reducing emissions and fostering sustainable urban mobility. The municipal car-sharing system plan focuses on integrating car-sharing services with public transport infrastructure, encouraging multimodal travel and prioritising eco-friendly vehicles such as electric and hybrid cars. The **development of Pasaj Lujerului** intervention, involves transforming the area into a **green pedestrian promenade** designed for alternative transportation and relaxation spaces. This intervention includes rehabilitating the existing infrastructure, creating pedestrian walkways, green spaces and cycle paths. Its aim is to promote sustainable urban mobility and alleviate traffic congestion in District 6 of Bucharest. **Development of the public network of recharging stations for EVs** action aims to install 50 charging stations across 11 locations in Bucharest, providing 100 recharging points. The initiative seeks to improve EV infrastructure, support eco-friendly transport, and reduce greenhouse gas emissions. It includes features such as fast charging, compliance with international standards, real-time monitoring and open access. This project promotes the adoption of electric vehicles, contributing to environmental sustainability in the city. This aim is to **expand this network with private electric charging stations** for cars and scooters, by applying technical regulations and other incentives: companies / private investments / new private developments. **Expanding pedestrian zones.** The action is dedicated to transforming the center and other historical neighbourhoods of Bucharest into a sustainable and pedestrian-friendly urban space. This initiative aims to establish a sustainable urban mobility corridor, designed for both pedestrians and cyclists, linking prominent city locations. Designing, promoting and implementing a **Low Emission Zone (LEZ)** across the metropolitan area of Bucharest will gradually restrict the most polluting vehicles from accessing the city, with a clear phase-out calendar that differentiates between fuel types (e.g. diesel, gasoline) and vehicle age. Diesel and older vehicles will face stricter, accelerated restrictions compared to other cars. By gradually phasing out high-polluting vehicles, this action will support Bucharest's climate goals and contribute to cleaner air and a healthier urban environment.
OUTCOME	Higher modal split of low carbon urban trips, especially of walking and cycling Replacement of traditional cars with EVs or hybrids and adoption of car sharing Reduced air pollutants (NOx and PM2.5)
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest Municipality (PMB) Bucharest Districts (District 1-6) Ilfov County Council (CJ Ilfov) Private entities
INVOLVED STAKEHOLDERS	Public domain administrations (PMB & districts) Bucharest Metropolitan Area Intercommunity Development Association (ADIZMB) Metropolitan Building Trust (TCM) Bucharest-Ilfov Regional Development Agency (ADR BI) Ministry of European Investments and Projects (MIPE) National Agency for Environment and Protected Areas (ANMAP) National Environmental Guard (GNM)

[6] https://doc.pmb.ro/institutii/primaria/directii/directia_investitii/2024/20240809/velo/12_retea_magistrala_secundara.pdf

	National Institute for Research and Development in Construction, Urban Planning and Sustainable Territorial Development (URBAN-INCERC) Energy and electric infrastructure & utility companies Universities Citizens Civil society (mobility, cycling, environmental advocacy groups)
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 465.000.000 108.078,72 tons CO_2/year from the Transport Sector
% OF TOTAL CO_2 REDUCTION	1,65%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Transport • 189.711,91 MWh/year diesel from Scope 1 • 181.128,67 MWh/year gasoline from Scope 1 • 516,85 MWh/year diesel from Scope 3
TIMELINE (START - END)	2026-2035

ACTION TITLE	**3.PARKING AND TRAFFIC MANAGEMENT SYSTEMS TO LIMIT TRANSPORT-RELATED GHG EMISSIONS**
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Metropolitan Area
FIELD OF ACTION	MOBILITY AND TRANSPORT
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Transport
COVERED INTERVENTIONS	1. Development of park & ride facilities 2. Parking system management 3. Modernization and expansion of the intelligent traffic light system (Traffic Management Bucharest - Ilfov) and prioritization of public transport vehicles
BRIEF DESCRIPTION	The **development of Park & Ride facilities** in Bucharest aims to alleviate traffic congestion by offering parking spaces near major access points of the city. These interventions enable commuters to park their vehicles on the outskirts of the city and transition seamlessly to public transport systems, including metro lines, trams and buses, for travel into the city centre. The **management of Bucharest's parking system** is undergoing substantial modernization to enhance urban mobility and reduce traffic congestion. Key measures include the adoption of smart parking technologies, digital payment platforms and automated systems that improve the efficiency of locating and paying for parking. An important step is the realization of a unitary parking regulation in Bucharest. The **modernisation and expansion of the intelligent traffic light system** in the Bucharest-Ilfov region aims to enhance traffic flow, improve road safety and reduce pollution. This action focuses on optimising traffic management by integrating smart traffic lights and prioritising public transport vehicles, thereby enabling more efficient urban mobility. The initiative involves upgrading existing intersections, expanding the centralised traffic control system and deploying advanced technologies such as vehicle detection sensors and adaptive traffic control mechanisms.
OUTCOME	Lower modal split of personal cars Reduced air pollutants (NOx and PM2.5)
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall Districts Town Halls (1–6) Ilfov County administrations
INVOLVED STAKEHOLDERS	Public transport operators (such as STB SA and Metrorex SA) Public domain administrations (PMB & districts) Bucharest – Ilfov Intercommunity Development Association for Public Transport (TPBI) Bucharest-Ilfov Regional Development Agency (ADR BI) Ministry of European Investments and Projects (MIPE) National Agency for Environment and Protected Areas (ANMAP) National Environmental Guard (GNM) Private technology and infrastructure companies Emergency and safety services (SMURD, Bucharest Ambulance Service, Bucharest Fire Department - ISU Bucureşti-Ilfov, Bucharest Police, Romanian Gendarmerie etc.) Private transportation, courier companies Universities Civil society (local communities and commuters, mobility & environmental advocacy groups)
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 144.700.000 10.835,14 tons CO_2/year from the Transport Sector
% OF TOTAL CO_2 REDUCTION	0,17%

GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Transport ● 18.843,48 MWh/year diesel from Scope 1 ● 18.287,03 MWh/year gasoline from Scope 1 ● 47,15 MWh/year electrical energy from Scope 2 ● 51,76 MWh/year diesel from Scope 3
TIMELINE (START - END)	2026-2035

ACTION TITLE	**4.RETROFIT OF PUBLIC BUILDINGS**
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Public buildings
FIELD OF ACTION	BUILT ENVIRONMENT
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Buildings
COVERED INTERVENTIONS	1. Energy rehabilitation and modernisation of administrative or cultural buildings (managed by the Municipality) 2. Energy renovation of educational institutions (managed by the six districts of the Municipality) 3. Consolidation, rehabilitation and increase of energy efficiency of public buildings with a sanitary destination classified at seismic risk 4. Seismic risk consolidation, energy rehabilitation and modernisation of the central institutions' public buildings
BRIEF DESCRIPTION	The **energy rehabilitation and modernisation projects for public buildings** in Bucharest aim to enhance the energy efficiency of **administrative, cultural, educational** (nurseries, kindergartens, schools, high schools, school sports clubs) **and healthcare institutions**. These initiatives are designed to reduce energy consumption, improve sustainability and increase the safety (including fire safety requirements) and comfort of the buildings. A part of these buildings are in historically protected areas or are historic monuments and some other are considered flagship projects as their restoration will act as an exemplary role: eg. Masca Theatre (green theatre pilot project), Solacolu Inn (securing of buildings, design competition), Excelsior (Înfrățirea între popoare) Theatre, Favorit multifunctional center etc. Moreover, hospitals such as Malaxa, Prof. Dan Theodorescu, Carol Davila, Filantropia or Victor Babeș are undergoing seismic reinforcement, ensuring enhanced protection against earthquakes. This work addresses both the structural integrity and energy efficiency of these key healthcare facilities, contributing to long-term resilience and sustainability. Other hospitals classified with 1st or 2nd seismic risk (eg. Fundeni) should follow. The proposals of the Police, Gendarmerie and Ministries to rehabilitate some of their premises are some of the projects to be included in the **Seismic risk consolidation, energy rehabilitation and modernisation of the central institutions' public buildings** action.
OUTCOME	Major energy savings and seismic resilience in the public sector Reduced air pollutants (NOx and PM2.5)
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall Districts Town Halls (1–6) Ministry of Health, Ministry of Culture, Ministry of Internal Defense etc.
INVOLVED	School Inspectorate of Bucharest Municipality (ISMB)

STAKEHOLDERS	Municipal Administration for the Reinforcement of Buildings at Seismic Risk (AMCCRS) Administration Hospitals and Medical Services Bucharest (ASSMB) Bucuresti Municipality Museum Bucharest-Ilfov Regional Development Agency (ADR BI) Ministry of European Investments and Projects (MIPE) National Agency for Environment and Protected Areas (ANMAP) National Environmental Guard (GNM) National Institute for Research and Development in Construction, Urban Planning and Sustainable Territorial Development (URBAN-INCERC) Private construction companies Universities Civil society Citizens The Order of Romanian Architects (OAR)
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€724.600.000 97.782,37 tons CO_2 / year from Buildings
% OF TOTAL CO_2 REDUCTION	1,49%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Buildings ● 63.025,51 MWh/year electrical energy from Scope 2 ● 59.768,34 MWh/year natural gas from Scope 2
TIMELINE (START - END)	2026-2035

ACTION TITLE	**5.MODERATE OR DEEP ENERGY RENOVATION OF PRIVATE RESIDENTIAL BUILDINGS**
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Housing, blocks, public area around blocks of flats renovation zone
FIELD OF ACTION	BUILT ENVIRONMENT
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Buildings
COVERED INTERVENTIONS	1. Moderate or deep energy renovation of multifamily residential buildings 2. Affordable energy for vulnerable households 3. PED (positive energy districts)
BRIEF DESCRIPTION	The intervention aims to **modernize residential buildings in the city**. The primary goal is to reduce energy consumption and greenhouse gas emissions by implementing measures such as thermal insulation, window replacements, upgrading heating and lighting systems and other technical improvements (if possible from renewable energy sources). All districts already have projects underway or are about to implement **multifamily residential buildings rehabilitation projects**. Some pilot projects introduce solar panel systems to power the equipment of shared parts of the building. Also the Municipal Administration for the Reinforcement of Buildings at Seismic Risk (AMCCRS) is currently running 17 projects for renovating residential buildings and other 88 have been selected for funding. Most of them are in historically protected areas and some are historic monuments.

	Affordable energy for vulnerable households action targets vulnerable households in Bucharest that are burning wood or waste and a strategy for ensuring the transition from fossil fuels to sustainable energy in the Bucharest-Ilfov region. A **Positive Energy District** (PED) is seen as an urban neighbourhood with annual net zero energy import and net zero CO_2 emissions working towards a surplus production of renewable energy, integrated in an urban and regional energy system. District 2 has a PED pilot for Traian Sports High School and some residential buildings. District 6 has a PED pilot in Favorit area.
OUTCOME	Energy savings and seismic resilience in the private residential sector Reduced air pollutants (NOx and PM2.5) Improving marginalized urban areas
RESPONSIBLE ENTITY / BODY / PERSON	Districts Town Halls (1–6) Bucharest City Hall Municipal Administration for the Reinforcement of Buildings at Seismic Risk (AMCCRS) private entities
INVOLVED STAKEHOLDERS	Homeowners' Associations of Bucharest Private sector (construction and renovation companies) Municipal Administration for the Reinforcement of Buildings at Seismic Risk (AMCCRS) Bucharest-Ilfov Regional Development Agency (ADR BI) Banks and private investors offering co-financing mechanisms for homeowners Energy Cluster Municipal Thermal Energy Company Bucharest (TEB) Energy and electric infrastructure & utility companies Ministry of development, public works and administration (MDLPA) Ministry of Energy Ministry of European Investments and Projects (MIPE) The Order of Romanian Architects (OAR, OAR Bucharest) Civil society (Ecoteca, Save Bucharest Association, NGOs that promotes citizen awareness and energy-saving measures) Romanian Green Building Council (RoGBC) Universities National Research-Development Institute for Urban and Territorial Development (URBAN-INCERC) Citizens
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 3.500.000.000 1.618.821,41 tons CO_2 / year from Buildings
% OF TOTAL CO_2 REDUCTION	24,74%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Buildings • 649.865,89 MWh/year electrical energy from Scope 2 • 1.979.993,20 MWh/year natural gas from Scope 2 • 1.270.752 MWh/year from Scope 2
TIMELINE (START - END)	2026-2035

ACTION TITLE	**6.URBAN RENEWAL OF PUBLIC SPACES TO REDUCE UHI EFFECT**
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Public spaces, cultural areas and mobility networks.
FIELD OF ACTION	BUILT ENVIRONMENT, nature based solutions

SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Buildings, Transport
COVERED INTERVENTIONS	1. Urban renewal of intermodal hubs with metro line connection 2. Urban renewal Podul Calicilor - Domniţa Bălaşa public area 3. Urban renewal of Calea Moşilor public area 4. Urban renewal of North Railway Station - Atelierele Griviţa – Carpati railway junction area 5. Urban renewal of North Railway Station - Calea Griviţei axis towards Amzei area 6. Urban renewal of Lacul Morii - Giuleşti-Sârbi public area 7. Greener schoolyards 8. Pedestrian & micro-mobility focused reconfiguration of boulevards 9. Rehabilitation of the network of parks & green areas in the residential neighborhoods 10. Redevelopment of unused or improperly used public land 11. Enhancement of public monuments by reconfiguring adjacent public space 12. PPP for the regeneration of public space
BRIEF DESCRIPTION	These interventions are focused on enhancing urban infrastructure, improving public spaces and integrating green and sustainable solutions, while preserving the city's architectural and historical heritage. The overarching goal is to create more liveable, accessible and environmentally-friendly urban environments across Bucharest. The **Urban renewal of intermodal hubs with metro line connection**: – **Răzoare** intervention aims to redevelop the Răzoare area, improving its infrastructure, public spaces and pedestrian pathways. There is also a focus on integrating green spaces and revitalising underused areas to enhance the quality of urban life. – **Victoriei Square** intervention involves redesigning Victoriei Square, one of the key public spaces in Bucharest. The aim is to improve traffic flow, public transport integration and the availability of green spaces for pedestrians and cyclists. – **Unirii square** (including car underpass consolidation) involves structural consolidation and the improvement of safety, traffic flow and aesthetics of the public space. The project aims to revitalise one of Bucharest's most important transit hubs and the space above – **Expoziţiei area** – intervention aim is to revamp the Expoziţiei area by improving infrastructure and public spaces, as well as enhancing accessibility and integrating green elements in a bid to revitalize the urban environment. **Urban renewal Podul Calicilor - Domniţa Bălaşa public area** renewal intervention focuses on restoring the area around a historic bridge and connecting fragmented urban spaces. The aim is to enhance public spaces while highlighting the area's cultural significance. **Urban renewal of Calea Moşilor public area** intervention targets the renovation of Calea Moşilor street, one of Bucharest's historical thoroughfares. The improvements include better pedestrian pathways, the restoration of architectural elements and enhanced infrastructure. **Urban renewal of North Railway Station - Atelierele Griviţa - Carpaţi railway junction** renewal initiative focuses on revitalising the area between Bucharest's North Railway Station and Carpaţi railway junction, improving public spaces and accessibility from Calea Griviţei to Calea Giuleşti over the rails, while preserving the industrial architecture that defines the area's heritage. **Urban renewal of North Railway Station - Calea Griviţei axis towards Amzei area** initiative focuses on urban renewal of Calea Griviţei in an area intensely frequented by artists due to the location in the vicinity of the Bucharest University of Art, galleries and art workshops, central and local institutions, an independent theater, office spaces, bars and restaurants. **Urban renewal of Lacul Morii - Giuleşti-Sârbi public area** focuses on the revitalisation of the Lacul Morii waterfront, creating recreational areas and green spaces and improving accessibility to the area. The intervention also includes a strong focus on linking the waterfront with surrounding neighborhoods and enhancing public infrastructure, with significant investments made near the lake—most notably in the development of the green area.

	Greener schoolyards intervention focuses on modernising schoolyards across Bucharest. The redesign will integrate green spaces, providing recreational areas for students and the local community and transforming the yards into community hubs. **Pedestrian & micro-mobility focused reconfiguration of boulevards** intervention focuses on transforming the car-oriented or car-saturated areas to micro-mobility and pedestrian friendly ones. This action includes tram based boulevards, wider sidewalks, bike lanes, extra rows of trees, adjacent development of public networks. Eg. Ion Mihalache Blvd., Barbu Văcărescu Blvd., Magheru Blvd., Ştefan cel Mare Blvd. **Rehabilitation of the network of parks & green areas in residential neighborhouds and public buildings** in Bucharest plays a vital role in urban revitalization, enhancing the quality of life and well-being of residents. The action will focus on maintaining residents' flower gardens, organizing composting areas, community garden areas, biodiversity, involving neighbors in planting and maintenance. **Redevelopment of unused or improperly used public land** with urban regeneration potential to develop flagship urban projects, with a strong nature based solution component: Victoria Depot, Berzei 21, Esplanada etc. but also regeneration projects around public / historical buildings (Amzei area, Piaţa Revoluţiei, Piaţa George Enescu etc.). **Enhancement of public monuments by rehabilitating and reconfiguring adjacent public space** plays a vital role in urban revitalization, enhancing the quality of life in Bucharest. The local register of public monuments in Bucharest gathers around 6000 historical monuments and war memorials (unclassified as historical monuments). Following a prioritization of intervention, some of them can be the starting point of small urban redevelopment / regeneration. **Public-private partnerships for the regeneration of public space** can be initiated for the projects listed above or for others that aim to improve public spaces and include nature-based solutions.
OUTCOME	Reduction of urban heat islands in the city center and main residential neighborhoods
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall Districts Town Halls (1–6) Romanian Railways (CFR SA) Ministry of Transport and Infrastructure of Romania (MTI) private entities
INVOLVED STAKEHOLDERS	Administration of Lakes, Parks and Leisure Bucharest (ALPAB) Districts' public domain administration Bucharest Municipal Eco Sanitation Company (CMEIB) Bucharest Municipal Public Lighting Company (CMIPB) Bucharest Transport Company (STB SA) Metrorex SA Bucharest Metropolitan Area Intercommunity Development Association (ADIZMB) Bucharest – Ilfov Intercommunity Development Association for Public Transport (ADI TPBI) Metropolitan Building Trust (TCM) Bucharest-Ilfov Regional Development Agency (ADR BI) National Research-Development Institute for Urban and Territorial Development (URBAN-INCERC) National Agency for Environment and Protected Areas (ANMAP) National Environmental Guard (GNM) National Institute of Hydrology and Water Management (INHGA), National Meteorological Administration (ANM) Ministry of Health, Ministry of Culture, Ministry of Internal Defense etc. Private sector (Construction companies and urban planning consultants) Universities The Order of Romanian Architects (OAR, OAR Bucharest) Romanian Landscapers Association (ASOP) School Inspectorate of Bucharest Municipality (ISMB) Civil society (Green Belt Coalition, Reper 21 association, Străzi pentru oameni association, ATU, Mai mult verde association, 2celsius association etc.)

	local communities and residents
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 479.068.800 13.501,6 tons CO_2 /year (34.987,81 from Buildings | 10.306,11 from Transport)
% OF TOTAL CO_2 REDUCTION	0,21%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Buildings ● 1,853.79 MWh/year electrical energy from Scope 2 ● 3,339.09 MWh/year natural gas from Scope 2 Transport ● 17,946.18 MWh/year diesel from Scope 1 ● 17,416.22 MWh/year gasoline from Scope 1 ● 49.30 MWh/year diesel from Scope 3
TIMELINE (START - END)	2026-2035

ACTION TITLE	**7.MODERNIZATION OF THE PUBLIC LIGHTING SYSTEM TO REDUCE ENERGY CONSUMPTION**
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Buildings (both public - used for providing public services and private - residential ones)
FIELD OF ACTION	ENERGY SYSTEMS
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Energy systems
COVERED INTERVENTIONS	1. Integrated projects for rehabilitation / modernization of urban infrastructure elements related to the public lighting system (network, poles, lighting fixture) 2. Interactive map (GIS) of the public lighting system in the Municipality of Bucharest (SIP) and monitoring/control of energy consumption of each ignition point 3. Modernization and energy proofing of the intelligent public lighting system in parks 4. Modernization of the public lighting system through the implementation of the remote management system and the use of devices with LED technology (by replacing the existing sodium vapor lighting devices with modern devices with LED technology) on traffic arteries
BRIEF DESCRIPTION	These interventions align with Bucharest's broader objectives of improving urban sustainability, lowering energy consumption, and embracing smart technologies in public infrastructure. They represent a significant step toward creating a more sustainable, efficient and safe urban environment. **Rehabilitation and modernisation of urban lighting infrastructure** involves the comprehensive upgrading of urban lighting components, such as poles, fixtures and the lighting network. The focus is on replacing outdated equipment with modern, energy-efficient alternatives, notably through the use of devices with LED technology. **Interactive GIS-based public lighting map and energy consumption monitoring**. An interactive Geographic Information System (GIS) map will be developed to monitor and manage the city's public lighting infrastructure. This system will track energy consumption for each lighting point, providing valuable data for maintenance, optimisation and cost management. It also enables centralised monitoring and ensures that the system operates at its most efficient capacity. **The intelligent public lighting system in parks** will optimise energy use by adjusting lighting levels based on environmental factors, such as daylight and weather conditions. This modernisation will enhance energy efficiency, reduce operational costs and improve the user experience within these public spaces. **LED technology and remote management for major traffic arteries and 7 zones in Bucharest**,

	will see the installation of LED lighting, replacing the existing sodium vapour lighting. The integration of a remote management system will enable the central control of the lighting system, facilitating real-time adjustments and more efficient energy use. All the mounted fixtures are equipped with a remote management system that allows adjusting the light intensity according to the needs. The implementation of this system is estimated to save more than 50% electricity. In 2024 - 4830 LED luminaires were installed, in 2025 - 7822 LED luminaires will be installed, in 2025-2026 9855 fixtures will be mounted in 7 zones and 8280 in 70 streets.
OUTCOME	Major energy savings in the public lighting sector
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall Districts Town Halls (1–6)
INVOLVED STAKEHOLDERS	Bucharest Traffic Management Municipal Company (CMMTB) Municipal Public Lighting Company Bucharest (CMIPB) Administration of Lakes, Parks and Leisure Bucharest (ALPAB) Districts' public domain administration Energy Providers (ENGIE Romania, PPC Romania) Private Technology Providers (LED manufacturers, smart technology firms)
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 161,999,600,00 6,006.51 tons CO_2/year
% OF TOTAL CO_2 REDUCTION	0.09%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Transport ● 1,794.62 MWh/year diesel from Scope 1 ● 1,741.62 MWh/year gasoline from Scope 1 ● 17,097.13 MWh/year electrical energy from Scope 2 ● 4.93 MWh/year diesel from Scope 3
TIMELINE (START AND END)	2026-2035

ACTION TITLE	**8. DEVELOPMENT OF AN ENERGY-EFFICIENT DISTRICT* HEATING SYSTEM**
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	District buildings (the ones connected to district heating supply systems)
FIELD OF ACTION	ENERGY SYSTEMS
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Buildings, IPPU
COVERED INTERVENTIONS	1. Modernization of the thermal networks related to the Aviation neighborhood 2. Transformation of the Casa Presei Thermal Heat Only Boiler Plant (HOB) 3. The transformation of the Ferentari 72 Heat Only Boiler Plant (HOB) 4. Modernization of 11 district heating group substations 5. Rehabilitation of the district heating networks 6. Installation of smart metering 7. Modernization of the main transmission thermal pipelines 8. Modernization of distribution thermal networks 9. Refurbishment of former gas power plants for biomass cogeneration 10. Ongoing upgrade of district heating group substations 11. Equipping consumers fed from group substations with building substations 12. Implementation of the SCADA system for the district heating system of Bucharest

BRIEF DESCRIPTION	• *in this section the term district refers to the city and not to the administrative subdivisions* The modernization of the district heating system in Bucharest comprises a series of complex interventions, structured around several essential directions aimed at improving the efficiency, reliability and sustainability of the system. **Modernization of thermal networks in the Aviaţiei neighbourhood** – Phase II includes upgrades at district heating group substations 2 Aviaţiei and district heating group substations 6 Aviaţiei, optimising heat distribution within the neighbourhood. **Transformation of the Casa Presei HOB** into a high-efficiency cogeneration plant involves modernising equipment to enhance efficiency and reduce pollutant emissions, transforming the facility into a modern and sustainable unit. **Transformation of the Ferentari 72 HOB** into a high-efficiency cogeneration plant will enable the efficient production of electricity and heat, reducing energy losses and optimising district heating services in the Ferentari area. **Modernization of 11 district heating group substations** - Luterană, Direcţie, Ştirbei Vodă, Rosetti, Olimpului, Depou Ferentari, Floreasca, Muzica. Group substations will be equipped with new, energy-efficient systems to ensure stable distribution and improved performance in providing heat to consumers. Existing district heating group substations will be rehabilitated by replacing outdated equipment with advanced technologies, thereby improving heat transfer to end-users. **Rehabilitation of district heating networks:** - 25 objectives covering 106 km of transmission pipes include the replacement of aging pipes to reduce heat losses and improve the overall efficiency of the network. - 35 objectives spanning 144 km of pipe trenches include the rehabilitation of thermal infrastructure by modernising piping networks. - 7 objectives totalling 31.6 km of pipe trenches include the rehabilitation of thermal infrastructure by modernising damaged heat channels piping networks. **The installation of smart meters** will facilitate precise, real-time measurement of heat energy consumption, enhancing transparency and the efficient management of resources. **Modernization of the main transmission thermal pipelines** include the rehabilitation of 9 km of primary heat pipes (Objectives 1-5), which are vital for transporting heat to the district heating group substations and the rehabilitation of the main Pipeline II West (2 km piping channel) which will enhance the efficiency of heat transmission across the main pipelines. This action aims to optimise the networks linking the building substations with the transmission system. **Modernization of distribution thermal networks** refers to upgrading the connections between district heating group substations and residential buildings to ensure balanced and efficient heat distribution. **Ongoing upgrade of district heating group substations** - Almost all existing group substations have been modernized 15 to 20 years ago. As time passes, equipment which has become technologically obsolete or worn out will be replaced. **Rehabilitation of former gas power plants for biomass cogeneration** involves adapting existing plants to utilise biomass, a renewable energy source, contributing to the reduction of carbon emissions and promoting energy sustainability. **Equipping consumers fed from centralized stations with building substations**- Modern building substations will be installed at consumer premises that are currently connected to group substations, enabling individual control over heat consumption and optimising heat distribution **Implementation of the SCADA system for the district heating system of Bucharest** - In order to implement new automation systems for the existing group substations, works are proposed to modernize the electrical part, the automation and instrumentation part of those substations with automations made before 2010. For the building substations, it is proposed to replace the data acquisition equipment (DAE) and for node junctions, new automation works and electrical works are proposed, to modernize their power supplies. Through the works aimed at process equipment, it is proposed to replace the partial or total mechanical part of the group substations, partial replacement only provides for the replacement of electric pumps, and complete replacement is provided with complete modular solutions. Through the works of dispatching and SCADA operational management, it is proposed to import the functionality of the existing system and add

	new functionalities, IT and communications integration solutions, VPN solutions and information security, works to integrate local group substations into the new SCADA system, access control and security works.
OUTCOME	Major energy savings in the public centralised heat supply system
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall
INVOLVED STAKEHOLDERS	District City Halls (1-6) Termoenergetica Municipal Company Bucharest (CMTEB) Bucharest-Ilfov Inter-community Thermo-energy Development Association (ADI TBI) National Energy Regulatory Authority (ANRE) Romanian Ministry of Energy & Ministry of Environment District Heating Companies Private Energy Companies ELCEN SA Powerplants The Prefecture of Bucharest Bucharest-Ilfov Regional Development Agency (ADR BI) Universities Civil Society and NGOs Homeowners' Associations
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 1.721.231.082 1.542.670,97 tons CO_2 / year (810.823,18 from Buildings and 731.847,79 from IPPU)
% OF TOTAL CO_2 REDUCTION	23,58%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Buildings • 3.924.902,55 MWh/year natural gas from Scope 2 • 68.231,36 MWh/year thermal energy from Scope 2 IPPU • 3.623.008,85 MWh/year natural gas from Scope 3 (decreasing losses in thermal energy production associated with the SACET system)
TIMELINE (START - END)	2026-2035

ACTION TITLE	**9. RENEWABLE ENERGY SOURCES (RES) GENERATION**
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	northern part of metropolitan area
FIELD OF ACTION	BUILT ENVIRONMENT
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Buildings, IPPU
COVERED INTERVENTIONS	➔ Development of new solar and geothermal capacities

BRIEF DESCRIPTION	The development of **new solar and geothermal capacities** intervention aims to enhance the city's renewable energy production and sustainability. Efforts are focused on tapping into the geothermal potential in northern Bucharest, particularly in areas like Otopeni (Ilfov county), where temperatures of up to 90-100°C have been identified as suitable for district heating and other applications such as medical facilities and airport operations. Prior to the integration of this resource for heating, surveys and analysis are needed to substantiate the drilling and the purpose of use. Additionally, solar energy projects are a priority, with photovoltaic (PV) systems being integrated into the city's existing energy infrastructure to reduce dependence on traditional energy sources and complement Bucharest's renewable energy framework. This action can overlap with positive energy districts or other renovations that involve the use of renewable energy
OUTCOME	share of energy needs covered by local renewable sources
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest Municipality /District City Halls/ Romanian Ministry of Energy
INVOLVED STAKEHOLDERS	Bucharest-Ilfov Regional Development Agency (ADR BI) National Agency for Energy Efficiency (ANRE) Private sector Consumers (residential or commercial) Universities National Institute for Research and Development in construction, urbanism and sustainable territorial development (URBAN INCERC)
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 100.000.000 96.307,94 tons CO_2/year
% OF TOTAL CO_2 REDUCTION	1,47%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	Buildings ● 50,000 MWh/year of solar energy could be generated as part of the investment IPPU ● 140,160 MWh/year of geothermal energy could be generated as part of the investment
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Buildings ● 50,000 MWh/year electrical energy from Scope 2 IPPU ● 140,160 MWh/year natural gas from Scope 3
TIMELINE (START -END)	2026-2035

ACTION TITLE	**10.COMPLETION AND CONSOLIDATION OF THE CIRCULAR ECONOMY SYSTEM**
TYPE OF ACTION	Technical & soft intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Residential areas
FIELD OF ACTION	WASTE AND CIRCULAR ECONOMY
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Waste

COVERED INTERVENTIONS	1. Organization of the bio-waste and green waste management system in the city 2. Management of construction and demolition waste CDW from Bucharest-Ilfov area and the creation of voluntary intake center(s) 3. Construction of a waste sorting facility according to the waste management plan of the Municipality of Bucharest 4. Elaboration and implementation of a plan for the management of medical waste from all medical units within the radius of the city of Bucharest 5. Purchase of land outside Bucharest and development of an integrated waste management system (including mechanical treatment and anaerobic digestion) 6. Implementation of smart solutions in order to increase the efficiency of the waste management system 7. Integrated waste management at district level 8. Digitalisation of (selective) waste collection fleet 9. Monthly bulky waste / WEEE collection campaigns
BRIEF DESCRIPTION	Within the waste management system of the Municipality of Bucharest, several initiatives are being undertaken to enhance waste management practices and foster a more sustainable and environmentally friendly approach. These measures include: **The organization of the bio-waste and green waste management system** aims to develop an efficient infrastructure for the collection, recycling and treatment of biological and green waste, thereby reducing landfill volumes and contributing to environmental protection. A voluntary collection centre for **construction and demolition waste from Bucharest-Ilfov area** is being established to ensure its proper sorting and management, which will help mitigate the environmental impact of such waste. Bucharest-Ilfov area should organize 2 centers for CDW. **Establishment of a waste sorting facility** will be set up to separate recyclable materials from other waste, in line with the city's waste management plan. This will facilitate recycling efforts and reduce the volume of waste directed to landfills.Several sorting facilities / stations will be built which will ensure the recycling of collected waste. A comprehensive **medical waste plan** will be implemented to handle medical waste from healthcare facilities in Bucharest. This will include secure collection, treatment and disposal methods to avoid contamination and health hazards. **Land acquisition for an integrated waste management system** will be acquired outside the city to develop an integrated system that includes mechanical treatments and anaerobic digestion, which will reduce waste volumes and generate energy from waste. **Implementation of smart solutions for waste management efficiency** will be incorporated to monitor and optimise waste flows, improving overall system efficiency and sustainability. **Integrated waste management** approach will be implemented at the city level, ensuring uniform management across all areas of the municipality. **Digitalisation of the selective waste collection fleet** will enable more precise waste flow management, enhancing the efficiency of collection processes and reducing operational risks. **Monthly bulky waste / WEEE collection campaigns** – Operators will organize campaigns to collect bulky waste or WEEE in all neighborhoods to come to help those who can not bring the waste to the voluntary centers.
OUTCOME	Strong circular economy developed around the waste management system
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall Districts 1-6 Bucharest Intercommunal Development Association for Integrated Municipal Waste Management (ADIGIDMB)
INVOLVED STAKEHOLDERS	Waste Management Companies National Agency for Environmental Protection (ANPM) National Environmental Guard - Bucharest general Commissariat (GNM) Ilfov County Local NGOs that are active in the field of environmental protection or citizens engagement Citizens or local initiatives

	local innovation ecosystem private sector
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 536.717.562 40.961,76 tons CO_2 / year
% OF TOTAL CO_2 REDUCTION	0,63%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Waste ● 1.159,86 MWh/year diesel from Scope 1 ● 7.566,36 MWh/year electrical energy from Scope 2 ● 115,90 MWh/year electrical energy from Scop3 376,76 MWh/year diesel from Scope 3
TIMELINE (START - END)	● 2026-2035

ACTION TITLE	**11.DEVELOPING GREEN-BLUE INFRASTRUCTURE FOR CARBON STORAGE**
TYPE OF ACTION	Nature-based solution, pedestrian and cycling mobility corridor, soft
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	All citizens within the metropolitan area
FIELD OF ACTION	Green infrastructure and nature based solutions, soft mobility, biodiversity, recreation & health
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Buildings, Transport, Waste, IPPU, AFOLU
COVERED INTERVENTIONS	1. The creation of the green-blue-yellow infrastructure along the Colentina river, including a a promenade route for pedestrians and cyclists and shoreline consolidation works 2. Support for the protection, conservation and promotion activities aimed at the Văcărești Natural Park and other local natural protected areas that will be defined 3. Expansion and redesign of the network of parks in the city of Bucharest – all districts 4. Protection and rehabilitation of historical parks, including landscape as applicable, shoreline consolidation works for the water bodies 5. Creation of urban forests 6. The development of biodiversity corridors along the streets 7. Greening the gray - pilot interventions 8. The green belt of the city of Bucharest 9. The creation of the green-blue infrastructure along Dâmbovița river, including a promenade route for pedestrians and cyclists and shoreline remodeling works
BRIEF DESCRIPTION	The creation of the **green-blue-yellow infrastructure along the Colentina river** action, initiated by the Municipality of Districts 1 and 2 in Bucharest, aims to develop the Colentina Green Corridor, a large-scale urban regeneration effort along the Colentina River. This initiative will restore and modernize the areas surrounding nine lakes in northeastern Bucharest: Tei, Plumbuita, Colentina, Fundeni, Dobroești and Pantelimon, Băneasa, Grivita, Straulesti. The project in District 2 envisions redesigning & creating parks, promenades, cycling tracks and protected natural areas, integrating the Colentina River into the city's landscape as a recreational and ecological corridor. In District 1, the project developed under Green Promenade represents a green corridor designed to promote pedestrian and cycling mobility. Its main objectives are to improve urban connectivity, create ecological recreation spaces and restore the natural landscape of the lakes. Both initiatives support sustainable mobility, improve biodiversity and contribute to climate neutrality by reducing emissions and improving environmental quality, providing significant benefits to both residents

	and the surrounding ecosystem. Both initiatives should be extended in Ilfov county around the 13 lakes on the Colentina river and with a recreational circuit. A water quality assurance system is also needed to make the ecosystem as healthy as possible. **Supporting protection, conservation and promotion activities for Văcărești Natural Park** aims to enhance the sustainability of this unique natural area in Bucharest, Romania's first natural park inside the city, spanning approximately 183 hectares. The main objectives include safeguarding existing habitats, improving ecological infrastructure, monitoring species and promoting the park as a model of successful nature conservation within an urban environment. Establishment and conservation of **other protected natural areas of local interest** should also be pursued in: Lunca Dâmboviței, Pădurea Băneasa, Pajiștea Petricani, Dobroești lakes and reedbeds, Valea Saulei. In the last few years, several projects have been implemented to **rehabilitate and expand parks**, contributing to the enhancement of the urban environment and the quality of life for residents. The initiatives to redesign existing parks or green areas such as Circului, Crângași or the new parks were inaugurated in 2023-2024: Liniei Park I-II (S6), Tudor Arghezi Park (S4), Sticlăriei (S2) focus on modernizing infrastructure, creating recreational areas, enhancing biodiversity or introducing modern facilities, thereby providing residents with revitalized, accessible, and functional green spaces. Of these parks, Sticlăriei has the highest percentage of blue-green infrastructure in reference to the total park area. Even if the accessibility of some user groups is limited, the approach aligns with contemporary design principles. Starting 2025-2026 all sectors are preparing to start more work on new parks or extension of parks by reconfiguring existing green spaces: Valea Saulei (S2), Plumbuita (S2), Tudor Arghezi II Park (S4), Cooperativei Park (S5), Liniei Park III (S6), Grozăvești Park (S6), Lacul Morii Linear Park & Lacul Morii island (S6). The **protection and rehabilitation projects across the city's parks** aim to restore historical heritage, modernize infrastructure and develop new recreational areas. For example, Carol I Park will be restored to preserve its cultural significance, while Cișmigiu Park will undergo restoration of its alleys and vegetation, maintaining its historic character. Herăstrău Park will be modernized to improve accessibility and safeguard the existing ecosystem and Tineretului Park will see the modernization of facilities and enhancements in safety. Additionally, Plumbuita Park will be expanded by 4 hectares and National Park will be rehabilitated to become a more attractive and functional space for the community. The **creation of urban forests** in Bucharest is a significant initiative aimed at enhancing the urban environment. In October 2024, the General Council of Bucharest Municipality approved a request to the Government for the transfer of a 6-hectare plot of land, located at 20A Vitan Bârzești Road, to facilitate the development of a new urban forest. Also in 2024, the City Hall of District 1 signed a contract under the National recovery and resilience plan (PNRR) for the planting of four urban forests, comprising 73,000 trees and shrubs, including species such as red oak and ash. Additionally, the University of Agronomic Sciences and Veterinary Medicine of Bucharest launched a project to establish a mini-forest of 6,000 native trees and shrubs on its campus. These projects are part of a broader national initiative, supported by the Ministry of Environment, to promote urban forests, combat pollution and improve the quality of urban life. The **development of biodiversity corridors along the streets** in Bucharest is a vital initiative aimed at enhancing the quality of the urban environment and improving residents' quality of life. Green alignments of trees and shrubs, stormwater biofiltration, water features or bodies help reduce air pollution, provide shade during periods of intense heat and enhance the city's aesthetic appeal. These interventions are closely linked to *Pedestrian & micro-mobility focused reconfiguration of boulevards* and other urban renewal projects from *Urban renewal of public spaces to reduce UHI effect* action. The implementation of **Greening the gray** intervention aims at improving the urban environment and enhancing the quality of life for its residents through adding green gardens on residential, public or private building terraces or land around buildings. It is also necessary to develop public policies for the collective planning and use of the public domain in the vicinity of housing, to

	sanction informal gardening and to provide support from the authorities through specialized structures for communities. There are already pilot interventions that reflect the commitment of both authorities and the private sector to transform Bucharest into a greener and more sustainable city, providing substantial ecological and economic benefits. The **Bucharest-Ilfov green belt** is an environmental initiative designed to establish a vegetative buffer around Bucharest, on the administrative border with Ilfov, both on Bucharest and Ilfov territory, with the objectives of improving air quality, promoting biodiversity and last but not least to comply with legal requirements of establishing green belts around Romania. The creation of the **green-blue infrastructure along Dâmbovița river**, including a promenade route for pedestrians and cyclists and shoreline remodeling works, is dedicated to transforming a key section of Bucharest's waterfront and providing more recreational opportunities for residents. This action aims to: create a continuous path for pedestrians and cyclists by reducing car traffic, enhancing the green urban space around the water, create stormwater management systems to avoid pollution of the river, use of land in relation to the river for public interest objectives, increasing the number of pedestrian connections between the two banks and also developing community driven activities related to the river.
OUTCOME	Consolidation of a network of large natural carbon sinks
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall District 1-6 City Halls
INVOLVED STAKEHOLDERS	Văcărești Nature Park Administration Administration of Lakes, Parks and Leisure Bucharest (ALPAB) Districts' public domain administration Bucharest Municipal Eco Sanitation Company (CMEIB) Bucharest Municipal Public Lighting Company (CMIPB) Bucharest Metropolitan Area Intercommunity Development Association (ADIZMB) Bucharest-Ilfov Regional Development Agency (ADR BI) National Agency for Environment and Protected Areas (ANMAP) National Environmental Guard (GNM) National Institute of Hydrology and Water Management (INHGA) National Meteorological Administration (ANM) Ministry of Culture, Ministry of Environment, Waters and Forests National Institute of Heritage (INP) The Order of Romanian Architects (OAR, OAR Bucharest) Romanian Landscapers Association (ASOP) Universities Researchers and academic institutions, heritage conservation specialists Urban planners and landscape architects Residents and local communities Civil society (Green Belt Coalition, Reper 21 association, Străzi pentru oameni association, ATU, Mai mult verde association, 2celsius association etc.) International partners Private sector
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 574,211,804.00 2,029,568.00 tons CO_2 / year as follows: ● 1,397,256.25 tons CO_2 / year from Buildings ● 542,302.09 tons CO_2 / year from Transport ● 67,309.76 tons CO_2 / year from IPPU ● 17,949.30 tons CO_2 / year from Waste ● 4,750.60 tons CO_2 / year from AFOLU
% OF TOTAL CO_2 REDUCTION	31.02%
GENERATED	-

RENEWABLE ENERGY (IF APPLICABLE)	
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	This action was not calculated to remove or substitute any energy but to abate CO_2 from the overall municipality proportional to the energy requirements of each sector.
TIMELINE (START - END)	2026-2035

ACTION TITLE	**12.CONSOLIDATION OF CLIMATE GOVERNANCE AT URBAN AND METROPOLITAN LEVEL**
TYPE OF ACTION	Soft intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Metropolitan area
FIELD OF ACTION	ORGANISATIONAL AND GOVERNANCE INNOVATION
SYSTEMIC LEVER	Governance, policy and regulations Learning and capabilities Democracy and participation
EMISSION DOMAIN(S)	Buildings
COVERED INTERVENTIONS	1. Urban green & blue infrastructure planning for Bucharest municipality 2. Implementing separately collected rainwater and sustainable urban drainage systems in Bucharest 3. Intelligent air quality and pollen forecast system 4. Public-Private Partnerships for climate and green Initiatives 5. Register of green spaces 6. Ongoing update of the municipality Urban Data Bank 7. Solar energy/ renewable potential assessment 8. Technical studies for the transition to cogeneration power small scale plants at block level 9. Climate neutrality capacity building program for public servants 10. Appointment of Energy Managers across all districts 11. Decrease number of visits to public administration offices through digitalisation 12. Enforcement of sanctions for non-compliance on waste management 13. Procurement framework update 14. Renovation packages of heritage buildings for private owners
BRIEF DESCRIPTION	These projects collectively aim to enhance sustainability, energy efficiency and climate governance in Bucharest by developing comprehensive policies and initiatives that address various environmental challenges: **Urban green & blue infrastructure planning for Bucharest municipality** intervention aims to improve green spaces and adapt the city's infrastructure to the effects of climate change, ensuring a resilient and sustainable urban environment. This initiative focuses on protecting biodiversity by establishing biodiversity corridors, improving ecological connectivity and ensuring the sustainability of natural habitats within the urban landscape. This strategic planning will include reorganization of any type of urban space for implementing nature based solutions (boulevards, pedestrian streets, small squares etc.). Wastewater treatment emission can be reduced by **collecting separately rainwater** from residual water. At the moment, rain water is being collected, mixed and treated together with residual water, increasing the total volume and CO2 emissions. **Sustainable urban drainage systems,** such as bioswales or rain gardens, can be implemented to retain and filter rainwater, reducing emissions for water treatment and storing CO2 at the same time. Development of a **smart forecasting system for air quality and pollen levels** in Bucharest by using advanced technologies (IoT, AI based prediction models, cloud computing, etc.). Improve the quality and quantity of information on air quality in the capital using the existing network of air quality sensors plus new equipment for detection and measurement (including for fine and ultrafine particles, pollen and other allergens), in line with the recommendations of the World

	Health Organization (WHO). Facilitating public access to this information. The use of measurement data to enable the timely implementation of measures to improve air quality and public health. **Public-Private Partnerships for climate and green initiatives** initiative aims to promote collaboration between the public and private sectors, fostering climate action, green investments and the implementation of innovative solutions for environmental sustainability in Bucharest. The development of an IT solution for managing and permanently updating the **Register of Green Spaces** in Bucharest aims to digitize the monitoring and management of the city's green areas. This system will enable efficient tracking of green spaces, including parks and gardens, by providing accurate and real-time data. It is designed to support urban sustainability and aid in environmental planning, ensuring better management and maintenance of green spaces across the city. **Ongoing update of the municipality Urban Data Bank**: digitization of urban management and urban mobility services in order to increase the efficiency of decision-making processes at local public administration level through the integration and interoperability of systems and databases in the field of urban planning and urban mobility. Specific objectives: management of an open data platform in the field of urban mobility functioning as an integrated ITS system that will collaborate with the existing system of mobility planning and public transport management managed by the Municipality of Bucharest; integrated monitoring and coordination of issues related to the improvement of urban mobility and implicitly of issues related to the quality of life and air quality in the Municipality of Bucharest. (City Hall Mobility and Urban Management Hub for example) **Solar energy / renewable potential assessment** evaluates the potential for solar energy installations throughout the city, aiming to boost renewable energy adoption, reduce carbon emissions, and increase energy independence. **Technical studies for the transition to block-level cogeneration small scale plants** assess the feasibility of introducing district-level cogeneration systems to enhance energy efficiency and reduce greenhouse gas emissions. **Climate neutrality capacity building program for civil servants** (or for subordinate employees or municipal companies) seeks to enhance the knowledge and skills in the field of climate neutrality, providing them with the tools necessary to effectively implement climate action strategies. **Appointment of energy managers in all districts** is a critical step in strengthening climate governance at the urban and metropolitan levels, with energy managers overseeing energy efficiency measures and climate mitigation initiatives at the district / city level. Establishment of an urban energy management team in general town hall that will coordinate all district data. **Decrease number of visits to public administration offices through digitalisation** action includes measures to reduce bureaucracy (development of skills, IT platforms, standard mechanisms and procedures, strategic planning, electronic archiving, public applications, diversifying public online services. **Enforcement of sanctions for non-compliance** with City Council Decisions on waste management aims to increase and generalize recycling in Bucharest. **Public procurement framework update** intervention includes updating to European directives that focus on circular economy, nature based solutions, DNSH, smart city etc. These updates must be introduced in all procurement and tender specifications. **Renovation packages of heritage buildings for private owners** intervention targets preservation and the cultural and economic valorisation of the built heritage. It can include analysis and creation of renovation packages for heritage/historical/old buildings, including administrative support to competent authorities (One Stop Shop). This intervention can be a continuation of the ongoing AMCCRS program for tall multifamily buildings
OUTCOME	Improved capacity to plan, implement and monitor climate neutrality policies
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall 7 District 1-6 District City Halls
INVOLVED STAKEHOLDERS	All the stakeholders involved in implementing the NZC Action Plan
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 23.550.000 91.505,36 tons CO_2/year

% OF TOTAL CO_2 REDUCTION	1,40%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	4.363,79 MWh/year of solar energy
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Buildings ● 52.365,50 MWh/year electrical energy from Scope 2 ● 100.459,76 MWh/year natural gas from Scope 2
TIMELINE (START - END)	2026-2035

ACTION TITLE	**13.LOCAL NET ZERO COALITION**
TYPE OF ACTION	Soft intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Metropolitan area & ecosystem (public institutions and organizations, universities and RDI organizations, private companies, NGOs), citizens, any other interested stakeholder
FIELD OF ACTION	ORGANISATIONAL AND GOVERNANCE INNOVATION
SYSTEMIC LEVER	Governance, policy and regulations Learning and capabilities Democracy and participation
EMISSION DOMAIN(S)	Buildings, Transport, Waste, IPPU, AFOLU
COVERED INTERVENTIONS	1. Climate neutrality advocacy and awareness campaigns 2. (Post)university programs for climate neutrality 3. Green grants for climate-neutral communities and lifestyles (non-reimbursable funding for NGOs, for neighbourhood-level projects) 4. Climate neutral hubs, living labs or clusters
BRIEF DESCRIPTION	Local NetZero Coalition is a comprehensive initiative aimed at promoting community engagement and supporting the transition to climate neutrality at the local level. Several key interventions form part of this action: **Advocacy and awareness campaigns** are designed to enhance public understanding and participation in climate neutrality efforts. These campaigns target both residents and businesses, encouraging sustainable practices and raising awareness about the critical importance of achieving NetZero emissions. **(Post)university programs for climate neutrality** offer academic and professional training focused on climate adaptation and sustainability. These programs are intended to equip young professionals with the knowledge and skills necessary to lead the transition to a climate-neutral future. **Green grants for climate-neutral communities and lifestyles** provide non-repayable funding to support NGOs and local projects that promote sustainable living. These grants help fund initiatives such as renewable energy solutions, green building projects and environmental education at the neighborhood level. **Climate neutral hubs, living labs, information points or clusters** that will serve as innovation nodes, public engagement platforms, and knowledge exchange centers across the metropolitan area. These spaces are envisioned to play a key role in enabling a systemic transition toward climate neutrality by facilitating collaboration between local authorities, research institutions, businesses, NGOs, and citizens. They will support both grassroots initiatives and institutional programs, anchoring climate action in the lived realities of urban communities. Specifically, the contract envisions the following: ● Establishing thematic climate hubs and clusters in partnership with universities, RDI

	organizations, and private sector actors to co-develop and test solutions in domains such as energy efficiency, circular economy, green mobility, and sustainable urban infrastructure. ● Deploying living labs as real-life experimentation environments where residents, civil society organizations, and city departments co-design, prototype, and evaluate climate-related interventions. ● Setting up community-based information, both physical and digital, where citizens can access resources on emissions reduction strategies, sustainable living practices, and funding opportunities for local green projects. ● Developing a digital awareness and engagement platform, an interactive online hub that offers personalized tools such as carbon footprint calculators, data dashboards, learning modules, and interactive maps of NetZero initiatives across the city.
OUTCOME	Improved capacity to plan, implement and monitor climate neutrality policies
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall Districts 1-6 City Halls
INVOLVED STAKEHOLDERS	All the stakeholders involved in implementing the NZC Action Plan
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€6.100.000 167.573,99 tons CO_2 / year as follows: ● 5.317,44 tons CO_2/year from Buildings ● 1.030,61 tons CO_2/year from Transport ● 158.315,77 tons CO_2/year from IPPU ● 426,99 tons CO_2/year from Waste ● 2.483,18 tons CO_2/year from AFOLU
% OF TOTAL CO_2 REDUCTION	2,56%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Buildings ● 2.618,28 MWh/year electrical energy from Scope 2 ● 6.027,59 MWh/year natural gas from Scope 2 ● 2.044,90 MWh/year thermal energy from Scope 2 Transport ● 1.794,62 MWh/year diesel from Scope 1 ● 1.741,62 MWh/year gasoline from Scope 1 ● 4,93 MWh/year diesel from Scope 3 IPPU ● 146,57 MWh/year electrical energy from Scope 2 ● 279,61 MWh/year natural gas from Scope 2 Waste ● 8,10 MWh/year diesel from Scope 1 ● 80,48 MWh/year electrical energy from Scope 2 AFOLU ● 20,62 MWh/year diesel from Scope 1 ● 6,61 MWh/year electrical energy from Scope 2 ● 220 MWh/year thermal energy from Scope 2 ● 0,03 MWh/year diesel from Scope 3
TIMELINE (START AND END)	2026-2035

ACTION TITLE	**14.ENHANCING COMMUNITY ENGAGEMENT FOR CLIMATE NEUTRALITY**
TYPE OF ACTION	Soft intervention

SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Local, Local residents
FIELD OF ACTION	SOCIAL AND OTHER INNOVATION
SYSTEMIC LEVER	Governance, policy and regulations Learning and capabilities Democracy and participation Technology and infrastructure
EMISSION DOMAIN(S)	Buildings, Transport, Waste, IPPU, AFOLU
COVERED INTERVENTIONS	1. Community engagement and social pressure mapping initiative 2. Public awareness campaigns 3. Implementation of pilot projects to raise awareness among citizens for the selective collection of waste at the level of the Municipality of Bucharest 4. Awareness raising, education and activation for energy sustainability (campaigns for green energy, energy efficiency and energy communities) 5. Technological solutions for calculating and presenting carbon footprints 6. Education, promotion and incentives for public transport and non-motorized travel
BRIEF DESCRIPTION	The Enhancing Community Engagement for Climate Neutrality action in Bucharest encompasses the main interventions designed to increase public involvement and awareness in the city's climate neutrality efforts: **The social pressure mapping and community engagement initiative** aims to identify and map areas where social pressure can be leveraged to encourage environmentally friendly behaviors among residents and businesses. This initiative seeks to enhance community engagement through targeted interventions and mobilization. **Public awareness campaigns** strives to - improve water use efficiency in Bucharest while raising public awareness about the importance of sustainable water management. The initiative promotes practices that reduce water waste and encourage the responsible use of water resources. - highlighting the importance of urban green spaces in mitigating climate change, enhancing air quality, and improving residents' quality of life. The campaign encourages the preservation, creation and improvement of green areas throughout the city by clean-up and planting campaigns or other campaigns - Public campaigns to reduce waste and increase recycling percentage among residents. Organize workshops and information sessions for residents to raise awareness about the impact of climate change and the need to transition to a green society and about the benefits of renewable energy, energy efficiency, and ways to reduce carbon footprint. Raise public awareness of the importance of separate collection of household waste. - Reuse and repair before recycling campaigns. Advertising / support for increasing the number of businesses based on the circular economy. **Implementation of pilot projects for selective waste collection** aims to raise citizens' awareness of the significance of waste separation and recycling. These pilot projects showcase practical solutions for waste management and encourage broader adoption of selective waste collection practices in local neighborhoods. **Awareness, education and activation for energy sustainability** concentrates on campaigns that promote green energy, energy efficiency and the formation of energy communities. These initiatives educate the public on sustainable energy practices and support local projects focused on energy conservation and production. **Technological solutions for calculating and presenting carbon footprints** will provide tools and technologies that assist individuals and businesses in measuring their carbon footprints. This initiative aims to raise awareness and encourage actions to reduce emissions. **Education, promotion and incentives** focuses on promoting the use of **public transport and alternative mobility options**, such as cycling and walking. This initiative seeks to reduce car dependency and lower carbon emissions from transport in the city.
OUTCOME	Community awareness and engagement related to individual and collective climate neutral behaviours.

RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall Districts 1-6 All partners involved in implementing the NZC Action Plan
INVOLVED STAKEHOLDERS	All the stakeholders involved in implementing the NZC Action Plan
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 7.900.000 24.535,78 tons CO_2 / year as follows: • 12.407,37 tons CO_2/year from Buildings • 1.889,45 tons CO_2/year from Transport • 9.719,29 tons CO_2/year from IPPU • 164,52 tons CO_2/year from Waste • 355,15 tons CO_2/year from AFOLU
% OF TOTAL CO_2 REDUCTION	0,37%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Buildings • 6.109,31MWh/year electrical energy from Scope 2 • 14.064,37MWh/year natural gas from Scope 2 • 4.771,42 MWh/year thermal energy from Scope 2 Transport • 3.290,13 MWh/year diesel from Scope 1 • 3.192,97 MWh/year gasoline from Scope 1 • 9,04 MWh/year diesel from Scope 3 IPPU • 24,43 MWh/year electrical energy from Scope 2 • 46,60 MWh/year natural gas from Scope 2 Waste • 2,70 MWh/year diesel from Scope 1 • 26,83 MWh/year electrical energy from Scope 2 • 4,20 MWh/year electrical energy from Scope 3 AFOLU • 3,44 MWh/year diesel from Scope 1 • 1,10 MWh/year electrical energy from Scope 2
TIMELINE (START - END)	2026-2035

ACTION TITLE	**15.PUBLIC ART FOR CLIMATE-NEUTRAL NEIGHBOURHOODS**
TYPE OF ACTION	Other interventions
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	City
FIELD OF ACTION	SOCIAL AND OTHER INNOVATION
SYSTEMIC LEVER	Democracy and participation Social Innovation Finance and funding
EMISSION DOMAIN(S)	Buildings, Transport
COVERED INTERVENTIONS	1. Funding for street art works on climate neutrality topics
BRIEF DESCRIPTION	This intervention is designed to promote climate awareness through artistic expression in public spaces. This initiative provides financial support for the creation of art installations that focus on themes of climate neutrality, sustainability and environmental conservation. By engaging local artists and communities, the project seeks to raise awareness of climate change and encourage sustainable practices. These art installations will act as a visual representation of the city's commitment to climate action, fostering a sense of ownership and pride among residents and contributing to the transformation of neighborhoods into more environmentally conscious and

	climate-resilient spaces.
OUTCOME	Community awareness and engagement related to individual and collective climate neutral behaviours
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest City Hall 1-6 District CIty Halls
INVOLVED STAKEHOLDERS	Artists, art collectives, cultural organisations Local communities and residents Private sector sponsors NGOs Educational institutions, cultural centers
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 3.000.000 2.116,02 tons CO_2 / year as follows: ● 1.772,48 tons CO_2/year from Buildings ● 343,54 tons CO_2/year from Transport
% OF TOTAL CO_2 REDUCTION	0,03%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Buildings ● 872,76 MWh/year electrical energy from Scope 2 ● 2.009,20 MWh/year natural gas from Scope 2 ● 681,63 MWh/year thermal energy from Scope 2 Transport ● 598,21 MWh/year diesel from Scope 1 ● 580,54 MWh/year gasoline from Scope 1 ● 1,64 MWh/year diesel from Scope 3
TIMELINE (START - END)	2026-2035

ACTION TITLE	**16.GREEN SOLUTIONS MARKETS & CLIMATE NEUTRAL HACKATHONS**
TYPE OF ACTION	Other interventions
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Metropolitan Area
FIELD OF ACTION	SOCIAL AND OTHER INNOVATION
SYSTEMIC LEVER	Democracy and participation Technology and Infrastructure Learning and capabilities Social Innovation
EMISSION DOMAIN(S)	Buildings, Transport
COVERED INTERVENTIONS	1. Events promoting innovative and sustainable technological solutions and concepts 2. Hackathons on climate neutrality topics for the innovation ecosystem
BRIEF DESCRIPTION	**Events promoting innovative and sustainable technological solutions and concepts** action is designed to promote and demonstrate innovative, sustainable technologies and concepts that contribute to the city's environmental sustainability. These events will bring together entrepreneurs, innovators, researchers and businesses to present cutting-edge solutions in areas such as renewable energy, green building technologies, waste management and sustainable urban mobility. By creating platforms for knowledge exchange and collaboration, the initiative aims to encourage the adoption of green technologies, foster local innovation and raise awareness of sustainable practices. These events will play a pivotal role in accelerating Bucharest's transition towards a greener and more sustainable urban environment. **Hackathons focused on climate neutrality** will be organized to support the innovation ecosystem in Bucharest. These hackathons will bring together innovators, researchers, entrepreneurs and

	community members to develop creative solutions and sustainable technologies aimed at reducing carbon emissions and promoting a cleaner environment. The events will feature brainstorming sessions, workshops and thematic challenges, encouraging collaboration across various sectors of society and contributing to the acceleration of the city's transition to a greener and more sustainable future. In 2024, Bucharest hosted several hackathons dedicated to climate neutrality, fostering innovation and community engagement. Notable events included the EU Sparks for Climate Hackathon, Climathon 2024 and the NASA Space Apps Challenge.
OUTCOME	Community awareness and engagement related to individual and collective climate neutral behaviours
RESPONSIBLE ENTITY / BODY / PERSON	Bucharest 7 & District 1-6 City Halls
INVOLVED STAKEHOLDERS	All the stakeholders involved in implementing the NZC Action Plan
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	€ 3.000.000 6.338,06 tons CO_2 / year as follows: ● 5.317,44 tons CO_2/year from Buildings ● 1.030,62 tons CO_2/year from Transport
% OF TOTAL CO_2 REDUCTION	0,1%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	Buildings ● 2.181,90 MWh/year electrical energy from Scope 2 ● 5.022,99 MWh/year natural gas from Scope 2 ● 1.704,08 MWh/year thermal energy from Scope 2 Transport ● 1.495,51 MWh/year diesel from Scope 1 ● 1.451,35 MWh/year gasoline from Scope 1 ● 4,11 MWh/year diesel from Scope 3 Buildings ● 436,38 MWh/year electrical energy from Scope 2 ● 1.004,60 MWh/year natural gas from Scope 2 ● 340,82 MWh/year thermal energy from Scope 2 Transport ● 299,10 MWh/year diesel from Scope 1 ● 290,27 MWh/year gasoline from Scope 1 ● 0,82 MWh/year diesel from Scope 3
TIMELINE (START -END)	2026-2035

Targeted actions grouped together according to each field of action

Table 8. Portfolio of actions

FIELD OF ACTION	**MOBILITY AND TRANSPORT**
LIST OF COVERED ACTIONS	● Development and modernization of green public transport ● Promoting of low-carbon urban mobility, especially cycling and walking ● Parking and traffic management systems to limit transport-related GHG emissions

FIELD OF ACTION	BUILT ENVIRONMENT
LIST OF COVERED ACTIONS	• Retrofit of public buildings • Moderate or deep energy renovation of private residential buildings • Urban renewal of public spaces to reduce UHI effect

FIELD OF ACTION	ENERGY SYSTEMS
LIST OF COVERED ACTIONS	• Modernization of the public lighting system to reduce energy consumption • Development of a energy efficient district heating system • RES Generation

FIELD OF ACTION	WASTE AND CIRCULAR ECONOMY
LIST OF COVERED ACTIONS	• Completion and consolidation of the circular economy system

FIELD OF ACTION	GREEN INFRASTRUCTURE AND NATURE BASED SOLUTIONS
LIST OF COVERED ACTIONS	• Developing green-blue infrastructure for carbon storage

FIELD OF ACTION	ORGANISATIONAL AND GOVERNANCE INNOVATION
LIST OF COVERED ACTIONS	• Consolidation of climate governance at urban and metropolitan level • Local NetZero Coalition

FIELD OF ACTION	SOCIAL AND OTHER INNOVATION
LIST OF COVERED ACTIONS	• Enhancing community engagement for climate neutrality • Public art for climate-neutral neighbourhoods • Green Solutions Markets & Climate-neutrality hackathons

Figure 12. Impact Pathways - Mobility and transport

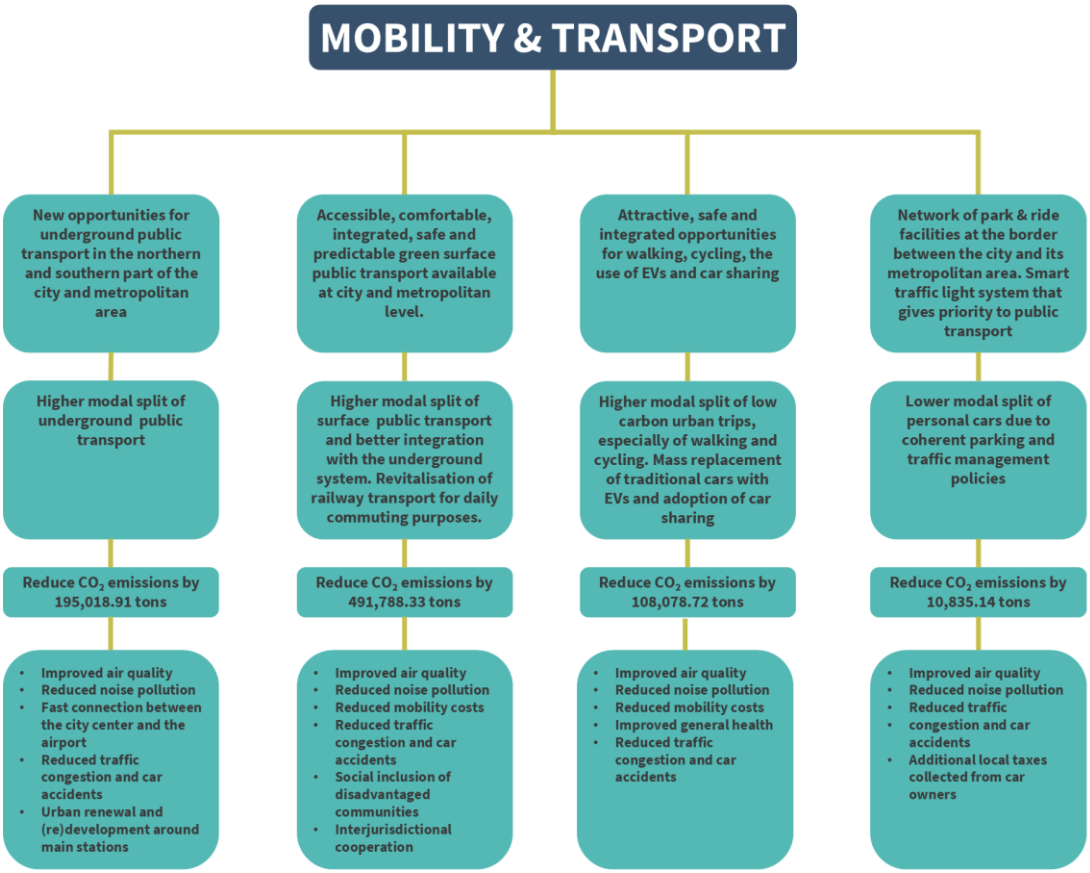


Figure 13. Impact Pathways – Built environment

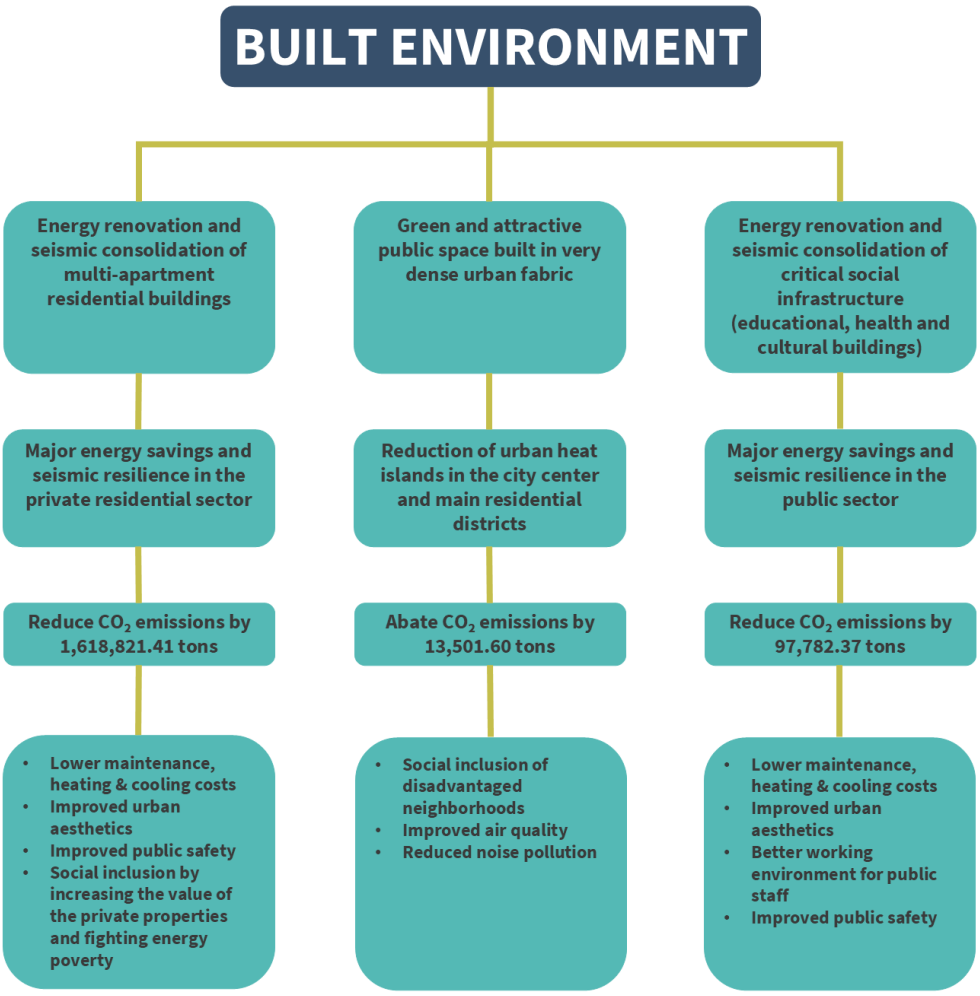


Figure 14. Impact Pathways – Energy systems

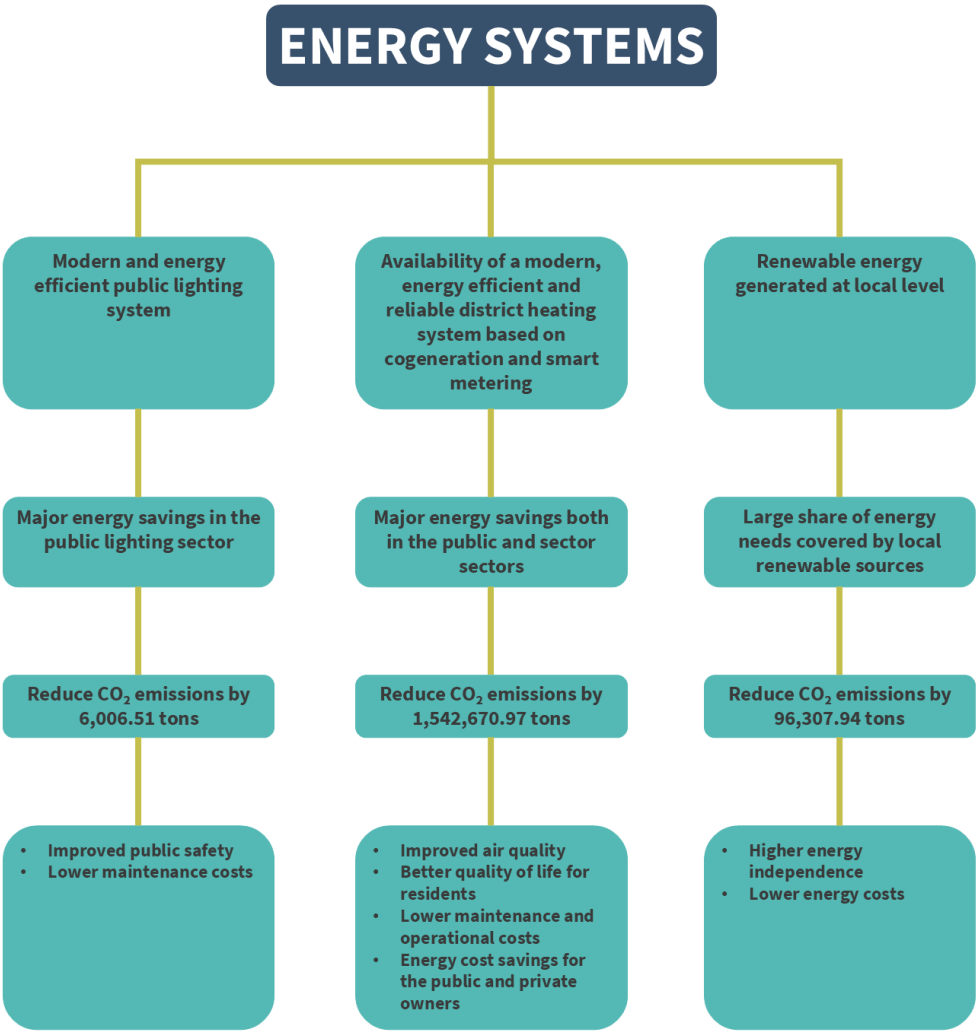


Figure 15. Impact Pathways – Waste and circular economy

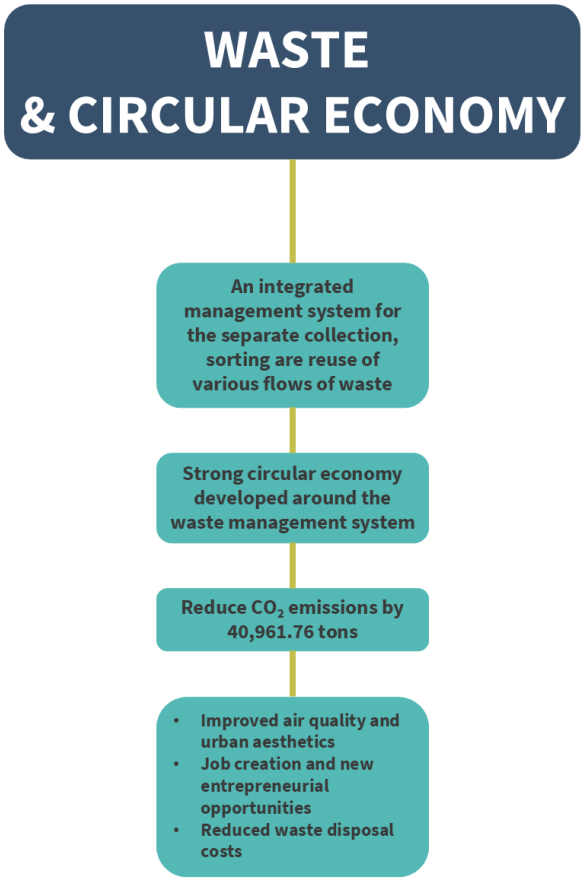


Figure 16. Impact Pathways – Green infrastructure and nature based solutions

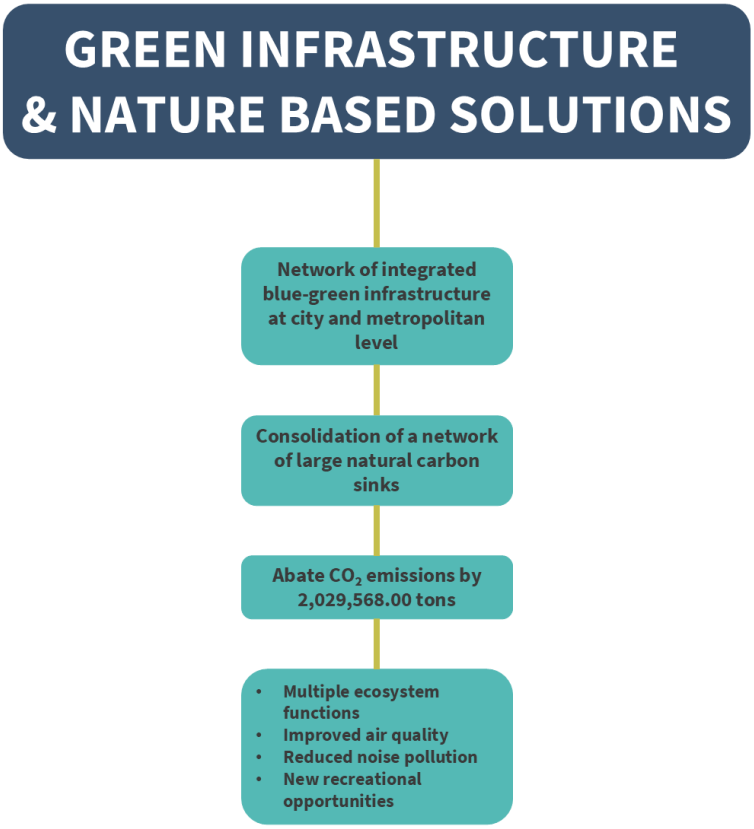


Figure 17. Impact Pathways – Organizational and governance innovation

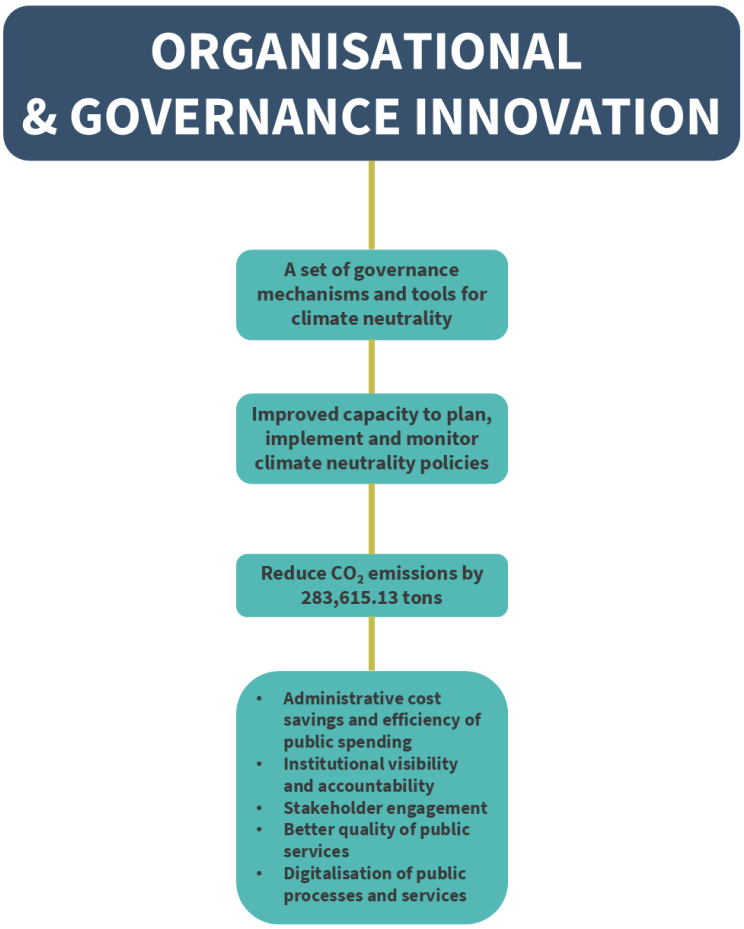


Figure 18. Impact Pathways – Social and other innovation

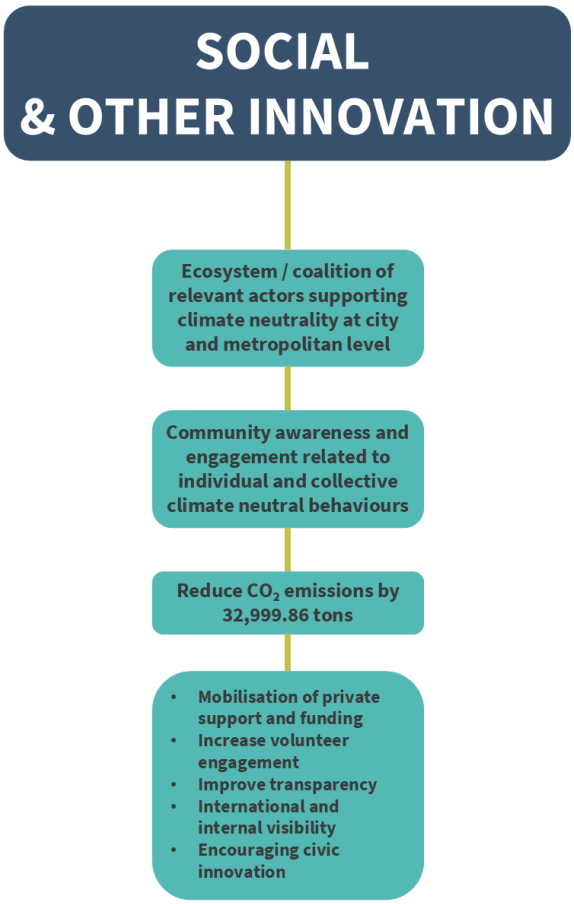


Table 9. Impact Pathways

FIELDS OF ACTION	SYSTEMIC LEVERS	EARLY CHANGES (1-2 YEARS)	LATE OUTCOMES (3-4 YEARS)	DIRECT IMPACTS (EMISSION REDUCTIONS)	INDIRECT IMPACTS (CO-BENEFITS)
MOBILITY AND TRANSPORT	TECHNOLOGY / INFRASTRUCTURE	New opportunities for underground public transport in the northern and southern part of the city and metropolitan area	Higher modal split of underground public transport	Reduce CO_2 emissions by 195,018.91 tons	Improved air quality Reduced noise pollution Fast connection between the city center and the airport Reduced traffic congestion and car accidents Urban renewal and (re)development around main stations
	TECHNOLOGY / INFRASTRUCTURE	Accessible, comfortable, integrated, safe and predictable green surface public transport available at city and metropolitan level.	Higher modal split of surface public transport and better integration with the underground system. Revitalisation of railway transport for daily commuting purposes.	Reduce CO_2 emissions by 491,788.33 tons	Improved air quality Reduced noise pollution Reduced mobility costs Reduced traffic congestion and car accidents Social inclusion of disadvantaged communities Interjurisdictional cooperation
	TECHNOLOGY / INFRASTRUCTURE	Attractive, safe and integrated opportunities for walking, cycling, the use of EVs and car sharing	Higher modal split of low carbon urban trips, especially of walking and cycling. Mass replacement of traditional cars with EVs and adoption of car sharing	Reduce CO_2 emissions by 108,078.72 tons	Improved air quality Reduced noise pollution Reduced mobility costs Improved general health Reduced traffic congestion and car accidents
	TECHNOLOGY / INFRASTRUCTURE	Network of park & ride facilities at the border between the city and its metropolitan area. Smart traffic light system that gives priority to public transport	Lower modal split of personal cars due to coherent parking and traffic management policies	Reduce CO_2 emissions by 10,835.14 tons	Improved air quality Reduced noise pollution Reduced traffic congestion and car accidents Additional local taxes collected from car owners

FIELDS OF ACTION	SYSTEMIC LEVERS	EARLY CHANGES (1-2 YEARS)	LATE OUTCOMES (3-4 YEARS)	DIRECT IMPACTS (EMISSION REDUCTIONS)	INDIRECT IMPACTS (CO-BENEFITS)
BUILT ENVIRONMENT	TECHNOLOGY / INFRASTRUCTURE	Energy renovation and seismic consolidation of multi-apartment residential buildings	Major energy savings and seismic resilience in the private residential sector	Reduce CO_2 emissions by 1,618,821.41 tons	Lower maintenance, heating & cooling costs Improved urban aesthetics Improved public safety Social inclusion by increasing the value of the private properties and fighting energy poverty
	TECHNOLOGY / INFRASTRUCTURE	Green and attractive public space built in very dense urban fabric	Reduction of urban heat islands in the city center and main residential districts	Abate CO_2 emissions by 13,501.60 tons	Social inclusion of disadvantaged neighborhoods Improved air quality Reduced noise pollution
	TECHNOLOGY / INFRASTRUCTURE	Energy renovation and seismic consolidation of critical social infrastructure (educational, health and cultural buildings)	Major energy savings and seismic resilience in the public sector	Reduce CO_2 emissions by 97,782.37 tons	Lower maintenance, heating & cooling costs Improved urban aesthetics Better working environment for public staff Improved public safety
ENERGY SYSTEMS	TECHNOLOGY / INFRASTRUCTURE	Modern and energy efficient public lighting system	Major energy savings in the public lighting sector	Reduce CO_2 emissions by 6,006.51 tons	Improved public safety Lower maintenance costs
	TECHNOLOGY / INFRASTRUCTURE	Availability of a modern, energy efficient and reliable district heating system based on cogeneration and smart metering	Major energy savings both in the public and sector sectors	Reduce CO_2 emissions by 1,542,670.97 tons	Improved air quality Better quality of life for residents Lower maintenance and operational costs Energy cost savings for the public and private owners
	TECHNOLOGY / INFRASTRUCTURE	Renewable energy generated at local level	Large share of energy needs covered by local renewable sources	Reduce CO_2 emissions by 96,307.94 tons	Higher energy independence Lower energy costs

FIELDS OF ACTION	SYSTEMIC LEVERS	EARLY CHANGES (1-2 YEARS)	LATE OUTCOMES (3-4 YEARS)	DIRECT IMPACTS (EMISSION REDUCTIONS)	INDIRECT IMPACTS (CO-BENEFITS)
WASTE AND CIRCULAR ECONOMY	**TECHNOLOGY / INFRASTRUCTURE**	An integrated management system for the separate collection, sorting are reuse of various flows of waste	Strong circular economy developed around the waste management system	Reduce CO_2 emissions by 40,961.76 tons	Improved air quality and urban aesthetics Job creation and new entrepreneurial opportunities Reduced waste disposal costs
GREEN INFRASTRUCTURE AND NATURE BASED SOLUTIONS	**TECHNOLOGY / INFRASTRUCTURE**	Network of integrated blue-green infrastructure at city and metropolitan level	Consolidation of a network of large natural carbon sinks	Abate CO_2 emissions by 2,029,568.00 tons	Multiple ecosystem functions Improved air quality Reduced noise pollution New recreational opportunities
ORGANISATIONAL AND GOVERNANCE INNOVATION	**GOVERNANCE & POLICY**	A set of governance mechanisms and tools for climate neutrality	Improved capacity to plan, implement and monitor climate neutrality policies	Reduce CO_2 emissions by 283,615.13 tons	Administrative cost savings and efficiency of public spending Institutional visibility and accountability Stakeholder engagement Better quality of public services Digitalisation of public processes and services
SOCIAL AND OTHER INNOVATION	**DEMOCRACY / PARTICIPATION**	Ecosystem / coalition of relevant actors supporting climate neutrality at city and metropolitan level	Community awareness and engagement related to individual and collective climate neutral behaviours	Reduce CO_2 emissions by 32,999.86 tons	Mobilisation of private support and funding Increase volunteer engagement Improve transparency International and internal visibility Encouraging civic innovation

STRATEGY FOR RESIDUAL EMISSIONS

Our approach to managing residual emissions

Buildings - 355,421.64 tons CO_2 To eliminate residual emissions from buildings, a comprehensive approach focused on energy efficiency and sustainable construction is essential. Targeted awareness campaigns at the neighbourhood level will educate citizens about the importance of building orientation, ventilation systems, and using eco-friendly construction materials for energy efficiency and thermal comfort. Fiscal incentives, such as tax breaks or subsidies for individuals who invest in passive energy systems like solar panels or heat pumps, would encourage adoption. Additionally, a "Green Buildings Loan Program" offering zero-interest loans for apartment associations to insulate buildings will significantly reduce energy consumption. Pairing these measures with a public-private partnership for green certifications could further motivate developers and property owners.

Transport - 367,647.18 tons CO_2 In transportation, the focus will be on electrification, public transport improvements, and behavioral change. Encouraging active recycling, such as trading PET bottles for bus or tram tickets, will align sustainability with daily habits while reducing waste. Expanding Bucharest's "Rabla" program for appliances to include bicycles and electric vehicles would promote the adoption of clean alternatives. Furthermore, partnerships with supermarkets could encourage them to introduce CSR campaigns that would incentivize customers to use eco-friendly transportation methods, such as electric buses or shared bicycles, by offering discounts or rewards.

Waste - 281,445.92 tons CO_2 To address residual waste emissions, stricter recycling regulations will be implemented, enhanced by community competitions. Green space care competitions between apartment associations could increase participation in waste reduction efforts while combating urban heat islands. Advanced waste-to-energy plants will be integrated into the city's infrastructure, converting non-recyclable waste into renewable energy. Education campaigns in schools and workplaces about waste separation would also reinforce long-term behavioral change.

Industrial Processes and Product Use (IPPU) - 599,011.72 tons CO_2 For industrial emissions, collaboration with businesses is critical. The city will work with large supermarket chains and manufacturers to set emission reduction targets as part of their corporate social responsibility (CSR) initiatives. Subsidies for industries adopting green technologies, such as carbon capture and storage (CCS) or switching to renewable energy sources, would also help. Implementing strict emissions caps and incentivizing local production to reduce transport emissions will also play a significant role.

Agriculture, Forestry, and Land Use (AFOLU) - 7,600.75 tons CO_2 Though emissions from agriculture and land use are comparatively low, they still demand attention. Promoting urban agriculture through rooftop gardens or community gardens would absorb CO_2 while enhancing food security. Tree planting initiatives and preserving green spaces in urban planning would sequester carbon and mitigate climate change effects. Encouraging sustainable farming practices in peri-urban areas with educational programs and grants could further reduce emissions.

INDICATORS FOR MONITORING, EVALUATION AND LEARNING

Table 10. Portfolio of indicators

ACTION	OUTCOME / IMPACT ADDRESSED	INDICATOR TITLE	INDICATOR CODE	TARGET VALUES		
				2027	2030	2035
ALL	CO_2 emissions reduction	Change of the greenhouse gas emissions during the lifetime of the Climate Neutrality Action Plan (%)	B-NZC-I1	30%	50%	80%
ALL	CO_2 emissions reduction	Total greenhouse gas emissions per year (t CO_2e)	B-NZC-I2	6,191,521.80	4,882,837.63	1,611,127.20
ALL	CO_2 emissions reduction	Residual emissions (t CO_2e)	B-NZC-I3	-	-	1,611,127.20
ALL	CO_2 emissions reduction	GHG emission from grid supplied electrical energy per year (t CO_2e)	B-NZC-I4	1,694,056.85	1,441,271.48	809,308.07
DEVELOPMENT & MODERNIZATION OF GREEN PUBLIC TRANSPORT PROMOTING OF LOW-CARBON URBAN MOBILITY, ESPECIALLY CYCLING AND WALKING PARKING AND TRAFFIC MANAGEMENT SYSTEMS TO LIMIT TRANSPORT-RELATED GHG EMISSIONS	Higher modal split of underground public transport Higher modal split of surface public transport and better integration with the underground system. Revitalisation of railway transport for daily commuting purposes. Higher modal split of low carbon urban trips, especially of walking and cycling. Mass replacement of traditional cars with EVs and adoption of car sharing. Lower modal split of personal cars due to coherent parking and traffic management policies.	GHG emission from Transport per year (t CO_2e)	B-NZC-I5	1,488,378.83	1,323,113.24	909,949.28

ACTION	OUTCOME / IMPACT ADDRESSED	INDICATOR TITLE	INDICATOR CODE	TARGET VALUES		
				2027	2030	2035
COMPLETION AND CONSOLIDATION OF THE CIRCULAR ECONOMY SYSTEM	Strong circular economy developed around the waste management system	GHG emission from Waste per year (t CO_2e)	B-NZC-I6	328,482.50	320,171.85	299,395.21
RETROFIT OF PUBLIC BUILDINGS MODERATE OR DEEP ENERGY RENOVATION OF PRIVATE RESIDENTIAL BUILDINGS	Major energy savings and seismic resilience in the public sector Major energy savings and seismic resilience in the private residential sector	GHG emission from Buildings per year (t CO_2e)	B-NZC-I7	3,653,134.61	3,110,146.97	1,752,677.89
LOCAL NET ZERO COALITION GREEN SOLUTIONS MARKETS & CLIMATE-NEUTRALITY HACKATHONS	Improved capacity to plan, implement and monitor climate neutrality policies Community awareness and engagement related to individual and collective climate neutral behaviours	GHG emission from IPPU per year (t CO_2e)	B-NZC-I8	1,346,058.09	1,180,419.06	766,321.47
LOCAL NET ZERO COALITION	Improved capacity to plan, implement and monitor climate neutrality policies.	Climate-Neutral City Companies (number)	B-NZC-I9	105	175	350
DEVELOPMENT OF AN ENERGY-EFFICIENT DISTRICT HEATING SYSTEM	Major energy savings both in the public and sector sectors	District heating system losses (%)	B-NZC-I10	35%	30%	20%
DEVELOPING GREEN-BLUE INFRASTRUCTURE FOR CARBON STORAGE	Consolidation of a network of large natural carbon sinks	Negative emissions through natural sinks (t CO_2e)	B-NZC-I11	638,870.40	1,064,784.00	2,129,568.00
MODERNIZATION OF THE PUBLIC LIGHTING SYSTEM TO REDUCE ENERGY CONSUMPTION	Major energy savings in the public lighting sector	Share of energy efficient bulbs for public lighting (%)	B-NZC-I12	30%	50%	100%
DEVELOPMENT AND MODERNIZATION OF GREEN PUBLIC TRANSPORT	Higher modal split of underground public transport Higher modal split of surface public transport and better integration with the underground system. Revitalisation of railway transport for	Modal split of public transport (%)	B-NZC-I13	37%	38%	40%

ACTION	OUTCOME / IMPACT ADDRESSED	INDICATOR TITLE	INDICATOR CODE	TARGET VALUES		
				2027	2030	2035
	daily commuting purposes.					
PROMOTING OF LOW-CARBON URBAN MOBILITY, ESPECIALLY CYCLING AND WALKING	Higher modal split of low carbon urban trips, especially of walking and cycling. Mass replacement of traditional cars with EVs and adoption of car sharing.	Modal split of non-motorised transport - walking and cycling (%)	B-NZC-I14	17%	18%	20%
PROMOTING OF LOW-CARBON URBAN MOBILITY, ESPECIALLY CYCLING AND WALKING	Higher modal split of low carbon urban trips, especially of walking and cycling. Mass replacement of traditional cars with EVs and adoption of car sharing.	Share of electric cars (%)	B-NZC-I15	1.50%	2.50%	5.00%
COMPLETION AND CONSOLIDATION OF THE CIRCULAR ECONOMY SYSTEM	Strong circular economy developed around the waste management system	Recycling rate of municipal waste (%)	B-NZC-I16	30%	55%	60%
ENHANCING COMMUNITY ENGAGEMENT FOR CLIMATE NEUTRALITY	Community awareness and engagement related to individual and collective climate neutral behaviours.	Improved citizen participation (number)	B-NZC-I17	105,000.00	175,000.00	350,000.00
ALL	Mobilization of funding for climate neutrality	Public and External Capital Invested in Climate Action Projects	B-NZC-I18	30%	50%	100%

Metadata Indicator sheet, by using the template provided :

Table 11. Indicator metadata. Change of the greenhouse gas emissions during the lifetime of the CNAP

INDICATOR NAME	**CHANGE OF THE GREENHOUSE GAS EMISSIONS DURING THE LIFETIME OF THE CLIMATE NEUTRALITY ACTION PLAN**
INDICATOR UNIT	%
DEFINITION	The change in GHG emissions from the start to the completion of the Climate Neutrality Action Plan (CNAP) implementation - the point in time when all the actions under the Climate Neutrality Action Plan have been carried out and the CNAP is fully realized.
CALCULATION	GHG emissions at the end of the Climate Neutrality Action - GHG emissions at the start of the Climate Neutrality Action) / GHG emissions at the start of the Climate Neutrality Action * 100
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	ALL
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	NO
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	-
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	Yes
EXPECTED DATA SOURCE	GHG emission inventory (compiled by the technical experts responsible for developing the CNAP)
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 12. Indicator Metadata. Total greenhouse gas emissions per year

INDICATOR NAME	**TOTAL GREENHOUSE GAS EMISSIONS PER YEAR**
INDICATOR UNIT	%
DEFINITION	The total cumulative CO_2 emissions produced by all targeted sectors in a given year.
CALCULATION	The sum of the CO_2 emissions produced by each targeted sector in a given year.

INDICATOR NAME	**TOTAL GREENHOUSE GAS EMISSIONS PER YEAR**
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	ALL
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	NO
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	-
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	Technical experts responsible for developing the CNAP
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 13. Indicator Metadata. GHG emission from grid supplied electrical energy per year

INDICATOR NAME	**GHG EMISSION FROM GRID SUPPLIED ELECTRICAL ENERGY PER YEAR**
INDICATOR UNIT	t CO_2 equivalent
DEFINITION	GHG emissions occurring as a consequence of the use of grid-supplied electrical energy within the city boundary
CALCULATION	Specific calculation for the electrical energy use within each Sector (See *GHG Baseline Inventory*)
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	ALL
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Energy independence and resilience to grid outages Energy cost savings
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF	YES

INDICATOR NAME	**GHG EMISSION FROM GRID SUPPLIED ELECTRICAL ENERGY PER YEAR**
MAYORS PLATFORMS?	
EXPECTED DATA SOURCE	Technical experts responsible for developing the CNAP
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years

Table 14. Indicator Metadata. GHG emission from transport per year

INDICATOR NAME	**GHG EMISSION FROM TRANSPORT PER YEAR**
INDICATOR UNIT	t CO_2 equivalent
DEFINITION	Greenhouse gas emissions from the operations of vehicles.
CALCULATION	Specific calculation for the electricity uses within the Transport Sector (See *GHG Baseline Inventory*)
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	TRANSPORT
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Improved air quality Reduced noise pollution Reduced traffic congestion and car accidents
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	Technical experts responsible for developing the CNAP
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 15. Indicator Metadata. GHG emission from waste per year

INDICATOR NAME	**GHG EMISSION FROM WASTE PER YEAR**
INDICATOR UNIT	t CO_2 equivalent
DEFINITION	Greenhouse gas emissions from waste collection, treatment, waste incineration and landfills.

INDICATOR NAME	**GHG EMISSION FROM WASTE PER YEAR**
CALCULATION	Specific calculations within the Transport Sector (See GHG Baseline Inventory)
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	WASTE
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Improved air quality and urban aesthetics Job creation and new entrepreneurial opportunities Reduced waste disposal costs
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	Technical experts responsible for developing the CNAP
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 16. Indicator Metadata. GHG emission from buildings per year

INDICATOR NAME	**GHG EMISSION FROM BUILDINGS PER YEAR**
INDICATOR UNIT	t CO_2 equivalent
DEFINITION	Greenhouse gas emissions (mainly CO_2) from the operations of buildings
CALCULATION	Specific calculations within the Buildings Sector (See GHG Baseline Inventory)
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	BUILDINGS
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Lower maintenance, heating & cooling costs Improved urban aesthetics & public safety Social inclusion by increasing the value of the private properties and fighting energy poverty Improved air quality

INDICATOR NAME	**GHG EMISSION FROM BUILDINGS PER YEAR**
	Reduced noise pollution
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	Technical experts responsible for developing the CNAP
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 17. Indicator Metadata. GHG emission from IPPU per year

INDICATOR NAME	**GHG EMISSION FROM IPPU PER YEAR**
INDICATOR UNIT	t CO_2 equivalent
DEFINITION	Greenhouse gas emissions from industrial processes and product use within the city boundary.
CALCULATION	Specific calculations within the IPPU Sector (See GHG Baseline Inventory)
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	IPPU
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Stakeholder engagement
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	NO
EXPECTED DATA SOURCE	Technical experts responsible for developing the CNAP
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 18. Indicator Metadata. Climate-neutral city companies

INDICATOR NAME	**CLIMATE-NEUTRAL CITY COMPANIES**
INDICATOR UNIT	Number
DEFINITION	Number of local companies developing solutions related to climate neutrality.
CALCULATION	The number of companies that have joined or are part of a Local Coalition dedicated to Climate Neutrality OR the number of companies collaborating in various ways (e.g., as solution providers, partners in RDI projects, local investors, or other roles) with the CCC stakeholders (e.g. public administration, universities, NGOs, institutions, etc.) in the field of climate neutrality.
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	IPPU
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Mobilisation of private support and funding
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	NO
EXPECTED DATA SOURCE	NetZero Local Coalition website / reports
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Yearly
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Adaptation based on Comprehensive MEL Indicator System

Table 19. Indicator Metadata. Residual emissions

INDICATOR NAME	**RESIDUAL EMISSIONS**
INDICATOR UNIT	t CO_2 equivalent
DEFINITION	The difference between the city's GHG emissions inventory and their 2030 climate neutrality target.
CALCULATION	Emissions baseline minus the emission reductions.
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN	NO

INDICATOR NAME	**RESIDUAL EMISSIONS**
GREENHOUSE GAS EMISSIONS?)	
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	-
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	NO
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	-
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	Technical experts responsible for developing the CNAP
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 20. Indicator Metadata. Negative emissions through natural sinks

INDICATOR NAME	**NEGATIVE EMISSIONS THROUGH NATURAL SINKS**
INDICATOR UNIT	t CO_2 equivalent
DEFINITION	"Natural sinks" refer to the planting of trees or other conversion of land use. Carbon sinks should be accounted for as part of the 'AFOLU' sector of the GHG inventory and can be independently monitored as a progress indicator to show negative emissions.
CALCULATION	Negative Emissions (namely the amount of negative emissions achieved through natural sinks in the city) = Carbon stock post-implementation (namely the total carbon stock measured after the natural sinks have been established) − Carbon stock baseline (namely the total carbon stock measured before the implementation of natural sinks).
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	AFOLU
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT	Multiple ecosystem functions

INDICATOR NAME	**NEGATIVE EMISSIONS THROUGH NATURAL SINKS**
MEASURE?	Improved air quality Reduced noise pollution New recreational opportunities
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	Public administration – Urban Planning, Territorial Planning, and Cadaster personnel & Public Domain and Real Estate personnel & Environmental personnel
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 21. Indicator Metadata. Share of energy efficient bulbs for public lighting (%)

INDICATOR NAME	**SHARE OF ENERGY EFFICIENT BULBS FOR PUBLIC LIGHTING (%)**
INDICATOR UNIT	%
DEFINITION	Share of energy efficient bulbs
CALCULATION	(Energy efficient bulbs / Total bulbs) x 100
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	BUILDINGS
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Improved public safety Lower maintenance costs
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	Public lighting operator
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report

INDICATOR NAME	**SHARE OF ENERGY EFFICIENT BULBS FOR PUBLIC LIGHTING (%)**
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 22. Indicator Metadata.modal split of public transport (%)

INDICATOR NAME	**MODAL SPLIT OF PUBLIC TRANSPORT (%)**
INDICATOR UNIT	%
DEFINITION	The percentage share of total trips within a given area made using public transportation (buses) compared to other modes of transport such as private vehicles, walking, or cycling.
CALCULATION	(Public transport trips / Total trips) x 100
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	TRANSPORT
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Improved air quality Reduced noise pollution Reduced mobility costs Reduced traffic congestion and car accidents Social inclusion of disadvantaged communities
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	Data compiled by the technical experts responsible for developing the SUMP Local transport operators Survey conducted at local level (questions about how the citizens travel)
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2-3 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Adaptation based on Comprehensive MEL Indicator System

Table 23. Indicator Metadata. Modal split of non-motorised transport (%)

INDICATOR NAME	**MODAL SPLIT OF NON-MOTORISED TRANSPORT (%)**
INDICATOR UNIT	%
DEFINITION	The percentage share of total non-motorised trips compared to other modes of transport.
CALCULATION	(Non-motorised trips / Total trips) x 100
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	TRANSPORT
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Improved air quality Reduced noise pollution Reduced mobility costs Improved general health Reduced traffic congestion and car accidents
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	Data compiled by the technical experts responsible for developing the SUMP Local transport operators Survey conducted at local level (questions about how the citizens travel)
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2-3 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Adaptation based on Comprehensive MEL Indicator System

Table 24. Share of electric cars (%)

INDICATOR NAME	**SHARE OF ELECTRIC CARS (%)**
INDICATOR UNIT	%
DEFINITION	The percentage share of electric automobiles in the total number of automobiles
CALCULATION	(Number of electric automobiles / total number of automobiles) x 100
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	TRANSPORT

DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Improved air quality Reduced noise pollution
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	DRPCIV
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 2 years
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Adaptation based on Comprehensive MEL Indicator System

Table 25. Indicator Metadata. Recycling rate of municipal waste (%)

INDICATOR NAME	**RECYCLING RATE OF MUNICIPAL WASTE (%)**
INDICATOR UNIT	%
DEFINITION	The share of recycled municipal waste of the total municipal waste generation.
CALCULATION	Share of Recycled Waste (%) = (Recycled Municipal Waste / Total Municipal Waste Generation) × 100
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	WASTE
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Operational and disposal cost savings Improved air quality and urban aesthetics Job creation and new entrepreneurial opportunities Reduced waste disposal costs
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	YES
EXPECTED DATA SOURCE	Local public administration database (covering waste generation, collection, and recycling at the local level) Local waste management operators National Environmental Agency

INDICATOR NAME	**RECYCLING RATE OF MUNICIPAL WASTE (%)**
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Yearly
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 26. Indicator Metadata. Improved citizen participation

INDICATOR NAME	**IMPROVED CITIZEN PARTICIPATION**
INDICATOR UNIT	number
DEFINITION	The number of citizens participating in awareness campaigns regarding sustainability and the environment
CALCULATION	Social media reach metrics for online campaigns and participation reports for in-person events
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	YES
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	ALL SECTORS
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	YES
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Increase volunteer engagement Improve transparency International and internal visibility Encouraging civic innovation
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	NO
EXPECTED DATA SOURCE	Internal reports
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Yearly
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Comprehensive MEL Indicator System

Table 27. Indicator Metadata. Public and external capital invested in climate action projects

INDICATOR NAME	**PUBLIC AND EXTERNAL CAPITAL INVESTED IN CLIMATE ACTION PROJECTS**
INDICATOR UNIT	%

INDICATOR NAME	**PUBLIC AND EXTERNAL CAPITAL INVESTED IN CLIMATE ACTION PROJECTS**
DEFINITION	The percentage of capital invested for the implementation of the CNAP. The indicator covers both its own sources and the funds received from the State budget, European fund, as well as external financing organizations (e.g., commercial banks, EBRD).
CALCULATION	Amount of capital invested / Total CNAP budget
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	NO
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	-
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	NO
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	-
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	NO
EXPECTED DATA SOURCE	Local budget - investments program
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Yearly
DELIVERABLES DESCRIBING THE INDICATOR	Baseline Inventory and Monitoring Report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Adapted based on the Comprehensive MEL Indicator System

STAKEHOLDERS

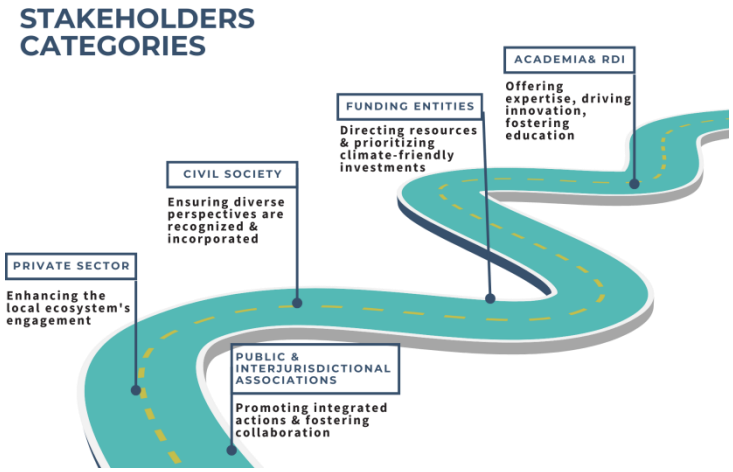
Bucharest demonstrates a strong commitment to a participatory approach in its urban development and climate strategies, as evidenced by the Integrated Urban Development Strategy (SIDU), the Green City Action Plan (GCAP/ PaOV) or the Velo Masterplan for the Municipality of Bucharest. All strategies prioritize inclusive collaboration, actively involving stakeholders from the public and private sectors, NGOs, citizens, and specialized entities like research institutions and funding bodies. By fostering consensus and aligning city development goals with the needs of diverse target groups, Bucharest ensures that its policies and actions are both comprehensive and responsive, paving the way for sustainable and equitable urban growth.

Bucharest's Green City Action Plan (GCAP) and the Integrated Urban Development Strategy (SIDU) serve as a starting point for the development of the city's Climate Neutrality Action Plan (CNAP). All initiatives emphasize broad civic participation to foster stakeholder ownership and ensure community-centered solutions. The GCAP's participatory framework enables the identification of environmental challenges, prioritization of community needs, and evaluation of proposed actions' feasibility. Continuing this approach, the CNAP advances Bucharest's commitment to inclusive and sustainable urban development, setting the city on a path to climate neutrality by 2035. Additionally, through the monitoring and evaluation process, the Plan ensures progress tracking, outcome assessment, and updates through governance collaboration, data tools, and community engagement.

The governance framework outlined in Bucharest's Climate Neutrality Action Plan (CNAP) focuses on consolidating climate governance at both urban and metropolitan levels. Key initiatives include developing a NetZero Coalition and enhancing policies at the metropolitan level to address green spaces (eg. green belt, biodiversity corridors), air quality and soil enhancement. The plan also emphasizes fostering public-private partnerships for renewable energy and biodiversity conservation, along with integrated data management. Furthermore, the plan supports transitioning to efficient energy systems and building capacity through training programs for public servants, educational initiatives and green grants. The Local NetZero Coalition will lead awareness campaigns to engage stakeholders and offer green grants to support climate-neutral communities and sustainable lifestyles.

Bucharest's Climate Neutrality Action Plan (CNAP) emphasizes community engagement and innovation to achieve climate goals. Key initiatives include awareness campaigns on waste separation, green energy and sustainable transport, along with interactive tools like a digital monitoring platform and carbon footprint calculators. Programs such as public art projects, green solutions markets and hackathons foster creativity and innovation. These efforts aim to build an informed, collaborative, and proactive community around climate neutrality. **By strengthening climate governance, fostering community engagement, and leveraging innovation, the plan ensures broad participation from citizens, public and private sectors, and academia.**

Figure 19. Stakeholders categories



Public utility associations or companies: associative structures of local public authorities, public utility associations or companies promote integrated actions and foster collaboration among Bucharest City Hall departments, district administrations, the General or District City Halls to strengthen both local and metropolitan governance.
Private sector: To enhance the local ecosystem's engagement in achieving climate neutrality, the **NetZero Coalition** will work to align local private sector stakeholders with the city's established CO_2 emission reduction objectives.
Civil society: Local NGOs, citizens, and associations are pivotal to the success of the Action Plan. Through the participatory process of other projects and strategies of the city hall we mapped key stakeholders, including NGOs, academic institutions and vulnerable communities. This inclusive approach ensures their perspectives are not only reflected in completed phases but also actively incorporated into future initiatives.
Funding entities: The organizations managing non-reimbursable public funds, such as Managing Authorities, Intermediate Bodies for European and national programs, and the European Commission, along with private investors like banks and international bodies like the EBRD, EIB, WB play a key role in shaping Bucharest and its metropolitan area's sustainable development. These stakeholders are crucial for directing funding toward climate-neutral initiatives. Among them, those overseeing non-reimbursable funds are particularly influential, as many of Bucharest's projects rely on this financing. This dependence has driven local priorities for nearly two decades and will remain vital as efforts increasingly focus on low-carbon investments.
Academia and Research, Development and Innovation (RDI) organisations: Local universities and RDI organizations play a vital role in addressing climate challenges by offering expertise, driving innovation, and fostering education through research and specialized programs. The city's collaboration with academic institutions, research centers, and local stakeholders ensures that cutting-edge research informs key initiatives in energy efficiency, sustainable mobility, urban renewal and green infrastructure, all aligned with climate neutrality objectives.

Table 28. Stakeholders analysis

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
Bucharest City Hall	PROCESS	public administration	Through collaboration with citizens, the local community, and various external partners, the Bucharest City Hall, together with the District City Halls, will design, implement, assess, and monitor the actions outlined in the city's Climate Neutrality Action Plan."	Engaging all stakeholders to meet the indicators and achieve the targets set in the Climate Neutrality Action Plan.	HIGH
District 1 City Hall	PROCESS	public administration			HIGH
District 2 City Hall	PROCESS	public administration			HIGH
District 3 City Hall	PROCESS	public administration			HIGH
District 4 City Hall	PROCESS	public administration			HIGH
District 5 City Hall	PROCESS	public administration			HIGH
District 6 City Hall	PROCESS	public administration			HIGH
General council of Bucharest	PROCESS	deliberative authority	The General Council of Bucharest, together with the District local council, is dedicated to supporting the implementation of the Climate City Contract by allocating resources, enacting policies,	Promoting climate action initiatives tailored to the local community's needs.	HIGH
District 1 Local council	PROCESS	deliberative authority			HIGH
District 2 Local council	PROCESS	deliberative authority			HIGH

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
District 3 Local council	PROCESS	deliberative authority	promoting community involvement, and overseeing initiatives to achieve climate neutrality and sustainability at the municipal level.		HIGH
District 4 Local council	PROCESS	deliberative authority			HIGH
District 5 Local council	PROCESS	deliberative authority			HIGH
District 6 Local council	PROCESS	deliberative authority			HIGH
Bucharest-Ilfov Regional Development Agency - ADR Bucharest-Ilfov	FUNDS	public utility NGO / managing authority	Providing financial support for both public and private initiatives focused on achieving climate neutrality. Managing Authority for the implementation of the Regional Program Bucharest-Ilfov 2021-2027.	Tackling the priorities set forth in the Bucharest-Ilfov Regional Programme while working towards achieving climate neutrality.	HIGH
The Prefecture institution – Bucharest Municipality	ALLIANCES	public authority	Advocating for governmental interests and overseeing decentralized public services managed by ministries and central public administration bodies at the local level.	Ensuring that the city's climate action plan aligns with national policies and advocating for resources and support from the central government.	MODERATE
Ilfov General Council	ALLIANCES	public administration	The public administration authority is set up at county level to coordinate the work of the municipal and city councils in order to realize public services of county interest.	Coordination with Bucharest municipality for climate neutral policies.	HIGH
Bucharest Intercommunal Development Association for Integrated Municipal Waste Management ADI GIDMB	ALLIANCES	associative structure of local public authorities - NGO	Modernizing and expanding local waste management infrastructure in line with international standards and environmental requirements.	Fostering sustainable practices and reducing the ecological footprint for long-term community well-being.	HIGH
Intercommunity Development Association Bucharest Metropolitan area ADI ZMB	ALLIANCES	associative structure of local public authorities - NGO	The local or metropolitan body's role is to expand the climate neutrality vision, measures, and collaboration, extending beyond the local level to include the entire Bucharest metropolitan area.	Promoting collaboration and knowledge-sharing from the local to the metropolitan level and vice-versa, ensuring the widespread adoption and implementation of climate neutrality projects.	HIGH
Bucharest Intercommunity Development Association for RODENT and pest control ADI DDD	ALLIANCES	associative structure of local public authorities - NGO	Enhancing public health and sanitation through efficient services, modernizing sanitation systems with public investments, and securing	Aligning with broader environmental and climate objectives by promoting cleaner and healthier urban environments.	MODERATE

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
			European funding for sustainable development.		
Intercommunity Development Association for public transport Bucharest – Ilfov ADI TPBI	ALLIANCES	associative structure of local public authorities - NGO	Enhancing the fleet and expanding the eco-friendly public transportation network.	Delivering efficient, low-emission, and high-quality public transportation services that meet the needs of all citizens at the Bucharest-Ilfov level.	HIGH
Municipal Authority for the Regulation of Local Public Services AMRSP	ALLIANCES / PROCESS	associative structure of local public authorities			MODERATE
Bucharest -Ilfov Intercommunity Thermo-Energy Development Association ADI TBI	ALLIANCES	associative structure of local public authorities	Advancing the city's climate-neutral objectives by designing and implementing rehabilitation, expansion, and modernization programs for centralized thermal energy systems, as well as initiating new systems. These efforts are carried out in consultation with operators to ensure alignment with sustainability and efficiency goals.	Ensuring efficient and sustainable energy solutions, aligning with climate-neutral objectives while addressing the specific needs.	HIGH
Administration of Hospitals and Medical Services ASSMB	UTILITIES	PMB subordinates - public institution			
Street Administration ASB	UTILITIES	PMB subordinates - public institution			
Administration of Lakes, Parks and Leisure Bucharest ALPAB	UTILITIES	PMB subordinates - public institution	Conserving and enriching green spaces, parks, and lakes, which contribute to environmental sustainability by preserving green areas and promoting eco-friendly recreational activities.	Managing the city's natural and cultural heritage while enhancing opportunities for recreation, education, and leisure.	HIGH
Administration of Cemeteries and Crematoria ACCU	UTILITIES	PMB subordinates - public institution			
Real Estate Fund Administration AFI	UTILITIES	PMB subordinates - public institution			
Administration of Bucharest Zoological Garden	UTILITIES	PMB subordinates - public institution			
Municipal administration for	UTILITIES	PMB subordinates - public institution	Planning and implementing safety measures, conducting	Reducing the seismic risk of buildings and helping protect both	HIGH

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
strengthening buildings at seismic risk AMCCRS			technical assessments, and carrying out reinforcement projects. Additionally, managing data on seismic risks, coordinating with property owners for necessary interventions, and ensuring the city's infrastructure is resilient to earthquakes.	people and the environment.	
Văcărești Natural Park Administration	UTILITIES	PMB subordinates - public institution	Implementing projects that preserve biodiversity, enhance green spaces, and promote sustainable environmental practices.	Focusing on ecological balance and sustainable development.	HIGH
Bucharest General Directorate of social Assistance	CAPACITIES	PMB subordinates - public institution	Implementing measures to reduce the vulnerability of at-risk communities.	Reducing the adverse effects of climate change on vulnerable communities.	MODERATE
		+ relevant district subordinates			
TCMB Bucharest Municipal Metropolitan Buildings Trust Company PLC	UTILITIES	municipal companies	Contributing to the development of sustainable infrastructure, the modernization of public buildings, and the promotion of eco-friendly practices.	Providing a structured and responsive framework for the design, execution, and consulting of urban projects.	HIGH
CMAB Bucharest Municipal Public Lighting Company PLC	UTILITIES	municipal companies	Promoting new lighting technologies and modern management solutions, such as energy consumption regulation, remote control efficiency, and other technological innovations.	Optimizing energy consumption and improving the quality of public spaces.	HIGH
CMESB Municipal Energy Services Company PLC	UTILITIES	municipal companies	Tackling system inefficiencies, building electric vehicle charging infrastructure, and encouraging pollution-free transport to reduce greenhouse gas emissions.	Ensuring ensure high-quality thermal energy transport and distribution services in Bucharest	HIGH
CMPB Bucharest Municipal Parking Company PLC	UTILITIES	municipal companies	Reducing urban congestion and environmental pollution by aligning with European SMART PARKING standards.	Improving parking efficiency and reducing the need for excessive vehicle circulation in urban areas.	MODERATE
CMMTB Bucharest Traffic Management Municipal Company PLC	UTILITIES	municipal companies	Incorporating all intersections into the Integrated Traffic Management System, implementing smart traffic solutions to reduce	Enhancing traffic flow and urban mobility in Bucharest by introducing a modern, integrated traffic management system.	HIGH

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
			congestion, ensuring energy efficiency and environmental protection, and promoting sustainable transport by developing bike lanes and eco-friendly infrastructure.		
Bucharest Municipal Thermo-Energy Company PLC – CMTEB	INFRASTRUCTURE	municipal companies	Minimizing the environmental impact of the energy system, including infrastructure and energy production methods, to reduce its climate effects.	Improving owned infrastructure, internal processes, and service offerings to support operators in their transition to climate neutrality.	
APA NOVA BUCUREŞTI - WATER COMPANY	INFRASTRUCTURE	PUBLIC COMPANIES	Preserving and restoring freshwater ecosystems, eliminating water pollution, and transitioning to carbon-neutral and circular water usage systems.	Enhancing water resource protection by promoting sustainable use, ensuring the delivery of high-quality services for safe water access, and increasing wastewater reclamation rates.	HIGH
Romprest Service SA	UTILITIES	PRIVATE COMPANY	Adopting safe and sustainable waste management practices while promoting circular economy principles, with a strong focus on safeguarding public health and protecting the environment.	Improving waste collection, transportation, and storage systems, while maximizing the recovery of recyclable materials to minimize landfill dependence and foster sustainable waste management practices.	HIGH
SUPERCOM SA	UTILITIES	PRIVATE COMPANY			HIGH
General Directorate of Sanitation District 3	UTILITIES	PUBLIC COMPANIES			HIGH
UWS (ROSAL GRUP)	UTILITIES	PRIVATE COMPANY			HIGH
SC SALUBRIZARE SECTOR 5 SA	UTILITIES	PUBLIC COMPANIES			HIGH
URBAN SA	UTILITIES	PRIVATE COMPANY			HIGH
ENGIE ROMANIA SA	INFRASTRUCTURE / UTILITIES	PRIVATE COMPANIES	Minimizing the environmental impact of the energy system, including infrastructure and energy production methods, to reduce its climate effects.	Improving owned infrastructure, internal processes, and service offerings to support operators in their transition to climate neutrality.	HIGH
PPC ENERGIE	UTILITIES	PRIVATE COMPANIES			HIGH
Electricity Networks Romania Rețele Electrice	INFRASTRUCTURE	PRIVATE COMPANIES			
Hidroelectrica	UTILITIES	PRIVATE COMPANIES			
METROREX SA	INFRASTRUCTURE	PUBLIC COMPANIES	Delivering efficient, low-emission, and high-quality public transportation services that cater to the needs of all citizens.	Upgrading the fleet and expanding the green public transportation network.	HIGH
Bucharest Transport Company STB SA	INFRASTRUCTURE	municipal company			HIGH

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
BUCHAREST AIRPORTS NATIONAL COMPANY	INFRASTRUCTURE	PUBLIC COMPANIES	Enhancing operational efficiency, adopting carbon offset strategies, and raising awareness to minimize the climate impact.	Creating initiatives to reduce climate impact and securing funding for their implementation.	LOW
ROMANIAN RAILROADS (CFR SA)	INFRASTRUCTURE	PUBLIC COMPANIES	Enhancing train mobility as a preferred transportation option to reduce reliance on cars for local, metropolitan, regional, and European travel.	Ongoing modernization efforts to improve train mobility, optimize services, and ensure the efficient and sustainable use of rail infrastructure.	LOW
National Road Infrastructure Administration Company - CNAIR SA Bucharest Department	INFRASTRUCTURE	PUBLIC COMPANIES			LOW
University of Bucharest	CAPACITIES	EDUCATION & RDI	Participating in RDI initiatives and incorporating curricula designed to advance climate neutrality objectives.	Promoting innovative solutions and providing academic programs focused on achieving climate neutrality.	HIGH
Bucharest Polytechnic University - UPB	CAPACITIES	EDUCATION & RDI			HIGH
"Ion Mincu" University of architecture and urban Planning - UAUIM	CAPACITIES	EDUCATION & RDI			HIGH
Technical Construction University Bucharest UTCB	CAPACITIES	EDUCATION & RDI			HIGH
University of Agronomic Sciences and Veterinary Medicine Bucharest USAMV	CAPACITIES	EDUCATION & RDI			HIGH
Bucharest Art University - UNARTE	CAPACITIES	EDUCATION & RDI			HIGH
Bucharest University of Economic Studies - ASE	CAPACITIES	EDUCATION & RDI			HIGH
The Order of Romanian Architects - OAR	CAPACITIES	professional organisation			MODERATE
The Order of Romanian Architects - Bucharest Branch - OAR B	CAPACITIES	professional organisation			MODERATE
Romanian Landscapers Association Bucharest-Ilfov territorial branch - ASOP	CAPACITIES	professional organisation			MODERATE
Romanian Association of Building Energy Auditors - AAECR	CAPACITIES	professional organisation			MODERATE
Romanian Order of Energy Auditors - OAER	CAPACITIES	professional organisation			MODERATE
Association of Romanian Urban Planning Professionals APUR	CAPACITIES	professional organisation			MODERATE /LOW
ASSOCIATION OF BUSINESS SERVICE LEADERS IN ROMANIA (ABSL)	CAPACITIES	PRIVATE SECTOR			MODERATE
ASSOCIATION OF ROMANIAN BUSINESS PEOPLE (AOAR)	CAPACITIES	PRIVATE SECTOR			MODERATE

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
ROMANIAN BUSINESS LEADERS	CAPACITIES	PRIVATE SECTOR	Through partnerships and collaborations with public institutions, these stakeholders can help implement climate-friendly solutions, enhance corporate social responsibility, and accelerate the adoption of sustainable practices across industries. Their involvement ensures that climate neutrality is integrated into business models, leading to long-term environmental and economic benefits for the local community.	Driving climate neutrality goals by leveraging networks, resources, and expertise.	MODERATE
FOREIGN INVESTORS COUNCIL	CAPACITIES	PRIVATE SECTOR			MODERATE
CIRCULAR ECONOMY COALITION - CERC	CAPACITIES	PRIVATE SECTOR			MODERATE
NATIONAL COUNCIL OF SMALL AND MEDIUM PRIVATE ENTERPRISES IN ROMANIA (CNIPMMR)	CAPACITIES	PRIVATE SECTOR			MODERATE
IMPACT HUB BUCHAREST	CAPACITIES	PRIVATE SECTOR			MODERATE
NATIONAL TRADE UNION BLOC	CAPACITIES	PRIVATE SECTOR			MODERATE
CONCORDIA EMPLOYER CONFEDERATION	CAPACITIES	PRIVATE SECTOR			MODERATE
ROMANIAN BANK ASSOCIATION	CAPACITIES	PRIVATE SECTOR			MODERATE
BUCHAREST CHAMBER OF COMMERCE AND INDUSTRY	CAPACITIES	PRIVATE SECTOR			MODERATE
AHK ROMANIA (GERMANY ROMANIAN CHAMBER OF COMMERCE)	CAPACITIES	PRIVATE SECTOR			MODERATE
NETHERLANDS ROMANIAN CHAMBER OF COMMERCE (NRCC)	CAPACITIES	PRIVATE SECTOR			MODERATE
FRENCH CHAMBER OF COMMERCE AND INDUSTRY IN ROMANIA (CCIFER)	CAPACITIES	PRIVATE SECTOR			MODERATE
AMERICAN CHAMBER OF COMMERCE IN ROMANIA (AMCHAM)	CAPACITIES	PRIVATE SECTOR			MODERATE
Community Foundation Bucharest	CAPACITIES	NGO	Through advocacy, awareness campaigns, and collaboration, they can shape policies, promote sustainable practices, and ensure inclusive, effective climate actions. Their involvement in areas like renewable energy, urban planning, and social justice can drive innovative solutions and accelerate the city's climate neutrality efforts	By engaging with local communities, advocating for inclusive policies, and working alongside governmental bodies, NGOs can create lasting positive change that aligns with both environmental and social objectives, ensuring a more resilient and equitable future for the city.	LOW
2Celsius Association	CAPACITIES	NGO			
Salvați copii Association	CAPACITIES	NGO			
Preocupați de Viitor Association	CAPACITIES	NGO			
InfoClima	CAPACITIES	NGO			
Nod Makerspace Association	CAPACITIES	NGO			
Hai cu bicla Association	CAPACITIES	NGO			
Act for tomorrow	CAPACITIES	NGO			
BAZA Association	CAPACITIES	NGO			
Climato Sfera Association	CAPACITIES	NGO			
Agenda 21	CAPACITIES	NGO			
Nomad Multisport Association	CAPACITIES	NGO			
ATU Association	CAPACITIES	NGO / EDUCATION			
Străzi pentru Oameni Association	CAPACITIES	NGO			

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
Parcul Natural Văcărești Association	CAPACITIES	NGO			
Ecoteca Association	CAPACITIES	NGO			
Reper 21 Association	CAPACITIES	NGO			
Association for Sustainable Development Ecopolis	CAPACITIES	NGO			
Romanian Association for Applied Meteorology and Education ARMAE		NGO / EDUCATION			
PlusMinus Association	CAPACITIES	NGO			
YOUTH COUNCIL OF MUNICIPALITY	CAPACITIES	NGO			LOW
THE ROMANIAN YOUTH COUNCIL	CAPACITIES	NGO			LOW
BUCHAREST CITY YOUTH FOUNDATION (FTMB)	CAPACITIES	NGO			LOW
COUNCIL OF INSTITUTIONALIZED YOUTH	CAPACITIES	NGO			LOW
ROMANIAN CENTER FOR EUROPEAN POLICIES	CAPACITIES	NGO			LOW
ASSOCIATION OF STUDENTS IN ADMINISTRATION AND BUSINESS (ASAA)	CAPACITIES	NGO			LOW
INTERNATIONAL ASSOCIATION OF STUDENTS IN ECONOMICS AND BUSINESS (AIESEC)	CAPACITIES	NGO			LOW
ASSOCIATION OF STUDENTS FROM BUCHAREST AND ILFOV	CAPACITIES	NGO			LOW
ECO-CIVICA FOUNDATION	CAPACITIES	NGO			LOW
VIITOR PLUS ASSOCIATION	CAPACITIES	NGO			LOW
TERRA MILLENNIUM III FOUNDATION	CAPACITIES	NGO			LOW
METROU UȘOR ASSOCIATION	CAPACITIES	NGO			LOW
SAVE BUCHAREST ASSOCIATION	CAPACITIES	NGO			LOW
FUNKY CITIZENS	CAPACITIES	NGO			LOW
ROMANIA CYCLISTS FEDERATION	CAPACITIES	NGO			LOW
ENERGY COOPERATIVE	CAPACITIES	NGO			LOW
EFDEN Sustainable City Association	CAPACITIES	NGO / EDUCATION			LOW
THE COUNTY COUNCIL OF PENSIONERS AND ELDERLY PEOPLE FROM THE MUNICIPALITY OF	CAPACITIES	NGO			LOW

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
BUCHAREST					
GOOD HOUSE ASSOCIATION	CAPACITIES	NGO			LOW
PROTECTED WORKSHOPS ASSOCIATION	CAPACITIES	NGO			LOW
WORKSHOPS WITHOUT BORDERS	CAPACITIES	NGO			LOW
ROMANIAN NATIONAL ASSOCIATION OF THE DEAF -Bucharest Branch	CAPACITIES	NGO			LOW
ASSOCIATION OF THE BLIND FROM ROMANIA (BUCHAREST BRANCH)	CAPACITIES	NGO			LOW
MOTIVATION ROMANIA FOUNDATION	CAPACITIES	NGO			LOW
FERENTARI ASSOCIATION	CAPACITIES	NGO			LOW
THE FEDERATION OF OWNERS ASSOCIATIONS FROM ROMANIA	CAPACITIES	NGO			LOW
INSTITUTE FOR DEVELOPMENT AND INNOVATION ASSOCIATION (IDEI)	CAPACITIES	NGO			LOW
TOGETHER FOR THE GREEN BELT	CAPACITIES	NGO			LOW
AGENT GREEN	CAPACITIES	NGO			LOW
ORGANIZATION FOR THE PROMOTION OF ALTERNATIVE TRANSPORT IN ROMANIA (OPTAR)	CAPACITIES	NGO			LOW
NETWORK FOR URBAN NATURE	CAPACITIES	NGO			LOW
ROMANIAN NETWORK OF ENERGY CITIES (OER)	CAPACITIES	NGO			LOW
COALITION FOR GENDER EQUALITY	CAPACITIES	NGO			LOW
URBANIZEHUB	CAPACITIES	NGO			LOW
CIȘMIGIU CIVIC INITIATIVE GROUP	CAPACITIES	NGO			LOW
THE SALA PALATULUI CIVIC INITIATIVE GROUP	CAPACITIES	NGO			LOW
CIVIC INITIATIVE GROUP "I LIVE IN A MATCHBOX"	CAPACITIES	NGO			LOW
IANCULUI CIVIC GROUP	CAPACITIES	NGO			LOW
CIVIC INITIATIVE GROUP LACUL TEI	CAPACITIES	NGO			LOW
FLOREASCA CIVIC GROUP	CAPACITIES	NGO			LOW
IN COTROCENI – PEOPLE, IDEAS, STORIES	CAPACITIES	NGO			LOW

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
IZVOR PARK CIVIC INITIATIVE GROUP	CAPACITIES	NGO			LOW
CIVIC GROUP "FOR PLAYGROUNDS AND GREEN SPACES IN GROZĂVEŞTI"	CAPACITIES	NGO			LOW
GHENCEA EXTENSION INITIATIVE	CAPACITIES	NGO			LOW
COUNCIL OF INSTITUTIONALIZED YOUTH	CAPACITIES	Local Communities and individual citizens			LOW
FILIA CENTRE	CAPACITIES	Local Communities and individual citizens			LOW
GOOD HOUSE ASSOCIATION	CAPACITIES	Local Communities and individual citizens			LOW
"PRO-EUROPE" ROMA PARTY ASSOCIATION	CAPACITIES	Local Communities and individual citizens			LOW
PROTECTED WORKSHOPS ASSOCIATION	CAPACITIES	Local Communities and individual citizens			LOW
ROMANIAN NATIONAL ASSOCIATION OF THE DEAF (BUCHAREST BRANCH)	CAPACITIES	Local Communities and individual citizens			LOW
ASSOCIATION OF THE BLIND FROM ROMANIA (BUCHAREST BRANCH)	CAPACITIES	Local Communities and individual citizens			LOW
ROMANIAN NATIONAL COUNCIL FOR REFUGEES FOUNDATION (CNRR)	CAPACITIES	Local Communities and individual citizens			LOW
BUCHAREST MUNICIPAL AGENCY FOR EMPLOYMENT OF THE LABOR FORCE	CAPACITIES	PUBLIC SECTOR	Encouraging the development of green job opportunities at the municipal and metropolitan levels, while providing professional training to prepare the local workforce for these roles.	Supporting the integration of green jobs into local economies to drive sustainable growth and employment opportunities.	MODERATE
EMERGENCY UNIVERSITY HOSPITAL BUCHAREST	CAPACITIES	PUBLIC SECTOR	Offering expertise on the links between climate and health, advocating for health-focused policies, and implementing measures to cut greenhouse gas emissions	Tackling the health challenges posed by climate change and advancing strategies to minimize their effects.	MODERATE
SMURD BUCHAREST	CAPACITIES	PUBLIC SECTOR			MODERATE
					MODERATE

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
			while addressing climate-related health risks, such as promoting active transportation to reduce air pollution and establishing heat wave preparedness plans.		
INSPECTOR FOR EMERGENCY SITUATIONS "DEALUL SPIRII" BUCHAREST-ILFOV	CAPACITIES	PUBLIC SECTOR	The Inspectorate actively reduces the impact of emergencies and strengthens climate resilience through risk assessments, preparedness training, and public education campaigns.	Ensuring public safety, managing emergency responses, and offering support during crises stemming from the adverse effects of climate change.	MODERATE
DIRECTORATE FOR AGRICULTURE OF THE MUNICIPALITY OF BUCHAREST	CAPACITIES	PUBLIC SECTOR	Promoting sustainable and climate-resilient agricultural practices.	Promoting sustainable farming methods while reducing the impact of extreme weather on agricultural yields.	MODERATE
ENVIRONMENTAL PROTECTION AGENCY (APM)	CAPACITIES	PUBLIC SECTOR	Implementing various initiatives, including educational and awareness programs, to strengthen natural systems' resilience to climate change and promote climate neutrality.	Minimizing environmental impacts caused by human activities and climate change while boosting resilience to its effects.	MODERATE
FORESTRY LOCAL CONTROL AUTHORITY	CAPACITIES	PUBLIC SECTOR	Promoting sustainable forestry practices, safeguarding biodiversity, and offering recreational opportunities for both local residents and tourists.	Ensuring ecological balance and improving quality of life by conserving the environment and addressing climate change through sustainable forest management practices.	MODERATE
NATIONAL LIBRARY OF ROMANIA	CAPACITIES	PUBLIC SECTOR	Creating and distributing educational resources to promote climate neutrality.	Keeping abreast of popular books, educational content, and study resources.	MODERATE
NATIONAL ADMINISTRATION OF ROMANIAN WATERS (ANAR)	CAPACITIES	PUBLIC SECTOR	Promoting sustainable water management, enhancing climate resilience through adaptive water systems, and improving flood control. Additionally, increasing research, data monitoring, and public awareness on water conservation would guide effective policies and promote collaboration for sustainable water use	Reducing environmental impact, ensuring water sustainability, and contributing to climate neutrality goals for the city.	MODERATE
National Institute for Research and Development in Forestry „Marin Drăcea”	CAPACITIES	EDUCATION & RDI			
National Institute for Research and Development in Construction, Urbanism and Sustainable territorial Development	CAPACITIES	EDUCATION & RDI			

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
URBAN INCERC					
National Research-development Institute for environmental and protection Bucharest	CAPACITIES	EDUCATION & RDI			
ROMANIAN ACADEMY	CAPACITIES	RDI			
The National Institute for Earth Physics - NIEP	CAPACITIES	EDUCATION & RDI			
NATIONAL INSTITUTE OF HYDROLOGY AND WATER MANAGEMENT (INHGA)	CAPACITIES	PUBLIC SECTOR			MODERATE
NATIONAL ENVIRONMENTAL GUARD - BUCHAREST GENERAL COMMISSARIAT	CAPACITIES	PUBLIC SECTOR	Promoting environmental protection, biodiversity conservation, and sustainable land management (e.g., enhance forest management and increase green spaces, enforce environmental regulations and promote best practices in waste management, pollution control, and the preservation of natural resources. Expanding protected natural areas and integrating eco-friendly policies into urban planning or engaging in public awareness campaigns and collaborating on restoring ecosystems).	Promoting environmental sustainability, enhancing climate resilience, and reducing the negative impacts of human activity on natural ecosystems	MODERATE
NATIONAL AGENCY FOR PROTECTED NATURAL AREAS BUCHAREST	CAPACITIES	PUBLIC SECTOR			MODERATE
NATIONAL DIRECTORATE OF FORESTS BUCHAREST (ROMSILVA)	CAPACITIES	PUBLIC SECTOR			MODERATE
NATIONAL INSTITUTE OF PUBLIC HEALTH (INSP)	CAPACITIES	EDUCATION & RDI	Promoting public health by supporting policies that mitigate environmental risks, improving air quality, and protecting vulnerable groups. Additionally, providing scientific research and raising public awareness about the links between health and environmental sustainability, encouraging sustainable practices in the community.	Assessing and monitoring the health impacts of environmental factors, such as pollution and climate change, on the population.	MODERATE
NATIONAL METEOROLOGICAL ADMINISTRATION (ANM)	CAPACITIES	EDUCATION & RDI	Monitoring climate patterns, detecting extreme weather events, and understanding long-term climate trends.	Providing accurate weather forecasting and climate data to inform decision-making and support adaptive measures in response to climate change.	MODERATE

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
BUCHAREST STATE CONSTRUCTION INSPECTORATE	CAPACITIES	PUBLIC SECTOR	Enforcing sustainable construction practices, ensuring that new developments adhere to energy-efficient standards, and promoting green building certifications.	Support the implementation of regulations related to energy performance in buildings, encourage the use of sustainable materials, and oversee the proper execution of energy-efficient retrofitting projects for existing structures.	MODERATE
NATIONAL AGENCY FOR ROMA	CAPACITIES	PUBLIC SECTOR	Improving access to green spaces, promoting energy-efficient housing, and supporting education and awareness about climate change.	Advocating for the integration of sustainable development practices in Roma neighborhoods.	MODERATE
ROMANIAN GREEN BUILDING COUNCIL	ALLIANCES	NGO / Certification body	Encouraging the adoption of best practices, technologies, and certifications to achieve climate neutrality in buildings.	Shaping the built environment to achieve climate neutrality.	MODERATE
Ministry of European Investments and projects MIPE	FUNDS	PUBLIC SECTOR	Providing funding for climate neutrality projects, supporting Bucharest's public administration in becoming a carbon-neutral capital, and promoting it as a model.	Supporting and advancing Romania's and EU pursuit of climate neutrality goals.	MODERATE
Ministry of finance	FUNDS	PUBLIC SECTOR			
The Ministry for development, public works and administration of Romania MDLPA	FUNDS	PUBLIC SECTOR			
The Ministry of transport of Romania MT	FUNDS	PUBLIC SECTOR			
Ministry of Energy	FUNDS	PUBLIC SECTOR			
Ministry of Environment	FUNDS	PUBLIC SECTOR			
The Ministry of Research, innovation and Digitalisation	FUNDS	PUBLIC SECTOR			
COMMERCIAL BANKS	FUNDS	BANKING INSTITUTIONS	Funding public investments for climate neutrality beyond local budgets and supporting private projects to reduce greenhouse gas emissions.	Supporting European climate neutrality goals and creating a portfolio of sustainable banking services.	MODERATE
OTHER PRIVATE COMPANIES	FUNDS	PRIVATE SECTOR	Developing climate neutrality projects and supporting public and community initiatives aimed at achieving this goal.	Boosting climate resilience and strengthening brand identity by raising awareness and encouraging participation in climate change action.	MODERATE

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
CITIZENS	CAPACITIES, PROCESSES, ALLIANCES, FUNDS	CIVIL SOCIETY	Engaging in local initiatives to support the Municipality's transition to climate neutrality.	Enhancing well-being, climate resilience, and fulfillment through active participation.	HIGH

PARTICIPATORY PROCESSES

Bucharest employs a participatory framework in its decision-making process, ensuring public engagement is both a legal requirement and a practical approach to local governance. Legislation mandates that citizens and stakeholders have the opportunity to stay informed and voice their opinions on local planning documents. However, the city goes beyond these statutory obligations by organizing public debates on a wide range of environmental issues as was the case for the Green City Action Plan. This proactive engagement extends participation to local initiatives such as programs, projects, and regulations, fostering broader community involvement. Additionally, the municipality adopts a strategic approach by collaborating with various stakeholders on targeted interventions, showcasing its commitment to inclusive and effective governance.

This approach reflects a balanced effort to meet legal requirements while actively encouraging civic engagement and leveraging collaborative efforts to address specific challenges, demonstrating Bucharest's dedication to participatory governance in urban development.

COMPLETED ACTIONS

The General City Hall of Bucharest's updated website supports participation by providing accessible information and tools, including for initiatives like the Green City Action Plan (GCAP), fostering transparency and citizen engagement.

The participatory budgeting platform is a tool that allows Bucharest's residents to engage directly in the city's development. This online platform enables citizens to propose investment projects, vote on initiatives they consider most important, and monitor their implementation. By providing a straightforward way for the public to contribute to decision-making, the platform ensures that municipal funds are allocated to projects that reflect community priorities, fostering greater transparency and collaboration between residents and local authorities.

- **The 'Green Crown for Queen Elizabeth Street' project**, implemented by the NGO Streets for People, won the Participatory Budgeting initiative organized by the Bucharest City Hall in 2022, with 1,614 citizens voting in its favor. The project successfully revitalized Regina Elisabeta Boulevard. Following consultations with individuals working near Cişmigiu Park, daily commuters from the Universitate metro station, and students from the University of Bucharest and the "Ion Mincu" University of Architecture and Urbanism, the project tackled key issues such as the deterioration of trees and planting pits along the boulevard. As a result, the initiative has transformed the area into a greener, more vibrant space that better serves the community.

The 'INFO AER' platform is a strategic initiative by the Bucharest Municipality to improve public access to air quality information and foster citizen involvement in environmental governance. This tool serves as both an educational and participatory instrument, providing real-time data on air pollution through a dedicated website, supported by 44 air quality sensors strategically installed near schools and hospitals. By displaying detailed measurements of pollutants such as particulate matter (PM10, PM2.5, PM1) and nitrogen dioxide (NO_2), the platform equips citizens with the knowledge to understand the impact of pollution on health and encourages their participation in identifying actionable solutions for cleaner air. Additionally, the platform contributes to transparency and accountability in local environmental policies, enabling the municipality to trace pollution sources more effectively and implement targeted measures to mitigate air quality issues.

The "Bucharest Catalogue" program, initiated by the Bucharest-Ilfov Metropolitan Area Intercommunity Development Association (ADIZMB) in partnership with the Romanian Association for Culture, Education, and Normality (ARCEN), aims to educate residents and property owners about preserving the heritage value of protected buildings. By providing guidance on responsible maintenance and conservation, the program

supports cultural heritage preservation and sustainable urban development. With approximately 70 volunteers participating monthly, it underscores the role of community involvement in safeguarding Bucharest's architectural legacy.

The Termo Alert mobile application, launched in partnership with the Bucharest City Hall, is developed by Termoenergetica Bucureşti SA, a company owned by the city. The app provides Bucharest residents with real-time updates on the status of the district heating system. This tool enhances transparency and communication between the utility provider and citizens, allowing users to access critical information about the heating infrastructure. By keeping residents informed, the app supports proactive management of heating-related issues and fosters greater trust and engagement in public utilities.

The Info Transport Bucureşti application, developed by STB SA (Societatea de Transport Bucureşti S.A.), a public company owned by the Bucharest City Hall, improves communication between the public transportation system and Bucharest residents. It allows users to easily purchase tickets, access real-time transit information, and stay updated on routes and schedules. With multiple payment options and digital features, the app enhances accessibility, reduces queues, and provides a more efficient and user-friendly transportation experience. This tool fosters greater transparency and connectivity, contributing to the modernization of urban mobility in Bucharest.

The "Open Streets, Bucharest - Urban promenade" project is a key cooperation tool for engaging stakeholders in the revitalization of public spaces and the promotion of cultural life in Bucharest. Organized by the Bucharest City Hall, ARCUB (Cultural Center of Bucharest) and PROEDUS (Center for Educational and Sports Projects), this large-scale initiative transforms city streets into cultural hubs, offering over 800 events that attract both residents and tourists. The project fosters collaboration between the local government, cultural institutions, private partners like Raiffeisen Bank, and international cultural entities. By encouraging active participation and creating an inclusive cultural environment, "Străzi deschise" strengthens community ties, promotes cultural tourism, and contributes to the city's modern identity. The project's success in involving diverse stakeholders makes it a powerful tool for fostering cooperation and enhancing the city's urban experience.

The Line Project in Bucharest's District 6 exemplifies effective stakeholder collaboration. The local City Hall recognized the need for more green spaces and decided to repurpose an outdated railway line into a linear park. Unlike traditional approaches, the administration involved the community in the planning process, allowing residents to co-design the park. UrbanizeHub facilitated this collaboration, ensuring that the project reflected the needs and preferences of the local population. This approach not only enhanced the relevance and impact of the project but also fostered community engagement, demonstrating how local government and residents can work together to create more sustainable and people-centered urban spaces.

The Intercommunity Development Association for Public Transport Bucharest – Ilfov (ADITPBI) operates a website that serves as an essential tool for informing the public about transportation services and initiatives in the Bucharest-Ilfov metropolitan area. The platform provides information on public transport schedules, routes, and updates on disruptions or changes in services. It also offers users access to key documents related to transportation planning and development, allowing them to stay informed about ongoing projects and improvements in the public transit network.

UNDER IMPLEMENTATION

The Metropolitan Association of Bucharest (ADIZMB) is currently implementing several EU-funded projects, including "Enhancing Danube Green Textile and Garment Production and Consumption," "S.M.ALL" (Sustainable Urban Mobility-for-ALL), and "Green Place Orbital." These projects rely on collaboration with other cities and regions within the European Union, facilitating the exchange of knowledge, resources, and best practices to address local urban challenges with integrated, sustainable solutions.

The "Enhancing Danube Green Textile" project is under implementation and aims to address the lack of an integrated textile waste collection system in the Bucharest-Ilfov region. By working with project partners, ADIZMB is establishing textile waste collection points and promoting circular economy practices through the reuse of materials. While still in progress, this initiative is already contributing to improving waste management and environmental sustainability, building on successful practices from other European cities.

The "S.M.ALL" project, which is also under implementation, focuses on improving access to sustainable mobility for vulnerable groups, such as children, the elderly, and people with disabilities. A key component of

the project is the design of a multimodal transport hub for the peripheral areas of Bucharest, with guidance from best practices in other EU cities. The aim is to provide better connectivity to alternative transport options like bicycles, scooters, and shared mobility, ensuring equitable access to sustainable mobility for all residents.

The "Green Place Orbital" project is also in progress, focusing on revitalizing underused urban spaces into community-friendly areas. ADIZMB is working on developing a manual for transforming spaces like Depoul Victoria into vibrant, sustainable locations that meet the needs of local communities. These projects demonstrate the ongoing effort to foster sustainable urban development through EU collaboration, and while still under implementation, they reflect a shared commitment to addressing environmental and urban challenges.

UNDER DEVELOPMENT

The Metropolitan Association of Bucharest (ADIZMB) is currently developing key projects aimed at improving urban governance and sustainability with EU funding, fostering collaboration across European cities.

The 'METRO CASE' project focuses on enhancing regional development policies and governance tools in metropolitan areas. It aims to improve coordination between central cities and peripheral areas, promoting a shared vision for metropolitan governance and integrated territorial development. The project seeks to optimize EU investments in these regions for more effective, holistic development.

'PROWD (PROximity Without Density)' is another ongoing project, funded by Horizon Europe. It supports urban research and innovation to help cities transition to sustainable economies. The project addresses challenges such as energy-positive districts, the 15-minute city concept, and circular urban economies, offering solutions for more sustainable, resilient urban living.

COMMUNITY-DRIVEN ACTIONS LED BY NGOs

'Bucharest Environment Platform' is a collaboration space where civil society, academia, administration, and businesses work together to address the environmental challenges of the city. By 2025, the Bucharest Community Foundation aims to build a community prepared for collective impact to tackle complex environmental issues that no single actor can resolve alone. As a facilitator, the platform provides a collaborative environment where all members of the community can propose project ideas and advocacy campaigns. Supported by the Bucharest Community Foundation and ING Bank Romania, the "În ZONA TA" initiative, part of the Platforma de mediu pentru București, empowers smaller communities by boosting their confidence in creating real, positive changes in the urban environment. This action focuses on enabling local residents to improve their neighborhoods and enhance the daily lives of those around them through sustainable, community-driven solutions.

- **The 'The Community Garden at the Map Museum' project** is an initiative aimed at revitalizing and activating the garden of the Museum of Maps in the heart of Bucharest, bringing this small urban oasis closer to the local community. Funded by the "În ZONA TA" program, part of the Environmental Platform for Bucharest, the project encourages local communities to actively engage in improving their surrounding environment. The project, initiated by Club Clorofila, will run from September 2024 to March 2025, offering opportunities for community involvement and environmental education in the city.
- **'Revoluției Garden'** is a pilot urban regeneration project in the heart of Bucharest, aimed at transforming an underutilized space into a vibrant area for people. Located at Piața Revoluției, currently a vast parking lot, the project envisions a green, welcoming public space that promotes collaboration between NGOs, local authorities, and communities. By converting this area into a park, the initiative seeks to improve urban quality of life and provide an example of successful cooperation in city development. Funded by "În ZONA TA," part of the Platforma de mediu pentru București, the project reflects a commitment to environmental sustainability and community engagement.

The 'Grow Up Romania' civic initiative has created a tool that simplifies reporting issues in Bucharest using AI technology. The platform allows citizens to easily report problems such as blocked sidewalks, potholes, broken playground equipment, and faded pedestrian crossings. Users can pinpoint the issue on a map, describe it briefly, and the tool automatically generates a report and suggests the relevant authorities to

contact. This makes it easier for residents to engage with the local government and contribute to improving the city's infrastructure.

STRATEGIC COLLABORATIONS

EUROPEAN LEVEL: The strategic collaboration between the Bucharest City Hall and the European Bank for Reconstruction and Development (EBRD) focuses on the development of Green City Action Plans (GCAP) under the Green Cities programme. This initiative aims to help cities address environmental challenges and adapt to climate change. EBRD provides the funding and technical assistance for the development of the plans, while the Bucharest City Hall, along with local and central stakeholders, is responsible for the implementation of the plans. This partnership ensures a coordinated approach to fostering a more sustainable and climate-resilient urban environment in Bucharest. District 2 of Bucharest is one of the city's most populous areas. As part of Romania's broader efforts to meet the European Union's climate goals, District 2 is included in the EU Mission for 100 Climate-Neutral and Smart Cities by 2030, also known as the Cities Mission. This initiative aligns with Bucharest's commitment to reducing emissions and transitioning to a more sustainable urban environment.
NATIONAL LEVEL: Bucharest is one of the 10 cities selected for the M100 Climate Neutrality Mission, part of a national initiative aimed at helping cities reduce carbon emissions and transition into smart, green, and resident-friendly urban environments by 2035. Alongside Alba Iulia, Bistrița, Brașov, Buzău, Constanța, Iași, Oradea, Reșița, and Timișoara.
REGIONAL LEVEL: The City Hall of Bucharest maintains a strong collaboration with the Bucharest-Ilfov Regional Development Agency (ADR Bucharest-Ilfov), ensuring coordinated efforts in urban planning and sustainability initiatives. Additionally, the Bucharest-Ilfov Regional Development Council (CDRBI) plays a crucial role in the region. As a deliberative body with no legal personality, CDRBI operates on partnership principles within the Bucharest-Ilfov Development Region, coordinating activities related to the formulation and monitoring of regional development policies. The council is composed of equal representation from the local public administration of Bucharest and Ilfov County, fostering joint efforts for regional development and strategic planning.
METROPOLITAN LEVEL: Asociația de Dezvoltare Intercomunitară Zona Metropolitană București (ADIZMB) is the main formal entity covering the Bucharest and Ilfov County areas. Established in 2008, it functions as a partnership between the City Hall of Bucharest and the Ilfov County Council. The City Hall is responsible for implementing the decisions of the General Council and the directives of the General Mayor, while the Ilfov County Council coordinates the activities of local councils to ensure regional public services. ADIZMB enables Bucharest and Ilfov County to collaborate in addressing local challenges and supporting regional development initiatives.
LOCAL LEVEL: The General City Hall of Bucharest provides various tools for citizens to collaborate with local administration, stay informed, and share their opinions. Additionally, each district city hall offers its own channels for communication and feedback from residents. Civil society plays a crucial role as well, organizing community-driven initiatives aimed at enhancing climate action and improving quality of life. These initiatives often take place with the support of local authorities or through private funding, highlighting the collaborative efforts of both public and private sectors in fostering sustainable urban development.

THE PROCESS OF DEVELOPING

The development of Bucharest's Climate Neutrality Action Plan (CNAP) was a participatory and methodical process involving two main phases—**drafting and public consultation**—ensuring alignment with European and national frameworks, as well as community and stakeholder engagement**.**

DRAFTING PHASE - general information

Participatory Approach: Community and stakeholder involvement were central to drafting the CNAP, ensuring inclusivity and transparency. This approach built on the participatory framework established for the Green City Action Plan (GCAP), which served as the primary reference document.
Integration with Strategic Documents: Proposed actions in the CNAP were aligned with pre-existing municipal strategies, including the Romanian National Urban Policy and the Country Climate and Development Report for Romania.
Stakeholder Engagement: Continuous consultations were held with key stakeholders, including urban planning experts, climate specialists, and civil society representatives. Feedback from these consultations was integrated into the CNAP's structure and content.
Compliance with EU and National Standards: The CNAP followed the methodology defined by the European Commission under the EU Mission for Climate-Neutral and Smart Cities, as referenced by the M100 National Hub. Discussions with Bucharest District 2, a participant in the EU Mission, helped ensure the CNAP adhered to EU standards.

PUBLIC CONSULTATION PHASE - general information

The draft CNAP was published on the municipality's website for public review, accompanied by feedback forms to gather community input on proposed actions.
Insights and suggestions from the broader community were incorporated to refine the final document, enhancing its relevance and public support.

1. The Importance of Public Engagement in Achieving Climate Neutrality

Achieving net-zero emissions was not only a technical challenge but also a deeply social one. In an era of increasing public awareness and scrutiny, implementing climate measures without meaningful citizen engagement was no longer feasible. Therefore, active and inclusive public participation proved critical to the success of Bucharest's transition toward climate neutrality.
This engagement strategy highlighted the pivotal role of public involvement, defining it as the active participation of citizens in both the decision-making process and the implementation of the measures needed to reach climate neutrality. Public participation became a cornerstone in transforming Bucharest into a climate-neutral city.
While concern for climate change among citizens reached a record high and remained resilient even during the COVID-19 pandemic, this concern did not automatically translate into sustained support for the scale of transformation required. Moreover, public awareness regarding the nature and scope of necessary climate measures remained limited.
In this context, sustained public engagement efforts played a crucial role in raising awareness, fostering a deeper understanding of the rationale behind the climate transition, and securing long-term public support for the changes that are set to unfold over the coming decades.

2. Core Principles of Public Engagement

· Transparency and Trust: Decision-making was open, clear, and accessible to all citizens, aiming to build a strong trust-based relationship between the municipal administration and the community.
· Inclusion and Equity: All social groups, including vulnerable and marginalized communities, were given meaningful opportunities to actively shape the Climate Action Plan.
· Collaboration and Innovation: Dedicated spaces and mechanisms were established for citizens, businesses, academia, NGOs, civic groups, and experts to co-create innovative solutions for a climate-neutral city.

3. Fundamental Rationales for Stakeholder Engagement

· Instrumental Rationale: Citizen engagement was essential for building legitimacy and equity in decision-making. Through open consultation and dialogue, the Municipality of Bucharest secured a strong social mandate for climate action and strengthened mutual trust.
· Substantive Rationale: The Municipality valued the diverse knowledge and perspectives of its citizens, which were critical for designing policies that reflected local realities and addressed community needs.
· Normative Rationale: Citizens had the fundamental right to participate in decisions that affected their future. Bucharest promoted transparency, accountability, and equitable access to information.

4. Participatory Governance

To implement the Climate Neutrality Action Plan (CNAP), a formal governance structure was established to create a unified vision and clarify roles and responsibilities across municipal departments, district sectors, and civil society actors.

This structure included representatives from public authorities, academic and research institutions, the private sector, NGOs, civic groups, and citizens, ensuring ongoing political and operational support for the climate transition.

An internal working group, the Climate Neutrality Task Force, was established and coordinated by the Climate Neutrality Coordinator and Officer. This group oversaw and monitored the implementation of climate neutrality measures and included personnel from departments such as urban planning, environment, investments, transport, public services, civil society relations, and EU project management, as well as experts from intercommunity development associations.

The Task Force collaborated closely with teams designated by each of Bucharest's six districts, ensuring a coherent, integrated citywide approach. This collaboration was formalized in the Bucharest Climate Neutrality Coordination Team, which tailored climate policies to sectoral realities and enhanced the impact of local initiatives.

All stakeholders who committed to supporting climate neutrality formed the M100 Bucharest Forum for Climate Neutrality — a collaborative structure that guided all phases of the climate journey: co-design, co-planning, implementation, monitoring, and iterative revision. This model of participatory governance reflected the city's ambition to reach climate neutrality by 2035 through inclusive, multi-actor collaboration.

5. Methods of Stakeholder Engagement

The stakeholder engagement strategy for climate neutrality used a diverse range of innovative methods and tools inspired by international best practices. These enhanced dialogue, promoted transparency, and ensured inclusive citizen participation in the decision-making process. Key Methods Included:

· Stakeholder Mapping: Identified and classified stakeholders to understand their needs, expectations, resources, and influence across five priority areas: mobility/transport, energy-positive buildings, green public spaces, waste and wastewater management, and a resilient energy framework.

· Surveys and Workshops: Collected public perceptions and facilitated knowledge exchange among interest groups.

Table - List of Stakeholders Participating in Consultations and Workshops

STAKEHOLDER	TYPE
Intercommunity Development Association for the Integrated Management of Municipal Waste in the Municipality of Bucharest - ADIGIDMB	Associative structure of local public authorities - NGO
Intercommunity Development Association Bucharest Metropolitan Area - ADIZMB	Associative structure of local public authorities - NGO
District 1 City Hall	Deliberative authority
District 2 City Hall	Deliberative authority
District 3 City Hall	Deliberative authority
District 4 City Hall	Deliberative authority
District 5 City Hall	Deliberative authority
District 6 City Hall	Deliberative authority
Center for Environmental Research and Impact Studies - Univ. Buc.	Education & RDI
NetZeroCities Competence Center - Univ. Pol. Bucharest	Education & RDI
Faculty of Physics - UniBuc / Institute of Earth Physics	Education & RDI

University of Bucharest - Faculty of Geography	Education & RDI
Technical University of Civil Engineering Bucharest	Education & RDI
Act For Tomorrow	NGO
Agenda 21	NGO
Climato Sfera Association	NGO
Ecoteca Association	NGO
Hai cu bicla Association (Let's go by bike Association)	NGO
Nod Makerspace Association	NGO
Nomad Multisport Association	NGO
Văcărești Natural Park Association	NGO
Ecopolis Association for Sustainable Development	NGO
Association for Urban Transition	NGO
Concerned About the Future Association (APV)	NGO
Reper 21 Association	NGO
Save the Children Association	NGO
Streets for People Association	NGO
Viitor Plus Association (Future Plus Association)	NGO
BAZA Association	NGO
Romanian Center for European Policies (CRPE)	NGO
Code for Romania	NGO
Energy Policy Group	NGO
FCB - Environmental Platform	NGO
Civil Society Development Foundation	NGO
The Institute Foundation/Institute	NGO
InfoClima	NGO
Youth Platform for Sustainability	NGO
Urbanize Hub	NGO
Cireșari Parents Association (Cherry Tree Parents Association)	NGO
Masca Theater	PMB subordinates - public institution
Business Development Group Bucharest	Private Companies
Tractebel Engineering (Engie Group)	Private Companies
Concordia Employers' Confederation	Private Sector - Employers's Association
IMM Bucharest - Ilfov	Private Sector - Employers's Association

The Order of Romanian Architects	Professional organization
National Meteorological Administration	Public sector
Bucharest-Ilfov Regional Development Agency - ADRBI	public utility NGO / managing authority

The Municipality adopted a tailored, adaptive approach to public engagement, using appropriate tools for each target group and strategic goal to ensure ongoing community involvement in achieving climate neutrality.

THE PROCESS FOR IMPLEMENTING AND MONITORING

The proposed governance framework in Bucharest's Climate Neutrality Action Plan emphasizes the consolidation of climate governance at both urban and metropolitan levels. Key initiatives include:

Policy Development Projects: This includes the Green Spaces and Climate Change Adaptation Policy, and the Air Quality and Soil Policy Enhancement Program.
Public-Private Partnerships: Initiatives to foster collaboration between sectors, such as the Solar Energy Potential Assessment and Promotion Project and the Biodiversity Conservation and Green Corridor Initiative.
Urban Data Integration: integrate and operate urban GIS data banks, ensuring updated, open, and georeferenced urban data for analysis and publication.
Energy Transition and Efficiency: Conducting technical studies for transitioning to block-level cogeneration power plants and appointing Energy Managers across all districts and municipal buildings to drive energy efficiency.
Institutional Development: Creation and operationalization of the Metropolitan Spatial Planning and Urban Planning Agency to guide sustainable urban growth and planning efforts.
Capacity Building and Education: Launching a Climate Neutrality Capacity-Building Program for public servants, promoting (post)university programs on climate neutrality, and awarding green grants to support neighborhood-level, climate-neutral projects led by NGOs.
Engagement and Advocacy: Forming a Local NetZero Coalition to spearhead promotion and awareness campaigns for sustainable lifestyles.

The social and innovation framework of Bucharest's Climate Neutrality Action Plan focuses on enhancing community engagement and fostering collaboration to achieve climate neutrality. Key initiatives include:

Community engagement programs: Launching the Community Engagement and Social Pressure Mapping Initiative, the Water Management Optimization and Public Awareness Campaign, and the Urban Green Space Promotion Campaign.
Citizen awareness and education: Implementing pilot projects to promote waste separation, running campaigns on green energy and energy efficiency, and educating citizens on sustainable energy and transportation choices.
Interactive platforms and tools: Developing a digital monitoring platform with a mobile app for citizen reporting, tracking climate neutrality progress, and integrating technological solutions to calculate and present carbon footprints.
Art, innovation and collaboration: Supporting public art projects in neighborhoods to promote climate-neutral themes, organizing Green Solutions Markets to present sustainable technologies, and hosting hackathons to foster innovation in climate-neutrality solutions.
Scientific and academic integration: Foster scientific collaboration and incorporate student projects into climate initiatives, enhancing innovation and practical solutions.
Urban rooms: Dedicated physical spaces for dialogue and debate among diverse urban actors, focusing on exploring challenges and opportunities for the city.
Living labs: Physical or virtual community-based experimentation environments for testing carbon-reduction solutions.

Online platforms: Developed an open-data interactive platform for transparency and ongoing collaboration between citizens and authorities.
Climate commitment mobilization: Bucharest launched an outreach campaign to mobilize individuals and entities — local, regional, national, and international — to sign a voluntary commitment supporting the implementation of the Climate Neutrality Action Plan.

The monitoring and evaluation (M&E) process for Bucharest's Climate Neutrality Action Plan (CNAP) outlines the mechanisms for tracking progress, assessing outcomes, and informing updates. It integrates collaboration between governance structures, data-driven tools, and community engagement to ensure effective implementation and adjustments as needed.
The process is structured as follows:

Organizational structure (*see Opportunities*): The Climate Neutrality Division coordinates M&E activities, supported by Chief Climate Officers (CCOs), Climate Neutrality Offices, and Energy Managers.
Data integration and tools (*see Action Portofolio*): a platform that centralizes data and supports visualization, while MEL indicators provide performance metrics.
Monitoring framework (*see Work Process***)**: Biannual reports and GHG inventory updates assess fund allocation, CO_2 reductions, co-benefits, and risks.
Community and stakeholder involvement (*see Action Portofolio*) : Interactive reporting tools and engagement initiatives involve citizens and stakeholders.
Learning and adaptation (*see Work Process*) : Knowledge sharing with other cities informs updates and strategy refinements.
Capacity building and collaboration (*see Action Portofolio*): Training programs and partnerships with academia enhance expertise and project development.
Governance and innovation (*see Action Portofolio)*: Consolidated governance structures and civil society coalitions support project implementation and awareness campaigns.

The CNAP recognizes the socio-economic disparities in Bucharest and the need to integrate climate justice principles into its transition to climate neutrality. To address this, it proposes a robust solution: providing targeted support and dedicated resources to the public administration to effectively incorporate climate justice into its actions. This includes developing mechanisms and tools to ensure the fair distribution of benefits and burdens, safeguarding vulnerable and marginalized communities. By embedding climate justice into the CNAP's social inclusion framework, the plan aims to deliver equitable, impactful outcomes that prioritize the well-being of all citizens.

BARRIERS

The primary barriers which may hinder or complicate the transition to climate neutrality in Bucharest and its Districts are outlined below, along with the key solutions to mitigate their effects. To address these barriers, the collaborative mechanisms established through this Climate Neutrality Action Plan will be activated, both in terms of internal cooperation among the responsible staff of the 6+1 City Halls and external collaboration with the local community and key stakeholders.

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
TRANSVERSAL BARRIERS	**Urban sprawl**	This process barrier stems from the lack of an integrated spatial planning vision and the poorly regulated urban development, both at the level of the six Districts and the Bucharest Municipality and at the metropolitan level. In the absence of coherent and up-to-	Given the extensive nature of this barrier, its resolution depends on the rapid finalization of the updated General Urban Plan of Bucharest and of Ilfov's CSDP and on taking advantage of the inclusion of climate-neutrality as a central pillar of these plans and their associated regulations. It is key to put in

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		date spatial plans to guide growth and reinforce sustainable practices, development has been led by market forces. More precisely, the delayed revision of Bucharest's General Urban Plan and the suspension of the Coordinated Zonal Urban Plans, hampered development within the city boundaries and led to urban sprawl, while the lack of a coherent metropolitan vision for development, led to urban fragmentation, inefficient land-use, inadequate access to public infrastructure and transport inefficiencies. Overall, sprawling and fragmented development patterns drive up costs related to technical and transportation infrastructure, lock people into car dependency and unsustainable living patterns, and can lead to the loss of green spaces, agricultural land and biodiversity, hindering the path to climate neutrality.	place adequate regulation and the institutional framework to reinforce sustainable urban development practices across administrative boundaries. Collaboration among local administrations and proactive engagement with private stakeholders is essential in guiding development in a comprehensive manner across the metropolitan area, without stifling economic growth. The development of the Local NetZero Coalition, which is proposed through the CNAP, will also be instrumental in this context, as it will facilitate the integration and operation of urban GIS data repositories, as well as the dissemination of urban data and analyses. Additionally, the IUDS and GCAP propose the development of Integrated Urban Regeneration Strategy to promote coherent spatial planning and optimize the land use, including the creation of green corridors and the regeneration of urban areas with low living standards. However, additional targeted public interventions are necessary to mitigate the adverse effects on climate-neutrality caused by existing sprawl, such as facilitating connections to the public transport network, encouraging mixed-use redevelopment, and ensuring access to green infrastructure and key public amenities within walking or biking distance.
ENERGY SYSTEMS	**Current energy mix**	This structural barrier stems from the current energy mix, more precisely the energy sector's dependence on fossil fuels and the lack of infrastructure for the integration of renewable energy sources in the local energy system.	While this barrier is heavily dependent on national actions for greening the energy sector, some local interventions can help accelerate the adoption of renewable energy solutions and the pursuit of energy efficiency. Incentives and local policies will be developed to encourage households and businesses to implement energy efficiency measures and to stimulate the integration of renewable energy solutions. In this regard, CNAP envisions, under the framework of Governance Innovation, the establishment of public-private partnerships to support climate and green initiatives, which may also include investments aimed at accelerating the

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
			transition to green energy. Another key intervention proposed through the CNAP focuses on the assessment and promotion of solar energy potential. Furthermore, under the framework of Social Innovation, CNAP proposes interventions aimed at raising awareness, fostering education and mobilizing the local community and stakeholders towards energy sustainability: various campaigns promoting the adoption of green energy, energy efficiency measures and the creation of energy communities. Additionally, through CNAP, targeted interventions are planned to develop new solar and geothermal capacities, contributing significantly to the generation of RES energy. These will complement the investments in the district heating system associated with high-efficiency cogeneration technologies.
ENERGY SYSTEMS	**Inefficient district heating system**	Despite the potential to accelerate the transition to climate neutrality opened up by the existence of extensive district heating infrastructure, the poor technical condition and limited efficiency and reliability of the system pose significant barriers to the transition to climate neutrality. Bucharest's centralized heating network suffers from severe inefficiencies caused by extensive heat loss during transmission and frequent breakdowns caused by its age and state of disrepair, leading to excessive energy consumption. Moreover, the system is heavily reliant on carbon intensive energy sources. The limited reliability of the centralized heating system, causes more and more consumers to opt out of the system and shift towards individual heating systems, predominantly based on natural gas, thus further exacerbating CO_2 emissions at local level.	The complexity of Bucharest's district heating system calls for integrated action, thus the solution to existing inefficiencies relies on the rigorous implementation of the measures outlined in *The strategy of supplying thermal energy in a centralized system to consumers in the City of Bucharest* (2023). This Action Plan also outlines a series of interventions aimed at the development of an energy efficient district heating system, concerning the rehabilitation of existing infrastructure to reduce inefficiencies, its expansion towards strategic areas, and the implementation of energy-efficiency solutions. The potential to capitalize on geothermal resources, waste to energy solutions, or on the existing infrastructure's potential to also act towards cooling down buildings in the summer, will also be explored. Additionally, as part of the Social Innovation intervention aimed at raising awareness, fostering education and promoting activation for energy sustainability, the formulation and implementation of local policies to encourage the connection to the central heating system of new developments

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
			located in areas already covered by the system and to discourage households from opting out of the system will also be explored. Additionally, to support the decarbonisation of district heating, the GCAP outlines a range of interventions involving planning, investments and programs. These measures aim to pilot and expand district heating options while considering various sources, carriers, and technologies, as well as exploring alternatives.
BUILT ENVIRONMENT	**Low energy efficiency in buildings**	This structural barrier arises from low energy efficiency of the building stock, particularly of residential buildings. In spite of EU and state budget funding dedicated for thermal rehabilitation and sustained efforts to implement such projects in public buildings and apartment blocks, results remain limited. The renovation process is particularly difficult for apartment buildings, due to the limited capacity of homeowners' associations to navigate the bureaucratic hurdles of the application process, the individuals' skepticism towards the benefits and their limited capacity to afford the required co-financing, in addition to the municipalities' limited capacity to match the increased demand. Moreover, deep renovation projects going beyond basic upgrades and capable of achieving the most significant improvements in energy performance are few and in the absence of incentives for private developers to adopt higher energy efficiency standards, new construction typically complies to minimum energy performance requirements only.	This barrier can be overcome through both hard and soft measures. The CNAP highlights the importance of substantial investments in deep energy renovation projects in both public and apartment buildings. These projects will integrate structural, energy efficiency and architectural retrofit, and given their high level of complexity, will benefit from public support both in terms of funding and implementation management. Moreover, the transition to high energy efficiency in residential and private buildings will be promoted through the intervention planned for raising awareness, fostering education and activation for energy sustainability. These efforts will be further reinforced by the measures supported by the Local NetZero Coalition. Additional measures call for the implementation of nZEB standards in new public buildings, as well as for revising local regulation to reinforce high energy efficiency standards in new developments. Moreover, incentives, such as tax deductions or streamlined permitting processes, could be granted to companies implementing high efficiency or innovative energy solutions. However, the GCAP proposes conducting energy audits, complemented by proactive measures for new buildings, including the establishment of energy efficiency standards and regulations.

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
BUILT ENVIRONMENT	**Limited deployment of renewable energy solutions in residential buildings**	This barrier involves both capacity and behavioral aspects, stemming from a combination of technical, financial and regulatory barriers, coupled with low awareness among citizens on the advantages of renewable energy solutions and lack of involvement of homeowners' associations, private developers and individuals in green energy transition efforts. Many residential structures, especially older ones built during the communist era, lack the necessary infrastructure or space for installing renewable technologies such as solar panels or heat pumps. Additionally, the high upfront costs of renewable energy systems deter existing homeowners and private developers alike. Regulatory hurdles, such as complex approval processes and limited subsidies for residential-scale renewables, further slow adoption and transition towards climate neutrality.	Addressing this barrier revolves to some extent around investing in pilot projects, to inspire, demonstrate benefits and serve as examples for efficient implementation. Nevertheless, the solution relies even more so on a combination of soft measures, such as offering support to homeowners' associations to adopt renewable energy solutions (e.g., help them navigate bureaucracy, offer incentives and technical support, offer guidance in obtaining EU funds). In addition, the public administration, in partnership with NGOs and private entities who can later support the deployment of renewable energy solutions, can also conduct awareness and educational campaigns to inform homeowners about the technical solutions available and associated costs and benefits. Given all of the above, the CNAP encompasses both tangible (hard) and intangible (soft) interventions, as outlined earlier, to facilitate and encourage the adoption of RES among the households and residential buildings.
MOBILITY & TRANSPORT	**Car dependency in peri-urban areas leading to transport inefficiencies**	This structural barrier stems from the haphazard development in the peri-urban area and inefficient land-use patterns, resulting in monofunctional development which leads to long travel distances between the places of residence and work, lack of integration with the existing public transport network which lead to car dependency, and lack of essential amenities in new residential communities, such as schools, parks or supermarkets, triggering additional daily car-rides to meet basic needs. In addition, the absence of infrastructure for cycling or walking further entrenches reliance on cars. As a result, peri-urban dwellers are locked into unsustainable travel patterns, which further exacerbate traffic congestion in and around Bucharest, driving up emissions and costs associated with sustainable mobility solutions.	The resolution to these barriers lay in the integrated planning of transport development and residential and economic areas across the six sectors and Ilfov County, in line with the key guiding documents (i.e., SUMP, IUDS, future County Spatial Development Plan, the general urban plans of Bucharest and of the peri-urban administrative units). The Action Plan presents a series of interventions aimed at the continuous modernization and expansion of green public transport, through metropolitan, local and neighborhood scale action. At the metropolitan level, the actions focus on new major infrastructure projects, such as construction of new subway lines or the operationalization of the Bucharest-Ilfov metropolitan train. These are coupled with greening and development of local public transport connections (i.e., electric buses, trolleybuses, tram line extensions) and actions oriented towards making existing

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
MOBILITY & TRANSPORT	**Limited deployment and uptake of green mobility solutions among population**	The capacity of green mobility solutions to advance the transition to climate neutrality is limited by interdependent structural and capacity barriers. On the one hand, the limited deployment of green mobility solutions at municipal and metropolitan level discourages residents from using carbon-neutral mobility alternatives. The insufficient park & ride facilities connecting peri-urban dwellers to major public transport corridors, of dedicated lanes for public transit ensuring its efficiency and reliability, and of safe cycling infrastructure further reinforce reliance on cars. On the other hand, there is limited adoption of existing green mobility solutions among the population, which stems primarily from behavioral patterns, even if exacerbated by structural elements. The root of this collective behavior lies in the high rate of car ownership and relyance on cars for short trips, relaxed residential parking policies, and in the convenience of using the car over public transport or bikes. Moreover, the insufficient EV charging stations and high costs associated, maintain the residents' preference for fossil fuel powered cars.	public transport solutions more comfortable and convenient (e.g., dedicated bus lanes, fleet renewal, station modernization, convenient stops, integrated ticketing and passenger info systems). This barrier will also be addressed through the establishment of Low Emissions Zones at the metropolitan level, which will also be equipped with air quality monitoring systems, as outlined in the GCAP. It is also critical to improve active mobility within urban and peri-urban local communities, by ensuring access to car-free and adequately sized sidewalks, building cycling infrastructure, and proactively planning for new development areas to ensure walkability and promote mixed land-use. Moreover, mobility barriers can be overcome by guiding new development towards well connected areas (i.e., along major transport corridors), through proactive planning and stakeholder engagement, as well as investments in basic public infrastructure in these areas. At the level of the individual, the uptake of green mobility solutions can be stimulated by extending and further connecting Bucharest's *velo* network and the public network of EV charging stations, by expanding pedestrian areas and creating low-emissions zones, as well as by continuing to use strict parking policies to disincentivize the use of private vehicles in central areas. Apart from the actions proposed for developing and modernizing the green public transport and promoting low-carbon urban mobility (cycling and walking), the CNAP also includes interventions aimed at educating, promoting and providing incentives to encourage the use of public transport and non-motorized modes of travel.

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
MOBILITY & TRANSPORT	**High emissions and congestion generated by the logistics industry**	This structural barrier arises from the over reliance of the logistics industry on road-based logistics and diesel-powered trucks and vans, limited use of rail freight, inefficient transport routes and lack of dedicated logistics hubs and efficient last-mile delivery systems in the metropolitan area of Bucharest. As a result, delivery vehicles often cross the congested urban area during peak hours, further exacerbating traffic congestion and increasing fuel consumption and greenhouse gas emissions. The emissions and congestion generated by this sector present a major barrier to Bucharest's climate neutrality goals, as they lock the region into carbon-intensive practices and hinder the adoption of sustainable urban logistics solutions like electric delivery vehicles or consolidated freight hubs. Addressing these challenges requires coordinated policies to modernize vehicle fleets, improve infrastructure, and promote multimodal logistics systems.	To address emissions and congestion from the logistics industry, Bucharest and Ilfov county can adopt a range of sustainable logistics solutions. Promoting the use of rail freight and supporting the transition to electric and low-emission delivery vehicles can significantly reduce the environmental impact of goods transport. This requires investing in adequate infrastructure, such as charging stations, to facilitate the adoption of cleaner technologies as they become available. Additionally, encouraging a shift toward multimodal transport solutions by integrating rail freight into logistics networks can decrease reliance on road transport and minimize congestion. Cities can also support the development of urban consolidation centers, strategically located along rail corridors, where goods can be aggregated for last-mile delivery using smaller, cleaner vehicles. These centers reduce the number of heavy trucks entering urban areas, improving traffic flow and air quality. Complementary policies, such as incentivizing off-peak deliveries and promoting low-emissions last-mile delivery, can further mitigate congestion and reduce emissions during high-traffic hours, fostering a more efficient and sustainable logistics ecosystem. This barrier will also be addressed through the investments in extending and improving the Bucharest Transport Management System and establishing Low Emission Zones, as outlined in the GCAP.
GREEN INFRASTRUCTURE	**Deficiencies related to the green-blue infrastructure**	The green and blue infrastructure is currently not used at its full potential and is challenged by haphazard development which infringes on existing green areas and biodiversity and limits the potential for future expansion of green infrastructure. Bucharest lacks a cohesive strategy for connecting green and blue spaces into a functional network and for unlocking its true potential to support climate mitigation and adaptation efforts. The city has a low proportion of green spaces relative to its population, while the preservation of existing spaces remains	The Action Plan includes a comprehensive set of measures to accelerate the development of green and blue infrastructure, promote the adoption of nature-based solutions (NBS), and preserve existing green spaces, natural landscapes, and biodiversity. A key focus is the expansion of the city's park network to ensure residents have adequate access to green public spaces. This not only enhances urban livability but also increases the potential for carbon sequestration and helps mitigate the effects of climate change. Measures such as planting street

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		difficult to monitor and manage, since Bucharest continues to lack a register of green spaces. The quality of existing green spaces is sub-optimal, with many parks and natural areas poorly maintained, fragmented, or inaccessible to residents. Access to green areas is particularly limited within old-apartment block neighborhoods, where the public realm is suffocated by parking, as well as in new development areas, which lack proper planning of public spaces and amenities. Moreover, the abusive cutting of trees and incorrect upkeep works have an impact on residential gardens and on street greenery, further exacerbating the urban heat island effect and energy consumption during the summer. Bucharest's water systems, such as its rivers and lakes, are often underutilized and degraded due to pollution. In spite of some specific regeneration initiatives, the integration of blue infrastructure in urban planning strategies remains limited, resulting in loss of biodiversity and missed opportunities when it comes to tapping into its potential to serve as recreational spaces, reduce the urban heat island effect and contribute to natural stormwater management.	alignments with trees and shrubs aim to reduce the urban heat island (UHI) effect, contributing to cooler and more sustainable urban environments. Another priority is the creation of a green belt around the city, which will guide and contain urban development, prevent the loss of natural habitats, and improve access to green spaces for peri-urban residents. Flagship projects, such as developing green-blue infrastructure along the Colentina River floodplain and conserving Vacaresti Natural Park, exemplify large-scale efforts to protect natural ecosystems while enhancing climate resilience. Better management and preservation of green areas are also emphasized, supported by IT solutions to maintain an up-to-date register of green spaces. To encourage broader adoption of NBS, the CNAP proposes incentives like streamlined permitting processes for projects incorporating sustainable practices and local policies mandating the integration of NBS into new developments, such as requiring green spaces or permeable surfaces. Pilot projects, developed in collaboration with private entities and civil society, will serve as high-visibility demonstrations of NBS benefits, inspiring their wider implementation and fostering public and private sector engagement in sustainable urban development. Additionally, the GCAP envisions a dedicated action focused on nature-based solutions for stormwater management. This action includes the development of a regulatory framework for stormwater retention, the redesign of public spaces to incorporate permeable surfaces and retention capabilities, and targeted investments in Sustainable Drainage Systems (e.g., rain gardens, swales, green roofs, and similar measures).
GREEN INFRASTRUCTURE	**Limited deployment of nature-based solution**	This capacity and resource flow barrier stems from several challenges, including limited awareness of their benefits and a lack of financial and policy support. Nature-based solutions, such as green roofs, urban forests, and restored wetlands, can mitigate climate change impacts by reducing urban heat islands, enhancing biodiversity, and improving stormwater management. However, in Bucharest, the integration of nature based solutions is often sidelined in favor of conventional infrastructure, partly due to competing land-use demands, higher implementation costs and the perception that such solutions are non-essential. Bureaucratic inertia and the absence of a comprehensive strategy to incorporate nature based solutions into urban projects further limit their adoption. As a result, Bucharest misses on important opportunities to sequester carbon, adapt to climate	

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		extremes and foster sustainable urban living.	
WASTE & CIRCULAR ECONOMY	**Inefficient waste management and limited deployment of circular economy initiatives**	This barrier stems, on the one hand, from the insufficient infrastructure for separate collection, treatment of biodegradable and processing of various hazardous waste categories. This generates large volumes of landfill disposal releasing methane and other polluting gasses, while contributing to soil and water pollution. A key issue concerns the non-compliant landfills located in the vicinity of Bucharest, lacking proper waste treatment and containment measures and leading to pollution, soil contamination and increased greenhouse gas emissions. Illegal waste disposal practices, such as burning, are also registered in the metropolitan area, contributing to air pollution and posing significant hazards to people and the environment. On the other hand, the inefficiency of waste management is also a resource flow barrier arising from the slow implementation of recycling and waste prevention programmes, like the "pay-as-you-throw" system which is yet to be implemented, and from the inconsistent practices used across the six sectors of Bucharest. In addition, there is a limited deployment of circular economy initiatives stemming from the private sector, given the lack of incentives and awareness, coupled with high costs associated with the transition to circular practices. A behavioral barrier further exacerbates waste management inefficiencies, more precisely the individuals' limited awareness over the consequences of irresponsible waste disposal, importance of waste prevention and recycling and reuse opportunities.	To overcome this barrier it is key to pursue the objectives and targets included in the Waste management plan for the Municipality of Bucharest (2020-2025) following the proposed technical solutions and securing external funding for the required investments. In line with this strategic document, the Action Plan includes a mix of hard and soft interventions aimed at consolidating the circular economy system while raising public awareness about sustainable waste management. The key proposals include organizing an efficient bio-waste and green waste management system, improving the handling of construction and demolition waste, and creating a voluntary intake center for specific waste streams. Smart solutions, such as digital tools to optimize waste collection and processing, will also be implemented to enhance system efficiency. To complement these structural changes, the CNAP emphasizes public engagement through awareness campaigns that promote responsible waste sorting and recycling practices. Additionally, measures to support and incentivize circular economy businesses will further encourage the adoption of sustainable practices across the city, fostering a more resilient and environmentally conscious urban environment.
TRANSVERSAL BARRIERS	**Limited integration of strategic plans and lack of coordinated action at municipal and metropolitan level**	This process barrier stems from the complex administrative organization and multiple decision factors acting within the metropolitan area of Bucharest without a strong cooperation framework. The 6 administrative Districts of Bucharest operate with considerable autonomy, currently approving urbanization documents and issuing building permits in line with sectoral planning documents. However, the	The joint application and selection under M100 of Bucharest's General City Hall, together with the District City Hall, together with development of this Action Plan, are critical steps towards setting a common vision and commitment for integrated action towards climate neutrality. The development and comprehensive implementation of this Action Plan rest are the backbone to tackling this barrier, particularly those

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		municipality of Bucharest is responsible for guiding development towards a unitary vision, which in the absence of a revised General Urban Plan and with limited decision power remains difficult. In addition, there is little coordination between the Bucharest Municipality and the LAUs of Ilfov County, where most development takes place and the implementation of a cohesive strategy is hampered by the lack of consultations and exchange, particularly in the context of the key coordinating document (Ilfov CSDP) still under development. This disjointed planning framework prevents the implementation of a cohesive vision for the metropolitan area's growth, leading to urban sprawl, inefficient land use, and infrastructure mismatches. Without a clear and integrated strategy, efforts to transition to climate neutrality are fragmented, inefficient, and less impactful.	interventions aimed at Governance Innovation. Nevertheless, strengthening the cooperation between Bucharest and its districts should remain a priority and to this end, the Action Plan, together with the IUDS and GCAP, are valuable instruments. In addition, further efforts are needed to finalize and adopt the General Urban Plan of Bucharest and Ilfov County's Spatial Development Plan, and to strengthen the regulatory framework to standardize urban planning procedures and put climate-neutrality as a central pillar in the decision-making process. Since the challenges to transition to climate-neutrality posed by the urban and the peri-urban areas cannot be separated, it is important to establish an efficient metropolitan cooperation framework and join efforts to mitigate the urban-rural divide, foster knowledge transfer and best practices dissemination for Bucharest to peri-urban localities. The key interventions proposed by the CNAP in this regard include the data coordination in the transition to climate neutrality will be enhanced through the creation of an interactive digital monitoring platform, which will comprise a digital dashboard for tracking the progress towards the climate neutrality goals.
TRANSVERSAL BARRIERS	**Limited administrative and operational capacity within public administration with respect to climate neutrality priorities**	This barrier stems from the limited focus on climate-neutrality as a central pillar of urban development and the limited prioritization of integrated climate neutrality interventions, as currently reflected by urban planning documents and local policies, which have not yet succeeded to act as instruments for encouraging climate-neutrality. The lack of updated territorial planning documents further exacerbate the difficulty of coordinating effective climate action, nevertheless the ongoing revision of Bucharest's GUP of Bucharest and of Ilfov County's CSDP open up opportunities to fill this gap. Additional regulatory barriers, such as bureaucracy associated with expropriation measures for public	To ensure integrated actions, it is key to further develop the Climate Neutrality Division which will continue to act as a governance body within the public administration, by bringing together experts from each of Bucharest's 6 District City Halls and the General City Hall. This will function as a mechanism to strengthen collaboration between Bucharest and its district on climate-neutrality initiatives and to oversee and coordinate the implementation, monitoring and evaluation of the Action Plan implementation. To coordinate the Climate Neutrality Division, Chief Climate Officers will be appointed within each of the 6 Districts and in the General City Hall. Moreover, the Division will further support the

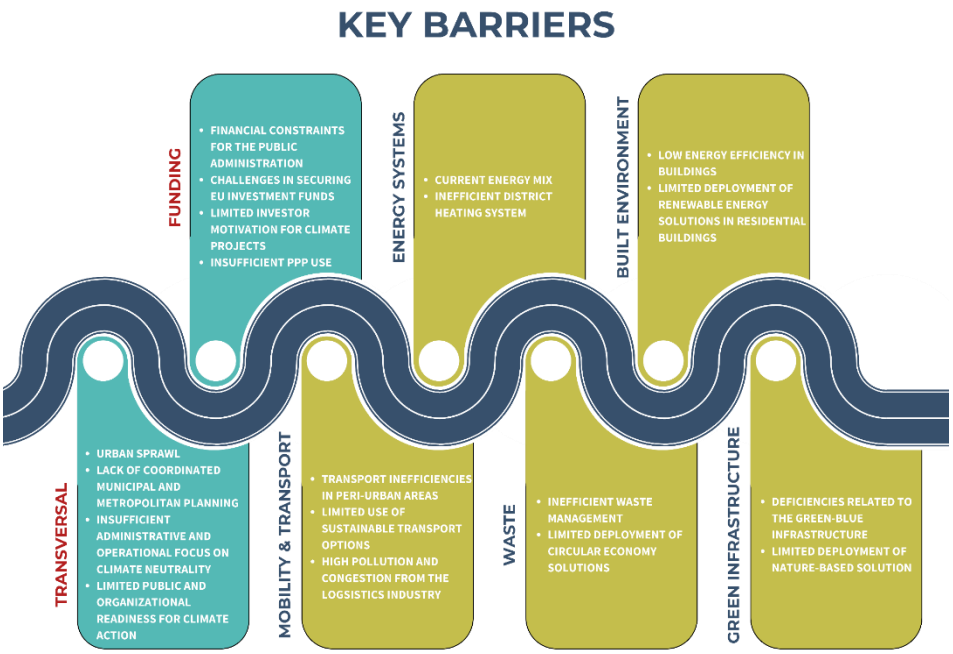
EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		infrastructure, poor regulation/standardization at central level (e.g. unclear micro-mobility legislation), and inefficient legislation on public procurement, further hinder the accelerated implementation of climate - neutrality interventions.	training of public officials and policymakers on climate-neutrality topics, leveraging on the support and resources provided by the M100 National Hub and the EU Mission for Climate-Neutral and Smart Cities. Therefore, in addition to proposing a climate neutrality capacity-building program for the public servants, the CNAP also includes an intervention for appointing Energy Managers in each District, with the aim of addressing the administrative limitations in energy management.
TRANSVERSAL BARRIERS	**Social resistance to change and limited capacity for climate action among individuals and organizations**	This barrier stems from a mix of behavioral, economic and institutional factors. Many residents and businesses lack awareness of the urgency of climate action or the benefits of sustainable practices, partly due to insufficient education and outreach on environmental issues. Economic constraints also play a role, as households and small organizations may perceive green technologies and behaviors — such as energy-efficient retrofitting or renewable energy adoption — as unaffordable or impractical. Additionally, unsustainable habits, such as reliance on private vehicles or a preference for disposable products, make behavior change challenging. Institutions often struggle with limited expertise or resources to support and implement climate initiatives, further weakening public confidence in collective action. Furthermore, the lack of local and metropolitan data on the average knowledge and competence levels of citizens and the local ecosystem hinders the ability to identify effective strategies for encouraging behaviors that support climate neutrality.	Multiple soft interventions are proposed in the Action Plan to help overcome this barrier, while the comprehensive execution of the proposed hard actions and the effective engagement with stakeholders throughout the process will demonstrate the public administrations' commitment to delivering climate-neutrality and inspire individuals to act towards climate-neutrality. The implementation of pilot projects is an effective tool to raise awareness and build momentum, for example when it comes to the selective collection of waste. Some of the key soft interventions proposed revolve around the implementation of awareness and educational campaigns, particularly on topics where behavioral changes can bring a significant contribution, as well as offering support and incentives for individuals, homeowners' associations and small businesses to engage in climate actions. Overall, the central lever for overcoming the social resistance to change and the limited capacity for climate action among the individuals and organizations is the activation of the Local NetZero Coalition, as its role will be to catalyze the necessary transformations within the community and among the local stakeholders.
FUNDING BARRIERS	**Financial constraints for the public administration**	The public administration faces multiple financial and administrative challenges in implementing impactful climate neutrality projects. The large and complex nature of the Bucharest	To address the complex financial barriers, the public administration will actively pursue non-reimbursable funds through Romanian Operational and Governmental Programs, the Regional

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		metropolitan area generates numerous immediate investment needs and competing priorities, making it difficult to allocate resources for long-term sustainability projects. These initiatives often require substantial upfront investments, involve complex multi-sectoral coordination, and deliver visible benefits in the long run, which clashes with the municipality's limited budget and immediate financial pressures. The limited local budgeting capacity and uncertainty around revenue streams, tied to market fluctuations and volatile funding streams, further complicate planning and execution. In addition, the fragmented governance structure and split of responsibilities and limited local budget between the Bucharest Municipality and the 6 District administrations further exacerbate inefficiencies in public investments, by fragmenting actions and delaying action towards integrated projects of high impact. Additionally, the city struggles with institutional capacity to prepare competitive applications for EU funding and manage large-scale projects effectively.	Program, and various European financing sources. Simultaneously, the City Halls raise awareness of the funding challenges faced by Romanian local public administrations through platforms such as the M100 Hub, the Green Cities Forum, and organizations like the Romanian Association of Energy Cities and the Association of Romanian Municipalities. Engaging in discussions with relevant ministries and the Central Regional Development Agency will further support this effort. To tackle blended finance difficulties, the public administration will enhance the internal experts' understanding of EU financial instruments, utilizing resources like the European Fi-compass tool, while intensifying efforts to attract private investments and increase local revenue streams. Nevertheless, overcoming this barrier involves specific measures within the CNAP, namely the private sector engagement interventions (e.g., public-private partnerships for climate and green initiatives), that will also implicitly facilitate the mobilization of private capital.
FUNDING BARRIERS	**Difficulties in securing EU funds for public and private investments**	This barrier stems on the one hand, from the inefficiency of national-level processes related to the management of EU funds. A key obstacle is the inefficiency and complexity of national-level processes for accessing these funds. Delays in launching funding calls, coupled with instability and unpredictability in timelines, undermine stakeholders' ability to plan and execute projects effectively. The cumbersome rules and procedures governing applications, combined with stringent compliance requirements, make the process not only time-consuming but also financially burdensome, particularly for smaller organizations with limited resources. Both public and private entities often find themselves overwhelmed by these administrative hurdles, which further delays critical investments in climate neutrality initiatives. In addition, private companies are faced with limited or cumbersome access to funding, planning	To address the challenges in securing EU funds for public and private investments in the metropolitan area of Bucharest, the public administration proposes a two-fold approach focused on advocacy and capacity-building. First, the M100 Hub will serve as the primary platform for raising awareness about the inefficiencies and administrative barriers associated with accessing EU funds. This initiative will be supported by additional channels, such as the Romanian Federation of Metropolitan Areas and Urban Agglomerations and the Association of Romanian Municipalities, to amplify these concerns and advocate for streamlined processes. Structured dialogues with key stakeholders, including the Bucharest-Ilfov Regional RDA and relevant Ministries (e.g., Investments and European Projects, Transport, Energy), will be conducted to emphasize the urgency of reforming the national-level procedures and improving the predictability in funding calls and

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		uncertainties and occasional delays in payment or reimbursement, which creates financial risks that are difficult to bear.	reimbursements. At the same time, efforts will be made to enhance the capacity of both public and private entities in navigating the complexities of EU funding. This will involve providing targeted resources to help stakeholders better understand compliance requirements, application procedures, and financial planning for EU-funded projects. Additionally, the establishment of a centralized support unit within the metropolitan area is proposed to offer technical assistance, reduce administrative burdens, and foster collaboration between the public and private sectors. By combining advocacy for systemic reform with localized capacity-building initiatives, the public administration aims to reduce delays, improve access to funding, and promote critical investments in climate neutrality projects.
FUNDING BARRIERS	**Difficulty to motivate private investors to implement climate neutrality projects**	Motivating private investors to engage in climate neutrality projects and pursue innovative entrepreneurship endeavors faces various barriers that generate a certain degree of reluctance among private investors to engage in projects that could have a significant impact on climate neutrality. A primary barrier is the perceived lack of profitability associated with such initiatives. Many climate neutrality projects, particularly in local industry, involve high initial costs and long payback periods, making them less attractive to investors focused on immediate or substantial returns. This hesitancy is compounded by economic uncertainty, which makes risk-averse behavior more prevalent among private sector players.Additionally, the inherent uncertainty of climate neutrality projects—often reliant on untested or emerging technologies—further deters investment. Regulatory barriers exacerbate the issue, as inconsistent, unclear, or insufficiently supportive national regulations fail to create an environment conducive to private sector engagement and R&I activities. In addition, many investors are not fully aware of the opportunities opened up by such projects, about the	To address the challenge of motivating private investors to implement climate neutrality projects, whether through independent projects or private initiatives, a multi-faceted solution is required to tackle the perceived risks, regulatory barriers and knowledge gaps. On one hand, the public administration will focus on enhancing its capacity to engage in targeted public-private partnerships (PPPs). These partnerships may include co-financing mechanisms or risk-sharing instruments, such as green bonds, guarantees, or subsidies, to mitigate high initial costs and incentivize investment in projects with longer payback periods. To reduce the financial burden and demonstrate lower risk, the climate neutrality projects will be well-defined and feasible, with feasibility studies, cost-benefit analyses, and risk assessments prepared prior to engaging with the private investors. Additionally, the CNAP outlines soft interventions aimed at supporting events to highlight innovative and sustainable technological solutions and concepts, as well as organizing hackathons focused on climate neutrality topics within the local innovation ecosystem. On the other hand, to encourage the

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		potential for long-term value creation or the role their participation could play in advancing climate neutrality goals.	businesses to adopt climate-friendly solutions, it is essential to improve regulatory clarity and create a supportive environment. To achieve this, the national and local authorities should collaborate to streamline permitting processes, offer tax incentives, and establish clear, stable policies aligned with climate neutrality objectives. To their end, the Bucharest City Halls will address this matter primarily through the policies proposed under the Governance Innovation interventions, as well as by mobilizing the Local NetZero Coalition.
FUNDING BARRIERS	**Limited use of PPPs for climate neutrality investments**	The limited use of Public-Private Partnerships (PPPs) for climate neutrality investments in Bucharest is rooted in several structural and procedural challenges. Lengthy and complex procedures, combined with uncertain legal frameworks at the national level, discourage both public and private entities from pursuing PPP arrangements. Public administrations often lack the expertise and experience required to navigate these processes effectively, leading to management and control difficulties. Additionally, PPPs inherently involve a transfer of significant control to private partners, raising concerns about whether the projects will fully align with public climate neutrality goals. Financial risks further complicate PPP implementation, as public entities may need to provide substantial upfront funding or bear liability for cost overruns, creating hesitancy in resource-constrained administrations. Public opposition also poses a barrier, with citizens often expressing concerns about private companies' roles in managing public infrastructure. Regulatory hurdles at the central level add another layer of difficulty, delaying project timelines and creating uncertainty for potential stakeholders. These factors collectively limit the adoption of PPPs, despite their potential to mobilize additional resources and expertise for achieving climate neutrality.	

Figure 20. Key barriers



RISKS

Bucharest's transition towards climate neutrality is subject to a relatively intricate array of risks, varying in their levels of impact, as detailed in the table below. These risks have the potential to influence the process of reducing and capturing the polluting emissions in multiple ways, ranging from delaying or slowing down the planned actions to hindering the achievement of the objectives set forth in this regard. Nonetheless, mitigation measures have been identified for each of the mapped risks. These measures are informed by diverse approaches and mechanisms, including leveraging the existing local mechanisms (such as those already implemented within the 6+1 City Halls) and activating the systemic levers outlined in this Action Plan; the actions proposed in the CNAP are specifically designed to address these risks, reducing their influence across the short, medium and long term.

Table 29. Main risks

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
ENERGY SYSTEMS	**Fluctuations in the cost of energy prices and of energy related projects**	Fluctuations in energy prices and in the cost of energy related projects pose a significant risk to achieving climate neutrality, both in terms of the affordability of energy and the financial viability of energy-related projects. Volatile energy prices, driven by global market trends, can disrupt long-term planning and investment in renewable energy, energy efficiency upgrades, and infrastructure development, while also intensifying energy poverty. Bucharest is particularly vulnerable, given that its central heating system is currently receiving generous subsidies to keep heating costs affordable for households. For municipalities and private investors, unpredictable costs can lead to delays or cancellations of critical climate initiatives, as budgets may be exceeded or financing conditions may change unexpectedly. For consumers, while rising energy prices might incentivize some to invest in renewable energy solutions and take energy-efficiency measures, lower-income households remain vulnerable, particularly in the context of inflation driving up the costs of energy-efficiency interventions.	The primary measure involves strengthening the energy efficiency investments, as outlined in the CNAP, which revolves around implementing deep energy renovation measures for both the public and the private residential buildings; these actions are expected to significantly reduce the energy consumption within these structures. A similar approach applies to the modernization of the public lighting system, which will further reduce the local energy usage. A key action within the CNAP which will reduce the vulnerability to fluctuations in energy prices focuses on the generation of renewable energy sources through the development of new solar and geothermal capacities, along with the interventions aimed at transforming the existing power plants into high-efficiency cogeneration facilities. Another critical measure focuses on enhancing the resilience of the central heating system through energy efficiency upgrades; modernizing the district heating infrastructure will reduce the energy waste and improve the operational efficiency, thereby lowering the costs, despite the potential energy price increases. This action will be complemented by technical studies aimed at transitioning to block-level cogeneration power plants. All of the above measures will primarily be based on leveraging the EU funding opportunities for green energy projects (particularly through the dedicated financing allocated under M1000), in order to alleviate the financial burden on the City Halls' budgets. Support will also be extended towards the private investments in renewable energy production capacities and the adoption of smart energy solutions, targeting both the economic operators and the citizens. In this regard, the key interventions outlined in the CNAP include the public-private partnerships

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
			for climate and green initiatives, together with the solar energy potential assessment and promotion. Finally, through the Local NetZero Coalition, public engagement and education initiatives will be promoted for encouraging energy-saving behaviors and household-level investments in renewable energy. The CNAP also includes an intervention focused on awareness, education and mobilization for energy sustainability, which involves campaigns promoting green energy, energy efficiency and the formation of energy communities.
ENERGY SYSTEMS	**Scale and complexity of the central heating system rehabilitation investments**	The scale of investments, technical complexities and intricate coordination associated with the rehabilitation of the central heating system pose significant challenges to its performance and its potential contribution towards climate-neutrality. The necessary upgrades involve diverse and complex technical solutions, which can cause extended execution times and disruption for residents, while also complicating the process of sourcing experts capable of timely delivering high-quality solutions at competitive prices. Securing funds and coordinating the necessary interventions puts an additional burden on the local administration.	By strategically addressing the multifaceted risks associated with this investment, the Bucharest municipality aims to ensure its smooth implementation, while maximizing the central heating system's contribution to achieving climate neutrality within its territory. The investment process will be grounded in comprehensive planning, as the interventions outlined in the CNAP prioritize the most critical areas and infrastructure upgrades, to address the most urgent needs. Moreover, the foreseen interventions will be designed to minimize the potential disruptions for the residents. The execution of the rehabilitation works will be entrusted to specialized companies, which are experienced in large-scale infrastructure projects. The oversight will be managed by teams of internal experts (from the City Halls), who will be specifically tasked with coordinating the technical, financial and logistical aspects, in order to ensure both an efficient execution and a rigorous monitoring. Moreover, the 6+1 City Halls have emphasized the need for support from M100, particularly in the training component, to enhance the capacity of the public-sector experts responsible for managing large-scale investments. Regarding the financial perspective, the efforts will focus on maximizing the access to EU grants, while also

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
			exploring additional green financing mechanisms, in order to support the required investments. Lastly, through the Local NetZero Coalition, the Municipality will prioritize transparent communication with the public; each City Hall will work to keep residents informed about the planned disruptions, timelines and anticipated benefits, aiming to foster greater public support and cooperation throughout this ambitious action.
ENERGY SYSTEMS	**Accelerated rate of disconnection from the central heating system**	The widespread dissatisfaction with SACET Bucharest, caused by frequent breakdowns, inconsistencies in service delivery, and overall unreliability, can accelerate the rate of disconnections from the central heating system. This led to a shift toward individual heating solutions, such as gas or electric boilers, which are typically more energy-intensive and less efficient. Moreover, as more households disconnect from the central system, overall energy consumption and emissions rise and the system's financial sustainability declines.	The suite of interventions encompassed within the development of an energy-efficient district heating system action (including the construction, modernization and rehabilitation works, alongside the interventions aimed at implementing smart solutions to optimize the entire central heating supply chain), were designed to enhance the system's performance, efficiency and overall quality. The overarching objective is to counteract the trend of disconnection from the system, by addressing the existing deficiencies, thereby reducing the residents' dissatisfaction by increasing the users' satisfaction.
BUILT ENVIRONMENT	**Seismic vulnerability and limited capacity to conduct deep renovation projects**	Bucharest's unaddressed seismic vulnerability, particularly in the context of the aging building stock, represents a critical challenge to advancing climate neutrality. Many apartment buildings, particularly those constructed before the adoption of modern seismic codes, are at high risk of collapse during an earthquake. However, this critical issue is rarely addressed due to the high complexity of pursuing structural rehabilitation projects and the limited capacity of both homeowners and the municipality to take action. Nevertheless, many of these buildings are undergoing energy efficiency intervention, missing out on the potential to pursue deep renovation projects. This fragmented approach not only leads to inefficient spending of public funds, but it also exacerbates vulnerabilities and limits the long-term benefits of ongoing climate interventions. In addition, the lack of action towards safeguarding buildings for seismic resilience, poses significant socio-economic	Under the CNAP actions focused on the deep energy renovation of public buildings, specific interventions for the consolidation, rehabilitation and energy efficiency enhancement of public buildings with a healthcare purpose and classified as high seismic risk were prioritized. This approach targets the most critical segment of public infrastructure—the medical sector—as a starting point to mitigate the seismic risks. Additionally, the Regional Programme (RP) allocates dedicated funding to reduce the seismic risks in public buildings; the City Halls will access the RP funds under Action 3.2 (aimed at increasing the energy efficiency in public buildings), once the funding calls are launched, as a part of the Action 3.2 allocation will support the integrated projects, including the consolidation of buildings in seismic risk classes I and II and their deep

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
		risks, which in the case of a potential disaster, would divert resources from climate action and leave the city vulnerable to increased emissions from reconstruction.	renovations, through a joint call with Action 3.4 (this latter action focuses on the design and execution of intervention works to enhance the seismic safety of existing public buildings comprised in the seismic risk classes I and II). As such, for both the General City Hall and the District City Halls, the highest priorities in this context are leveraging the RP funding opportunities under both Actions 3.2 and 3.4.
BUILT ENVIRONMENT	**Financial risks associated with building and retrofitting for climate neutrality**	There are multiple financial risks associated with building and retrofitting the existing built environment for climate neutrality. On the one hand, the Municipality and the 6 District administration face the risk of having insufficient capacity to absorb sufficient non-reimbursable funds to meet the extensive needs of the aging building fabric within the timeframe of existing programmes, and to manage the high volume of large-scale investments. On the other hand, the limited capacity of homeowners' associations to pursue retrofit projects due to the inability to cover the required co-financing or the upfront costs of independent investments, and the reluctance of developers to bear the higher costs of investing in climate-neutrality and RES solutions. Moreover, the rising construction costs, driven by inflation, together with the imbalances between demand and supply and the shortage of experts and workforce that challenge Romania's construction sector, may further exacerbate these financial risks, potentially delaying projects and increasing financial strain on both public and private sectors.	Addressing this risk necessitates a mix of multiple mitigation measures. Regarding the financing perspective, the focus will be on securing the non-reimbursable European funds and the national grants for public investments aimed at modernizing the built environment. Moreover, the technical studies and analyses will prioritize the works having favorable cost-benefit ratios. The procurement processes for the required studies and works will be meticulously planned, such as to ensure the selection of the most cost-effective offers. The inflation-related cost variances, typically ineligible within the non-reimbursable funding calls, will be covered through the local budgets. In terms of capacity, dedicated teams within all of the City Halls will oversee the effective implementation of these projects; if the internal resources will be insufficient, specialized consultants will be outsourced, in order to provide the necessary expertise. In terms of public engagement, the Local NetZero Coalition will be mobilized to raise awareness and foster the acceptance and participation of the residents living in apartment buildings, through the Homeowners Associations, in order to support the thermal rehabilitation of these structures. Additionally, the intervention aimed at raising awareness, providing education and promoting actions for energy sustainability will encompass measures specifically addressing energy efficiency.

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
MOBILITY & TRANSPORT	**Pace of raising transport inefficiencies surpasses the capacity to implement carbon-neutral mobility solutions**	The pace of transport inefficiencies far surpasses the public administration's capacity to implement carbon-neutral mobility solutions. The lack of integrated spatial and mobility planning and proactive master planning, leads to sprawling urban expansion disconnected from the public transport network. This phenomenon further exacerbates traffic congestion and obliges the public administrations to invest in road infrastructure to connect these areas, calls for complex and financially daunting investments in public-transport solutions, and limits the deployment of green mobility solutions within the new communities (i.e., walking, cycling, use of public transport).	The actions proposed in the CNAP regarding green mobility and sustainable transport have been developed in close alignment with the priorities outlined in the SUMP and the vision presented in the IUDS. As such, the mobility planning component is integrated, cohesive and, most importantly, continuous, serving as a clear direction for the transition towards less polluting travel options, which are also more comfortable for the citizens and more efficient for the economic operators. Moreover, to address this risk, as well as the other mobility and transport-related risks identified, the CNAP includes a comprehensive set of interventions focused on the development and modernization of underground and surface green public transport, alongside measures aimed at promoting low-carbon urban mobility, plus improvements in the parking and traffic management. Collectively, these interventions account for over half of the CNAP budget. The expected impact is significant, not only in reducing the CO_2 emissions but also in generating co-benefits, such as reduced air and noise pollution, improved transport connectivity, less congestion, fewer accidents, lower travel costs and increased local budget revenues.
MOBILITY & TRANSPORT	**Misalignment between central, urban and peri-urban infrastructure development needs and actions**	This risk stems from the slow pace of major infrastructure development coordinated from central and country level, limited integration of transport planning and fragmented investments across the metropolitan area and the limited funding available for local sustainable mobility solutions, relative to the past pace of raising transport inefficiencies due to uncontrolled expansion. For instance, even when major public transport projects are implemented, such as the metropolitan train, many settlements in the peri-urban areas require additional investments to connect to the rail corridor, such as local bus lines, park & ride facilities, cycling or walking infrastructure. In addition, the lack of coordination between strategic projects can exacerbate the disturbances felt by citizens due to major	Addressing this risk, which spans multiple levels of coordination, requires dedicated measures to ensure a proper alignment and a clear synchronization across all the relevant layers. At the local level, the synergy and complementarity within the CNAP framework will be facilitated by the Climate Neutrality Division, as it will include representatives from both the General City Hall and each of the 6 District City Halls, ensuring a more unified effort across all the jurisdictions. At the metropolitan scale, the strategic coordination will be ensured through the collaboration of the 6+1 City Halls

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
		infrastructure projects, and generate inefficient spending of public funds and missed synergies. For example, Bucharest's traffic congestion is often aggravated by major infrastructure projects, like the expansion of the subway network, but oftentimes authorities miss on the opportunity to synchronize complementary improvements, to rail or major road infrastructure, due to the misalignment between the multiple actors involved, at both central and local level.	with the Bucharest Metropolitan Area IDA. The Bucharest Metropolitan Area IDA addresses the complex challenges among the peri-urban LAUs, by facilitating idea exchanges to develop the most suitable solutions (both in terms of individual investments for local needs and partnership projects for common challenges). An additional key role in addressing this risk, specifically in the public transport field, will be fulfilled by the Bucharest-Ilfov Public Transport IDA, as this cooperative structure of local authorities in the Bucharest-Ilfov region is tasked with managing the public transport services across its more than 40-member LAUs. Regarding the alignment with the national-level administration, M100 will be used as a key mechanism for raising issues and engaging in dialogue with the relevant central institutions and organizations. Overall, the CNAP adopts a systemic approach to managing these various dimensions of interaction, strategically countering the identified fragmentation both in terms of vision and investments. The proposed actions aim to balance the implementation of major infrastructure projects with smaller-scale sustainable mobility solutions (in this regard, we also mention that the 6 District City Halls independently pursue green mobility initiatives at the District level, adhering to the broader frameworks of the IUDS and SUMP).
GREEN & BLUE INFRASTRUCTURE	**Accelerated shrinkage of urban green spaces associated with chaotic densification**	Poor urban planning, weak enforcement of regulations, and profit-driven construction often lead to the shrinkage of green spaces, particularly in the context of the limited land reserves and dynamic real estate market of Bucharest. This risk is further exacerbated by the difficulties to monitor and preserve green spaces due to the absence of a green space registry and weak enforcement of environmental policies. The shrinkage of green areas undermine efforts to improve air quality, mitigate flooding and manage extreme heat, while also limiting opportunities to improve the quality of life and move towards sustainable practices,	To address this risk, the CNAP includes both tangible interventions and measures focused on organizational and governance innovation. The development of the green-blue infrastructure combines the interventions to expand the green spaces (expanding the park network, greening the streets, the residential areas and the buildings, planting urban forests and creating a green belt) with the efforts to rehabilitate, protect and conserve the existing natural assets. However, the proposed solutions go

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
		such as walking, cycling or using green areas as carbon sinks .	beyond physical works, by also incorporating a planning enhancement component, namely the development of an IT solution for managing and continuously updating the Green Space Register. This tool will be essential for mitigating the negative impacts of urban densification and unsustainable development patterns on the local biodiversity. Equally important is the urban green space promotion campaign, which was adapted from the GCAP, in order to integrate the efforts to protect the local natural environment. This campaign revolves around the role of green spaces as providers of ecosystem services, which can contribute to the climate neutrality goals, while also offering nature-based solutions for climate change adaptation. Moreover, the GCAP proposes the development of an Integrated Urban Regeneration Strategy to promote coherent spatial planning and optimize the land use, including the creation of green corridors.
GREEN & BLUE INFRASTRUCTURE	**Risks upon natural landscapes associated with unsustainable urban development patterns**	Unsustainable urban development practices, particularly urban sprawl, pose significant risks to the natural landscapes and biodiversity in the greater metropolitan area of Bucharest. Residential expansion exerts intense pressure on natural areas and green spaces, leading to habitat loss and degradation. A notable portion of agricultural land within urban boundaries is increasingly earmarked for development, accelerating the decline of nearby natural areas. Forest reserves, which provide essential ecosystem services and carbon sequestration, are also vulnerable to urban expansion pressures, risking fragmentation and loss of ecological integrity.	
WASTE & CIRCULAR ECONOMY	**Risks associated with continuous inefficiencies in the waste management system**	Bucharest faces significant risks in waste management and its transition to a circular economy, largely due to insufficient infrastructure for waste segregation, recycling, and composting, alongside a heavy reliance on landfills nearing capacity. The lack of integrated waste management planning poses additional risks, since many of the system's components (i.e., sorting stations, landfills, warehouses) serving the Bucharest municipality are located outside administrative boundaries. Transitioning to sustainable waste management practices and circular economy models pose economic challenges, as high initial costs for building compliant infrastructure, for advanced recycling systems or waste-to-energy plants may strain local budgets and deter private investments. Low public awareness and participation in proper waste minimization and recycling practices further exacerbate inefficiencies. Additionally, industries and businesses reliant on "take-make-dispose" practices may resist changes, perceiving circular	The CNAP foresees an action dedicated to strengthening the local circular economy systems, through a series of integrated interventions. In order to drive the needed systemic changes through the infrastructure and technology levers, the CNAP proposes constructing a waste sorting station and developing an integrated waste management system, integrating the waste management at the district level, implementing smart solutions to improve the efficiency of the waste management system and digitizing the (selective) waste collection fleet. The CNAP extends beyond the conventional household waste, by incorporating targeted interventions for biowaste, green waste, construction and demolition waste and medical waste. Beyond the infrastructure investments, the CNAP also proposes social innovation interventions, through the pilot projects aimed at raising public awareness regarding the selective waste collection. These interventions

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
		economy policies as costly or too complex to adopt. Poor management of hazardous or non-recyclable waste during the transition could also pose environmental health risks, undermining sustainability goals.	seek to foster the behavioral changes needed for achieving more sustainable individual and community waste management practices. Regarding the behavioral changes, the national launch of the Guarantee-Return System for recycling beverage packaging has played a significant role, as it incentivizes the individuals to return the packaging, by allowing them to reclaim the financial deposit paid for each item. In terms of private sector collaboration, the 3R GREEN CLUSTER will be invited to join the Local NetZero Coalition. This Bucharest-based organization comprises a consortium of companies, NGOs and institutions united by shared objectives in promoting circular economy initiatives. Regarding the interjurisdictional cooperation, the IDA established in 2022 for ensuring the municipal waste management in Bucharest represents a critical institutional advancement in addressing the city's waste challenges; this association, initiated by the General City Hall in partnership with the District City Halls, focuses on resolving the local sanitation issues. Its responsibilities extend beyond infrastructure development, by including public awareness campaigns, which will support the CNAP's waste sustainability objectives. Similarly, the IDA for waste management in Ilfov County will be included in the climate neutrality discussions, given its role in managing the ecological landfill for urban and industrial solid waste in Vidra (Ilfov county LAU).
TRANSVERSAL RISKS	**Environmental risks associated with the slow transition to climate neutrality**	The slow transition to climate neutrality in Bucharest exacerbates several environmental risks that threaten both the city's resilience and its residents' well-being. Persistent air pollution from fossil fuel-dependent transportation, industry, and energy systems continues to harm public health and degrade air quality. The urban heat island effect is further accentuated by insufficient green infrastructure and becomes particularly pronounced in vulnerable areas, exacerbating health risks during heatwaves, especially for low-income	The CNAP, through its implementation, serves as a comprehensive suite of solutions aimed at mitigating the environmental risks associated with the gradual transition to climate neutrality. The execution of the foreseen actions directly contributes to climate change mitigation by reducing the CO_2 emissions and capturing the residual ones. This systemic approach will not only reduce the negative impact on the environment and public health, but also generate a range of co-

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
		populations. Additionally, the city's delayed adoption of sustainable practices increases vulnerabilities to extreme weather events, by failing to capitalize on the potential of green-blue infrastructure to help manage such impacts. These environmental risks complicate the city's transition to climate-neutrality, while placing a growing burden on public resources and resilience efforts.	benefits which will positively influence the local biodiversity and enhance the quality of life in the entire Municipality.
TRANSVERSAL RISKS	**Continued inefficient urban planning and fragmented policy implementation**	Continued inefficient urban planning and fragmented policy implementation across Bucharest's metropolitan area poses significant risks to the effective transition to climate neutrality. For one, the transition calls for integrated action between Bucharest's 6 Districts and the Municipality of Bucharest, as well as coordination with the peri-urban municipalities. Nevertheless, the delayed revision of Bucharest's General Urban Plan and of the elaboration of Ilfov County Spatial Development Plan, coupled with the lack of coordination when developing and approving spatial plans that have an impact beyond administrative boundaries, locks the Bucharest metropolitan area into fragmented development, hindering climate neutrality efforts. The limited cooperation and existing disparities among local public administrations – such as the differing priorities (e.g., the urban-rural infrastructure gap), levels of commitment to climate neutrality, expertise, and budget capacities of Bucharest, its 6 Districts, and surrounding peri-urban municipalities – hinder the development of cohesive, large-scale climate initiatives, making it difficult to achieve climate neutrality goals effectively and equitably.	The CNAP, together with the IUDS and the GCAP, represent the largest cooperative efforts pursued between the General City Hall and the 6 District City Halls, marking the culmination of their collective efforts for the green, cohesive and inclusive development of the Municipality. These efforts will be further reinforced through the activation of the Climate Neutrality Division. To strengthen the integrated planning capacity and reduce the fragmentation in policy implementation, additional support and capacity-building opportunities will be pursued, including the M100 tools, but also various other channels (e.g., the technical assistance agreement between Bucharest-Ilfov RDA and the World Bank, the experience exchange opportunities supported by the EUI, the policy learning and collaboration initiatives facilitated by the Interreg platform).
TRANSVERSAL RISKS	**Bureaucratic and regulatory hurdles**	Bureaucratic and regulatory hurdles can delay the implementation of critical projects aimed at moving towards climate-neutrality. These risks include the complex bureaucratic procedures for expropriation for public use, which can hinder major infrastructure projects (i.e., such as expansion of green areas, preservation of biodiversity), as well as inefficient legislation on public procurement and inconsistent regulation at central level, all of which can significantly delay project implementation.	The Bucharest Municipality and the 6 Districts are committed to implementing all the necessary internal measures to enhance the capacity and responsibility of the City Halls in addressing the bureaucratic and regulatory challenges more effectively, thereby ensuring the timely execution of the climate neutrality projects. At the individual level, the administrations are already working and will continue to streamline and

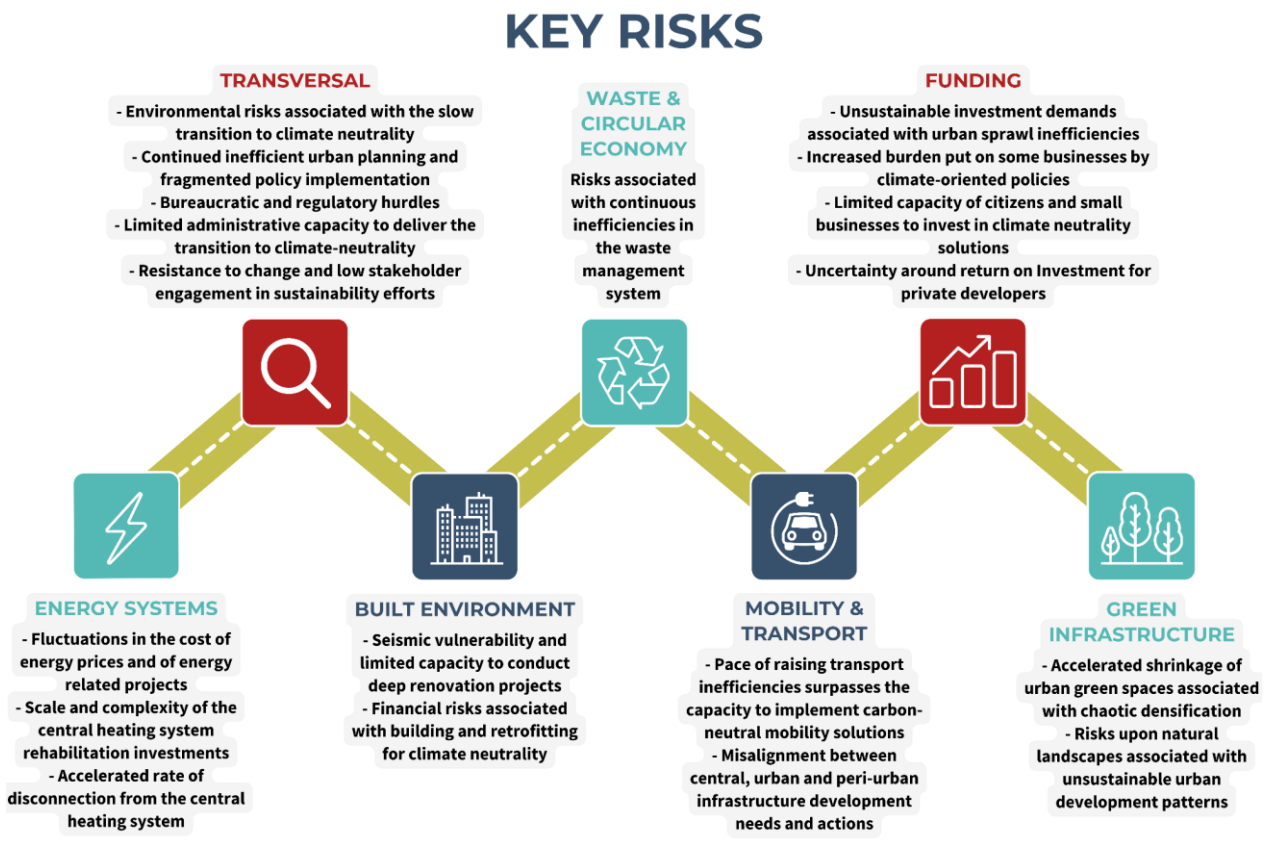
FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
			accelerate the bureaucratic processes related to their internal powers and decisions. These continued efforts aim to expedite the existing procedures and eliminate the current bottlenecks, including through digitalization. A primary focus is on strengthening the institutional capacity through training on key topics such as managing complex projects, navigating regulatory frameworks and understanding the technical aspects of climate neutrality. Accordingly, the CNAP incorporates a dedicated program aimed at building climate neutrality capacity among public servants. Where internal expertise is insufficient, partnerships with private sector experts will be established, to provide additional support and resources. Furthermore, the CNAP proposes the appointment of Energy Managers in all of the Districts. Finally, the City Halls' representatives will continue to advocate for more efficient public procurement processes, as they need to be more transparent, competitive and less time-consuming. They will also continue to address the regulatory inconsistencies, in order to facilitate smoother project implementation processes. In this regard, both the M100 channels and those of the Romanian Association of Municipalities, as well as the Romanian Federation of Metropolitan Areas and Urban Agglomerations, will be activated.
TRANSVERSAL RISKS	**Limited administrative capacity to deliver the transition to climate-neutrality**	The complex nature of Bucharest exposes the local administrations to an organizational risk, related to the limited capacity of existing public officials to secure funds and manage the large volume of interventions required to move towards climate-neutrality, some of which are of unprecedented size and complexity. In addition, the novelty of the climate-neutrality framework might bring additional challenges due to the unfamiliarity with specific or technical aspects or requirements and the limited funds available to hire additional expertise.	The CNAP incorporates a dedicated intervention aimed at implementing a climate neutrality capacity-building program for public servants. Furthermore, through the CNAP, the public administration seeks to collaborate with the local universities, to design and implement (post)university programs on climate neutrality. This initiative primarily aims to enhance the expertise of the internal specialists from City Halls by enabling them to participate in these study programs. Additionally, it aspires to cultivate a future pool of trained professionals who, upon completing

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
			these programs, may join the public administration as experts capable of effectively addressing the climate neutrality challenges. Moreover, as outlined in the Barriers and Opportunities sections, all of the City Halls will leverage the available national and European resources for learning and training, in order to consolidate their technical capacity for the preparation, implementation and subsequent evaluation and monitoring of the actions proposed for reducing and capturing the CO_2 emissions. Nonetheless, when internal capacity is inadequate, external experts will be brought in through outsourcing (consultancy and thematic support) and more importantly, through collaborations with the members of the Local NetZero Coalition (local universities, relevant organizations, independent experts in areas such as urban planning, geography, environmental sciences etc).
TRANSVERSAL RISKS	**Resistance to change and low stakeholder engagement in sustainability efforts**	Individual's resistance to change or unwillingness to engage in sustainability efforts, due to economic concerns, lack of awareness over the shared responsibility, or the reluctance to change established practices and compromise on personal convenience, can pose significant difficulties to the delivery of climate-neutrality. More precisely, if key stakeholders, including businesses, local communities, and political leaders, are not fully invested in or supportive of sustainability initiatives, it can hinder the adoption of necessary policies and the successful implementation of green projects.	Given the significant nature of this risk, the CNAP includes dedicated Social and Other Innovation measures, complemented by several Governance Innovation actions. The key to shifting this reluctant mindset, however, lies in the Local NetZero Coalition, which aims to attract as many members as possible from the private sector and the community. These members will not only actively support Bucharest's transition to climate neutrality but will also encourage their peers to join the effort. At the same time, as all of the City Halls strive to become genuine partners with the citizens and the local stakeholders in these initiatives, they aim to take on the role of leaders in the transition to climate neutrality. By providing a responsible model for managing and mitigating the negative effects of climate change, the public administrations aim to set an example which can be adopted by citizens and organizations alike, fostering a local spirit of cooperation and reciprocal support.

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
FUNDING RELATED RISK	**Unsustainable investment demands associated with urban sprawl inefficiencies**	Daunting investment demands associated with urban sprawl inefficiencies pose significant risks to achieving climate neutrality. The need for extensive funding to provide basic infrastructure, public amenities, and sustainable transport solutions in sprawling areas places a shared financial burden on all the LAUs from the Bucharest metropolitan area. Moreover, such investments are often unsustainable in the long term, as they require continuous resource allocation, leaving limited financial capacity for other critical climate-related initiatives and for innovative actions. Furthermore, the construction activities necessary to address these inefficiencies—such as building roads, utilities, and facilities—generate significant emissions, counteracting efforts to reduce the city's carbon footprint. These challenges underscore how urban sprawl diverts resources, increases emissions, and hinders progress toward climate neutrality by perpetuating inefficient urban development patterns.	Bucharest will implement a range of measures to mitigate the financial and environmental risks associated with the inefficiencies of urban sprawl. A key focus will be on continuing to strengthen the collaboration between the Bucharest and the 6 District Halls. In this context, the IUDS' sustainable development vision will be rigorously adhered to, the ultimate goal of the CNAP being to embed the climate policies into the urban planning process, not only for the entire Bucharest Municipality but also for its surrounding metropolitan area. In the long term, the objective for all the public administrations of the Bucharest Metropolitan Area is to ensure that all of the local investments (and, in this case, particularly those aimed at climate neutrality) are strategically aligned through a coordinated approach, which can minimize the financial burdens and optimize the resource allocation for metropolitan-wide infrastructure and climate-neutral initiatives. Additionally, efforts will be made to develop and implement sustainable financing models, which will involve not only leveraging the climate-related non-reimbursable funding programmes, but also private financing sources, and, where necessary, loans.
FUNDING RELATED RISK	**Increased burden put on some businesses by climate-oriented policies**	New regulations and policies aimed at achieving climate neutrality, such as carbon taxes, stricter energy efficiency standards, or emissions reduction targets, could disproportionately impact certain sectors or businesses. Industries that rely heavily on fossil fuels, such as transportation or heavy manufacturing, may face higher operational costs, potentially reducing profitability or competitiveness. Small businesses with limited resources may struggle to comply with these regulations and bear the high upfront costs of investing in climate friendly solutions.	The mobilization of the private sector in the transition to climate neutrality will be primarily driven through the Local NetZero Coalition, which will serve as the main mechanism for engaging the key local stakeholders in any climate-related initiative. Additionally, through the CNAP, dedicated Governance Innovation and Social Innovation interventions (e.g., the public-private partnerships focused on climate and green initiatives, the green grants for climate-neutral communities and lifestyles, the events for innovative and sustainable technological solutions and concepts, the hackathons on climate neutrality topics for the innovation ecosystem)
FUNDING RELATED	**Limited capacity of citizens and small**	Many individuals and small businesses face significant upfront costs when adopting	

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
RISK	**businesses to invest in climate neutrality solutions**	green technologies or implementing energy-efficient solutions, such as installing solar panels, retrofitting buildings, or purchasing electric vehicles. Without access to affordable financing options or incentives, these investments may be financially burdensome, particularly for small businesses or lower-income households.	have been developed, in order to actively involve the local ecosystem in these efforts. Moreover, within this framework, the existing non-reimbursable financing opportunities for businesses (e.g., the funding calls launched under the Bucharest-Ilfov Regional Programme and other relevant Operational Programmes), will be promoted, together with other sources of funding (e.g., loans for green projects). The promotion of the available financial resources will be complemented by targeted campaigns and discussions designed to inform the stakeholders about the tangible benefits of accessing these funds and the advantages of investing in initiatives aimed at reducing the CO_2 emissions.
FUNDING RELATED RISK	**Uncertainty around return on Investment for private developers**	Climate-neutral projects, such as renewable energy installations or energy-efficient retrofits, often involve long-term investments with uncertain returns. Private investors may face financial risks if the expected savings or revenues from these projects do not materialize as anticipated due to fluctuating energy prices, technological challenges, or changes in market conditions, thus limiting their willingness to invest in such solutions.	

Figure 21.Key risks



OPPORTUNITIES

Given the complexity of implementing the CNAP, the Bucharest General City Hall, together with the District City Halls, is committed to leveraging all the available opportunities to support a streamlined transition towards climate neutrality. The main opportunities pursued are those with the highest potential to enable the effective implementation of the planned actions, to maximise their impact in terms of CO_2 emission reduction and to secure the necessary resources. A summary of the key opportunities is presented below, along with the primary priorities and the activation catalysts needed for their achievement.

Table 30. Opportunities

TRANSITION PRIORITY	ACTIVATION CATALYST
CAPACITIES	
OPERATIONALIZATION OF THE CLIMATE NEUTRALITY DIVISION The Climate Neutrality Division is the formal name given to the team of experts from the 6+1 City Halls, who collaborated on preparing the Expression of Interest for the M100 Selection Call and furtherly, for developing the Climate Neutrality Action Plan. With the implementation of the CNAP, the Division is set to advance to a higher level of maturity. The Climate Neutrality Division will serve as an internal governance body within the public administration, uniting the relevant experts from each of Bucharest's 6 District City Halls and the General City Hall, to be engaged in the implementation and monitoring of the CNAP (and, initially, in its development). Drawing from departments such as strategic planning, project development, environmental management, utilities, finance, this Division will coordinate the efforts to comprehensively implement, monitor and evaluate the CNAP actions. The Division will also function as a mechanism to strengthen the collaboration between Bucharest and its Districts on climate mitigation initiatives, fostering a unified approach across the city. Additionally, it aims to build and enhance the skills of its members on climate neutrality topics (and as a secondary focus, climate adaptation), positioning the Division as a key driver of local change towards achieving a net-zero carbon footprint for Bucharest.	• The learning resources provided by the M100 National Hub and the EU Mission for Climate-Neutral and Smart Cities. • Support from the European Bank for Reconstruction and Development (within the framework of the Green City Action Plan). • Technical assistance from the World Bank (through the agreement with the Bucharest-Ilfov Regional Development Agency). • The knowledge (expertise, past experiences, lessons learned) and best practices which can be drawn from Bucharest District 2, which is labeled by the EU Mission for Climate-Neutral and Smart Cities. • The insights which could be gained from the European cities engaged in the EU Mission for Climate-Neutral and Smart Cities through the NetZeroCities Twinning Learning Programme for knowledge sharing and best practice transfers. • The local ecosystem's resources, which can be leveraged to address the public administration's gaps (e.g., the research conducted by the local universities, the technological
ASSIGNMENT OF CHIEF CLIMATE OFFICER(S) A Chief Climate Officer (CCO) will be appointed within each of the 6 District City Halls and the General City Hall (or, initially, at least one within the General City Hall). Accordingly, within each of the 6+1 City Halls, this Officer may oversee the coordination of an internal Climate Neutrality Office, comprising personnel from the relevant departments (e.g., environmental management, public utilities, finance, strategic planning, project development). The CCO(s) will also be responsible for coordinating the Climate Neutrality Division, representing the public administration within the NetZero Local Coalition and guiding the Coalition's activities and initiatives for supporting Bucharest's transition to climate neutrality. To effectively oversee the work of the Offices, Division and the Coalition in implementing the CNAP, the CCO(s) will also require strengthened expertise in climate neutrality, ensuring well-informed and effective leadership in advancing the city's climate goals.	
APPOINTMENT OF ENERGY MANAGERS It is envisioned that each District, and by extension the entire city of Bucharest, will have designated Energy Managers. The GCAP also underscores this necessity, within the broader context of ensuring the long-term decarbonisation of the energy sector, as the document emphasizes the	

TRANSITION PRIORITY	ACTIVATION CATALYST
importance of developing and supporting a comprehensive and integrated vision for energy production, infrastructure, distribution, supply and demand management.[7] These experts will not only be accountable for but also adequately trained in developing and implementing strategies and tools to optimise the energy systems (production – distribution - consumption). Their responsibilities will also include reducing the costs and pollution associated with the energy systems and the stationery energy, while also promoting sustainable energy practices and supporting the transition to clean energy across the public facilities and services.	solutions developed by the local businesses, the citizens' grassroots ideas).
LOCAL COMMUNITY EMPOWERMENT This priority aims to offer the local community (both the citizens and their representatives, such as the civil society organisations) a broad range of opportunities to deepen their understanding of climate neutrality. The objective is not only to encourage the acceptance and ownership of the vision for climate neutrality, but also to empower the individuals and the local groups to adopt the needed behavioural changes. In addition, it seeks to motivate them to take proactive steps, both individually and collectively, to accelerate the city's transition to climate neutrality.	
PROCESSES	
COMPLIANCE WITH THE EU FRAMEWORK FOR THE CLIMATE NEUTRALITY TRANSITION The development of the CNAP has closely adhered to the framework established by the European Commission through NetZeroCities for the EU Mission for Climate-Neutral and Smart Cities, which is also supported by the M100 National Hub. The same approach will govern the implementation, monitoring and evaluation of the CNAP, ensuring that Bucharest aligns with the European principles and criteria for reducing the CO_2 emissions. In this regard, we also refer to respecting the EC's recommendations, e.g., the involvement of the private sector and community in the transition to climate neutrality, the openness to innovative solutions (including innovative financing options) or the monitoring of the GHG emissions inventory. All these principles will also guide the operations of the Climate Neutrality Division and shape the activities of the NetZero Local Coalition.	• Engagement in knowledge-sharing with other public administrations, which are already excelling in the processes related to the set priorities. • Partnerships with organisations having expertise in the specific areas outlined by the set priorities, including collaborations with independent experts and private providers specialising in these fields.
COMPLEMENTING THE HARD ACTIONS WITH SOFT INTERVENTIONS Bucharest and its Districts, like any other public administrations across Romania, have historically allocated a significant portion of their resources (funds, human capital, time) towards the public infrastructure investment projects, recognising their important role in enhancing quality of life for the residents, but also the attractiveness for the businesses. However, within the framework of the CNAP (and as outlined in the GCAP), the actions centred on infrastructure and technology will be complemented by interventions belonging to the categories of organisational, governance and social innovation. This approach will enable the public administration to actively involve a broad range of private sector stakeholders and community members in the efforts to reduce the CO_2 emissions and capture the residual ones, through various instruments (e.g., learning, awareness, and engagement).	

[7] **According to the GCAP, the Energy Manager should have the following tasks:**
Prepare an integrated Long-term Energy and Decarbonisation Vision, including among others renewable generation, H&C production and supply, district H&C deployment, climate adaptation of energy infrastructure, increasing energy resilience, etc.
Coordinate the preparation of a H&C plan (cf. Article 25(6) of the recast Energy Efficiency Directive EED), with the appropriate consultation and implication of relevant parties, both from public and private.
Develop & implement several specific programmes.
Coordinate various strategic initiatives .

TRANSITION PRIORITY	ACTIVATION CATALYST
A key priority will be the development of new local policies, which, together with the other soft interventions, will be designed to fully align with the principles of climate justice and social inclusion.	
STRENGTHENING THE MONITORING AND EVALUATION CAPACITY Although the monitoring and evaluation process for the CNAP is currently a challenging one, due to the existing barriers (e.g., the lack of data and tools for data collection), this dimension represents a priority for Bucharest and all of its Districts. In the medium term, the efforts will focus on identifying solutions to optimise these processes, ensuring that both the public administration and all the relevant stakeholders (including the citizens), have access to real-time data, for tracking the city's progress at any stage of its transition to climate neutrality, while also providing clarity on the cost-effectiveness of the actions undertaken. As such, the CNAP envisions the development of an interactive digital monitoring platform for tracking the MEL indicators related to the CNAP, as well as other relevant indicators, to ensure clear and transparent data-driven monitoring of the transition to climate neutrality. This platform will feature a digital dashboard to monitor the progress towards climate neutrality, being linked to a mobile app that will allow the citizens to provide real-time insights and feedback on the published information /data. Additionally, the platform will be complemented with technological solutions for calculating and displaying the carbon footprints across the city.	
DIGITALISATION FOR SMART CITY Given that the EU Mission and by extension, the M100 National Hub, not only focus on climate neutrality but also on the development of smart cities, a key priority for Bucharest is digitalisation—both within the public administration and across the various emission sectors. This priority is reflected in several actions outlined in the CNAP, while also being continually pursued within the City Halls through other projects aimed at increasing their digital maturity, both in terms of infrastructure and skill development.	
ACTIVE SUPPORT OF INNOVATION FOR CLIMATE CHANGE MITIGATION Through the implementation of the CNAP, both the General City Hall and the District City Halls are pledging to foster greater openness to innovation as a key mechanism for accelerating the transition to climate neutrality. We refer to a variety of innovation-related components, including new projects which have not been previously undertaken, cutting-edge technological solutions from the private sector, the adoption of RDI results from academia and research institutions, community-driven social innovation and novel financing approaches.	
ALLIANCES	
CROSS-DISTRICT COOPERATION A top priority in terms of alliances is to strengthen the cooperation among the General City Hall and the 6 District City Halls. Given the differences in jurisdiction and responsibilities defined by the national legislation, there are inherent differences between the General City Hall and the District City Halls. Additionally, each administration pursues its own strategic development priorities, despite all of them adhering to an urban development vision, grounded in integration and sustainability principles. In this context, the CNAP, alongside the IUDS and GCAP, serves as a valuable opportunity to reinforce the cooperation between Bucharest and its Districts. The climate neutrality partnership will enable the complementary use of competencies, the addressing of gaps, the alignment of local policies and programmes and the coordination of investments. The ultimate priority is, as such, to work collectively towards achieving climate neutrality, ensuring that all of Bucharest's residents, regardless of District, benefit from the shared co-benefits.	• National-level collaboration opportunities offered by the M100 National Hub, the Romanian Association of Municipalities and the Romanian Federation of Metropolitan Areas and Urban Agglomerations. • European opportunities, e.g., Urbact (e.g., Urbact Networks), the Urban Agenda for the EU (the relevant partnerships), EUI (e.g., EUI City-to-City Exchanges), Interreg (e.g., Interreg Policy Platform, funding for transnational projects), New

TRANSITION PRIORITY	ACTIVATION CATALYST
NETZERO LOCAL COALITION Another key priority for the public administration in Bucharest is the establishment and operationalisation of a NetZero Local Coalition. This Coalition would unite all the local stakeholders with an interest in, or the potential to impact, the city's transition to climate neutrality. These stakeholders include the public institutions and companies, the Intercommunity Development Associations, the academic and RDI entities, the NGOs, the businesses (including the industry clusters and other representative organisations / associative structures), and most importantly, the community (both citizens and civil society representatives). The Coalition's role is envisioned as a collaborative platform within the local ecosystem, designed to accelerate the transition to climate neutrality through acceptance and ownership, awareness-building and learning, partnerships (co-design, co-implementation, co-monitoring, co-evaluation) and participatory action (including the financing dimension as well). The operational model of the Coalition will prioritise attracting private projects and investments, while also fostering grassroots initiatives, all aimed at strengthening the collective local capacity to ensure Bucharest successfully completes its journey towards climate neutrality.	European Bauhaus (e.g., NEB Friends, EIT Community NEB), NetZeroCities (e.g., Twinning Learning Programme, NetZeroCities Community of Practice), other European Commission funding programmes (e.g., Life, Horizon Europe, DUT). • Strategic partnerships with international organisations, such as the EBRD and the World Bank.
PUBLIC-PRIVATE PARTNERSHIPS Within Bucharest, there are multiple examples of private sector involvement in sustainability initiatives. Under the CNAP framework, the administration will focus on expanding the public-private partnerships (PPPs), particularly in areas aimed at reducing and/or capturing the CO_2 emissions. The PPPs are especially sought with large private companies (e.g., for urban regeneration projects, green real estate developments, and mobilisation of private capital for implementing the CNAP actions, all within a CSR/ESG framework).	
COOPERATION WITH HOMEOWNERS ASSOCIATIONS Considering the significant impact of the built environment (particularly the residential blocks) on the CO_2 emissions, as well as the large number of residents living in such buildings, a key action outlined in the CNAP focuses on the moderate and deep energy renovation of the private residential buildings. As these buildings are managed by Homeowners Associations, strengthening the collaboration with them is essential to accelerate the action's implementation. Moreover, the Homeowners Associations not only represent their residents, but also have the potential to encourage them to adopt solutions which could furtherly reduce the CO_2 emissions.	
ACTIVE INVOLVEMENT IN THE M100 COHORT Bucharest's inclusion in the M100 National Hub presents an exceptional opportunity to strengthen its collaboration with the other 9 Romanian cities selected in the M100 Cohort, pursue mutual learning and position Bucharest as a national leader / central figure in Romania's urban transition to climate neutrality. In this context, the opportunities offered by M100 for intra-cohort cooperation (e.g., dialogues, thematic working meetings, events, study visits, experience exchanges) will be fully leveraged, in order to enhance Bucharest's role and further its objectives in the climate neutrality journey.	
LEARNING FROM THE ROMANIAN CITIES LABELED BY THE EU MISSION FOR CLIMATE-NEUTRAL AND SMART CITIES In addition to engaging with Bucharest District 2, dialogues will also be pursued with the other two Romanian cities labeled by the EU Mission for Climate-Neutral and Smart Cities (Cluj-Napoca and Suceava). As these cities are further advanced in implementing their CNAPs, both in terms of infrastructure actions and soft interventions, the objective is to understand the challenges they have faced and the strategies they used to overcome them, including how they managed the risks.	

TRANSITION PRIORITY	ACTIVATION CATALYST
Bucharest aims to gain valuable insights through discussions on the lessons learned (particularly from the EU Mission cities' collaborations with their Climate City Advisors) and the adoption of best practices.	
NATIONAL CLIMATE NEUTRALITY LEADERSHIP As the administrative capital of Romania, Bucharest aims to establish itself as the national leader in the transition to climate neutrality, as outlined through its membership in M100 and the development of the CNAP. To achieve this, Bucharest will also leverage the platforms of the Romanian Association of Municipalities and the Romanian Federation of Metropolitan Areas and Urban Agglomerations, aiming to further solidify its role as the driving force behind Romania's urban transition to climate neutrality.	
PARTNERSHIPS WITH THE NORDIC CITIES Through the M100 National Hub and the resources it manages under the EEA Grants and Norwegian Mechanism, Bucharest and its Districts are committed to strengthening the collaboration with cities from Norway, Iceland and Liechtenstein on climate neutrality matters. These partnerships would be aimed not only at facilitating learning and the exchange of best practices, but also at developing and implementing joint transnational projects, establishing strategic partnership agreements and sharing resources to mutually support the progress towards climate neutrality.	
PARTNERSHIPS WITH THE SWISS CITIES The same objectives outlined for the collaboration with the Nordic cities also apply to the cities in Switzerland, through the opportunities provided by the Romanian-Swiss Cooperation Programme.	
PARTNERSHIPS WITH THE EU CITIES Although not part of the EU Mission for Climate-Neutral and Smart Cities, Bucharest seeks to strengthen its ties with the European cities which are involved in this initiative, both in terms of strategy alignment and effective cooperation. In this regard, Bucharest is exploring multiple opportunities, primarily through the M100 National Hub, but also through other relevant European initiatives and with assistance from its strategic partners, such as the World Bank.	
INFRASTRUCTURE	
LEVERAGING THE EXISTING PROJECTS AS A DEVELOPMENT FOUNDATION A considerable number of impactful projects have already been implemented across Bucharest and its Districts, contributing positively to the environment and climate through their integrated sustainability measures. These projects will serve as a foundation for advancing the local sustainability objectives, by supporting the actions outlined in the CNAP. In this way, they will help shift the sustainability focus towards climate change mitigation, having been regarded as a foundational element while shaping the CNAP's action portfolio.	• The financing allocated from government sources, European Union funds, Nordic and Swiss funds for public investments and innovation projects. • The resources (capacity) available from public companies and Intercommunity Development Associations, which could be directed towards the pursued public investment projects. • The funding which the private sector can allocate to climate change mitigation projects,
SCALING AND REPLICATING SUCCESSFUL PROJECTS As previously noted, a range of projects targeting the CNAP's emission sectors (e.g., mobility, energy, built environment) have already been implemented in Bucharest. Through the actions proposed within the CNAP, some of these projects will be scaled up (e.g., the energy efficiency improvements of the public and residential buildings), while others will be replicated. This approach will ensure continuity in Bucharest's development vision, as the CNAP will support the implementation of the priority projects outlined in the IUDS, along with the initiatives proposed within the GCAP.	
INNOVATION THROUGH NOVEL PROJECTS	

TRANSITION PRIORITY	ACTIVATION CATALYST
As previously noted, the CNAP also serves as a commitment to embracing innovation, not only in terms of technological advancement, but also for internal capacity, stakeholder engagement and citizen participation. In addition to the various innovative actions proposed within the CNAP, the public administration will, until 2035, remain open to implementing and supporting new technologies and infrastructure projects focused on carbon reduction and capture.	especially under CSR and ESG principles. • The ideas which could be generated from the local community (e.g., through the climate-neutrality hackathons, the showcase events, the green grants and also public consultations) and from international experts (e.g., through international solution competitions). • The resources provided by the EU Mission on Adaptation to Climate Change, particularly through the Pathways2Resilience initiative. • The guidance available from the European Commission and the Bucharest-Ilfov Regional Development Agency on the New European Bauhaus topic.
COLLABORATION WITH THE LOCAL ECOSYSTEM The transition to climate neutrality will involve a closer collaboration with the local ecosystem, beyond the soft actions, such as to actively engage and, where possible, to incentivise the local stakeholders to undertake private investments which support the CO_2 emission reduction. Examples for companies: modernising the industrial facilities, improving the energy efficiency in office spaces, installing green roofs and facades, adopting the circular economy principles in the production processes, developing technological solutions for climate mitigation, pursuing green real estate projects. Examples for the community: the installation of solar panels or heat pumps in the individual residential units.	
INTEGRATING THE CLIMATE NEUTRALITY VISION WITH CLIMATE CHANGE ADAPTATION ACTIONS Since addressing the climate changes requires both mitigation and adaptation measures, the public administration will pursue projects which will enhance the climate resilience, alongside the climate neutrality actions. These projects will focus on strengthening the resilience of citizens, organisations, infrastructure (e.g., buildings, roads) and natural factors (e.g., vegetation, wildlife, soils, water) to the adverse impacts of climate change. Notably, certain actions within the CNAP already serve a dual purpose (both mitigation and adaptation), such as the development of green-blue infrastructure.	
ADOPTION OF THE NEB APPROACH IN THE CLIMATE NEUTRALITY ACTIONS While implementing the CNAP actions, the adherence to the values and principles of the New European Bauhaus (NEB) will be a key focus wherever feasible, recognising the NEB's importance at European, national and regional levels (as observed in the Bucharest-Ilfov Regional Programme).	
RESOURCE FLOWS	
DIRECTING ALL THE AVAILABLE RESOURCES TOWARDS A SINGLE OBJECTIVE Bucharest and its Districts have access to a vast array of resources, particularly in comparison to other cities in Romania, due to its status as the country's capital and its well-developed metropolitan area. These resources, however, originate from a variety of sources (e.g., universities, businesses, NGOs, various national and international organisations), and are currently dispersed across multiple directions. The priority, therefore, is to align as many of these resources as possible (financial, human, intellectual, and in terms of visibility) towards the goal of achieving climate neutrality. Equally important, from the resource flow perspective, is the need to direct the resources available to the six Districts, or those they can attract, towards the shared objective of reducing the CO_2 emissions.	• The learning and working tools available at the European level on resource pooling topics (e.g., NetZeroCities, fi-compass). • The expertise from professionals in the field, through technical assistance (e.g., World Bank, European Bank for Reconstruction and Development) and consultancy services (e.g., from specialised firms or independent experts). • The pilot initiatives which can be launched as test beds for the resource pooling approach (e.g., those supported by the EIT-KICs).
FUNDING	

TRANSITION PRIORITY	ACTIVATION CATALYST
ACCESSING THE AVAILABLE GRANTS To effectively and comprehensively implement the actions outlined in the CNAP, it is a priority for Bucharest and its six Districts to secure the maximum amount of non-reimbursable funding possible to complement the local budget, which alone is insufficient to support such an ambitious agenda. Priority will be given to the non-reimbursable funds dedicated exclusively to the M100 Cohort member cities, as well as to the other EU funds available at the national level (e.g., the Bucharest-Ilfov Regional Programme, the relevant operational programmes), but also to the other national programmes managed through government funds. In addition, the public administration will endeavour to also access the funding allocated through the European Commission-managed programmes, as previously mentioned.	• The non-reimbursable funds available from national and European sources, including the EU funding and the funds managed by Norway, Iceland, Liechtenstein and Switzerland. • The private funds which can be attracted. • Potential loans (e.g., from the World Bank, the European Investment Bank, the European Bank for Reconstruction and Development). • Best practice models from other European cities which excel in attracting private capital for public development projects. • The learning and working tools available at the European level on the funding topics.
ATTRACTING PRIVATE CAPITAL Equally important will be the mobilisation of private capital to complement the public funds, particularly from companies (e.g., through investment projects, PPPs, CSR and ESG initiatives and other avenues). Additionally, efforts will be made to mobilise capital from the residents, with examples of such models including the individual green investments made by citizens, the community development projects, the crowdfunding initiatives, but also more innovative approaches (e.g., energy communities, the purchase of green / climate bonds issued by the municipality).	

Figure 22. Key opportunities

ASSISTANCE NEEDS

The staff of Bucharest City Hall and the City Halls of its 6 Districts have identified several areas where external support would be needed, in order to overcome the local barriers, mitigate the external risks, and capitalize on the available opportunities. These areas, outlined below, are categorised based on the specific gaps which need to be addressed, in order to to improve the efficiency of the processes leading to climate neutrality and, implicitly, increase the CNAP's impact. While the primary source of support is expected from the M100 National Hub, additional external assistance channels are also being considered, as illustrated below.

Table 31. Assistance needs

CONTEXT	ASSISTANCE NEED
ORGANIZATIONAL PROCESSES	
TECHNICAL EXPERTISE (SKILLS, COMPETENCIES) The transition to climate neutrality is a multifaceted process, not only in terms of the effort required but also in the breadth of knowledge it demands, particularly with regard to the comprehension of the technical concepts and the specialised processes. Although the teams within the 6+1 City Halls already have the basic competencies and, through the CNAP, will benefit from dedicated interventions to build capacity their on climate neutrality topics, they need to further deepen their understanding of climate change mitigation, in order to acquire the specific skills needed to effectively implement both the technical and strategic actions outlined in the CNAP.	• Capacity building for the City Halls' staff on climate neutrality topics, which should minimally include: specialised theoretical training, workshops to bridge the theory with practical application, best practice exemplifications and study visits.
ACTION PRIORITISATION The CNAP encompasses a broad and diverse portfolio of actions aimed at reducing and/or capturing the CO_2 emissions, which will require sustained efforts over the long term (through 2035 and potentially beyond). To effectively begin the implementation of the CNAP and maximise the impact relative to the effort required, it is essential to prioritise the actions outlined in the Plan. This prioritisation will enable a more streamlined approach to launching and rolling out the projects, programmes and local policies needed for the transition to climate neutrality. Additionally, one of the challenges identified in the IUDS is the tendency of the City Hall departments to focus on the immediate operational needs (i.e., addressing the current issues) rather than planning for the future in a regional, European or global context. By prioritising the actions within the CNAP, the City Halls would be better positioned to adopt a forward-looking approach to climate neutrality, having a clear timeline for the actions needed in the near term.	• Technical assistance for developing (preferably in a participatory approach) a list of priority projects which will guide the implementation of the CNAP, based on the actions outlined within the Plan.
DATA COLLECTION, MONITORING AND ASSESSMENT The MEL process, as proposed by the European Commission through the NetZeroCities and endorsed by the M100 National Hub, is highly complex. It demands not only specialised knowledge but also specific processes and technologies, which are currently unavailable to the City Halls. Therefore, there is a clear need for support in the development and implementation of a robust methodology (including principles and steps), along with a well-defined process for the monitoring and evaluation of the CNAP indicators (including the stages of data collection, processing, interpretation, publication), to substantiate and support the digital tools proposed through the CNAP for the monitoring component	• Technical support for developing and implementing a methodology and a process framework to carry out the activities related to the monitoring and evaluation of the MEL indicators and their associated data.

CONTEXT	ASSISTANCE NEED
DIGITALISATION FOR CLIMATE-NEUTRAL AND SMART BUCHAREST All of the City Halls need to enhance their overall level of digital maturity, which is inherently reflected in the requirement to digitise the internal work processes related to the projects and initiatives focused on climate neutrality.	• Technical support for identifying and implementing digital solutions which can optimize the implementation (e.g., digitalisation of internal work processes, GIS solutions covering the entire territory of Bucharest, digital twinning) and monitoring (e.g., sensors) of the CNAP.
INTERNAL AND EXTERNAL GOVERNANCE	
CLIMATE NEUTRALITY DIVISION AND CHIEF CLIMATE OFFICER(S) Governing the CNAP involves an innovative process both internally (within the public administration) and externally (among the relevant stakeholders), due to its unique nature. As such, the operationalisation of the Climate Neutrality Division (to furtherly coordinate the efforts within each City Hall and, more importantly, among the City Halls), as well as the appointment of Chief Climate Officers to oversee this process, are being considered. Both the Division and the CCO position would help address (at least partially), the staffing challenges currently faced by the City Halls on climate neutrality matters. Regarding these challenges, we also acknowledge those highlighted in the IUDS: • The lack of a regulatory framework for collaborating and sharing responsibilities between the General City Hall and the District ones; • The existing organisational structure, inherited from the communist era, which has led to fragmented and uncoordinated development initiatives, inefficient resource allocation and delays in the modernisation process, hindering the territorial cohesion (implementation of major municipal infrastructure projects); • The horizontal organisation of the departments, which creates a daily "traffic" of information and data, complicating the decision-making process; • The lack of clear collaboration or communication interfaces at the directorate level to facilitate joint decision-making; • The lack of KPIs to evaluate the activities of the directorates, services and public service providers. Additionally, according to the GCAP, certain key sectors (e.g., green spaces) lack dedicated policies, while others (e.g., air quality, soil, biodiversity, water use) do have local policies, but their implementation remains flawed. Both the Climate Neutrality Division and the Chief Climate Officer would help address these issues, while also contributing to the optimisation of relations with the public companies and the IDAs, (specifically concerning the climate neutrality topics). However, none of the proposed concepts have a precedent to guide their development, which is why the public administration requires support (governance principles, work processes and tools, evaluation methodologies) for the establishment, formalisation and operationalisation of the Division and the CCO position(s).	• Technical assistance is needed for refining and operationalising the Climate Neutrality Division and the Chief Climate Officer positions.
ENERGY MANAGEMENT The energy component has a direct and/or indirect impact on the entire CNAP, which is why the City Halls should collaborate closely with Energy Managers. Such collaborations should cover a range of activities, from conducting energy audits and technical reporting to identifying, proposing, and implementing	• Support to identify the most effective approach for appointing Energy Managers, with a particular focus on empowering them through well-defined tasks to ensure that their work delivers

CONTEXT	ASSISTANCE NEED
energy optimisation solutions and integrated sustainable energy projects, all within the framework of clear decarbonisation plans for the sector.	maximum benefits in energy management and related actions.
EXTERNAL PARTNERSHIPS While all of the City Halls engage in various collaborations with external partners, most of these are protocol-based and only some of the collaborations have been translated into concrete initiatives, falling short of their full potential to drive the necessary changes. The range of partnerships which could effectively support the implementation of the CNAP is, however, very large (e.g., with Romanian and European cities, with other national and international partners such as universities, RDI entities and private solution providers). As a result, it is challenging to establish such partnerships in a balanced and impactful manner.	• Support for planning and accessing external partnership opportunities, starting with the prioritisation of the internal needs and subsequently leveraging the outcomes of the pursued collaborations.
FINANCING	
ACCESS TO NON-REIMBURSABLE GRANTS The City Halls do not have sufficient human resources to effectively access the wide range of grants needed (and already available) for the implementation of the CNAP. Moreover, the existing staff does not have the full knowledge capacity to support such a complex process. This issue is also reflected in the IUDS findings, which notes that many departments within City Halls have vacancies, and the staff turnover rate (particularly with debuting experts) is very low. Additionally, the IUDS highlights that the share of revenues to the local budget from non-reimbursable grants is also low, partly due to the relatively low success rate in securing EU funds for investment projects, community actions and institutional development initiatives.	• Support to identify the most efficient and impactful solution for reducing the gap in attracting non-reimbursable funds (e.g., determining whether to hire internal staff or collaborate with consultancy companies).
PRIVATE CAPITAL ATTRACTION Although the need to attract private capital from various sources to support the CNAP's implementation is critical, the capacity to undertake this work is currently very limited. This lack of capacity inevitably results in the inability to blend the available finances and to activate innovative mechanisms to generate the funds needed to support the climate change mitigation actions.	• Technical assistance to map and activate the most effective tools and mechanisms for attracting and leveraging private capital for both the public and the private climate neutrality projects.
CITIZEN ENGAGEMENT, STAKEHOLDER COLLABORATION	
NETZERO LOCAL COALITION The NetZero Local Coalition has been identified as the most effective approach to simultaneously engage the stakeholders and encourage the citizens' participation in the transition to climate neutrality. The Coalition would also help address several issues highlighted in the IUDS, such as the lack of dialogue with the residents (e.g., due to the absence of personalised channels for directly communicating with the citizens on thematic issues) and the disconnection of public policies from the population. Moreover, this Coalition is also an innovative concept, representing an unknown process, which poses multiple implementation challenges. As such, at the moment, the optimal solution for ensuring the success of this Coalition is not fully known. Therefore, support is needed not only for the effective launch of the Coalition but also for maturing it (methodologies, processes and tools for formalising, operationalising and evaluating it, visibility and promotion, member attraction and engagement strategies etc.).	• Support for the launch, activation and long-term sustainability of the NetZero Local Coalition.

CONTEXT	ASSISTANCE NEED
CLIMATE JUSTICE Bucharest faces significant socio-economic disparities among its population, having many vulnerable individuals and marginalized communities. As such, the climate justice principles can not be overlooked in its transition to climate neutrality, as they can ensure that the benefits and burdens of the CNAP actions are shared fairly, protecting the vulnerable communities. Thus, in light of Bucharest's challenges regarding social inclusion, climate justice represents an additional responsibility towards its citizens. However, the public administration requires support and resources to manage this sensitive issue, which is both resource-intensive and difficult to implement in an equitable and impactful manner.	• Support (resources and mechanisms) to ensure the integration of the climate justice dimension within the social inclusion framework which must underpin the CNAP's implementation.
INNOVATIVE APPROACHES	
INNOVATIVE TECHNOLOGICAL SOLUTIONS Given the rapid pace of technological progress, particularly in the field of sustainable technologies, identifying and implementing the most effective solutions for climate neutrality is a significant challenge. This is compounded by the fact that many of the providers of modern, high-performance solutions are based abroad (those available at the national level being generally developed by companies with limited market visibility, such as the tech start-ups), as are the cities which usually pilot such technologies.	• Assistance in identifying a portfolio of innovative technological solutions to be used in the projects covered by the CNAP actions, but also in accessing and implementing these solutions. • Support in identifying best practices and organising study and learning visits to the cities which have successfully adopted such solutions.
SOCIAL INNOVATION AND CITIZEN SCIENCE Although these two components could also fall under the category of Citizen Engagement and Stakeholder Collaboration, they are presented under the Innovative Approaches category due to their nature. In Bucharest, various initiatives of both types are already being implemented, primarily by NGOs (organisations focused on urban and community development), but also by the private sector and academic institutions. However, due to the existing constraints, the City Halls have not devoted sufficient attention to such actions, despite the potential benefits they offer in fostering ownership of the CNAP and by extension, accelerating its implementation.	• Support in adopting and using social innovation and citizen science approaches during the implementation of the CNAP, at least at the pilot level, through the NetZero Local Coalition and the other Social Innovation interventions.

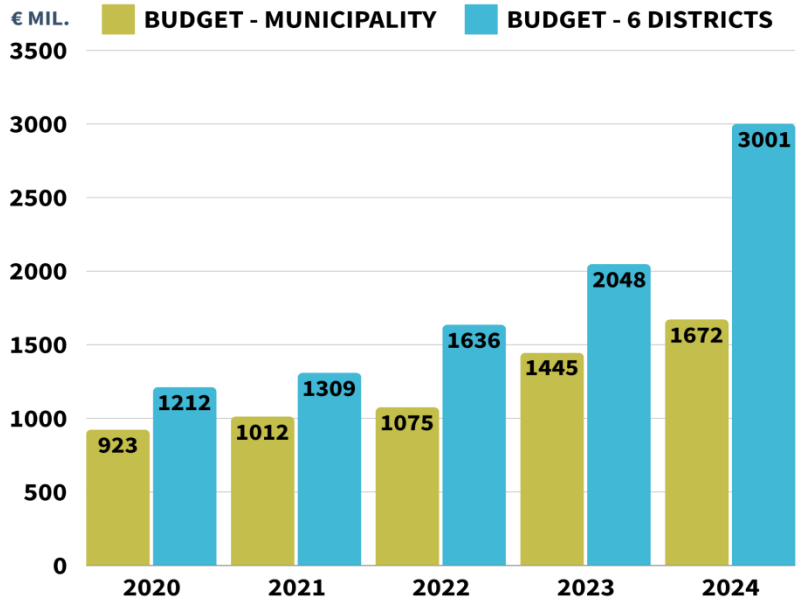
Figure 23. Key assistance needs

III. INVESTMENTS
EXISTING FUNDING AND FINANCING

Outline, analyze, and evaluate the past and current funding and financing allocated to climate-related initiatives across each field of action.

Bucharest City Hall has approved a total budget of €1.672 billion for 2024 (excluding subordinate institutions), setting a new record. This represents a significant increase compared to 2020, when budget receipts were approximately 80% lower. The strong growth in revenues is largely due to the robust economic performance of the Capital. Additionally, the six sectors of Bucharest have approved a combined budget of €3 billion for 2024, nearly 2.5 times higher than the amount allocated in 2020.

Figure 24. Existing funding and financing



In 2024, municipal budget allocations for climate neutrality initiatives exceed €880 million, with the majority directed towards public transport (€412 million), the centralized heating system (€333 million), and public lighting (€46 million). The six sectors of the city have set aside approximately €335 million for waste management, €325 million for the energy renovation of residential buildings, and €285 million for the development of green spaces.
When combining the citywide municipal budget with the sector budgets, the largest portions of public funds are allocated to public transport (8.8% of the total), waste management (7.4%), the centralized heating system (7.1%), energy renovations of residential buildings (6.9%), and green spaces (6.7%). In comparison, funding for non-motorized mobility, electric vehicle infrastructure, and public lighting is relatively smaller.

Table 32. Funding allocation by field of action

The capital flow table needs to also incorporate capital stock.

FIELDS OF ACTION	SECTOR SUBSECTION - MUNICIPALITY	% CURRENT BUDGET ALLOCATION	SECTOR SUBSECTION - MUNICIPALITY + 6 DISTRICTS	% CURRENT BUDGET ALLOCATION
TRANSPORTATION	Public transport	24.7	Public transport	8.8
	Non-motorized mobility	0.6	Non-motorized mobility	1.0
	Charging infrastructure for EVs	0.2	Charging infrastructure for EVs	0.3
BUILT ENVIRONMENT	Energy renovation and consolidation of public buildings	2.5	Energy renovation and consolidation of public buildings	4.0
	Energy renovation of residential buildings	0.0	Energy renovation of residential buildings	6.9
ENERGY SYSTEMS	District heating system	19.9	District heating system	7.1
	Public lighting	2.8	Public lighting	1.0
	RES generation	0.2	RES generation	0.2
GREEN INFRASTRUCTURE AND NATURE BASED SOLUTIONS	Parks & green areas	1.7	Parks & green areas	6.7
WASTE AND CIRCULAR ECONOMY	Waste management	0.6	Waste management	7.4

STRATEGIC FUNDING AND FINANCING

Approximately 60% of the municipality's revenue comes from income taxes, driven by the large workforce and relatively high average net salaries in Bucharest. Another key source of funding is the subsidies from the central government, which make up 16% of the total and are used to support the operation and modernization of the heating system, environmental projects, the healthcare sector, and the implementation of local initiatives under the National Recovery and Resilience Plan.
At the sector level, the main income sources include income taxes (35%), investment subsidies—primarily for projects under the National Recovery and Resilience Plan (30%), VAT and vehicle taxes (12%), and property taxes (8%).
An important point to note is that the majority of the NRRP funds are allocated to projects focused on climate neutrality, such as sustainable urban mobility and the energy renovation of buildings.The same applies to the European funds secured by the municipality, which are primarily allocated to projects in public transport and the district heating system.
Another finding is that the sectors generate relatively modest revenue from property taxes, despite the high standard of living and the significant value of real estate in the area. The same is true for the municipality's income from its real estate assets, such as concessions and rentals, which remains relatively low despite the value of the properties.

Table 33. Income sources for the city

INCOME CATEGORY	CITY INCOME - MUNICIPALITY (€ mil.)	% OF CITY BUDGET	CITY INCOME - MUNICIPALITY + 6 DISTRICTS (€ mil.)	% OF CITY BUDGET
Income tax	1016	60.7	2080	44.3
Property tax	0	0.0	261	5.5
Goods and services tax (VAT, tax on vehicles, licensees and permits)	32	1.9	384	8.2
Asset income (landing, renting, dividends)	20	1.2	27	0.6
Delivery of public goods and services	194	11.7	343	7.3
Financial operations (loan reimbursement)	40	2.4	83	1.8
Subsidies from the central government	261	15.6	1164	24.8
EU funds	104	6.2	318	6.8
Other sources	5	0.3	34	0.7
TOTAL INCOME	**1672**	**100%**	**3001**	**100%**

The estimated cost of implementing the climate neutrality action plan is nearly €16 billion. It is expected that only 42% of this amount can be covered by the municipality's own revenues and those of the six sectors. A significant portion of the funding will come from European funds, with 29% allocated from the 2021-2027 programming period and 17% of funds available after 2027.
The remaining capital needed will be sourced from investment subsidies from the state budget (3%, excluding co-financing for the aforementioned European funds), loans and bonds issued by local administrations (3%), and private contributions from citizens and businesses towards climate neutrality initiatives (5%).

Table 34. Capital sources for the city

TYPE	SIZE RANGE (€ mil.)	LEVEL	DESCRIPTION
Local budget (Municipality)	2000	Public	50% of the total annual budget for investment capital allocated to climate neutrality initiatives (public transport, non-motorized mobility, district heating, public lighting, green areas, public space & urban renewal)
Local budget (6 districts)	5400	Public	Annual allocations for green areas, waste management, energy renovation, non-motorized mobility, public space & urban renewal
EU funding (2021-2027 Bucharest-Ilfov Regional Programme)	500	Public	EU funding for urban renewal, green infrastructure, energy renovation of buildings, public transport and non-motorized mobility
EU funding (National Recovery and Resilience Plan)	1000	Public	EU and national co-financing for new metro line, energy renovation, new nZEB buildings, waste management
EU funding (2021-2027 Sustainable Development Programme)	300	Public	EU funding for district heating, waste management
EU funding (2021-2027 Transport Programme)	2500	Public	EU funding for public transport (metropolitan train, new metro line)
EU funding post 2027	2500	Public	EU funding available in the next programming period for district heating, public transport, energy renovation, non-motorized mobility etc.
EEA Grants & Norway, Swiss Funds	70	Public	External funding for renewable energy, district heating, energy renovation, public lighting
National funding (The Environment Fund Administration)	200	Public	National funding for public lighting, purchase of EVs & charging stations, energy renovation, non-motorized mobility
National funding (Modernisation Fund)	300	Public	National funding for district heating, RES generation, energy renovation
Loans & bonds	500	Public	EIB/EBRD loans and green bonds for public investment (energy renovation, public transport etc.)
Private funding	750	Private	Private contribution of homeowners for energy renovation, purchase of EVs, CSR campaigns in the field of climate neutrality, conducted by companies, fundraising / crowdfunding for ”soft” interventions

COST SCENARIOS AND CAPITAL PLANNING

Approximately 84% of the climate neutrality budget will be allocated to the two sectors responsible for the largest share of CO_2 emissions in the Capital. The transport sector will receive the most significant funding (55%), given the presence of advanced public transport projects, such as the metro extension, the development of the metropolitan train, and the modernization of infrastructure and fleets, including trams, trolleybuses, and buses. These initiatives aim to reduce the public's reliance on private cars and encourage greater use of public transport.
The construction sector will receive the second largest share of the allocated funds, accounting for 29%. This is due to its significant contribution to emissions, despite having remained relatively stable compared to the transport sector. The funds will primarily be directed towards the energy renovation of residential and public buildings.

Table 35. Costs, capital planning and economic indicators by action

FIELDS OF ACTION	ACTION	IMPLEMENTATION COSTS/ CAPEX	OPERATIONAL COSTS*	POSSIBLE SOURCES OF CAPITAL	% OF THE TOTAL CLIMATE NEUTRALITY BUDGET	% OF THE TOTAL CO_2 REDUCTION
MOBILITY AND TRANSPORT	Development and modernization of underground green public transport	€ 4,673,726,970	€ 43,750,000	NRRP 2021-2027 Transport Programme Municipal and district budgets National Programmes Loans & bonds	29.24%	2.98%
	Development and modernization of surface green public transport	€ 2,861,878,160	€ 176,470,000	NRRP 2021-2027 Bucharest-Ilfov RP Municipal budget Loans & bonds	17.90%	7.52%
	Promoting of low-carbon urban mobility, especially cycling and walking	€ 465,000,000	€ 15,000,000	2021-2027 Bucharest-Ilfov RP Municipal and district budgets	2.91%	1.65%
	Parking and traffic management systems to limit transport-related GHG emissions	€ 144,700,000	€ 4,779,600	NRRP 2021-2027 Bucharest-Ilfov RP Municipal and district budgets	0.91%	0.17%
BUILT ENVIRONMENT	Retrofit of public buildings	€ 724,600,000	€ 36,230,000	NRRP 2021-2027 Bucharest-Ilfov RP Post-2027 EU funds National Programmes (AFM) EEA Grants & Norway / Swiss Funds Loans & bonds	4.53%	1.49%
	Moderate or deep energy renovation of	€ 3,500,000,000	€ 70,000,000	NRRP 2021-2027 Bucharest-Ilfov RP	21.89%	24.74%

FIELDS OF ACTION	ACTION	IMPLEMENTATION COSTS/ CAPEX	OPERATIONAL COSTS*	POSSIBLE SOURCES OF CAPITAL	% OF THE TOTAL CLIMATE NEUTRALITY BUDGET	% OF THE TOTAL CO_2 REDUCTION
	private residential buildings			Climate Social Fund Post-2027 EU funds Loans & bonds		
	Urban renewal of public spaces to reduce UHI effect	€ 479,068,800	€ 9,581,376	2021-2027 Bucharest-Ilfov RP Municipal and district budgets	3.00%	0.21%
ENERGY SYSTEMS	Modernization of the public lighting system to reduce energy consumption	€ 161,999,600	€ 7,500,000	National Programmes (AFM) EEA Grants & Norway / Swiss Funds Municipal budget Loans & bonds	1,01%	0.09%
	Development of a energy efficient district heating system	€ 1,721,231,082	€ 150,000,000	2021-2027 Sustainable Development Programme Modernization Fund National Programmes (Termoficare) Post-2027 EU funds Municipal budget Loans & bonds	10,77%	23.58%
	RES generation	€ 100,000,000	€ 23,024,000	Modernization Fund EEA Grants & Norway / Swiss Funds Private capital / PPPs	0,63%	1.47%
WASTE AND CIRCULAR ECONOMY	Completion and consolidation of the circular economy system	€ 536,717,562	€ 236,491,575	NRRP 2021-2027 Sustainable Development Programme Municipal and district budgets	3,36%	0.63%
GREEN INFRASTRUCTURE AND NATURE BASED SOLUTIONS	Developing green-blue infrastructure for carbon storage	€ 574,211,804	13,063,000	2021-2027 Bucharest-Ilfov RP Municipal and district budgets	3.59%	31.02%
ORGANISATIONAL AND GOVERNANCE INNOVATION	Consolidation of climate governance at urban and metropolitan level	€ 23,550,000	€1,458,200	Municipal and district budgets Other EU programmes	0.15%	1.40%
	Local NetZero Coalition	€ 6,100,000	€770,000	Municipal and district budgets Other EU programmes	0.04%	2.56%

FIELDS OF ACTION	ACTION	IMPLEMENTATION COSTS/ CAPEX	OPERATIONAL COSTS*	POSSIBLE SOURCES OF CAPITAL	% OF THE TOTAL CLIMATE NEUTRALITY BUDGET	% OF THE TOTAL CO_2 REDUCTION
SOFT INTERVENTIONS (GOVERNANCE INNOVATION AND SOCIAL INNOVATION)	Enhancing community engagement for climate neutrality	€ 7,900,000	€1,545,000	Municipal and district budgets Other EU programmes Private funding / PPP	0.05%	0.37%
	Public art for climate-neutral neighbourhoods	€ 3,000,000	€15,000	Municipal and district budgets Other EU programmes Private funding / PPP	0,02%	0.03%
	Green Solutions Markets	€ 2,000,000	€1,500,000	Municipal and district budgets Other EU programmes Private funding / PPP	0,01%	0.08%
	Climate-neutrality hackathons	€ 1,000,000	€450,000	Municipal and district budgets Other EU programmes Private funding / PPPs	0,01%	0.02%
TOTAL		€ 15.886.683.978	€791,627,751		100,00%	100,00%

- **Bayesian methodologies were employed to estimate potential operational costs for each action, integrating underlying measures, allocated budgets, and insights derived from available online data sources, leveraging advanced AI research tools to enhance analytical accuracy.**

Table 36. Summarized costs and CO_2 reductions by field of action

FIELDS OF ACTION	TOTAL COSTS FOR ALL THE COVERED ACTIONS	% OF THE TOTAL BUDGET	TOTAL CO_2 REDUCTIONS FOR ALL THE COVERED ACTIONS	% OF THE TOTAL CO_2 REDUCTION
MOBILITY AND TRANSPORT	€8.145.305.130	50,95 %	805.721,10	12,31%
BUILT ENVIRONMENT	€4.703.668.800	29,42%	1.730.105,38	26,44%
ENERGY SYSTEMS	€1.983.230.682	12,41%	1.644.985,42	25,14%
WASTE AND CIRCULAR ECONOMY	€536.717.562	3,36%	40.961,76	0,63%
GREEN INFRASTRUCTURE AND NATURE BASED SOLUTIONS	€574.211.804	3,59%	2.029.568	31,02%

SOFT INTERVENTIONS (GOVERNANCE INNOVATION AND SOCIAL INNOVATION)	€43.550.000	0,27%	292.079,21	4,46%
TOTAL	**€ 15.986.683.978**	**100%**	**6.543.420,86**	**100%**

FINANCIAL INDICATORS FOR MONITORING, EVALUATION AND LEARNING

Briefly present the used monitoring indicators and explain them, if necessary.

Table 37. Financial indicators by field of action

FIELDS OF ACTION	INDICATOR	INDICATOR VALUE AND UNIT
MOBILITY AND TRANSPORT	Development and modernization of underground green public transport	0,04 CO_2 kg / euro
	Development and modernization of surface green public transport	0,18 CO_2 kg / euro
	Promoting of low-carbon urban mobility, especially cycling and walking	0,21 CO_2 kg / euro
	Parking and traffic management systems to limit transport-related GHG emissions	0,07 CO_2 kg / euro
	TOTAL CO_2 REDUCTION / CAPITAL INVESTED	**TONS CO_2 / FINANCIAL SUM** 814,651.84 /€ 8,145,305,130.00
BUILT ENVIRONMENT	Retrofit of public buildings	0,14 CO_2 kg / euro
	Moderate or deep energy renovation of private residential buildings	0,48 CO_2 kg / euro
	Urban renewal of public spaces to reduce UHI effect	0,03 CO_2 kg / euro
	TOTAL CO_2 REDUCTION / CAPITAL INVESTED	**TONS CO_2 / FINANCIAL SUM** 1,788,296.99/€ 4,703,668,800.00
ENERGY SYSTEMS	Modernization of the public lighting system to reduce energy consumption	- 0,0044CO_2 kg / euro
	Development of a energy efficient district heating system	0,09 CO_2 kg / euro
	RES Generation	-0,02 CO_2 kg / euro
	TOTAL CO_2 REDUCTION / CAPITAL INVESTED	**TONS CO_2 / FINANCIAL SUM** 1,539,946.88/€ 1,983,230,682.00
WASTE AND CIRCULAR ECONOMY	Completion and consolidation of the circular economy system	0,08 CO_2 kg / euro
	TOTAL CO_2 REDUCTION / CAPITAL INVESTED	**TONS CO_2 / FINANCIAL SUM** 40,961.76/€ 536,717,562.00
GREEN INFRASTRUCTURE & NATURE-BASED SOLUTIONS	Developing green-blue infrastructure for carbon storage	3,53 CO_2 kg / euro
	TOTAL CO_2 REDUCTION / CAPITAL INVESTED	**TONS CO_2 / FINANCIAL SUM** 2,029,568.00/€ 574,211,804.00
SOFT INTERVENTIONS (GOVERNANCE INNOVATION AND SOCIAL INNOVATION)	Consolidation of climate governance at urban and metropolitan level	3,80 CO_2 kg / euro
	Local NetZero Coalition	43,88 CO_2 kg / euro
	Enhancing community engagement for climate neutrality	3,14 CO_2 kg / euro
	Public art for climate-neutral neighbourhoods	0,72 CO_2 kg / euro
	Green Solutions Markets	2,69 CO_2 kg / euro
	Climate-neutrality hackathons	1,07 CO_2 kg / euro
	TOTAL CO_2 REDUCTION / CAPITAL INVESTED	**TONS CO_2 / FINANCIAL SUM**

FIELDS OF ACTION	INDICATOR	INDICATOR VALUE AND UNIT
		390,655.45/€ 43,550,000.00

CLIMATE POLICIES FOR CAPITAL FORMATION AND DEPLOYMENT

Although the municipality and the six sectors already allocate a significant portion of their budget to climate neutrality initiatives, they are actively exploring additional options to optimize the allocation of resources towards this goal. By evaluating new strategies and funding mechanisms, they aim to enhance the efficiency and impact of their investments in sustainable projects, ensuring that the transition to climate neutrality is both effective and economically viable.

In addition to ensuring more efficient use of public funds for climate neutrality, a key challenge is mobilizing financial resources from the private sector. This can be achieved directly, through mechanisms such as private co-financing or crowdfunding, or indirectly by prioritizing the procurement of green products and services from local companies that are investing in climate-proofing their operations. By engaging the private sector in both funding and the supply of sustainable solutions, the municipality can create a more robust and inclusive approach to achieving its climate goal.

Table 38. Climate policies to enable capital deployment

CLIMATE POLICY	DESCRIPTION OF THE POLICY	INTENDED OUTCOME FOR CAPITAL FORMATION
GREEN BUDGETING	The gradual transition to calculating emission reduction targets for projects financed by the municipal and sector budgets is an essential step in aligning funding with climate neutrality goals. This approach will ensure that investments are not only effective in terms of their economic and social impact but also contribute to measurable reductions in CO_2 emissions.	This approach helps prioritize investments in sustainable projects, ensuring that public funds are directed towards initiatives that reduce emissions, promote energy efficiency, and support environmental resilience.
GREEN PROCUREMENT	The implementation of a phased system for green public procurement, organized by categories of goods and services, will help ensure that sustainability criteria are progressively integrated into public purchasing processes. This approach will prioritize environmentally friendly products and services, driving demand for green solutions while supporting the city's climate neutrality objectives.	As the municipality prioritizes eco-friendly purchasing, local businesses will be encouraged to innovate and offer greener solutions, fostering a competitive market for sustainable goods. This not only supports local businesses but also drives job creation in the green economy, reduces environmental impact, and promotes long-term economic resilience.
GREEN BONDS	Issuing green bonds for climate neutrality projects that are not eligible for European or government funding is a strategic way to secure additional financing. By tapping into the growing market for green finance, the city can fund initiatives that contribute to its climate neutrality goals, such as renewable energy projects, energy-efficient infrastructure, and other green innovations, while also attracting investment that prioritizes environmental impact.	These bonds would allow the municipality to raise capital from private investors, including its own citizens, specifically earmarked for environmentally sustainable projects
CROWDFUNDING	Crowdfunding for small-scale climate neutrality interventions offers an innovative way to engage the community in funding local sustainability projects. This approach not only accelerates the implementation of climate-friendly solutions but also fosters a sense of collective responsibility and ownership among citizens, encouraging greater	By leveraging public support, the municipality can raise funds for initiatives such as energy-efficient building upgrades, green spaces, or renewable energy installations that may not be covered by larger budgets or government grants.

CLIMATE POLICY	DESCRIPTION OF THE POLICY	INTENDED OUTCOME FOR CAPITAL FORMATION
	involvement in climate action at the grassroots level. The establishment of a Municipal Climate Neutrality Fund based on both public and private funding will be analyzed.	

IV. OUTLOOK AND NEXT STEPS

AREAS FOR FUTURE IMPROVEMENT

The primary areas requiring future improvements are mainly those identified in the Assistance Needs section. These areas will be addressed progressively, particularly through the support and technical assistance opportunities which will be accessed, as well as through the organic improvements arising from the learning process that the entire CNAP team will undergo during its implementation. Furthermore, it is anticipated that, over time, the increased engagement from the private sector and the community in advancing the climate neutrality transition will contribute to improving these currently challenging areas.

FORESEEN CHALLENGES

The main anticipated challenges are the ones outlined in the Barriers and Risks sections. However, certain challenges are more immediate and will thus be prioritised in the problem-solving process:

OPERATIONAL AND ORGANISATIONAL CHALLENGES:

Coordinating a large and diverse team across multiple departments within all the City Halls, in order to effectively implement and monitor the CNAP;
Securing the full volume of public and private funding required for the CNAP's execution;
Integrating the numerous innovative components inherent to the CNAP's implementation (from internal processes and financing instruments to technical solutions and tools for citizen participation and stakeholder engagement).

MULTI-LEVEL AND MULTI-ACTOR GOVERNANCE AND PARTICIPATORY CHALLENGES:

Solidifying the cooperation between the General City Hall and the 6 District City Halls despite the existing gaps;
Scaling the impact to the metropolitan level, in order to prevent the potential isolation of the co-benefits generated by the implementation of the CNAP;
Strengthening the partnerships with the private sector, while meeting the residents' needs.

ITERATION AND REVIEW SESSIONS

The review sessions for the CNAP's update will occur at least every 2 years, alongside the updates to the emissions inventory (and more frequently, if required). These iteration and review sessions will be collaborative, involving the entire team responsible for the preparation and implementation of the CNAP, the most relevant stakeholders (through the NetZero Local Coalition), and, where possible, external expertise (e.g., through M100 or other specialised experts).

The first iteration and review session is scheduled for 2027, and the subsequent sessions are planned for 2029, 2031, and 2033, culminating in the final 2035 evaluation.

Table 39. Key milestones for future steps and recurring activity directions

2 0	**Implementing the CNAP actions which are eligible under the National Recovery and Resilience Plan's open funding calls.**	Within this time horizon, the focus of the soft dimension will be on initiating the civic participation and stakeholder engagement components, particularly through the

2026		establishment of the NetZero Local Coalition. The efforts will be concentrated on actively promoting the involvement of the interested parties in this local collaboration platform for climate neutrality. In terms of Organizational and Governance Innovation, the focus will be on building the know-how required for the successful implementation of the CNAP at the public administration level, as well as on starting to prepare the tools to be developed within the dedicated interventions. ***The initial years of the CNAP's implementation will serve as a formative period, providing insights into the processes and identifying potential opportunities for refinement and improvement.***
2027	**Implementing the CNAP actions which are eligible under the Bucharest-Ilfov Regional Programme's and other Operational Programmes' open funding calls.**	
2031	**Implementing the CNAP actions which are eligible under the EEA Grants and Norwegian Mechanism's and the Swiss-Romanian Cooperation Programme's open funding calls.**	Within this time horizon, the focus of the soft dimension will shift towards enhancing the civic participation and stakeholder engagement, through the maturation of the NetZero Local Coalition and the implementation of the other Social Innovation actions. In terms of administrative capacity, it is anticipated that most of the Organizational and Governance Innovation interventions will be at advanced stages of implementation. ***The goal will be to establish Bucharest as a national and European leader in the urban transition towards climate neutrality.***
2035	**Using previously untapped funding sources to support the CNAP's completion, by leveraging innovative financing mechanisms (the focus will be on attracting private capital).**	Within this time horizon, the focus of the soft dimension will be on social innovation, which will not only facilitate the implementation of the CNAP but, more importantly, will establish the foundation for the post-2035 interventions, in order to ensure the continued momentum of the local climate change mitigation efforts. At the public administration level, an assessment will be conducted to determine which Organizational and Governance Innovations have generated the most positive outcomes. The focus will then shift to how the dedicated tools developed through the implementation of CNAP can be further improved and scaled up. ***Efforts will be made to scale up the successful CNAP actions across Bucharest, but also to replicate them within the metropolitan area and even in other LAUs of the Bucharest-Ilfov Development Region.***

ONGOING CROSS-CUTTING ACTIVITIES	SUPPLEMENTARY / AUXILIARY WORK
• Accessing additional funding sources (beyond those previously mentioned), to complement the financing allocated from the local budgets: funds from the National Programmes and from the programmes managed by the European Commission, private funds. • Enhancing the administrative capacity to support the transition to climate neutrality through various activities: learning, cooperation, (inter)national visibility.	• Complementarily implementing climate change adaptation measures, in order to furtherly minimize the local vulnerability to the adverse impacts of climate risks (e.g., flooding, droughts, urban heat islands, water scarcity). • Implementing the priority projects outlined in the other local strategic documents, with particular emphasis on those included in the IUDS' short-list.

• Strengthening the cooperation between the General City Hall and the District City Halls.	• Engaging in national and European competitions (e.g., awards, titles and other thematic contests).

Figure 25. Implementation phases

V. ANNEXES

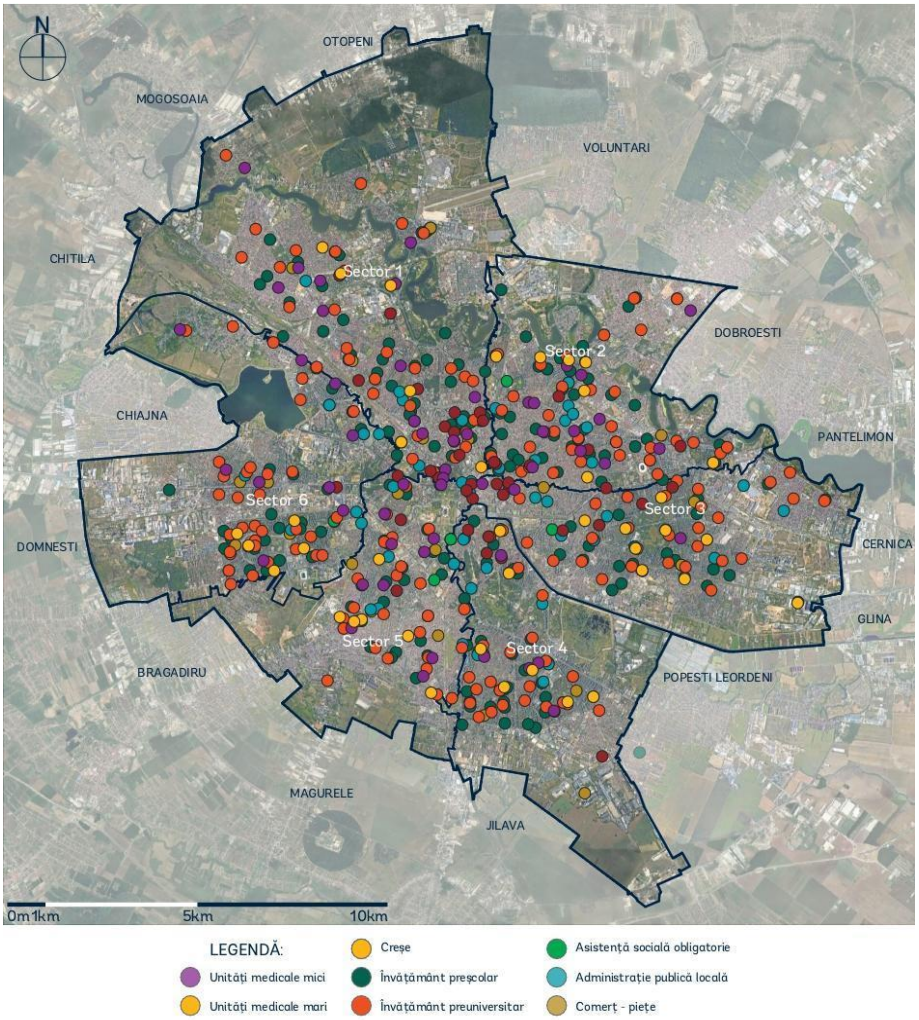
INDIVIDUAL LETTERS OF SUPPORT

ANNEX 1. BUILDINGS

Local public buildings

The analysis included buildings of local interest, according to the list extracted from the General Urban Plan of the Municipality of Bucharest. The update of the General Urban Plan is in progress, so in some cases, the headquarters of the respective institutions were identified according to publicly available data (contact details of the official website, in particular, or entries from the headers of official documents), for which the surface area calculation was performed. The total measured surface is 837.220,04 sqm built-up area and 1.431.594,40 sqm gross floor area, distributed as presented in the following table. The information will be reviewed under the general urban masterplan and subsequently throughout the monitoring of the climate contract.
The map below illustrates the distribution of public buildings across Bucharest, focusing on the key categories (small and large medical units, nurseries and kindergartens, pre-university educational institutions, social assistance centers, public markets, commercial centers and local public administration buildings). The map provides an overview of the location and density of these buildings within the city, enabling targeted interventions for energy efficiency improvements and carbon reduction strategies in line with the city's climate neutrality goals.

Figure 26. Local public buildings in Bucharest



small medical units; large medical units; nurseries; kindergartens; pre-university education; compulsory social assistance; local public administration; public markets and commercial centers

Table 40. Area and energy use for public buildings in Bucharest

	MEDIUM BUILT-UP AREA (SQM)	TOTAL BUILT-UP AREA (SQM)	MEDIUM GROSS FLOOR AREA (SQM)	TOTAL GROSS FLOOR AREA (SQM)	ELECTRICAL ENERGY (MWH/SQM)	NATURAL GAS (MWH/SQM)	DISTRICT HEATING (MWH/SQM)	ELECTRICAL ENERGY (MWH/YEAR)	NATURAL GAS (MWH/YEAR)	DISTRICT HEATING (MWH/YEAR)
SMALL MEDICAL UNITS	627.87	38,300.31	809.78	49,396.83	0.13	0.14	0.09	6,322.79	7,113.14	4,346.92
MEDIUM MEDICAL UNITS	1,377.13	63,348.14	2,639.02	121,394.83	0.14	0.14	0.09	17,480.86	17,480.86	10,682.75
NURSERIES	777.26	31,090.58	954.94	38,197.61	0.14	0.13	0.07	5,347.67	4,812.90	2,521.04
KINDERGARTENS	843.90	167,935.30	1,436.28	285,818.77	0.14	0.13	0.07	40,014.63	36,013.17	18,864.04
PRE-UNIVERSITY EDUCATION	1,801.45	336,870.98	3,441.64	643,586.51	0.14	0.13	0.07	90,102.11	81,091.90	42,476.71
COMPULSORY SOCIAL ASSISTANCE	1,754.24	21,050.86	3,351.27	40,215.28	0.08	0.09	0.06	3,217.22	3,619.38	2,211.84
LOCAL PUBLIC ADMINISTRATION	1,145.47	69,873.95	1,938.57	118,252.51	0.08	0.09	0.06	9,460.20	10,642.73	6,503.89
PUBLIC MARKETS AND COMMERCIAL CENTERS	4,182.69	108,749.92	5,182.00	134,732.06	0.10	0.11	0.07	12,934.28	14,551.06	8,892.32
TOTAL	12,510.01	837,220.04	19,753.50	1,431,594.40	0.95	0.95	0.55	184,879.76	175,325.13	96,499.50
SOURCE: PUBLIC BUILDINGS LIST ESTIMATED FROM THE GENERAL URBAN PLAN OF THE MUNICIPALITY OF BUCHAREST										
SHARE OF ENERGY										
ELECTRICITY	32%									
NATURAL GAS	36%									
DISTRICT HEATING	22%									
RENEWABLE	10%									
SOURCE: EUROPE'S BUILDINGS UNDER THE MICROSCOPE										
BUILDING TYPE	Energy (MWh/sqm/year)									
OFFICE	0,25									
EDUCATION, CULTURE	0,35									
HEALTH	0,4									
TURISM	0,3									
TRADE	0,3									
SOURCE: INCD URBAN INCERC										

ANNEX 2. IPPU (INDUSTRIAL PROCESSES AND PRODUCT USE)

Table 41. Industrial economic composition of Bucharest 2021

INDUSTRY	SHARE OF LOCAL ECONOMY (%)	ELECTRICAL ENERGY (%)	MWH ELECTRICAL ENERGY	NATURAL GAS (%)	MWH NATURAL GAS	SOURCE NR.
FOOD MANUFACTURING	2.03%	15.00%	10,490.66	54.00%	55,862.28	1
FABRICATED METAL MANUFACTURING	0.79%	50.00%	13,608.58	33.00%	13,285.25	2
			0.00		0.00	2.1
TRANSPORTATION EQUIPMENT MANUFACTURING	0.72%	33.00%	8,185.82	31.00%	11,374.26	3
NON-METALIC MINERAL PRODUCT MANUFACTURING	0.71%	33.30%	8,145.51	31.20%	11,288.64	4
PRINTING AND RELATED SUPPORT ACTIVITIES	0.55%	33.30%	6,309.90	31.20%	8,744.72	5
PLASTIC AND RUBBER PRODUCT MANUFACTURING	0.52%	25.00%	4,478.77	94.00%	24,909.21	6
			0.00		0.00	6.1
CHEMICAL MANUFACTURING	0.47%	28.00%	4,533.89	36.00%	8,622.42	7
			0.00		0.00	7.1
MISCELLANEOUS MANUFACTURING	0.34%	14.00%	1,639.92	33.00%	5,717.70	8
			0.00		0.00	8.1
BEVERAGE AND TOBACCO PRODUCT MANUFACTURING	0.48%	33.00%	5,457.21	32.00%	7,827.45	9
COMPUTER AND ELECTRONIC PRODUCT MANUFACTURING	0.34%	14.00%	1,639.92	38.00%	6,584.02	10
LEATHER AND ALLIED PRODUCT MANUFACTURING	0.30%	33.30%	3,441.76	31.20%	4,769.85	11
WOOD PRODUCT	0.28%	33.30%	3,212.31	31.20%	4,451.86	12

INDUSTRY	SHARE OF LOCAL ECONOMY (%)	ELECTRICAL ENERGY (%)	MWH ELECTRICAL ENERGY	NATURAL GAS (%)	MWH NATURAL GAS	SOURCE NR.
MANUFACTURING						
FURNITURE AND RELATED PRODUCT MANUFACTURING	0.47%	33.30%	5,392.10	31.20%	7,472.76	13
MACHINERY MANUFACTURING	0.31%	14.00%	1,495.22	33.00%	5,213.20	14
			0.00		0.00	14.1
TEXTILE MILLS	0.22%	70.00%	5,305.62	38.00%	4,260.25	15
			0.00		0.00	15.1
PAPER MANUFACTURING	0.16%	33.00%	1,819.07	30.00%	2,446.08	16
			0.00		0.00	16.1
ELECTRICAL EQUIPMENT APPLIANCES AND COMPONENT MANUFACTURING	0.14%	33.20%	1,601.33	32.70%	2,332.95	17
			0.00		0.00	17.1
PRIMARY METAL MANUFACTURING	0.07%	10.00%	241.16	16.00%	570.75	18
			0.00		0.00	18.1
APPAREL MANUFACTURING	0.06%	34.00%	702.82	23.00%	703.25	19
TEXTILE PRODUCT MILLS	0.01%	70.00%	241.16	38.00%	193.65	20
PETROLEUM AND COAL PRODUCTS MANUFACTURING	0.01%	10.00%	34.45	71.00%	361.82	21
OIL AND GAS EXTRACTION	0.61%	10.00%	2,101.58	71.00%	22,070.75	22
SUPPORT ACTIVITIES FOR MINING	0.12%	10.00%	413.43	71.00%	4,341.79	23
MINING	0.09%	80.00%	2,480.55	71.00%	3,256.34	24
			0.00		0.00	24.1
HEAVY AND CIVIL ENGINEERING	2.95%	10.00%	10,163.37	71.00%	106,735.57	25

INDUSTRY	SHARE OF LOCAL ECONOMY (%)	ELECTRICAL ENERGY (%)	MWH ELECTRICAL ENERGY	NATURAL GAS (%)	MWH NATURAL GAS	SOURCE NR.
CONSTRUCTIONS						
			0.00		0.00	25.1
CONSTRUCTION OF BUILDINGS	4.68%	60.00%	96,741.47	34.00%	81,087.44	26
SPECIALITY TRADE CONTRACTORS	3.87%	33.30%	44,398.75	31.20%	61,531.06	27
TOTAL	**21.30%**		**244,276.34**		**466,015.31**	
SOURCE: METROVERSE DATABASE (2020)						
REMAINING ELECTRICAL ENERGY (MWH)	3,445,208.90					
REMAINING NATURAL GAS (MWH)	5,095,993.00					

Source: Metrover

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ANNEX 3. AFOLU (AGRICULTURE, FORESTRY AND LAND USE)

Table 43. Technological framework estimate - tomatoes in greenhouses

DEVIZ CADRU TEHNOLOGIC - TOMATE IN SERE + investitie folie acoperire
Estimare an 2024
Calculatii pe hectar

Productia estimată 85.000 kg

Nr crt.	Denumirea lucrării	UM	Volum lucrare	LUCRĂRI MECANIZATE						LUCRĂRI MANUALE			MATERII ȘI MATERIALE					
				Tractor CP	Mașina agricolă	Ore-om mecan iz.	consum carburanți - litru-	Cost lucrare mecanizată lei/UM	Total - lei-	ZO nr.	Tarif -lei/ZO-	Total retribuții -lei-	Denumirea materialului	UM	Cantitatea totală	Preț unitar -lei-	Total lei-	Total cheltuieli agrotehnice - lei-
1	Acoperit sere modulare (10 sere a cate 1000 mp)	ha	1							8.57	250	2142.5	Folie acoperire solar	kg	3740	30.5	114070	186503
													Folie pereti sera	kg	2020	26.5	53530	
													Accesorii montaj	x	x	x	16760	
2	Mobilizarea solului	ha	1	40-45	grapa cu discuri	4.00	18.00	1 033.88	1 033.88									1 033.9
3	Nivelarea de întreținere	ha	1	40-45	nivelator	1.33	11.80	366.39	366.39									366.4
4	Incarcat ingrășăminte chimice	t	0.35		încărcător îngrășământ	0.02	0.05	11.53	4.03									4.0
5	Transport ingr. chim la 5km	t/km	1.75	55-75	remorcă	0.05	0.23	6.76	11.83									11.8
6	Alimentat cu îngrășăminte chimice	t	0.35		încărcător îngrășământ	0.02	0.05	11.53	4.03									4.0
7	Fertilizat cu ingrășăminte chimice	ha	1	40-45	mașină admin	0.67	1.50	160.82	160.82									
8	Arat	ha	1	40-45	plug+grapă	8.89	26.00	2 039.16	2 039.16				Fosfor	kg sa	18	29.4	530.0	2 390.8
	TOTAL LUNA DECEMBRIE					**14.98**	**57.63**		**3 620.15**	**0.00**		**2 142.50**	Potasiu	kg sa	100	17.0	1 700.0	
9	Incalzit sere	zile	20															2 039.2
10	Incarcat substante chimice	t	0.3		încărcător îngrășământ	0.02	0.04	11.53	3.46								**186 590.00**	**192 352.65**
11	Transport subst. chim la 5km	t/km	1.5	55-75	remorcă	0.04	0.20	6.76	10.14				Combustibili solizi	m3	14.88	1056.0	15 713.28	15 713.28
12	Alimentat cu subst. chimice	t	0.3		încărcător îngrășământ	0.02	0.04	11.53	3.46									3.5
13	Dezinfectia chimica a solului	ha	1	40-45	mașină admin	0.67	1.50	160.82	160.82									10.1
14	Incarcat ingr. chimice	t	0.4		încărcător îngrășământ	0.02	0.06	11.53	4.61									3.5
15	Transport ingr. chim la 5km	t/km	2	55-75	remorcă	0.06	0.26	6.76	13.52				Basamid granule	kg	300	97.0	29 100.00	29 260.82
16	Alimentat cu ingrasaminte chimice	t	0.4		încărcător îngrășământ	0.02	0.06	11.53	4.61									4.61
17	Fertilizat cu ingrasaminte chimice	ha	1	40-45	mașină admin	0.67	1.50	160.82	160.82									13.52
18	Pregatit pat germinativ (discuit solul + incorporat produse chimice)	ha	1	40-45	grapa cu discuri	4.00	18.00	1 033.88	1 033.88									4.61
19	Lucrat cu freza+ Deschis rigole	ha	1	40-45	freza+masina rigole	3.64	17.50	948.60	948.60				Fosfor	kg sa	27	29.4	795.00	2 655.82
20	Modelat sol în teren rigolat	ha	1	40-45	masina modelat	0.64	4.30	176.30	176.30				Potasiu	kg sa	100	17.0	1 700.00	
21	Intins sarme	ha	1							0.50	219.00	109.50						1 033.9
22	Montat instalatie de picurare	ha	1							0.50	219.00	109.50						948.60
23	Montat folie pentru mulcire	ha	1	40-45	mașină întins folie	1.48	5.50	373.98	373.98			0.00						176.30
24	Scos și pregătit răsad tomate	mii fire	40							3.64	219.00	796.28	Sarma	kg	34	12.0	408.00	517.50
25	Inc. lăzi cu răsad în mijl. transport	t	4							0.80	219.00	175.20						109.50
26	**Transport răsad la 5 km**	t/km	20	55-75	remorcă	0.59	2.60	6.76	135.21				Folie mulcire	kg	105.6	20.0	2 112.68	2 486.66
27	Descărcat lăzi cu răsad	t	4							0.62	219.00	134.73						796.28
																		175.20
																		135.21
																		134.73

28	Distribuit răsad la cuib	mii fire	40							6.45	198.00	1 277.50						1 277.50
29	Plantat răsad de tomate + tratament daunatori la cuib	mii fire	40							18.18	250.00	4 545.00	Răsad	mii fire	40	2.0	80 000.00	86 645.00
30	Udat răsaduri prin picurare	zile/ha	5									0.00	Sintogrill Super	kg	30	70.0	2 100.00	
31	Completat goluri	mii fire	2									0.00	Apă irigații	1000 mc	0.300	350.0	105.00	105.00
	TOTAL LUNA IANUARIE					**11.86**	**51.55**		**3 029.41**	1.00	219.00	219.00	Răsad	mii fire	2	2.0	4 000.00	4 219.00
32	Incalzit sera	zile	30							**31.68**		**7 366.71**					**136 033.96**	**146 430.07**
33	Sustinerea plantelor	mii fire	40							21.05	219.00	4 610.39	Combustibili solizi	m3	22.32	1056.0	23 569.92	23 569.92
34	Pregătit soluție pentru tratament fitosanitar	mii l	0.6							0.06	219.00	13.14	Sfoara	kg	80	18.0	1 440.00	6 050.39
35	Tratament fitosanitar	ha	1							3.33	250.00	833.33						13.14
36	Udat prin picurare	zile/ha	30										Dithane M45 0.2%	kg	2	51.0	102.00	1 062.53
37	Stimularea legarii fructelor	mii fire	40									0.00	Topsin M 0.1%	kg	1.2	106	127.20	
38	Copilit + Palisat 1	mii fire	40							13.20	250.00	3 300.00	Apa irigatii	1000mc	2.400	350	840.00	840.00
39	Pregătit soluție pentru tratament fitosanitar	mii l	0.6							40.00	219.00	8 760.00	Tomato-stim	l	1	98	98.00	3 398.00
40	Tratament fitosanitar	ha	1							0.06	219.00	13.14	Clips palisare	mii buc	40	0.05	2 000.00	10 760.00
	TOTAL LUNA FEBRUARIE									3.33	250.00	833.33	Curzate Manos 0.25%	kg	2.5	119	297.5	13.14
41	Incalzit sera	zile	20							**81.04**		**18 363.32**						1 130.83
42	Stimularea legarii fructelor	mii fire	40														**28 474.62**	**46 837.94**
43	Udat + fertilizat	ha	1							13.20	250.00	3 300.00	Combustibili solizi	m3	14.88	1 056	15 713.28	15 713.28
													Tomato-stim	l	1	98	98.00	3 398.00
44	Pregătit soluție pentru tratament fitosanitar	mii l	0.6										Apa irigatii	1000mc	0.060	350	21.00	21.00
45	Tratament fitosanitar	ha	1							0.06	219.00	13.14	Azot	kg sa	60	6.9	414.00	414.00
										3.33	250.00	833.33						13.14
46	Copilit + Palisat 2	mii fire	40										Teldor 0.08%	kg	0.8	308.8	247.04	1 284.37
47	Defoliat	mii fire	40							50.00	219.00	10 950.00	Dithane M45 0.2%	kg	2	102	204.00	
48	Udat prin picurare	zile/ha	30							10.80	198.00	2 138.40						10 950.00
49	Pregătit soluție pentru tratament fitosanitar	mii l	0.6										Apa irigatii	1000 mc	1.800	350	630.00	2 138.40
50	Tratament fitosanitar	ha	1							0.06	219.00	13.14						630.00
51	Stimularea legarii fructelor	mii fire	40							3.33	250.00	833.33						13.14
52	Pregătit soluție pentru tratament fitosanitar	mii l	0.6							13.20	250.00	3 300.00	Zeamă bordeleză	kg	2.4	52	124.80	958.13
53	Tratament fitosanitar	ha	1							0.06	219.00	13.14	Tomato-stim	l	1	98	98.00	3 398.00
54	Defoliat	mii fire	40							3.33	250.00	833.33					0.00	13.14
	TOTAL LUNA MARTIE									10.80	219.00	2 365.20	Ortiva 0.075	l	0.75	384	288.00	1 121.33
55	Copilit + Palisat 3	mii fire	40							**97.38**		**24 593.00**						2 365.20
56	Udat + fertilizat	ha	1							50.00	219.00	10 950.00					**17 838.12**	**42 431.11**
																		10 950.00
57	Defoliat	mii fire	40										Apa irigatii	1000mc	0.080	350	28.00	28.00
58	Copilit+Carnit	mii fire	40							10.80	219.00	2 365.20	Azot	kg sa	50	6.9	345.00	345.00
59	Pregătit soluție pentru fertilizare foliară	mii l	0.6							7.14	250.00	1 786.00						2 365.20
60	Administrat îngrășământ foliar	ha	1							0.06	219.00	13.14						1 786.00
61	Udat prin picurare	zile/ha	29							3.33	250.00	833.33						13.14
62	Pregătit soluție pentru tratament fitosanitar	mii l	0.6									0.00	Cropmax	l	2	158	316.00	1 149.33
63	Tratament fitosanitar	ha	1							0.06	219.00	13.14	Apa irigatii	1000 mc	2.320	350	812.00	812.00
64	Recoltat 1	t	17							3.33	250.00	833.33						13.14
65	Sortat + incărcat în mijloace de transport recolta	t	17							56.67	219.00	12 409.88	Champion 50WP	kg	3	55	165.00	998.33
										34.00	198.00	6 732.00						12 409.88
66	Transport recolta la 5 km	t/km	85	55-75	remorcă	2.50	11.05	6.76	574.64			0.00						6 732.00
	TOTAL LUNA APRILIE					**2.50**	**11.05**		**574.64**	**165.40**		**35 936.01**						574.64
67	Pregătit soluție pentru tratament fitosanitar	mii l	0.60							0.06	219.00	13.14					**1 666.00**	**38 176.65**
68	Tratament fitosanitar	ha	1							3.33	219.00	729.99						13.14
													Bravo 500	kg	2.5	90	225.00	1 011.37
69	Pregătit soluție pentru fertilizare foliară	mii l	0.6							0.06	219.00	13.14	Mospilan 20 SP	kg	0.125	451	56.38	
70	Administrat îngrășământ foliar	ha	1							3.33	198.00	659.99						13.14
													Cropmax	l	2	158	316.00	975.99

Source: MADJ

Table 44. Technology framework for green mass cultivation

71	Udat prin picurare	ha	30										Apa irigatii	1000 mc	3.000	350	1 050.00	1 050.00
72	Recoltat 2	t	18.7							62.33	198.00	12 341.88						12 341.88
73	Sortat + incărcat în mijloace de transport recolta	t	18.7							37.40	219.00	8 190.60						8 190.60
74	Transport recolta la 5 km	t/km	93.5	55-75	remorcă	2.75	12.16	6.76	632.11			0.00						632.11
75	Pregătit soluție pentru tratament fitosanitar	mii l	0.60							0.06	219.00	13.14						13.14
76	Tratament fitosanitar	ha	1							3.33	198.00	659.99	Dithane mM45	kg	2	51	102.00	941.19
													Nissorun 5EC	kg	0.8	224	179.20	
77	Recoltat 3	t	23.0							76.50	219.00	16 753.33						16 753.33
78	Sortat + incărcat în mijloace de transport recolta	t	22.95							45.90	219.00	10 052.10						10 052.10
79	Transport recolta la 5 km	t/km	114.75	55-75	remorcă	3.38	14.92	6.76	775.77									775.77
	TOTAL LUNA MAI					**6.13**	**27,07**		**1 407.88**	**232.31**		**49 427.31**					**1 928.58**	**52 763.76**
80	Udat prin picurare	ha	30										Apa irigatii	1000 mc	4.200	350	1 470.00	1 470.00
81	Recoltat 4 și recolta 5	t	26.35							87.83	219.00	19 235.31						19 235.31
82	Sortat + incărcat în mijloace de transport recolta 4 și recolta 5	t	26.35							52.70	198.00	10 434.60						10 434.60
83	Transport la 5 km recolta 4 și recolta 5	t/km	131.75	55-75	remorcă	3.88	17.13	6.76	890.70									890.70
84	**Desființat cultura**	**ha**	**1**	**40-45**	grapă cu discuri	**4.00**	**18.00**	**1 033.88**	**1 033.88**									**1 033.88**
	TOTAL LUNA IUNIE					**7.88**	**35.13**		**1 924.58**	**140.53**		**29 669.91**					**1 470.00**	**33 064.48**
	TOTAL GENERAL					**43.33**	**182.43**		**10 556.66**	**748.34**		**167 498.74**					**374 001.27**	**552 056.67**

TEHNOLOGIA CADRU LA CULTURA LUCERNA MASA VERDE

Recolta 2022/2023

Calculatii pe hectar

POTENTIAL MEDIU

Sistem: neirigat

Productia principala: 14.891 kg

Nr. Crt.	Denumirea lucrarii	LUNA	UM	Volumul Lucrarii	Tractor	Masina agricola	Ore mecaniz. nr.	Consum motorina litri	Tarif lei/UM	Total lei	ZO nr.	Tarif lei/UM	Total retributii lei	Denum. mat.	UM	Cant. totala	Pret unitar lei / UM	Total lei	Total cheltuieli agrotehnice - lei -
0	1		2	3	4	5	6	7	8	9,0	10	11	12	13	14	15	16	17	18
1	Incarc ingras organice	AUGUST	t	30		Incarcator	1,599	1.4	6.81	204.3									204.3
2	Transp ingras organice la 5 km		tkm	150	T50-100CP	Remorca	4.410	19.5	4.69	703.0									703.0
3	Alimentat masina administrat ingr. Org		t	30		Incarcator	1,599	1.4	6.81	204.3									204.3
4	Fertilizat cu ingrs.organice+jalonat		ha	1	T50-100CP	Masina administrat ingrasaminte	2,285	10.0	454.1	454.1	0.1	137.4	13.7	gunoi grajd	t	30.0	90.0	2700.0	3167.8
5	Incarc.ingras chimice		t	0.259		Incarcator	0,027	0.1	6.81	1.8									1.8
6	Transp ingras chimice la 5 km		tkm	1.295	T50-100CP	Remorca	0,074	0.3	4.69	6.1									6.1
7	Alimentat masina administrat ingr. Ch		t	0.259		Incarcator	0,027	0.1	6.81	1.8									1.8
8	Fertilizat cu ingras chimice+jalonat		ha	1	T50-100CP	Masina administrat ingrasaminte ch	0.286	1.2	56.79	56.8	0.06	137.4	2.5	fosfor	kg sa	50	7.20	360.0	419.3
9			ha	1	T50-100CP		0,178	0.75	45.35	45.4	0.033	137.4	4.5	potasiu	kg sa	60	6.60	396.0	445.9
10	Arat la 25 cm+grapat		ha	1	T90-150CP	Plug 4 trupite	2.105	20.5	**416,3**	416.3									416.3
11	Discuit		ha	1	T90-150CP	Grapa discuri	0.727	5.6		0.0									0.0
12	Transp apa +pregat solutie		t	0.3	T50-100CP	Cisterna	0.067	0.4	35.98	10.8	0,03	137,4	4.1						14.9
13	Erbicidat total+jalonat		ha	1	T50-100CP	Masina erbicidat	0.308	0.9	37.91	37.91	0,04	137.4	5.5	Erbicide*	l	0.5	137.61	68.8	112.2
14	Discuit		ha	1	T90-150CP	Grapa discuri	0,727	5.6	150.94	150.9									150.9
15	Incarc si desc samanta		t	0.042							0.01	137,4	1,4						1,4
16	Transp samanta la 5 km	SEPTEMBRIE	tkm	0.105	T50-100CP	Remorca	0,0037	0.02	4.69	0.5									0,5
17	Pregatit pat germinativ		ha	1	T50-100CP	Combinator	0.470	4.0	104.08	104.1									104.1
18	Semanat		ha	1	T50-100CP	Semanatoare paioase	1.000	4.5	158.94	158.9	0,1	137,4	13,7	samanta	kg	21.0	24.00	504.0	676,7
19	Desevit semanatoare		ha	1							0,1	159.6	16.0						16.0
20	**TOTAL PROD NETERM.**						**15,893**	**76,2**		**2556,9**	**0,47**		**61,42**					**4028,8**	**6647,1**
21	Trans apa pt. erbicidat+pregt sol	APRILIE	t	0,3	T50-100CP	Cisterna	0,067	0.4	35,98	10.8	0,03	137,4	4,1						14,9
22	Erbicidat total		ha	1	T50-100CP	Masina erbicidat	0.308	0.9	41.63	41.6	0.04	137,4	5.5	Erbicide**	x	x	x	184.4	231.6
23	**TOTAL infiintare**						**16,268**	**77,5**		**2609,3**	**0,54**		**71,04**					**4213,3**	**6893,6**
24	Recoltat mv I recolta	MAI	t	6.06		Masina recoltat furaje	0,854	9.1	45,49	275.7									275.7
25	Transp mv la 5 km		tkm	30.5	T50-100CP	Remorca	1,570	6.9	5.10	155.6									155.6
26	Recoltat mv II recolta	IUNIE	t	5,28		Masina recoltat furaje	0,847	8.6	45,49	240.2									240.2
27	Transp mv la 5 km		tkm	26.4	T50-100CP	Remorca	1,323	5.9	5,10	134.6									134.6
28	Recoltat mv III recolta	IULIE	t	3,59		Masina recoltat furaje	0,565	5.8	45,49	163.3									163.3
29	Transp mv la 5 km		tkm	17.95	T50-100CP	Remorca	0,822	3.9	5,10	91.6									91.6
30	Incarc.ingras chimice	SEPTEMBRIE	t	0,152		Incarcator	0,024	0.06	7,44	1,1									1,1
31	Transp.ingras.chimice la 5 km		tkm	0.76	T50-100CP	Remorca	0,064	0,28	5,10	3,9									3,9
32	Alimentat masina administrat		t	0,152		Incarcator	0,024	0.06	7,44	1,1									1,1
33	Fertiliz.cu ingras.chimice+jalonat		ha	1	T50-100CP	Masina administrat ingrasaminte ch	0,286	1,2	62,45	62,4	0,1	137,4	8,2	fosfor	kg sa	70,0	7,20	504,0	574,7
34	**TOTAL AN DE PLAN**						**6,379**	**41,7**		**1129,5**	**0,1**		**8,2**					**504,0**	**1641,8**
35	**TOTAL GENERAL**						**10,446**	**61,1**		**1781,8**	**0,2**		**26,0**					**1557,3**	**3365,1**
36	**Total infiintare (1 / 4 din cheltdo infiintare)**						**4,1**	**19,4**		**652,3**	**0,14**		**17,8**					**1053,3**	**1723,4**

*Preemergent: Agil 100EC

TEHNOLOGIA CULTURII: MĂR
Recolta 2022/2023
Calculatii pe hectar
Chletuilei pentru un an de exploatare

Cod EUROSTAT B_4_1_1_1

Potential: Mediu

Sistem: Neirigat
Productia medie: 20000 kg/ha

Nr crt.	Denumirea lucrării	LUNA CALENDARISTICA	UM	Volumul lucrării	LUCRĂRI MECANIZATE						LUCRĂRI MANUALE				MATERII ŞI MATERIALE					Total cheltuieli agrotehnice -lei-
					Tractor	Maşina agricolă	Ore mecaniz.	Consum motorină litri-	Tarif lei/UM	Total - lei-	ZO	nr.	Tarif -lei-	Total retribuţii - lei-	Denumirea materialului	UM	Cantitate a totală	Preţ unitar -lei-	Total -lei-	
1	Încărcat îngrăşăminte organice	SEP-OCT	t	20	Incarcator hidra		0,88	5,10	6,1	122,38										122,4
2	Transport îngrăşăminte organice la 5 km		t/km	100	55-70 CP	2 x Remorca agricola	2,73	17,31	3,7	367,14										367,1
3	Administrat îngrăşăminte organice		ha	1	55-70 CP	Masina de imprastiat ingrasaminte organice	1,95	7,70	348,8	348,78					Gunoi grajd	t	20	70,00	1400,0	1748,8
5	Încărcat + descărcat îngr. chimice		t	0,76	Incarcator hidra		0,04	0,25	6,1	4,65										4,7
6	Transport îngr. Chimice la 5 km		t/km	3,8	55-70 CP	2 x Remorca agricola	0,14	0,86	3,7	13,95										14,0
7	Administrat îngr. chimice toamna		ha	1	40-45 CP	Masina de administrat ingrasaminte	0,29	1,20	56,3	56,29										455,3
				1			0,18	0,75	34,3	34,27					Fosfor	kg sa	70	5,70	399,0	641,5
8	Lucrare adanca a solului		ha	1	40-45 CP	Plug purtat +Grapa stelata	2,75	14,00	346,3	346,33					Potasiu	kg sa	92	6,60	607,2	346,3
	TOTAL PRODUCTIE NETERMINATA		t				8,95	47,17		1293,80				0,00						2406,2
9	Lucrat solul pe rând	APR	m²	2000							2,56	181	463,4							3700,0
10	Tăieri de fructificare		pom	500							9,025	198	1787,0							463,4
11	Adunat şi încărcat ramuri		t	6							6	151	906,0							1787,0
12	Transport ramuri		t/km	30	55-70 CP	2 x Remorca agricola	1,32	7,65	4,0	121,2										906,0
13	Administrat îngr. chimice fazial		t	0,14																121,2
14	Prăşit pe rând	MAI	m³	5000							0,4	172	68,8		Azot	kg sa	45	14,40	648,0	716,8
15	Erbicidat pe rând		ha	1	40-45CP	Masina erbicid	0,5	1,6	4,4	4,4	7,68	181	1390,1							1390,1
16	Tăieri in verde		pom	500											Roundup	L	5,00	52,00	260,0	264,4
17	Pregatit soluţie actiune fitosanitara	MAI-AUG	mii l	8	55-70 CP	morca cister	4,02	23,4	31,8	254,5	2,325	198	460,4							460,4
18	Stropit pomii		ha	10	40-45CP	Masina strop	19,2	38,4	320,6	3206,3	3,6	172	619,2							873,7
19	Tocat iarba pe interval		ha	2	40-45CP	Masina tocat resturi vegetale	12,8	52	332,9	665,7					Acţiuni fito.				4266,0	7472,4
20	Incarcatt ambalaje	SEP	t	0,45																665,7
21	Transp. şi repartizat ambalaje la 5 km		t/km	2,25	40-45CP	2 x Remorca agricola	0,87	3,28	5,8	13,0	0,5	151	75,5							75,5
22	Recoltat fructe		t	20							0,5	151	75,5		Ambalaje	Buc	300	4,49	1347,0	1435,5
23	Încărcat si descarcat lad cu fructe		t	40,9							82,8	172	14241,6							14241,6
24	Transport fructe in ladite		t/km	102,25	40-45CP	2 x Remorca agricola	4,5	26,1	4,0	412,9	12,54	151	1893,5							1893,5
	TOTAL AN PLAN						38,7	126,3		4265,2	127,9		21980,9	0,0						412,9
	TOTAL GENERAL						47,7	173,5		5559,0	127,9		21980,9						6521,0	32767,1
																			8927,2	36467,1

Source: MADJ

Table 45. Technology framework for cattle growth

ANEXA 5

CALCULUL PROFITULUI

VACI 20 capete, reforma anuală 15 % - 3 capete, natalitatea peste 99 %, raportul între sexe 1:1, mortalitate viţei 0 capete.		
Venituri		Lapte marfă: 6500l/cap x 20 x 1leu/l = 130000 lei/an
		Subvenţie/cap vaca: 20 vaci x 490 lei /an = 9800 lei /an
		Vaci reformă: 3 capete x 650 kg (în viu) = 1950 kg x 4,5 lei /kg = 8775 lei/an
		Tăuraşi îngrăşare: 10 capete (din 20 viţei cât obţin raport 1:1) x 700 kg = 7000 kg x 6 lei /kg = 42000 lei /an
		Vânzare juninci: 7 capete (din 10 capete, raport 1:1, 3 juninci reţinute pentru înlocuire) x 8000 lei/cap = 56000lei/an
		Total venituri: 130000 lei + 9800 lei + 8775 lei +42000lei + 56000lei = **246575 lei /an**
Cheltuieli	Furaje	Fân lucernă: 5 kg/zi/cap x 0,45 lei /kg = 2,25 lei
		Paie: 4 kg/zi/cap x 0,1 lei/kg = 0,4 lei
		Porumb siloz: 25 kg/zi/cap x 0,25 lei /kg = 6,25
		Amestec de furaje concentrate: 3,5 kg/zi/cap x 1 leu/kg = 3,5 lei
		Total cheltuieli cu furaje: 2,25 lei + 0,4 lei + 6,25 lei + 3,5 lei = 12,4 lei/zi/cap x 366 zile = 4995,9 lei/cap x 20 capete = 90768 lei/fermă/an
		Fond de salarii (brut): 1 muncitor x 2000 lei/muncitor/lună x 12 luni = 24000 lei /an
		Asistenţă sanitar veterinară: 50 lei/an/cap x 20 capete = 1000 lei/an
		Consum energie lectrică: 3,78 kw/hl lapte x 1400 hl/an = 5292 kw x 0,48 lei/kw = 2540,16 lei/an
		Consum carburanţi (motorin): 2,5 l/hl lapte x 1400 hl/an = 3500 lei /an
		Alte cheltuieli (I.A., piese de schimb, materiale de uz general etc.): 100 lei/cap/an x 20 capete = 2000 lei/an
		Amortismente: 3000 lei/an/fermă
		Total cheltuieli: 90768 lei + 24000 lei +1000 lei + 2540,16 lei + 3500 lei +2000 lei + 3000 lei = **126808,16 lei/an**
Costuri aferente producerii a 1 litru lapte: 126808,16 lei : 140000 l lapte = **0,90 lei/l lapte**		
Beneficiu (total venit – total cheltuieli): 246575 lei - 126808,16 lei = **119766,84 lei/an**		
Impozit pe profit (16 % din beneficiu): 119766,84 lei x 16 /100 = **19162,69 lei**		
Profit net (beneficiu – impozit pe profit): 119766,84 lei - 19162,69 lei = **100604,15 lei/an**		

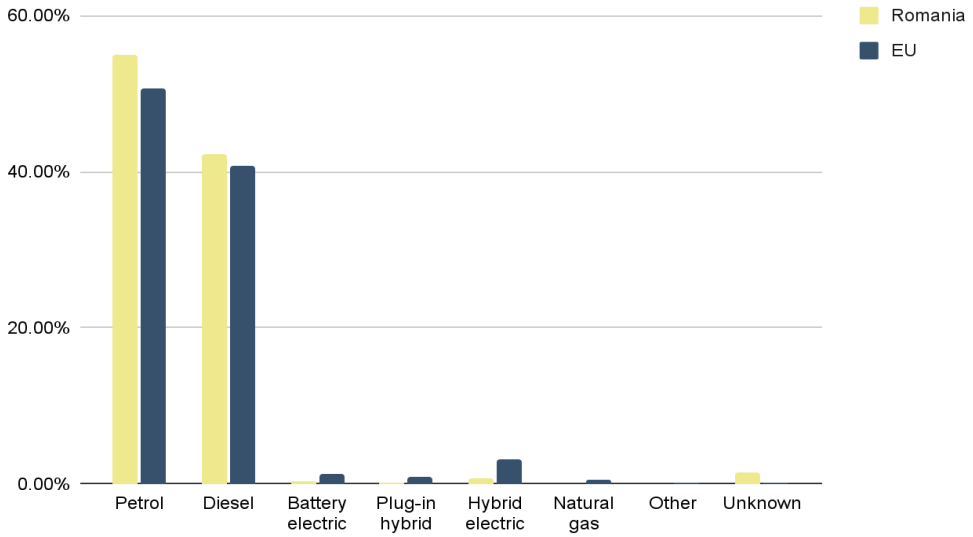
Source: Agromonitor

ANNEX 4. TRANSPORT

The transport sector is an important source of emissions, accounting for 21.3% of the total CO_2 emissions in Bucharest. At the national level, the European Automobile Manufacturers' Association report published in 2024 offers the following data:

- ➔ Cars average age in Romania (2022): 14.9 years (EU average: 12.3)
- ➔ Buses average age in Romania (2022): 17.1 years (EU average: 12.5)
- ➔ Cars by power source (2022): 54.9% of cars run on petrol (gasoline), and 42.2% on diesel.

Figure 41. Cars by power source in Romania and EU (2022)



Source: European Automobile Manufacturers's Association (EMEA)

Table 46. Cars by power source in Romania and EU (2022)

COUNTRY	PETROL	DIESEL	BATTERY ELECTRIC	PLUG-IN HYBRID	HYBRID ELECTRIC	NATURAL GAS	LPG	OTHER	UNKNOWN
ROMANIA	54.90%	42.20%	0.30%	0.10%	0.80%	0.00%	0.40 %	0.00%	1.40%
EU	50.60%	40.80%	1.20%	1.00%	3.10%	0.60%	2.60 %	0.10%	0.10%

Source: European Automobile Manufacturers's Association

The distribution of the energy requirement and CO_2e emissions in the Municipality of Bucharest by transport sub-categories (Private and commercial transport, public transport, municipal transport, as well as public lighting), along with the total Scope 3 emissions are presented below:

Table 47. Energy requirement and CO_2e emissions of the Bucharest Transport Sector (2021)

SUB-CATEGORY	TYPE	MWh / YEAR	TONS CO_2e / YEAR
PRIVATE AND COMMERCIAL TRANSPORT	AUTOMOBILES	5,057,281.17	1,300,207.22
PRIVATE AND COMMERCIAL TRANSPORT	MOPEDS, MOTORCYCLES	60,456.79	15,053.74
PRIVATE AND COMMERCIAL TRANSPORT	BUSES AND MICROBUSES	783,478.65	209,118.13
PUBLIC TRANSPORT	BUSES	307,168.75	82,014.06
PUBLIC TRANSPORT	METRO	175,720.13	70,463.77
PUBLIC TRANSPORT	TRAMS	53,249.58	21,353.08
PUBLIC TRANSPORT	TROLLEYBUSES	12,643.04	5,069.86
MUNICIPAL TRANSPORT (estimation)	PUBLIC FLEET	13,995.41	3,660.69
PUBLIC LIGHTING	PUBLIC LIGHTING	67,400.00	27,027.40
SCOPE 3 - TRANSPORT	ALL	8,648.93	2,309.26
All	**All**	**6,540,042.45**	**1,736,277.21**

Source: Own calculations

Table 48. Energy requirement and CO_2e emissions of the Bucharest Transport Sector by scope (2021)

SECTOR	SCOPE	MWh / YEAR	TONS CO_2e / YEAR
TRANSPORT	**SCOPE 1**	6,214,737.99	1,606,989.08
TRANSPORT	**SCOPE 2**	316,655.52	126,978.86
TRANSPORT	**SCOPE 3**	8,648.93	2,309.26
TRANSPORT	**TOTAL**	**6,540,042.45**	**1,736,277.21**

Source: Own calculations

Private and commercial transport (2021)

a) AUTOMOBILES

The primary sources of data for estimating the emissions associated with automobiles in Bucharest was the General Directorate of Driving Permits and Registrations (DRPCIV), which publishes yearly reports[8] (see table below), correlated with data on the total distance travelled by automobiles in Bucharest in 2021, estimated by Google Environmental Insights[9].

Table 49. Overview of Bucharest's fleet of autovehicles (2021)

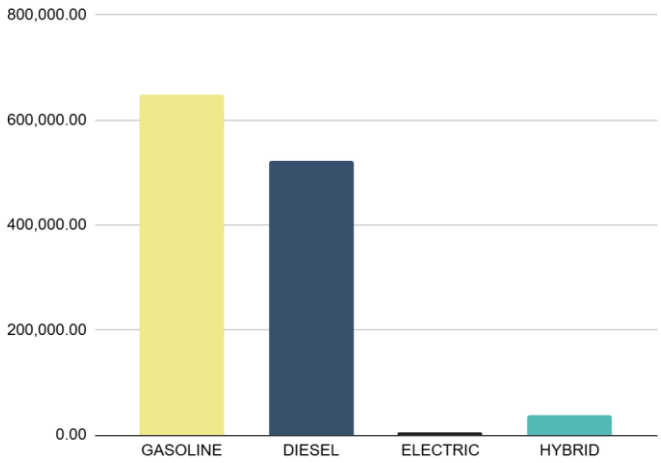
CATEGORY	TOTAL NUMBER	GASOLINE	DIESEL	ELECTRIC	HYBRID (GASOLINE+ELECTRIC, DIESEL+ELECTRIC, GPL+ELECTRIC)
Mopeds (L1e, L2e)	737.00	734.00	0.00	3.00	0.00
Motocycles(L3e, L4e, L5e, L6e, L7e)	30,294.00	30,068.00	91.00	131.00	2.00
Automobiles (M1, M1G)	1,227,038.00	648,993.00	522,641.00	6,228.00	38,126.00
Buses and microbuses (M2, M3)	9,823.00	45.00	9,625.00	1.00	132.00
Goods vehicles (N), excluding tractors	170,760.00	18,351.00	152,045.00	174.00	59.00
Tractors (N)	28,307.00	1.00	28,252.00	0.00	0.00
Semi-trailers	21,011.00	0.00	0.00	0.00	0.00
Trailers	32,383.00	0.00	0.00	0.00	0.00
Special purpose vehicles	12,014.00	1,574.00	10,434.00	1.00	0.00
Registered tractors	2,943.00	20.00	2,923.00	0.00	0.00
TOTAL	1,535,310.00	699,786.00	726,011.00	6,538.00	38,319.00

Source: DRPCIV

[8] DRPCIV, 2021: https://data.gov.ro/dataset/parc-auto-romania/resource/f94b0916-e1bc-4ce2-9eff-62f6e349f61a

[9] Google Environmental Insights, 2021: https://insights.sustainability.google/places/ChIJT608vzr5sUARKKacfOMyBqw?hl=en-US

Figure 42. Cars by power source in Bucharest (2021)



Source: DRPCIV

To estimate the energy requirement of automobiles, an average fuel consumption was used for each type of vehicle, based on the available data in the *Long Term Strategy of Romania* (2023). According to the strategy, "the data for the buses and HGV are derived from the National statistics Institute's data for passenger/tonne kilometers and total number of kilometers. For cars and motorcycles, the data from the JRS TIMES EU model - data for Romania were used. The fuel consumption of each type of vehicle was derived from the calibration of the model." The average consumptions are presented below:

Table 50. Occupancy and fuel consumption by vehicle type

Vehicle	Fuel	Occupancy/goods Passenger/t	Fuel consumption l/100 km
Passenger road transport vehicles	CNG/Biogas		
	Diesel	9.36	33
	Gasoline	9.36	34
	LPG	9.36	37
Motorcycles	Gasoline	1.10	4
Cars	CNG	1.98	8.4
	Diesel	1.98	6.9
	Gasoline	1.98	7.6
	LPG	1.98	8.4
HGV & LCV	Diesel	3.10	33
	Gasoline	3.10	25

Source: Long Term Strategy of Romania, page 96

For automobiles, the energy requirement / year was estimated based on the following data:

Fuel consumption: 6.9 liters/100 km for diesel, and 7.6 liters/100 km for gasoline (Long Term Strategy for Romania, based on JRC TIMES EU Model)[10]

Net calorific power: 11.9 for diesel, and 12.3 for gasoline (SEAP of Oradea Municipality, 2017)

- Diesel energy expressed in tons/year: MWh diesel = tons diesel per year * 11.9
- Gasoline energy expressed in tons/year: MWh gasoline = tons gasoline * 12.3

[10] Long Term Strategy of Romania, 2023, https://www.mmediu.ro/app/webroot/uploads/files/LTS%20-%20Versiunea%201.0%20-%20Eng%20-%2005.05.2023.pdf, page 96

'1 L of (normal) Diesel fuel (for automobiles, trucks, etc.) and/or light fuel oil (including heating oil) has a mass of about 0.85 kg; thus, a conversion factor of 0.00085 must be used to convert liters of Diesel and/or light fuel oil into tons;'[11]

'1 L of gasoline has a mass of about 0.74 kg; thus, a conversion factor of 0.00074 must be used to convert liters of gasoline into tons;'[12]

Total number of automobiles in Bucharest: 1,215,988 (DRPCIV, 2021)

Gasoline: 53.37% Diesel: 42.98% Electric: 0.51% Hybrid: 3.14%

➔ Total distance travelled by automobiles in Bucharest: 7,429,261,967 km (Google Environmental Insights, 2021)

Based on the total number of travelled kilometers, the distance travelled, energy requirement, and tons of CO_2e were estimated for each vehicle type:

GASOLINE CARS

- ➔ Estimated distance travelled by both private and public cars: 53.37% * 7,429,261,967 km / year = 3,965,120,554 km / year
- ➔ Fuel consumption in liters gasoline/year= 0.076*3,965,120,554 km/year = 301,349,162.07 liters gasoline/year

From this amount, the fuel consumption of gasoline cars of the public fleet (see Municipal Transport section) was subtracted, resulting in 300,755,216.13 liters

- ➔ Fuel consumption in tons gasoline / year: 300,755,216.13 liters * 0.00074 = 222,558.86 tons gasoline / year
- ➔ Energy requirement (MWh / year): 222,558.86 tons gasoline / year * 12.3 = 2,732,067.88 MWh / year
- ➔ This corresponds to 680,284.90 tons CO_2e / year (conversion factor for gasoline: 0.249)

DIESEL CARS

- ➔ Estimated distance travelled by both private and public cars: 42.98% * 7,429,261,967 km / year= 3,193,153,965 km / year
- ➔ Fuel consumption in liters diesel/year: 0.069 * 3,193,153,965 km / year = 220,327,623.59 liters diesel / year

From this amount, the fuel consumption of diesel cars of the public fleet (see Municipal Transport section) was subtracted, resulting in 219,494,117.71 liters

- ➔ Fuel consumption in tons diesel / year: (219,494,117.71 liters*0.85 kg/liter)/ 1000 = 186,570 tons diesel/year
- ➔ Energy requirement (MWh/year): 186,570 tons diesel / year * 11.9 = 2,211,752.09 MWh / year
- ➔ This corresponds to 590,537.81 tons CO_2e / year (conversion factor for diesel: 0.267)

ELECTRIC CARS

- ➔ Estimated distance travelled by both private and public cars: 0.51% * 7,429,261,967 km /year = 38,050,904.72 km / year
- ➔ Assuming a consumption of 0.20 kWh / km[13] (0.0002 MWh)
- ➔ Energy requirement (MWh/year): 7,610.18MWh/year. From this amount, the energy requirement of electric cars in the public fleet (see Municipal Transport section) was subtracted, resulting in 7,451.78MWh/ year
- ➔ In tons CO_2e, private electric automobiles account for 2,988.16 tons CO_2e / year (conversion factor for electric: 0.401)

HYBRID CARS

- ➔ Estimated distance travelled by both private and public cars: 3.14% * 7,429,261,967 km / year = 232,936,543.6 km / year
- ➔ Assuming a consumption of 5 liters of gasoline per 100 km (0.05 liters / km)
- ➔ Fuel consumption in liters gasoline/year: 0.05*232,936,543.6 km/year = 11,646,827.18 liters gasoline/year
- ➔ Fuel consumption in tons gasoline / year: 11,646,827.18 liters * 0.00074 = 8,618.65 tons gasoline / year
- ➔ Energy requirement (MWh / year): 106,009.42 MWh / year.
- ➔ In tons CO_2e this corresponds to 26,396.35 tons CO_2 / year (conversion factor for gasoline: 0.249)

[11] Conversion Factors for Liquid and Gaseous Fuels, https://toolkit.pops.int/Publish/Annexes/A_29_Annex29.html

[12] Conversion Factors for Liquid and Gaseous Fuels, https://toolkit.pops.int/Publish/Annexes/A_29_Annex29.html

[13] https://evbox.com/en/ev-home-charger-electricity-usage

Table 51. Estimation of CO_2e emissions for automobiles (Private and commercial transport) in Bucharest

PRIVATE AND COMMERCIAL TRANSPORT - AUTOMOBILES	GASOLINE	DIESEL	ELECTRIC	HYBRID (GASOLINE+ELECTRIC, DIESEL+ELECTRIC, GPL+ELECTRIC)	TOTAL
AUTOMOBILES (DRPCIV, 2021)	648,993.00	522,641.00	6,228.00	38,126.00	1,215,988.00
% OF TOTAL AUTOMOBILES	53.37%	42.98%	0.51%	3.14%	100.00%
ALL TYPES OF AUTOVEHICLES IN BUCHAREST (DRPCIV, 2021)	699,786.00	726,011.00	6,538.00	38,319.00	1,470,654.00
% AUTOMOBILES OF ALL TYPES OF AUTOVEHICLES	92.74%	71.99%	95.26%	99.50%	82.68%
ESTIMATED NUMBER OF KILOMETRES (AS SHARE OF TOTAL 7,429,261,967 KMS TRAVELLED BY AUTOMOBILES IN 2021, SOURCE: GOOGLE ENVIRONMENTAL INSIGHTS)	3,965,120,553.62	3,193,153,965.08	38,050,904.72	232,936,543.58	7,429,261,967.00
FUEL CONSUMPTION (LITRES / YEAR)	300,755,216.13	219,494,117.71		11,646,827.18	531,896,161.02
FUEL CONSUMPTION (TONS / YEAR)	222,558.86	186,570.00		8,618.65	417,747.51
ENERGY REQUIREMENT (MWH / YEAR)	2,732,067.88	2,211,752.09	7,451.78	106,009.42	5,057,281.17
TONS CO_2e / YEAR	**680,284.90**	**590,537.81**	**2,988.16**	**26,396.35**	**1,300,207.22**

Source: Own calculations based on data from DRPCIV (2021) and Google Environmental Insights (2021)

b) BUSES AND MICROBUSES

Based on data from DRPCIV, the CO_2 emissions for private and commercial buses and microbuses was calculated, subtracting the total number of buses of the public transport company STB (diesel: 1388 buses; hybrid: 130 buses). Subsequently, the distance travelled by public transport buses was also subtracted from the total distance travelled by buses of 302,078,125.5 km (Google Environmental Insights, 2021). As the share of buses and microbuses was not available, the calculation was based on the averages available for buses.

BUSES AND MICROBUSES

Average fuel consumption rate for hybrid buses: 43 liters /100 km[14]
Average fuel consumption for gasoline buses: 34 liters/ 100 km[15]
Average fuel consumption for diesel buses: 33 liters / 100 km[16]
Average energy consumption for electric buses: 1.15 KWh/km for 12-meter buses.
Net calorific value (MWh/tonne): 12.3 MWh / t (gasoline) and 11.9 MWh /t (diesel)

[14] https://civitas.eu/sites/default/files/measure_evaluation_report_lpa7.2_10032021_final.pdf, page 7
[15] *Long Term Strategy of Romania*, page 96, available at: https://www.mmediu.ro/app/webroot/uploads/files/LTS%20-%20Versiunea%201.0%20-%20Eng%20-%2005.05.2023.pdf
[16] idem

The estimated number of kilometers traveled by each category was estimated as a share of the total 302,078,125.5 travelled by buses in 2021, after subtracting the number of km travelled by the public transport buses (see Public Transport section). Based on the distance travelled, fuel consumption volume in liters was transformed to tons, and the energy requirement was calculated, as follows:

- Energy requirement for gasoline buses: 320.90 tons gasoline/year*12.3=3,947.04 MWh/y (982.81 tCO_2e)
- Energy requirement for diesel buses: 65,485.48 tons gasoline/year*11.9=779,277.16MWh/y (208,067 tCO_2e)
- Energy requirement for electric buses: 28,342.82 km * 32.59 (13.07 t CO_2e)
- Energy requirement for hybrid buses: 18.04 tons gasoline/year*12.3 = 221.86MWh/year (55.24t CO_2e)

Total energy requirement for private buses: 783,478.65 MWh / year
This is equivalent to 209,118.13 tons CO_2e (see detailed calculations below).

Table 52. Estimation of CO_2e emissions for buses and microbuses (Private and commercial transport) in Bucharest

PRIVATE AND COMMERCIAL TRANSPORT - BUSES AND MICROBUSES	GASOLINE	DIESEL	ELECTRIC	HYBRID (GASOLINE+ELECTRIC, DIESEL+ELECTRIC, GPL+ELECTRIC)	TOTAL
BUSES AND MICROBUSES (PRIVATE AND COMMERCIAL) - CALCULATED BY SUBTRACTING THE NUMBER OF PUBLIC TRANSPORT FLEET BUSES	45.00	8,237.00	1.00	2.00	8,285.00
% OF TOTAL PRIVATE AND COMMERCIAL BUSES AND MICROBUSES	0.54%	99.42%	0.01%	0.02%	100.00%
ESTIMATED NUMBER OF KILOMETRES (AS SHARE OF TOTAL 302,078,125.5 TRAVELLED BY BUSES IN 2021)[17]	1,275,426.89	233,459,806.15	28,342.82	56,685.64	234,820,261.50
FUEL CONSUMPTION (LITRES / YEAR)	433,645.14	77,041,736.03		24,374.82	77,499,756.00
FUEL CONSUMPTION (TONS / YEAR)	320.90	65,485.48		18.04	65,824.41
ENERGY REQUIREMENT (MWH / YEAR)	3,947.04	779,277.16	32.59	221.86	783,478.65
TONS CO_2E / YEAR	**982.81**	**208,067.00**	**13.07**	**55.24**	**209,118.13**

Source: Own calculations based on data from DRPCIV (2021) and Google Environmental Insights (2021)

c) MOTORCYCLES - GASOLINE

The primary source of data for estimating the CO_2 emissions from motorcycles was the DRPCIV report from 2021 (see table below) and the *Long Term Strategy for Romania*.

[17] Source: Google Environmental Insights, subtracting the number of km travelled by the public transport buses in 2021

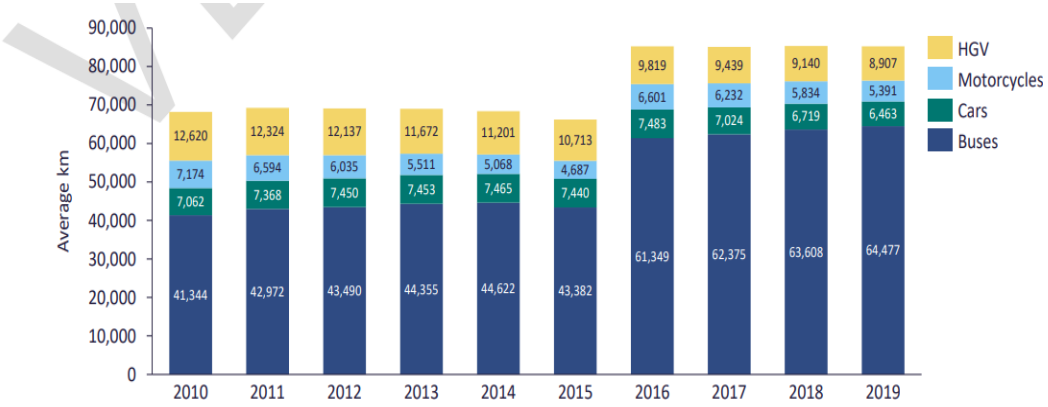
Table. Number of mopeds and motorcycles (Private and commercial transport) in Bucharest (2021)

CATEGORY	NUMBER	GASOLINE	DIESEL	ELECTRIC	HYBRID (GASOLINE+ELECTRIC, DIESEL+ELECTRIC, GPL+ELECTRIC)
MOPEDS (L1E, L2E)	737.00	**734.00**	0.00	3.00	0.00
MOTOCYCLES(L3E, L4E, L5E, L6E, L7E)	30,294.00	**30,068.00**	91.00	131.00	2.00
TOTAL	**31,031**	**30,802**	**91**	**134**	**2**

Source: DRPCIV

According to the *Long Term Strategy for Romania,* analysing Eurostat and INS data, the average km for motorcycles in 2019 in Romania was 5,391 km[18] (see figure below).

Figure 43. Average km per vehicle type



Source: EUROSTAT (Motor vehicle movements on national and foreign territory), National Institute of Statistics, team analysis

Source: Long Term Strategy of Romania, page 95

According to DRPCIV data from 2021, the total number of gasoline mopeds and motorcycles was 30,802. Considering the low number of mopeds (734) and lack of data on average yearly km for mopeds, they were included in the estimation for gasoline motorcycles. Considering the low number of diesel motorcycles (91), these were not included in the calculation.
Based on the average number of travelled kilometers and the average consumption of motorcycles in Romania, the energy requirement and tons of CO_2e were estimated as follows:

MOTORCYCLES AND MOPEDS- GASOLINE

- ➔ Estimated distance travelled: 30,802 * 5,391 km = 166,053,582 km
- ➔ Assuming that the average consumption for motorcycles is 4 liters of gasoline / 100 km[19]
- ➔ Fuel consumption in liters gasoline /year: 166,053,582 * 0.04 = 6,642,143.28 liters gasoline / year
- ➔ Fuel consumption in tons gasoline / year: 6,642,143.28 liters * 0.00074 = 4,915.19 tons gasoline / year
- ➔ Energy requirement: 4,915.19 tons gasoline / year * 12.3 = 60,456.79 MWh / year
- ➔ This is equivalent to 15,053.74 tons CO_2e (calculated by multiplying 60456.79 MWh / year by the 0.249 conversion factor for gasoline)

[18] *Long Term Strategy of Romania*, page 95, available at: https://www.mmediu.ro/app/webroot/uploads/files/LTS%20-%20Versiunea%201.0%20-%20Eng%20-%2005.05.2023.pdf
[19] https://www.mmediu.ro/app/webroot/uploads/files/LTS%20-%20Versiunea%201.0%20-%20Eng%20-%2005.05.2023.pdf, page 96

Table 53. Estimation of CO_2e emissions for mopeds and motorcycles (Private and commercial transport) in Bucharest

PRIVATE AND COMMERCIAL TRANSPORT - MOPEDS AND MOTORCYCLES	GASOLINE
MOPEDS (L1E, L2E)	734.00
MOTORCYCLES(L3E, L4E, L5E, L6E, L7E)	30,068.00
TOTAL NUMBER OF MOPEDS AND MOTORCYCLES	30,802.00
AVERAGE NUMBER OF KILOMETRES PER YEAR (MOTORCYCLES). SOURCE: EUROSTAT, INS	5,391.00
AVERAGE FUEL CONSUMPTION (LITRES) / YEAR / MOTORCYCLE)	215.64
AVERAGE FUEL CONSUMPTION (LITRES / YEAR)	6,642,143.28
FUEL CONSUMPTION (TONS / YEAR)	4,915.19
ENERGY REQUIREMENT (MWH / YEAR)	60,456.79
TONS CO_2E / YEAR	**15,053.74**

Source: Own calculations based on DRPCIV (2021), Eurostat and INS (2019), JRC TIMES EU model

PUBLIC TRANSPORT (buses - 2022; trams, metro and trolleybuses - 2021)

a) BUSES

The primary source of data for calculating the CO_2 emissions associated with the public transport by bus was data provided by Bucharest City Hall Transport Direction for 2022.

Table 54. Estimation of CO_2e emissions for buses (Public transport) in Bucharest (2022)

PUBLIC TRANSPORT - BUSES	NUMBER OF BUSES	DIESEL CONSUMPTION (TONS / YEAR)	KM TRAVELLED / YEAR	DIESEL CONSUMPTION (LITRES / YEAR)	ENERGY CONSUMPTI CONVERSION OF TON
EURO III	500	4,986.77	12,776,333.00	5,866,788.24	59342.563
EURO IV	488	8,156.77	22,141,716.00	9,596,200.00	97065.563
EURO VI	400	11,427.97	28,856,728.00	13,444,670.59	135992.843
HYBRID E6	130	1,240.99	3,483,087.00	1,459,988.24	14767.781
TOTAL	**1518**	**25,812.50**	**67,257,864.00**	**30,367,647.06**	**307168.75**

Source: Own calculations based on data provided by Bucharest City Hall Transport Direction for 2022

BUS PUBLIC TRANSPORT - DIESEL

OPTION 1: TONS DIESEL TO TCO_2E (BASED ON A NET CALORIFIC POWER OF 11.9 - SOURCE: SEAP ORADEA 2017)

➔ Energy requirement: 25,812.5 tons diesel /year *11.9 = 307,168.75 MWh/year (diesel)

➔ This is equivalent to 82,014.06 tCO_2e (307,168.75 Mwh/year multiplied by the conversion factor of 0.267)

b) METRO

The primary source of information for calculating the CO_2 emissions of public transport by metro was data reported directly by the METROREX SA public company. In 2021, METROREX consumed 175,720.13 MWh to supply the traction network and power supply installations to ensure the operation of the metro infrastructure.

Table 55. Electric energy consumption for the metro system (2020-2023)

- MWh –

	An			
	2020	2021	2022	2023
Energie electrică, din care:	169.697,12	175.720,13	167.434,72	164.061,78
- pentru tracțiune	90.438,72	91.668,66	88.448,51	94.059,89
- pentru instalații	79.258,40	84.051,47	78.986,21	70.001,89

Source: METROREX S.A., page 9

https://www.metrorex.ro/storage/documents/1720090135Raport%20de%20activitate%202023%20Metrorex%20S.A..pdf

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METRO PUBLIC TRANSPORT - ELECTRICAL ENERGY

The subway of Bucharest had an electricity consumption of 175.720,13 MWh in 2021
In tons CO_2e this corresponds to 70,463.77 tons CO_2e. This was calculated by multiplying 175.720,13 MWh / year by the 0.401 conversion factor for electrical energy.

Table 56. Estimation of CO_2e emissions for metro system (Public transport) in Bucharest (2021)

PUBLIC TRANSPORT - METRO	NUMBER OF METROS	ELECTRICITY CONSUMPTION (MWH/ YEAR)	KM TRAVELLED / YEAR	TONS CO_2E / YEAR
METRO SYSTEM	-	175,720.13	-	70,463.77

Source: Own calculations based on data from METROREX S.A.

c) TRAMS

Several national and international data sources were used for calculating the CO_2 emissions associated with tram public transport. Data on tram energy consumption and the number of trams in use in Bucharest and their age was correlated with the distance travelled by trams in Bucharest in 2021, provided by Google Environmental Insights.

TRAMS - ELECTRICAL ENERGY

- ➔ Distance travelled: 18,749,851 km (STB, 2021)
- ➔ Number of trams and age: From the total number of trams of in 2021 of 483, 292 were in use (60%)[20]. From a total of 303 trams in use in 2024, 82 were new (27%)[21]
- ➔ Average energy consumption:'Tram energy consumption is being studied, with estimates ranging between 2 and 5 kWh/km'.[22] Considering the average energy consumption of another Romanian city (Municipality of Oradea) of 2,84 kWh / km, with a similar share of new trams[23], this average was used to calculate the energy requirements for the Bucharest tram transport.

[20] https://clubferoviar.ro/tramvaie-in-bucuresti/, 2021

[21] https://hotnews.ro/schimbarea-la-fata-a-transportului-public-din-bucuresti-ce-autobuze-trolee-si-tramvaie-noi-mai-vin-n-2024-n-capitala-si-ce-mari-achizitii-mai-vrea-sa-faca-primaria-generala-11826 , 2024

[22] Comparative Analysis of Sustainable Electrification in Mediterranean Public Transportation, 2024, available at: https://www.mdpi.com/2071-1050/16/7/2645

[23] https://www.otlra.ro/upload/www.otlra.ro/pagini/ro/Bilant/Raportul_Administratorilor_S1_2023_Total.pdf, page 28

- ➔ Therefore, the estimated energy requirement is 18,749,851 km * 2,84 KWh = 53,249,576.84 KWh, equaling to 53,249.58 MWh / year
- ➔ In tons CO_2e, this corresponds to 21,353.08 toCO_2e (53,249.58 MWh / year multiplied by the conversion factor of 0.401).

Table 57. Average energy consumption - Oradea local transport

Nr. crt.	Luna	2022			2023			2023/ 2022
		consum (kWh)	km parcurşi	kWh/km	consum (kWh)	km parcurşi	kWh/ km	%
1	Ianuarie	647991	174955	3,70	450986	139762	3,22	87,02
2	Februarie	468214	151466	3,09	472574	130785	3,61	116,82
3	Martie	498351	173944	2,86	396495	146207	2,71	94,75
4	APRILIE	406990	161295	2,52	358038	129801	2,75	109,12
5	MAI	398537	170919	2,33	335190	143968	2,33	100,00
6	IUNIE	377419	154896	2,43	296286	121745	2,43	100,00
	Total:	2.797.502	987475	2,83	2.309.569	812268	2.84	100,35

Source: OTL https://www.otlra.ro/upload/www.otlra.ro/pagini/ro/Bilant/Raportul_Administratorilor_S1_2023_Total.pdf, page 28

d) TROLLEYBUSES

As in the case of trams, both national and international data sources were used for calculating the CO_2 emissions associated with public transport by trolleybuses (statistical data from the Bucharest Transport Company STB, media, CIVITAS report).

TROLLEYBUSES - ELECTRICAL ENERGY

- ➔ Distance travelled: 9,725,414 km (STB, 2021)
- ➔ Number of trolleybuses and age: In 2021, the STB fleet included 265 trolleybuses, out of which 181 were in use[24] (68.3%). In 2024, from 163 trolleybuses, 54 were new[25] (33.1%)
- ➔ Average energy consumption: Assuming an average energy consumption of 1.3 KWh/km for trolleybuses[26] the energy requirement associated with trolleybus public transport was calculated as follows:
- ➔ Energy requirement: 0.0013 MWh / km * 9,725,414 km = 12,643.04 MWh / year
- ➔ This is equivalent to 5,069.86 tons CO_2e (12,643.04 MWh / year multiplied by the conversion factor of 0.401).

Table 58. Estimation of CO_2e emissions for trams and trolleybuses (Public transport) in Bucharest

PUBLIC TRANSPORT - TRAMS AND TROLLEYBUSES	NUMBER OF TRAMS	ELECTRICITY CONSUMPTION (MWH / YEAR)	KM TRAVELLED / YEAR	TONS CO_2E
TRAMS	500	-	-	-
TRAMS IN USE	300	53,249.58	18,749,851.00	21,353.08
TROLLEYBUSES	265	-	-	-
TROLLEYBUSES IN USE	181	12,643.04	9,725,414.00	5,069.86

Source: Own calculations based on data from STB (2022): https://www.stb.ro/statistici

MUNICIPAL TRANSPORT

Data on the municipal fleet for the calculation of the CO_2 emissions from municipal transport was not readily available, so an estimation was run based on data for the Municipality of Oradea, correlated with the number of

[24] https://clubferoviar.ro/tramvaie-in-bucuresti/

[25] https://hotnews.ro/schimbarea-la-fata-a-transportului-public-din-bucuresti-ce-autobuze-trolee-si-tramvaie-noi-mai-vin-n-2024-n-capitala-si-ce-mari-achizitii-mai-vrea-sa-faca-primaria-generala-11826 , 2024

[26] CIVITAS, Possibilities of energy demand reduction in trolleybus transportation, Brno, 2014, available at: https://civitas.eu/sites/default/files/possibilities_of_trolleybus_transportation_energy_demand_reduction.pdf, page 26, Chapter 4.2.4, equation (4.8)

employees of the Bucharest City Hall, District City Halls, and subordinated institutions. As the total number of vehicles in the auto fleet of the Bucharest City Hall, the City Halls of the six districts and subordinated institutions was not available at the time of the baseline estimation, a comparative approach was applied. Based on this data, a rate of 1 vehicle /100 employees, and 1.34 tons gasoline per vehicle/year, and 2.16 tons diesel per vehicle/year were used[27]. Considering that the total number of employees of the Bucharest City Hall, District City Halls and subordinated institutions in 2021 was estimated at 70,000[28], the number of vehicles in the municipal institutions was estimated at 700 vehicles, out of which 44 electric (based on media sources and reported data), and the remaining number was assumed to be 50% gasoline cars, and 50% diesel cars (328 each).

AUTOMOBILES (MUNICIPAL TRANSPORT) - GASOLINE

- ➔ Estimated number of cars: 328
- ➔ Average consumption: 328 * 1.34 = 439.52 tons gasoline / year
- ➔ Energy requirement: 439.52 tons gasoline / year * 12.3 = 5,406.10 MWh / year
- ➔ This corresponds to 1,346.12 tons CO_2e (5,406.10 MWh / year multiplied by the conversion factor for gasoline 0.249).

AUTOMOBILES (MUNICIPAL TRANSPORT) - DIESEL

- ➔ Estimated number of cars: 328
- ➔ Average consumption: 328 * 2.16 = 708.48 tons diesel / year
- ➔ Energy requirement: 708.48 tons diesel / year * 11.9 = 8,430.91 MWh / year
- ➔ This corresponds to 2,251.05 tons CO_2e (8,430.91 MWh / year multiplied by the conversion factor for diesel of 0.267).

AUTOMOBILES (MUNICIPAL TRANSPORT) - ELECTRICAL ENERGY

- ➔ The number of electric cars in the public fleet of Bucharest (including local police fleet) was estimated at 44 vehicles, based on directly reported data and media sources.
- ➔ The average distance travelled: 18,000 km (as the distance travelled was not available, the average distance was used based on data reported by Constanţa Municipality).
- ➔ Average consumption: 0.20 kWh / kilometer for electric cars[29]
- ➔ Energy requirement for the electric car fleet: 158.40
- ➔ The energy consumption of the local police electric cars corresponds to 63.52 tons CO_2e / year.

Table 59. Estimation of CO_2e emissions for Municipal transport in Bucharest (2021)

MUNICIPAL TRANSPORT - PUBLIC FLEET	GASOLINE	DIESEL	ELECTRIC	TOTAL
Estimated number of vehicles	328	328	44	700
Fuel consumption (tons / year)	439.52	708.48	-	
Fuel consumption (liters / year)	593,945.95	833,505.88	-	
Energy requirement (MWh / year)	**5,406.10**	**8,430.91**	**158.40**	**13,995.41**
Tons CO_2e / year	**1,346.12**	**2,251.05**	**63.52**	**3,660.69**

Source: Own calculations

SCOPE 3 EMISSIONS - TRANSPORT

The calculation of Scope 3 emissions in the Transport sector was based on the following estimations:

[27] SEAP of Oradea Municipality, 2017: https://zmo.ro/download/PAED.pdf, page 76

[28] https://www.digi24.ro/stiri/actualitate/social/nicusor-dan-pmb-si-primariile-de-sector-au-de-ordinul-a-70-000-de-angajati-ce-masuri-va-lua-primarul-1394121

[29] https://evbox.com/en/ev-home-charger-electricity-usage

The average distance from refineries to Bucharest: (60.5 + 62 +237)/3 ≈ 120 km. This was calculated based on refineries in Romania fueling the stations of the oil and gas companies with highest market share (OMV Petrom - Brazii de Sus, Lukoil - Ploiești, Romeptrol - Năvodari).
The average distance for tankers to cover stations in Bucharest: 25 km
The average fuel consumption of a tanker: Around 33 liters of diesel per 100 km (0.33 liters / km)
Tanker average capacity: 35,000 liters
Total consumption in liters (gasoline and diesel) in Bucharest / year: 636,161,957.18 liters / year. To transport this quantity, about 18,176 tankers of 35,000 liters would be needed.
To calculate the consumption for one tanker, the average fuel consumption was multiplied by 145 km (120+25 km): 0.33 liters * 145 = 47.85 liters of diesel
Therefore, the total fuel consumption for all tankers to transport the total fuel for Bucharest gas stations was estimated as follows: 18,176 * 47.85 = 869,724.28 liters of diesel / year
To estimate the energy content of diesel in megajoules (MJ), the average energy density of diesel was used, which is about 35.8 MJ per liter[30]
Energy requirement (MJ): 35.8 MJ * 869,724.28 liters = 31,136,129.07 MJ / year
Energy requirement (MWh): 31,136,129.07 MJ/year*0.000277778=8,648.93 MWh/year (1 MJ=0.000277778 MWh)
This is equivalent to 2,309.26 tons CO_2e (conversion factor for diesel, from MWh/year to tons of CO_2 is 0.267).

Using this total, the share of energy requirement was estimated for municipal transport, public transport and private and commercial transport, based on their respective share from the total fuel consumption (private and commercial transport - automobiles: 81.78%, private and commercial transport - buses and microbuses: 12.18%, private and commercial transport - motorcycles and mopeds: 1.04%, public transport - buses: 4.77%, municipal transport - public fleet: 0.22%).

PUBLIC LIGHTING

The public lighting energy requirement in 2021 was about 67,400 MWh[31].
The conversion factor used for electricity, from MWh/year to tons of CO_2 is 0.401 (Standard IPCC).
Therefore, CO_2 emissions from Public lighting (tons of CO_2) for 2021 were estimated as follows: 67,400 MWh/year * 0.401 = 27,027.40 t CO_2e / year

ANNEX 5. WASTE

The Waste sector accounts for 4.18 % of the total CO_2 emissions in Bucharest. Estimations include energy requirements of waste collection, treatment, recycling, composting and landfilling facilities, as well as landfill gas related emissions.

Primary sources of data:

Bucharest Waste Management Plan (2020-2025)[32]
The JASPERS methodology for quantifying GHG emissions in waste and waste-to-energy projects, “based on standard emission factors for different waste management facilities which were estimated in a study by AEA Technology on Waste Management Options and Climate Change, financed by DG Environment and published in 2001”[33]

Table 60. C02 emissions from the waste sector by process

[30] MIT, Units & Conversions Fact Sheet (Derek Supple, MIT Energy Club), available at: https://indico.ictp.it/event/8008/session/3/contribution/23/material/slides/2.pdf
[31] https://spotmedia.ro/stiri/social/cat-costa-iluminatul-stradal-in-marile-orase-din-romania-si-ce-fac-primariile-din-bucuresti-oradea-cluj-napoca-brasov-si-iasi-ca-sa-isi-scada-consumul-de-curent
[32] https://doc.pmb.ro/institutii/primaria/directii/directia_servicii_publice/docs/planul_de_gestionare_a_deseurilor_din_mun_buc_2020_2025_20210827.pdf, pages 63-89
[33] https://jaspers.eib.org/knowledge/publications/calculation-of-ghg-emissions-in-waste-and-waste-to-energy-projects

PROCESS	TONS CO_2e / YEAR
Collection	3,133.31
Sorting	98.27
Composting of green waste	79.92
Composting of biodegradable waste	559.22
Recycling	52,812.90
Landfilling and biological treatment	1,443.17
Methane emissions	265,966.20
TOTAL - Waste	324,093.01

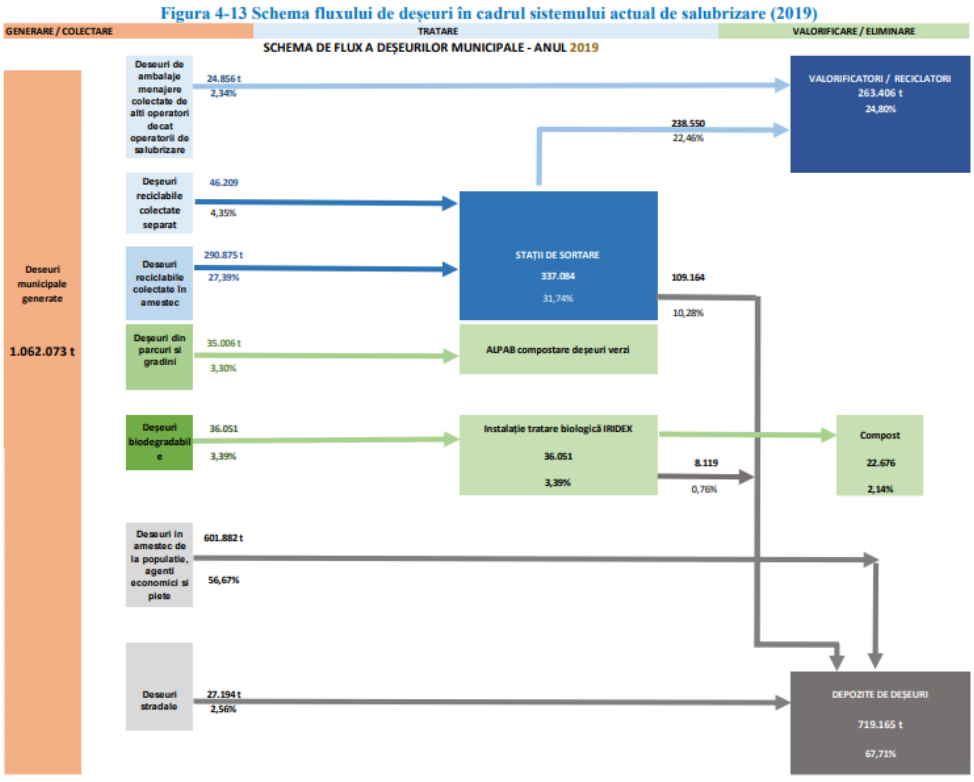
Source: Own calculations

Table 61. CO_2 emissions from the waste sector by scope

SECTOR	SCOPE	MWh / year	Tons CO_2e / year
WASTE	SCOPE 1	13,495.03	**3,603.17**
WASTE	SCOPE 2	134,135.36	**53,788.28**
WASTE	SCOPE 3	44,496.90	**17,590.83**
WASTE	EMISSIONS FROM LANDFILL GAS	-	**265,966.20**
WASTE	TOTAL	**192,127.29**	**340,948.48**

Source: Own calculations

Figure 44. Waste management flow and quantities (2019) - Bucharest municipality



Source: Bucharest Waste Management Plan (2020-2025)

WASTE TREATMENT (ELECTRICITY, DIESEL)

WASTE COLLECTION (DIESEL)

To estimate the energy requirement for waste collection (MWh / year - diesel fuel), fuel consumption for waste collection (liters) was first calculated, based on average consumption data.

'For the transport of waste to the different types of treatment / storage units, a general average transport distance of 40 km was considered' (JASPERS methodology, based on AEA study)[34]

Quantity of waste collected (2019): 1,062,073 tons

Assuming the capacity of a typical garbage truck of 18 tons, which consumes an average of 0.5 liters of diesel per km[35] (2 km / liter)

For the transport of waste to the different types of treatment / storage units, a general average transport distance of 40 km was considered[36]

Energy content of diesel is approximately 35.8 MJ/liter[37]

Based on the above data, the total number of collections was estimated: 1,062,073 tons / 18 tons = 59,004 collections (full trucks)

Distance travelled: 59,004 * 40 km = 2,360,000 km

Fuel consumption (liters / year): 2,360,000 * 0.5 = 1,180,000 liters / year

Energy requirement for collection (MJ / year): 1,180,000 liters * 35.8 MJ/liter = 42,244,000 MJ / year

Energy requirement for collection (MWh / year):

42,244,000 MJ / year * 0.000277778 = 11,734.45 MWh / year; (1MJ = 0.000277778 MWh)

This is equivalent to 3,133.09 tons of CO_2/year (conversion factor for diesel from MWh/year to tCO_2 is 0.267).

Table 62. Estimation of CO_2e emissions for waste collection in Bucharest (2021)

WASTE COLLECTION (2019)	DIESEL
QUANTITY OF WASTE COLLECTED IN 2019 (TONS)	1,062,073.00
AVERAGE TRUCK CAPACITY (TONS)	18.00
AVERAGE FUEL CONSUMPTION (LITRES / KM)	0.50
AVERAGE TRANSPORT DISTANCE (KM)	40.00
ENERGY CONTENT OF DIESEL (MJ / LITRE)	35.80
NUMBER OF COLLECTIONS (FULL TRUCKS)	59,004.06
DISTANCE TRAVELLED	2,360,162.22
FUEL CONSUMPTION (LITRES / YEAR)	1,180,081.11
ENERGY REQUIREMENT FOR COLLECTION (MJ / YEAR)	42,246,903.78
ENERGY REQUIREMENT FOR COLLECTION (MWH / YEAR)	11,735.26
TONS CO_2E / YEAR	**3,133.31**

Source: Own calculations

WASTE TREATMENT (ELECTRICITY, DIESEL)

a) WASTE SORTING

[34] https://www.mmediu.ro/app/webroot/uploads/files/RM_SEA_PNGD_v4.pdf, page 117

[35] T. Nguyen and B. Wilson, "Fuel consumption estimation for kerbside municipal solid waste (MSW) collection activities," Waste Management & Research, vol. 28, no. 4, pp. 289-297, 2010 (retrieved from https://www.researchgate.net/publication/383433518_Waste-to-energy_technology_selection_and_capacity_planning_in_a_multi-facility_waste_management_system)

[36] AEA, Waste management options and climate change, 2001, available at: https://ec.europa.eu/environment/pdf/waste/studies/climate_change.pdf, page 87; Raport de mediu pentru Plan Naţional de Gestionare a Deşeurilor şi Planul Naţional de Prevenire a Generării Deşeurilor, 2017, available at: https://www.mmediu.ro/app/webroot/uploads/files/RM_SEA_PNGD_v4.pdf, page 117

[37] MIT, Units & Conversions Fact Sheet (Derek Supple, MIT Energy Club), available at: https://indico.ictp.it/event/8008/session/3/contribution/23/material/slides/2.pdf

In 2019, solid municipal waste was treated in 7 sorting stations, located in Bucharest and Ilfov county. To estimate the electrical energy consumption per tonne for the sorting process, data from an environmental impact study on a sorting station with similar parameters and processes to the ones operating in Bucharest/Ilfov was used (one shift, mechanical and manual sorting).
Based on this estimation, the electrical energy consumption per tonne of waste is **0.727 kWh (8 MWh per 11,000 tons of waste)**[38]. **As such, the total energy consumption for all sorting stations (treating 337,084.40 tons of waste) is estimated at 245.06 MWh / year (electricity).**

ENERGY CONSUMPTION AND EMISSIONS FROM SORTING

Energy requirement for sorting per tonne of waste: 0.000727 MWh / t (electricity)
Quantity of waste sorted: 337,084.40 t / year
Energy requirement (electricity): 337,084.40 t / year * 0.000727 MWh / t = 245.06 MWh / year
This is equivalent with 98,27 t CO_2e (conversion factor for electricity, from MWh/year to tons of CO_2 is 0.401)

b) WASTE COMPOSTING

COMPOSTING OF GREEN WASTE

The Administration of Lakes, Parks and Recreation Bucharest (ALPAB) owns a shredder for green waste with which it obtains shredded materials that it uses as a support layer and filling. The composting station belonging to ALPAB operates based on the Environmental Authorizations in force. The same impact assessment study indicates an energy requirement for the composting process of 0.0833 KWh per tonne of waste (1 MW per 12,000 tons) from electricity, and 0.833 liters of diesel per tonne of waste (10,000 liters / 12,000 tons).

ENERGY CONSUMPTION AND EMISSIONS FOR COMPOSTING OF GREEN WASTE

Quantity of composted green waste (tons): 35,006 t
Energy requirement (electricity): By multiplying 35,006 tons of green waste composted in the facility of ALPAB by 0.0833, the estimated electricity consumption is 2,916.00 kWh / year (2.92 MWh / year).
By multiplying 35,006 tons of green waste composted in the facility of ALPAB by 0.833, the estimated number of liters of diesel is 29,160. This corresponds to 294.95 MWh / year (diesel): [(35,006 * 0.85)/1000] * 11.9 = 294.95 MWh / year (diesel density of 0.85 kg/liter, net calorific value of 11.9)

COMPOSTING OF BIODEGRADABLE WASTE

For in-vessel composting, several studies cited by Slorach et al. estimate an average range of electricity consumption of composting food waste from 93 kWh/t to 30 kWh/t in the best case.[39] **For practical reasons, an average of 61.5 kWh/t was used to estimate the electricity consumption associated with the composting of biodegradable waste (0.0615 MWh/tonne).**

ENERGY CONSUMPTION AND EMISSIONS FOR COMPOSTING OF BIODEGRADABLE WASTE

Energy requirement for composting of biodegradable waste (MWh/tonne of waste) - electricity: 0.0615 MWh / tonne
Quantity of composted biodegradable waste (tons): 22,676 t
Energy requirement (electricity): 22,676 tons * 0.0615 MWh / tonne = 1.394,57 MWh
This is equivalent with 559,22 tCO_2 (conversion factor for electricity, from MWh/year to tons of CO_2 is 0.401)

c) WASTE BIOLOGICAL TREATMENT

Biodegradable waste is subjected to the biological treatment process (aerobic fermentation) at the biological treatment facility owned by S.C. IRIDEX GROUP IMPORT EXPORT S.R.L.. Information on electricity consumption is provided as a total for the activity within the facility, which also includes landfilling operations (see section below).

[38] Environmental impact assessment study report - IWMS in Covasna county, available at: https://www.kvmt.ro/_f/raport_mediu/raportstudiuimpact_covasna-sept_2009_.pdf, page 23 and page 34
[39] Slorach et al., Energy demand and carbon footprint of treating household food waste compared to its prevention, 2019, available at: https://www.sciencedirect.com/science/article/pii/S1876610219311324/pdf?md5=48f1c75408152eb676263451a84c014c&pid=1-s2.0-S1876610219311324-main.pdf, page 20

WASTE RECYCLING

The electricity requirement of mechanical and physical recycling technologies is estimated between 300 and 700 kWh/tonne[40]. **An average of 500 kWh/tonne was used to estimate the electricity consumption associated with recycling processes (0.5 MWh/tonne).**
Note: Increasing recycling and composting rates is critical to reduce emissions associated with landfilling. Avoided emissions result from diverting waste from landfills through recycling and composting, reducing the need for new raw materials and preventing the release of greenhouse gases typically associated with landfilling.

ENERGY CONSUMPTION AND EMISSIONS FROM RECYCLING

Energy requirement for recycling per tonne of waste: 500 MWh / tonne (electricity)
Quantity of recycled waste (tons): 263,406 tons
Energy requirement (electricity): 263,406 tons * 0.5 MWh / tonne = 131,703 MWh
This is equivalent with 52.812,9 tCO_2 (conversion factor for electricity, from MWh/year to tCO_2 is 0.401)

WASTE LANDFILLING (DIESEL, ELECTRICITY)

a) OPERATIONS AT LANDFILLS

Typical landfill operations: waste is weighed on arrival and taken to the working area, where it is dumped, spread, and compacted. At the end of each day, soil or clay is used as a cover, which is also spread and compacted. Once the landfill reaches the planned depth, a final cover is added and compacted. The spreading and compaction of waste are the most energy-intensive activities, contributing significantly to CO_2 emissions.[41] Estimated energy requirement and emissions from landfill operations are presented below:

ENERGY CONSUMPTION AND EMISSIONS FROM OPERATIONS AT LANDFILLING (DIESEL FUEL)

- ➔ The AEA Technology Study (cited within the JASPERS methodology) indicates that a large landfill site in the UK uses 975,000 liters of diesel fuel per year and handles 2.2 million tons of waste. Based on this amount, an estimated at 0.4432 liters of diesel / tonne of waste / year is required[42].
- ➔ Average annual fuel consumption for diesel (liters / tonne): 0.4432 liters/tonne
- ➔ Fuel consumption for diesel (liters / year) was calculated by multiplying the total landfilled quantity by the average fuel consumption / tonne of waste): 746,963.00 tons * 0.4432 liters / tonne = 331,054 liters / year
- ➔ Fuel consumption (tons / year): (331,054 *0.85)/1000 = 281,39 tons / year (based on density of diesel)
- ➔ Energy requirement for diesel (MWh / year): 281,39 tons / year * 11.9 = 3,348.61 MWh / year
- ➔ This is equivalent to 894.08 tons CO_2e (conversion factor for diesel, from MWh/year to tons of CO_2 is 0.267).

ENERGY CONSUMPTION AND EMISSIONS FROM OPERATIONS AT LANDFILLING (ELECTRICITY)

Available data:

- ➔ For the waste management facility owned by SC IRIDEX SRL, the annual consumption is 939 MWh / year.[43] Note: this amount also includes the electrical energy required for biological treatment processes on site.
- ➔ For the landfill owned by SC ECO SUD SA, the consumption in 2015 was 430,31 MWh / year (430,311 kWh)[44]
- ➔ This is equivalent to 549,09 tons CO_2e (conversion factor for electricity from MWh/year to tCO_2 is 0.401)

b) ADDITIONAL EMISSIONS FROM LANDFILL GAS

In landfills, waste degrades and gas, mainly carbon dioxide (CO_2) and methane (CH_4) is released slowly over time. The primary concern in landfill emissions is methane. According to the IPCC's methodology for waste sector emissions[45], CO_2 emissions from the degradation of organic waste are excluded from national GHG inventories because they are considered biogenic and not a net addition to atmospheric carbon. **To ensure a comprehensive estimation of**

[40] Idem, page 49
[41] https://ec.europa.eu/environment/pdf/waste/studies/climate_change.pdf, page 94
[42] https://ec.europa.eu/environment/pdf/waste/studies/climate_change.pdf, page 94
[43] https://www.anpm.ro/documents/16241/32976582/IRIDEX+Revizuita+2017.pdf/a1454bef-de49-4b0c-a62e-79b5d50d8eb2
[44] https://www.anpm.ro/documents/22999/45523748/2019+DRAFT+Formular+de+solicitare+Vidra.pdf/2eb5f372-c550-4a46-94b7-f774e04e6d2b, page 20
[45] https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/5_Volume5/V5_3_Ch3_SWDS.pdf, page 6

emissions related to the Waste sector of Bucharest, the estimated emissions from landfill gas were added to the total CO_2e emissions based on energy requirement.

EMISSIONS FROM LANDFILLING (NON-RECOVERED METHANE)

Assuming an estimate of 149 m^3 biogas / tonne of municipal solid waste[46]
Assuming 50% of the assimilable carbon is released as methane and 50% as short-cycle carbon dioxide (74.5 m^3 of methane per tonne of municipal solid waste)[47]
Methane density is approximately 0.708 kg/m^3 (standard conditions: 0 degrees Celesius and 1 bara)[48].
Mass of CH_4 per tonne: 74.5 m^3 CH_4 / tonne * 0.708 kg/m^3 ≈ 52.75 kg CH_4 / tonne
Total CH_4 emissions: 746,963 tons of solid waste*52.75 kg CH_4/tonne ≈ 39,402,298.25 kg CH_4 (39,402.3 tons CH_4).
Assuming an average methane recovery rate of 75%[49], 29.551,7 tons of CH_4 are recovered, while the remaining 9.850,6 tons of CH_4 may be considered not recovered.
The Global Warming Potential (GWP) for non-fossil methane is 27 (over 100 years)[50]. This means that 1 tonne of methane has the same warming effect as 27 tons of carbon dioxide (CO_2) over 100 years.
The methane released through landfilling is equivalent with 265.966,2 tons CO_2e (9.850,6 t CH_4 * 27)

c) ENERGY PRODUCTION FROM LANDFILL GAS

The energy production for the landfill owned by SC IRIDEX GRUP SRL[51] is presented below, based on available data on the quantities of landfill gas extracted and recovered and the amount of electricity produced in 2019. This amount substituted the consumption of fossil fuels from non-renewable sources.

Extracted landfill gas: 5,450,849.0 m^3

Energy production: 10,049.35 MWh were produced using landfill gas in 2019[52]

Note: Avoided emissions associated with energy production were not subtracted from the total emissions for the Waste sector, but were reflected in the estimation of the total energy production of Bucharest.

WASTEWATER

The estimation of the energy required for wastewater treatment is based on the average electricity consumption per cubic metre of wastewater billed by Apa Nova Bucharest in 2021. The total energy use was calculated for the annual treated volume. The resulting energy consumption was then converted into CO_2e emissions using a standard emissions factor. Considering activities take place at the Glina facility outside the city boundary, the emissions fall under Scope 3 emissions.

ENERGY CONSUMPTION AND EMISSIONS - WASTEWATER

- ➔ In 2021, APA NOVA Bucharest invoiced 137.74 million m^3 of drinking water, 175.14 million m^3 of waste water and 23.17 million m^3 of industrial water [53]
- ➔ Average unit consumption of electricity per billed volume of wastewater - Apa Nova Bucharest: 0.24 kWh/m^3[54]
- ➔ Location: Glina, Ilfov county (Scope 3 - out of boundary)
- ➔ The electric energy consumption for the yearly volume of wastewater amounts to: 0.24 kWh/m^3 * 175,140,000 m^3 = 42.033.600 kWh / year (42,033.6 MWh / year)

[46] https://ec.europa.eu/environment/pdf/waste/studies/climate_change.pdf, page 96
[47] The assumption of 50% CH_4 and 50% CO_2 falls within the range offered by IPCC for landfill biogas composition. However, the guidelines recommend detailed modelling or direct measurement for more accurate estimates.
[48] https://www.engineeringtoolbox.com/methane-density-specific-weight-temperature-pressure-d_2020.html
[49] https://www.mmediu.ro/app/webroot/uploads/files/RM_SEA_PNGD_v4.pdf, page 117
[50] Greenhouse Gas Protocol (August 2024), available at: https://ghgprotocol.org/sites/default/files/2024-08/Global-Warming-Potential-Values%20%28August%202024%29.pdf, page 2
[51] Integrated Environmental Authorisation (2017), https://www.anpm.ro/documents/16241/32976582/IRIDEX+Revizuita+2017.pdf/a1454bef-de49-4b0c-a62e-79b5d50d8eb2
[52] https://www.scientificbulletin.upb.ro/rev_docs_arhiva/fullfd2_524938.pdf, page 8
[53] https://www.apanovabucuresti.ro/assets/pdf/Raport-anual-an-2021.pdf, page 10
[54] https://www.anrsc.ro/wp-content/uploads/2023/06/Raport-ANRSC-analiza-performanta-operatori.pdf, page 12

➔ This is equivalent to 16.855,47 tons CO_2e (multiplying 42,033.6 MWh by the 0.401 conversion factor).

Table 63. Estimation of CO_2e emissions for wastewater treatment in Bucharest (2021)

Total volume of billed wastewater (Apa Nova Bucharest, 2021)	Average unit consumption of electricity per billed volume of wastewater - Apa Nova Bucharest (kwh/m3)	Electric energy consumption for total volume of billed wastewater (KWh/year)	Electric energy consumption for total volume of billed wastewater (MWh / year)	Tons CO_2e
175,140,000.00	0.24	42,033,600.00	42,033.60	16,855.47

Source: Own calculations

ANNEX 7. INDIVIDUAL MEASURES

In the Climate Neutrality Action Plan for Bucharest, Bayesian methods were used to estimate the energy and CO_2 savings for each individual measure. This probabilistic approach allowed for a more accurate and data-driven estimation by incorporating prior knowledge from online sources, the allocated budget for each measure as well as observed data to refine predictions. Following this, the CO_2 emissions reductions were determined for each action based on their respective energy savings or CO_2 abatement potential. These estimates were then integrated into the overall energy demand of the city, ensuring that the cumulative impact of all measures was accurately accounted for in the final emissions reduction calculations for each action.

Action 1: Development and modernization of green public transport

Corresponding measures:

Development and modernisation of surface green public transport

1. Implementation of the Bucharest - Ilfov Metropolitan Train project
2. Modernizing the existing tram / trolleybus / bus depots and increasing the parking capacity for public transport
3. Passenger Information System in public transport stations
4. Integrated ITS system for public transport in the Bucharest-Ilfov region (public transport management)
5. Ticketing system for implementing the MaaS concept
6. Making public transport stations accessible for people with motor disabilities
7. Fast charging stations for electric buses
8. Modernisation of public transport fleet
9. Modernization and expansion of the trolleybus network on several sections
10. Modernization and expansion of Bucharest's tram network (line and public stations)

Development and modernisation of underground green public transport

11. Construction of M4 and M6 Metro Lines, including rolling stock

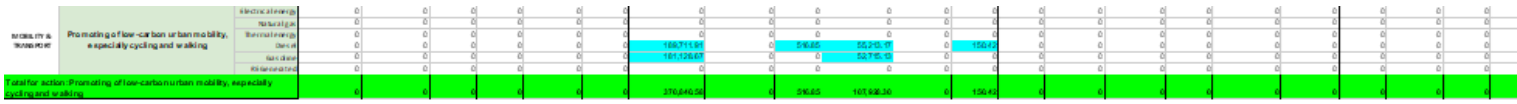
Logic behind estimations:

1. In an optimistic scenario, a potential **4%** reduction in emissions from private and commercial transport could be achieved, as suggested by an article from the World Resources Institute. This estimate considers factors such as the

impact and extent of the new infrastructure, the train's passenger capacity of 351 individuals, the total of 95 daily routes, and the anticipated rise in electricity consumption required to operate the new metropolitan train. Sources: 1, 2

2. An estimated **6%** reduction in emissions from public transport could be achieved, based on insights from source articles, the projected daily passenger volume for 2035 (380,000, as stated in the PMUD), and the scale of the planned investment. Sources: 4, 4.1, 4.2
3. An estimated **0,8%** reduction in emissions from private and commercial transport is anticipated, based on the available sources and the scale of the investment. Sources: 5, 5.1
4. An estimated **5%** reduction in emissions from public transport and a potential 0.5% reduction in emissions from private and commercial transport are projected, based on the available sources and the scale of the investment. Sources: 6, 6.1, 6.2
5. A potential **1%** reduction in emissions from private and commercial transport is anticipated, based on the consulted sources. Sources: 7, 7.1
6. A potential **0,001%** reduction in emissions from private and commercial transport is estimated, based on the consulted sources and the number of people with disabilities in Bucharest. Sources: 7, 7.1, 8
7. A potential **0,1%** reduction in emissions from private and commercial transport, along with a possible 10% increase in electrical energy demand for public transport, is anticipated based on the consulted sources. Sources: 9, 9.1, 9.2, 9.3
8. For trams, an increase of 24,850 MWh in electrical energy demand for public transport, along with a **2%** decrease in energy consumption associated with private and commercial transport, is expected based on the available data. Sources: 10, 10.1, 10.2. For non-polluting buses, an increase of 44,700 MWh in electrical energy demand for public transport, equivalent to the operation of 375 new electric buses, is projected, alongside a **4%** reduction in energy consumption associated with private and commercial transport. Sources: 11, 11.1, 11.2. For autonomous trolley buses, an increase of 14,250 MWh in electrical energy demand for public transport, equivalent to the operation of 120 new autonomous trolleybuses, is projected, alongside a **2%** reduction in energy consumption associated with private and commercial transport. Sources: 12, 12.1, 12.2.
9. A potential **0,5%** decrease in energy consumption associated with public and commercial transport is projected, based on the consulted sources and the scale of the investment. Sources: 13, 13.1
10. A potential **24%** decrease in energy consumption associated with public and commercial transport is projected, based on the consulted sources and the scale of the investment. Sources: 14, 14.1, 15, 14.1, 16, 14.1, 16.1
11. An estimated **12%** reduction in emissions related to private and commercial transport, as suggested by an article from the World Resources Institute, is linked to the projected daily passenger count of 126,000 for M6 and 360.000 for M4, the total of 1,215,988 registered vehicles in Bucharest, and the anticipated rise in electrical energy consumption required to operate the new metro line. Sources: 1, 1.1

Action 2: Promoting of low-carbon urban mobility, especially cycling and walking



Corresponding measures:

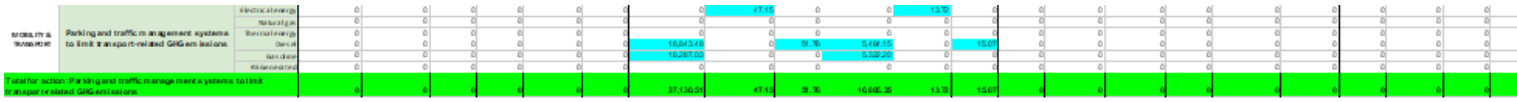
1. Velo network extended according to the masterplan, including complementary infrastructure (parking lots, rakes etc.)
2. Establishing a car-sharing system
3. Redevelopment of the Lujerului Railway Crossing by creating a green pedestrian promenade, dedicated to alternative transport
4. Development of a municipal network of recharging stations for EVs (public & private)
5. Expanding pedestrian zones
6. Low Emission Zone

Logic behind estimations:

1. A potential **1%** decrease in energy consumption associated with private and commercial transport is projected, based on the consulted sources, the scale of the investment, and the targeted 13.9% modal share for cycling by 2030, as outlined in the PMUD. Sources: 17, 17.1

2. A potential **0,2%** decrease in energy consumption associated with public transport is projected, based on the consulted sources and the scale of the investment. Additionally, a **0,1%** reduction in energy consumption for public and commercial transport is estimated, considering the impact of car-sharing initiatives, where one car-sharing vehicle is expected to replace 10 private vehicles, assuming an acceptance rate of 1%, according to the sources and the investment scale. Sources: 18, 18.1
3. A potential **0,04%** decrease in energy consumption associated with private and commercial transport is projected, based on the consulted sources and the scale of the investment, attributed to efforts promoting walking as a sustainable transportation alternative. Sources: 21, 21.1, 21.2
4. A potential **1,5%** decrease in energy consumption associated with private and commercial transport is projected, based on the estimated deployment of 200 EV charging stations, which could support approximately 300 electric vehicles per month. This shift is expected to result in an additional demand of approximately 304 MWh of electrical energy for EVs, according to the consulted sources and the scale of the investment. Sources: 20, 20.1, 20.2, 20.3
5. A potential **0,4%** decrease in energy consumption associated with private and commercial transport is projected, based on the scale of the investment. Sources: 21, 21.1, 21.2.
6. A potential **4%** decrease in energy consumption associated with public and commercial transport is projected, based on the consulted sources and the scale of the investment. Sources: 21, 21.1, 21.2.

Action 3: Parking and traffic management systems to limit transport-related GHG emissions



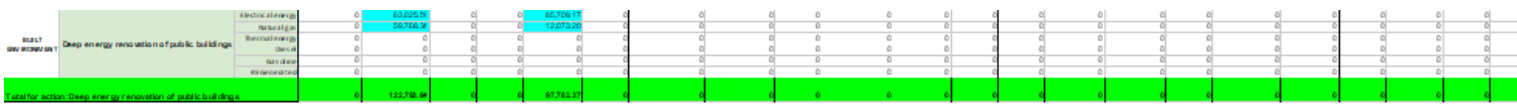
Corresponding measures:

1. Development of park & ride facilities
2. Parking system management
3. Modernization and expansion of the intelligent traffic light system (Traffic Management Bucharest - Ilfov) and prioritization of public transport vehicles

Logic behind estimations:

1. A potential **0,03%** decrease in energy consumption associated with private and commercial transport is projected, based on the consulted sources and the scale of the investment, considering a parking facility with a capacity of 4,500 cars. Sources: 22, 22.1
2. This investment will not lead to a reduction in energy consumption associated with private and commercial transport; however, it will play a significant role in optimizing traffic flows, improving overall mobility efficiency. Sources: 23, 23.1
3. A potential **0,6%** decrease in energy consumption associated with public and commercial transport is projected, based on the estimated deployment of 200 EV charging stations, which could support approximately 300 electric vehicles per month. This transition is expected to result in an additional demand of approximately 304 MWh of electrical energy for EVs, according to the consulted sources and the scale of the investment. Sources: 24, 24.1, 24.2.

Action 4: Retrofit of public buildings



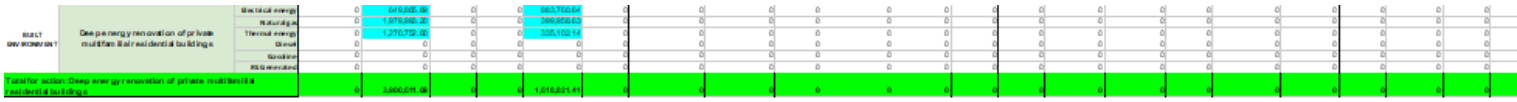
Corresponding measures:

1. Energy rehabilitation and modernization of administrative or cultural buildings (managed by the Municipality)
2. Energy renovation of educational institutions (managed by the six Districts of the Municipality)
3. Consolidation, rehabilitation and increase of energy efficiency of public buildings with a sanitary destination classified at seismic risk
4. Seismic risk consolidation, energy rehabilitation and modernization of central institutions public buildings

Logic behind estimations:

1. A potential reduction in energy consumption of 15/20-35% is projected for cultural public buildings, which are estimated to represent approximately 1% of all public buildings. This estimation is based on the energy savings observed in similar projects, the anticipated impact of integrating renewable energy technologies, and the overall potential for energy efficiency improvements within Romanian buildings. Sources: 25, 25.1
2. Based on the available information, it is estimated that this project could achieve energy savings in the range of 40-60% for the educational buildings included in the project. These buildings are estimated to account for approximately 65% of all public buildings by surface area. Sources: 26, 26.1, 26.2, 26.3
3. Based on the available information, it is estimated that this project could achieve energy savings in the range of 50-75% for the six hospitals included in the project, which are estimated to account for approximately 4% of all public buildings by surface area. Sources: 27
4. Based on the available information, it is estimated that this project could achieve energy savings in the range of 40-60% for the public buildings included in the project, which are estimated to account for approximately 2% of all public buildings by surface area. Sources: 26, 26.1, 25, 25.1.

Action 5: Moderate or deep energy renovation of private residential buildings



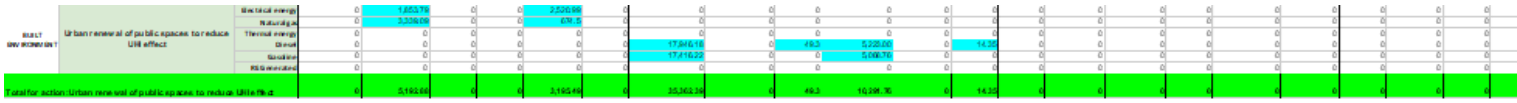
Corresponding measures:

1. Energy renovation of multifamily residential buildings
2. Affordable energy for vulnerable households
3. PED (positive energy districts)

Logic behind estimations:

1. Based on the available information and the project budget, it is estimated that this project could achieve energy savings of approximately **35%** for all residential buildings in Bucharest. Sources: 28, 28.1, 28.2, 28.3, 28.4.
2. Based on the available information and the project budget, it is estimated that this project could achieve energy savings of approximately **2,5%** for all residential buildings in Bucharest. Sources: 28, 28.1, 28.2, 28.3, 28.4.
3. Based on the available information and the project budget, it is estimated that this project could achieve energy savings of approximately **2,5%** for all residential buildings in Bucharest. Sources: 28, 28.1, 28.2, 28.3, 28.4.

Action 6: Urban renewal of public spaces to reduce UHI effect



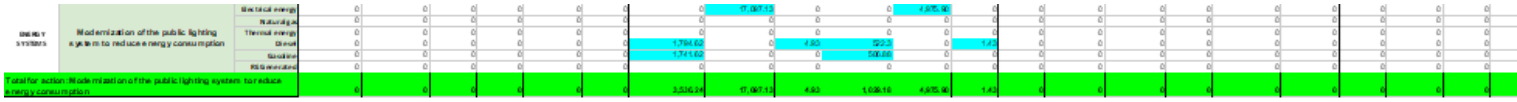
Corresponding measures:

1. Urban renewal of intermodal hubs with metro line connection
2. Urban renewal Podul Calicilor - Domnița Bălașa public area
3. Urban renewal of Calea Moșilor public area
4. Urban renewal of North Railway Station - Atelierele Grivița – Carpați railway junction area
5. Urban renewal of North Railway Station - Calea Griviței axis towards Amzei area
6. Urban renewal of Lacul Morii - Giulești-Sârbi public area
7. Greener schoolyards
8. Pedestrian & micro-mobility focused reconfiguration of boulevards
9. Rehabilitation of the network of parks & green areas in the housing complexes
10. Redevelopment of unused or improperly used public land
11. Enhancement of public monuments by reconfiguring adjacent public space
12. PPP for the regeneration of public space

Logic behind estimations:

1-12. Assuming a focus on expanding green spaces with grown trees, implementing cool pavements and other nature based solutions, it is estimated that energy consumption for public buildings, residential buildings, and tertiary buildings in the immediate vicinity could potentially decrease by **8-20%,** based on the consulted sources and the scale of the investment. Additionally, a 0,4% reduction in energy consumption for private and commercial transport is projected, based on the consulted sources and the scale of the investment. Sources: 29, 29.1, 29.2, 29.3, 29.4

Action 7: Modernization of the public lighting system to reduce energy consumption



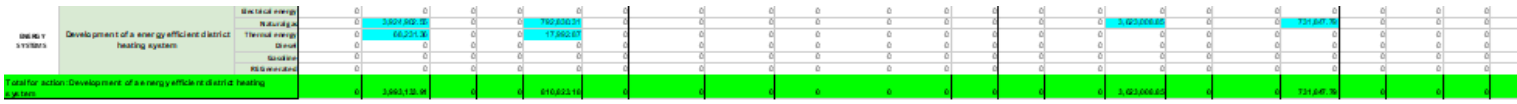
Corresponding measures:

1. Integrated projects for rehabilitation / modernization of urban infrastructure elements related to the public lighting system (network, poles, lighting fixture).
2. Interactive map (GIS) of the public lighting system in the Municipality of Bucharest (SIP) and monitoring/control of energy consumption of each ignition point
3. Modernization and energy proofing of the intelligent public lighting system in parks
4. Modernization of the public lighting system through the implementation of the remote management system and the use of devices with LED technology (by replacing the existing sodium vapor lighting devices with modern devices with LED technology) on traffic arteries.

Logic behind estimations:

1. Assuming a widespread implementation of LED technology and smart controls, this project could potentially achieve a 20-40% reduction in the energy consumption of the public lighting system. Additionally, it may indirectly benefit the private and commercial transport sector by encouraging walking and greater use of public transport, potentially leading to a **0,05-0,1%** reduction in energy requirements for the sector. Sources: 30, 30.1, 30.2, 30.3, 30.4
2. While this project does not directly involve replacing lighting fixtures, it can facilitate more efficient operation and help identify areas for optimization. This could potentially result in a 5-15% reduction in energy consumption for the public lighting system. Additionally, it may contribute to a marginal decrease in energy requirements for the private and commercial transport sector, estimated at **0,01-0,03%,** by encouraging walking and increased use of public transport. Sources: 30, 30.1, 30.2, 30.3, 30.4
3. By implementing energy-efficient lighting and smart controls, capital repair and extension of public lighting, this project could potentially achieve a 30-50% reduction in energy consumption for park lighting, enhancing sustainability and operational efficiency. Sources: 30, 30.1, 30.2, 30.3, 30.4
4. The project focuses on more than 100 traffic arteries and involves replacing existing sodium vapor lamps with LED technology. This targeted approach has the potential to achieve a 40-60% reduction in energy consumption for lighting on these specific roads, improving efficiency and reducing operational costs. Sources: 30, 30.1, 30.2, 30.3, 30.4.

Action 8: Development of an energy efficient district heating system



Corresponding measures:

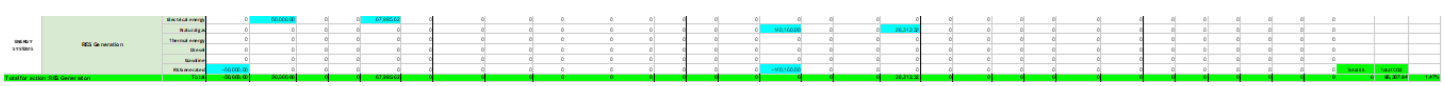
1. Modernization of the thermal networks related to the Aviation neighborhood
2. Transformation of the Casa Presei Thermal Heat Only Boiler Plant (HOB)
3. The transformation of the Ferentari 72 Heat Only Boiler Plant (HOB)
4. Modernization of 11 district heating group substations
5. Rehabilitation of the district heating networks
6. Installation of smart metering
7. Modernization of the main transmission thermal pipelines
8. Modernization of distribution thermal networks
9. Refurbishment of former gas power plants for biomass cogeneration

10. Ongoing upgrade of district heating group substations
11. Equipping consumers fed from group substations with building substations
12. Implementation of the SCADA system for the district heating system of Bucharest

Logic behind estimations:

1. Due to the small budget and limited scope of the project, the impact on overall SACET consumption is expected to be minimal. However, this project is estimated to have a 10% impact on the thermal energy consumption of the connected buildings, contributing to improved energy efficiency within those specific facilities. Sources: 32. 32.1
2. Assuming a conservative overall efficiency improvement of 15% compared to the current SACET average, and based on the industry standard cited in the sources, this project could contribute to a reduction in natural gas consumption for the SACET sector. Given that thermal energy and natural gas have the same emissions factor in the baseline, this improvement could lead to a 2-6% reduction in the total natural gas required by the SACET system across all sectors that rely on thermal energy. Sources: 31, 31.1
3. Assuming a conservative overall efficiency improvement of 10% compared to the current SACET average, and based on the industry standard cited in the sources, this project could contribute to a reduction in natural gas consumption for the SACET sector. Given that thermal energy and natural gas have the same emissions factor in the baseline, this improvement could lead to a 1-2% reduction in the total natural gas required by the SACET system across all sectors that are fueled with thermal energy. Sources: 32, 32.2
4. Due to the low budget, the project is estimated to have a 10-15% impact on the thermal energy consumption of the buildings connected to the power plants, leading to some improvement in energy efficiency for these specific facilities. Sources: 32, 32.1
5. Assuming an average reduction in heat loss of 15% due to pipe replacement, insulation improvements, and leak repairs, this will directly reduce the amount of thermal energy that needs to be generated by SACET. Based on the cited sources and the project budget, this could result in energy savings of between 5,1-17% for the system. Sources: 32, 32.2
6. According to the cited sources, these interventions could have a 5% impact on the overall thermal energy requirements across all sectors. This reduction would be attributed to faster leak detection, more efficient operation of power plants, and enhanced demand-side management. Sources: 32, 32.2
7. Assuming an average reduction in heat loss of 15% due to pipe replacement, insulation improvements, and leak repairs, this will directly reduce the amount of thermal energy that needs to be generated by SACET. Based on the cited sources and the project budget, this could lead to energy savings of between 2-5% for the SACET system. Sources: 32, 32.2
8. Assuming an average reduction in heat loss of 15% due to pipe replacement, insulation improvements, and leak repairs, this will directly reduce the amount of thermal energy that needs to be generated by SACET. Based on the cited sources and the project budget, this could lead to energy savings of between 0.5-2% for the SACET system. Sources: 32, 32.2
9. The project has the potential to reduce reliance on natural gas and, according to the sources and the overall project budget, could lead to a reduction of about 3,5% in SACET energy requirements. Sources: 32, 32.2
10. According to the sources and the size of the investment, this project could reduce thermal energy requirements for buildings by 5% through optimizing flow rates and reducing losses at the connection points. Sources: 32, 32.2
11. The modules designed to improve control and metering at the consumer level could potentially lead to more efficient energy use within buildings, reducing overheating and enhancing comfort. This could result in a 5% reduction in energy consumption at the building level in those buildings where the modules are installed. Sources: 32, 32.2
12. According to the cited sources, these interventions could have a 4% impact on the overall thermal energy requirements across all sectors. This reduction would be due to faster leak detection, more efficient operation of power plants, and improved demand-side management. Sources: 32, 32.2

Action 9: RES Generation



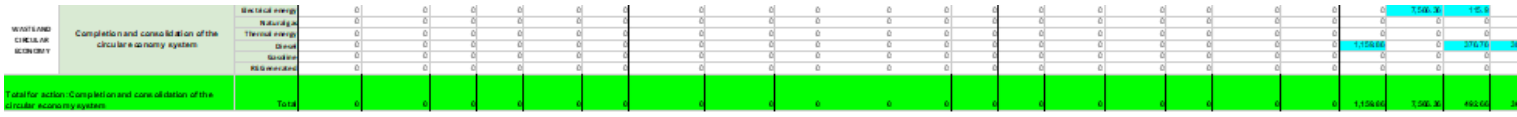
Corresponding measures:

· Development of new solar and geothermal capacities

Logic behind estimations:

· According to the sources and size of investment, the project could imply a setup of a 20-50 MWth installation for geothermal energy and a 50-100 MWp solar installation for solar energy. Sources: 33, 33.1, 33.2

Action 10: Completion and consolidation of the circular economy system



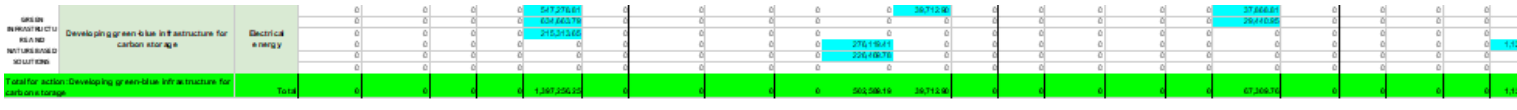
Corresponding measures:

1. Organization of the bio-waste and green waste management system in the City of Bucharest
2. Management of construction and demolition waste from Bucharest-Ilfov and the creation of voluntary intake center(s)
3. Construction of a waste sorting facility according to the waste management plan of the Municipality of Bucharest
4. Elaboration and implementation of a plan for the management of medical waste from all medical units within the radius of the city of Bucharest
5. Purchase of land outside Bucharest and development of an integrated waste management system (including mechanical treatment and anaerobic digestion)
6. Implementation of smart solutions in order to increase the efficiency of the waste management system
7. Integrated waste management at district level
8. Digitalization of (selective) waste collection fleet
9. Monthly bulky waste / WEEE collection campaigns

Logic behind estimations:

1. Based on similar projects and studies cited in the sources, such a project with its allocated budget could lead to a 20-30% energy savings from the composting and biological treatment phases. Sources: 34, 34.1, 34.2
2. Based on similar projects and studies cited in the sources, such a project with its allocated budget could lead to a 1-5% energy savings from the waste collection phase. Sources: 35, 35.1, 35.2
3. Based on similar projects and studies cited in the sources, such a project with its allocated budget could lead to a 10-20% energy savings from the waste sorting phase. Sources: 36, 36.1, 36.2
4. The plan would not have any impact on the energy savings of the waste sector, however it remains a required step for setting up state-of-the art waste management infrastructure in Bucharest.
5. Based on similar projects and studies cited in the sources, the project may result in a 20-30% reduction in Scope 3 energy associated with the waste sector. Sources: 37, 37.1, 37.2
6. Due to the limited budget of the project, a possible 0.1% reduction in energy associated with the waste
7. Based on similar projects and studies, such improvements can lead to energy savings of approximately 5-10% over Scope 1 and Scope 2 energy types in the waste sector. Sources: 38, 38.1
8. By optimizing waste collection routes, reduce fuel consumption and improve overall efficiency in waste management operations, according to the cited sources, this project could lead to an estimated 5-15% reduction in energy associated with waste collection. Sources: 39, 39.1, 39.2
9. By optimizing waste collection routes, reduce fuel consumption and improve overall efficiency in waste management operations, according to the cited sources, this project could lead to an estimated 0,5-2,5% reduction in energy associated with waste collection.

Action 11: Developing green-blue infrastructure for carbon storage



Corresponding measures:

1. The creation of the green-blue-yellow infrastructure along the Colentina river, including a promenade route for pedestrians and cyclists and shoreline consolidation works
2. Support for the protection, conservation and promotion activities aimed at the Văcărești Natural Park and other local protected natural areas that will be defined
3. Expansion and redesign of the network of parks in the city of Bucharest
4. Protection and rehabilitation of historical parks, including landscape as applicable, shoreline consolidation works for the water bodies
5. The development of biodiversity corridors along the streets
6. Creation of urban forests
7. Greening the gray - pilot intervention
8. The green belt of the city of Bucharest
9. The creation of the green-blue infrastructure along Dâmbovița river, including a a promenade route for pedestrians and cyclists and shoreline remodeling works

Logic behind estimations:

For each measure out of this action the allocated amount of tons CO_2/year may be abated. That quantity was divided proportionally between the 5 different districts. The proposed budget for each action combined with GIS information regarding the vegetation present in Bucharest allowed calibration of the CO_2 amount allocated to each measure. After consulting sources 40, 40.1, 40.2, the specific budget of each measure, the area of implementation of each measure and the vegetation typology extracted from the GIS assets, the following quantities of CO_2 to be abated were determined for each measure:

1. 151.139 (55.239 tons CO_2/year+95.900 tons CO_2/year)
   A potential 0,1% decrease in energy consumption associated with private and commercial transport is projected, based on the consulted sources and the scale of the investment, attributed to initiatives encouraging walking as a sustainable mode of transport. Sources: 21, 21.1, 21.2
2. 33.373 tons CO_2/year
3. 224.025 tons CO_2/year (32.223 tons CO_2/year + 191.802 tons CO_2/year)
4. 799.811 tons CO_2/year (46,032.00 tons CO_2/year + 40,278.00 tons CO_2/year + 281,948.00 tons CO_2/year + 166,867.00 tons CO_2/year+ 155,359.00 tons CO_2/year + 109,327.00 tons CO_2/year)
5. 9.206 tons CO_2/year
6. 57.540 tons CO_2/year
7. 690 tons CO_2/year.
8. 345.243 tons CO_2/year
9. 408.537 tons CO_2/year

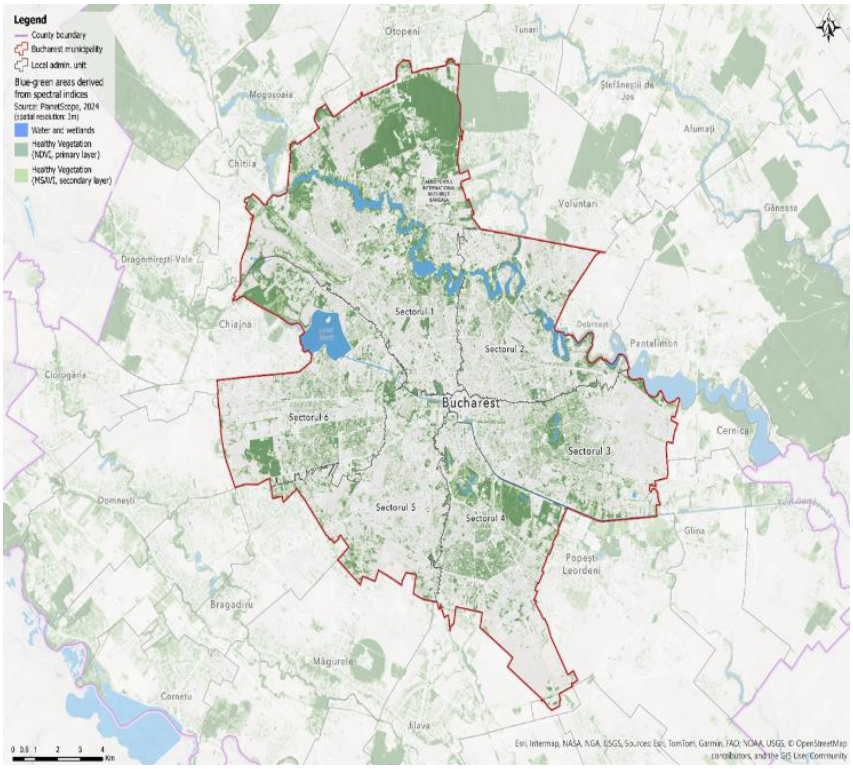
A potential 3% decrease in energy consumption associated with private and commercial transport is projected, based on the consulted source documents and the scale of the investment. Sources: 21, 21.1, 21.2

Assuming the expanding green spaces and implementing cool pavements, it is estimated that energy consumption could potentially decrease by 2-4% for public buildings, residential buildings, and tertiary buildings in the immediate vicinity. Additionally, a 0,2% reduction in energy consumption for private and commercial transport is projected, based on the consulted sources and the scale of the investment. Sources: 29, 29.1, 29.2, 29.3, 29.4

Figure 45. Tree Cover Density and Small Woody Features, resampled at 5m spatial resolution, data from Copernicus LMS

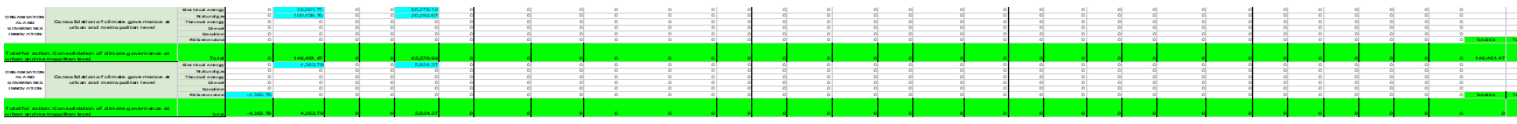
Source: Author

Figure 46. Urban blue-green areas obtained by combining NDVI and MSAVI spectral indices - filtered for presence of healthy vegetation



Source: Author

Action 12: Consolidation of climate governance at urban and metropolitan level



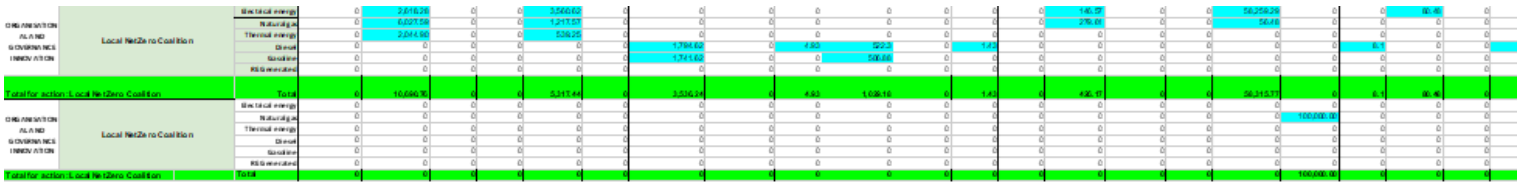
Corresponding measures:

1. Urban green & blue infrastructure planning for Bucharest municipality
2. Implementing separately collected rainwater and sustainable urban drainage systems in Bucharest
3. Intelligent air quality and pollen forecast system
4. Public-Private Partnerships for climate and green Initiatives
5. Register of green spaces
6. Ongoing update of the municipality Urban Data Bank
7. Solar energy/ renewable potential assessment
8. Technical studies for the transition to cogeneration power small scale plants at block level
9. Climate neutrality capacity building program for public servants
10. Appointment of Energy Managers across all districts
11. Decrease number of visits to public administration offices through digitalisation
12. Enforcement of sanctions for non-compliance on waste management
13. Public procurement framework update
14. Renovation packages of heritage buildings for private owners

Logic behind estimations:

1. This plan is a crucial step towards achieving climate neutrality, however, as a standalone project, it will not have any energy savings on any of the sectors.
   Indirectly, increased green spaces can reduce the urban heat island effect, leading to lower building cooling demand (estimated <1% savings in building energy use). Sources: 41, 41.2, 41.2, 41.4
2. It does not directly contribute to GHG reduction.
3. No direct energy savings.
4. Highly variable energy savings depending on specific projects. Could be significant if partnerships focus on energy efficiency retrofits in buildings, renewable energy deployment, or sustainable transport.
5. 5754 tons CO2/year
6. No direct energy savings.
7. Potentially significant in the long term, depending on the scale of solar energy adoption. A detailed assessment could identify optimal locations and incentives for rooftop solar installations. Estimated potential of 0.1-2% RE production in building electricity consumption if aggressively implemented and properly financed.
8. No direct energy savings, however, a crucial step towards the implementations of other actions that would lead to significant energy savings, as highlighted in other actions from this Plan.
9. No direct energy savings. However, it is mandatory to improve knowledge and skills among public servants that will lead to better implementation of climate policies and projects, resulting in future energy savings.
10. A possible 1-5% in energy savings from all buildings, by identifying and implementing energy efficiency measures. Sources: 41, 41.2, 41.2, 41.4
11. Potentially significant in the long term.
12. No direct energy savings, however, a crucial step towards the implementations of other actions that would lead to significant energy savings, as highlighted in other actions from this Plan.
13. 14. No direct energy savings. However, improved architecture and urban design would have significant long-term impacts on energy consumption in all sectors, by promoting compact urban development, efficient transport systems, and energy-efficient buildings.

Action 13: Local NetZero Coalition



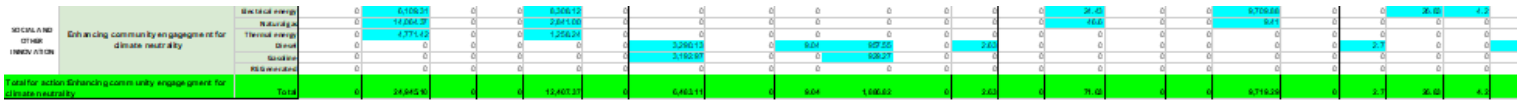
Corresponding measures:

1. Local NetZero Coalition promotion and awareness campaigns
2. Post-university programs for climate neutrality
3. Green grants for climate-neutral communities and lifestyles (non-reimbursable funding for NGOs, for neighbourhood-level projects)
4. Energy efficiency and CO_2 abatement measures in the industrial and private sector

Logic behind estimations:

1. A possible 0-1% in energy savings from all sectors, by raising awareness and promoting behavioral changes related to climate neutrality.
2. By educating and training professionals in fields related to climate neutrality, this project could lead to a possible 0-1% energy savings from all sectors
3. A possible 0-1% in energy savings from all sectors by financing interventions related to climate neutrality.
4. A possible 0-1% in energy savings from all sectors by financing interventions related to climate neutrality.

Action 14: Enhancing community engagement for climate neutrality



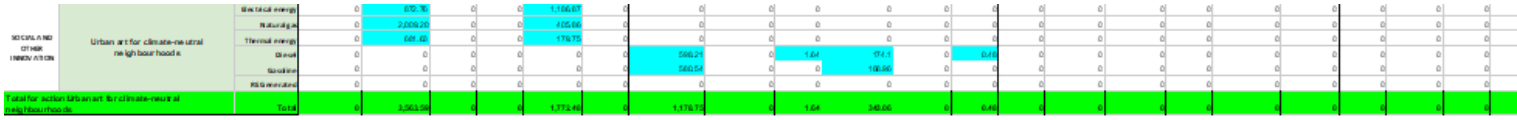
Corresponding measures:

1. Community Engagement and Social Pressure Mapping Initiative
2. Public Awareness Campaigns
3. Implementation of pilot projects to raise awareness among citizens for the selective collection of waste at the level of the Municipality of Bucharest
4. Awareness raising, education and activation for energy sustainability (campaigns for green energy, energy efficiency and energy communities)
5. Interactive digital monitoring platform (digital dashboard for tracking climate neutrality progress with citizen reporting via digital app)
6. Technological solutions for calculating and presenting carbon footprints
7. Education, promotion, and incentives for public transport and non-motorized travel

Logic behind estimations:

1. A possible 0-1 in energy savings from all sectors by encouraging behavior change related to climate neutrality.
2. A possible 0-1% in energy savings from the wastewater sector and from the buildings sector due to mitigation of the heat island effect.
3. A possible 0-1% in energy savings from the waste sector due to behavior change.
4. A possible 0-1% in energy savings from the buildings sector.
5. A possible 0-1% in energy savings from the buildings sector.
6. A possible 0-1% in energy savings from the buildings sector.
7. A possible 0-1% in energy savings from the transport sector.

Action 15: Public art for climate-neutral neighborhouds



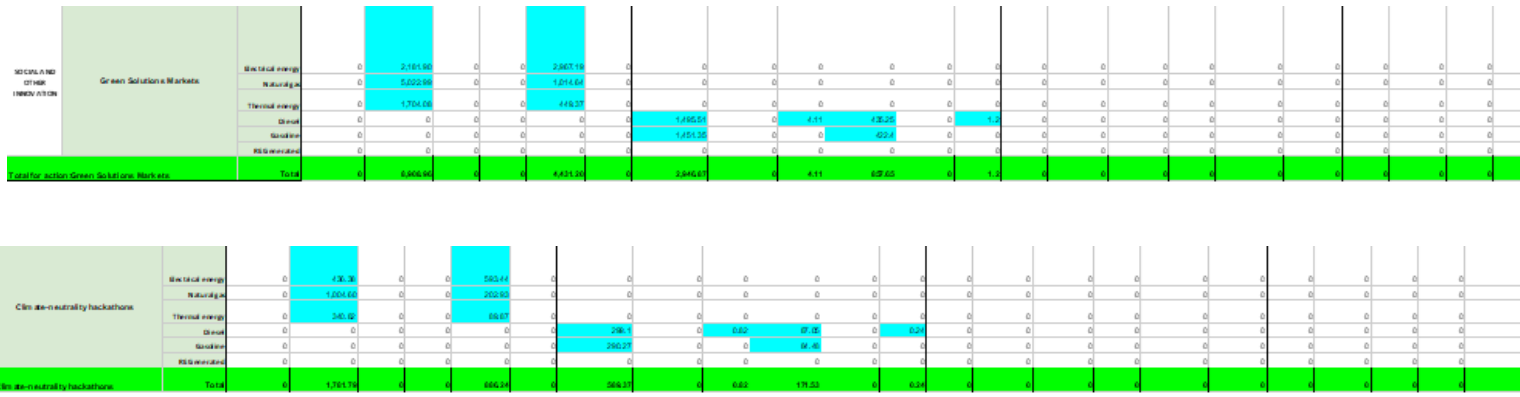
Corresponding measures:

· Funding for neighborhood street art works on climate neutrality topics using only paints that capture the smog and air pollutants.

Logic behind estimations:

· A possible 0-1% in energy savings from the buildings and transport sector due to raising awareness.

Action 16: Green Solutions Markets & Climate-neutrality hackathons



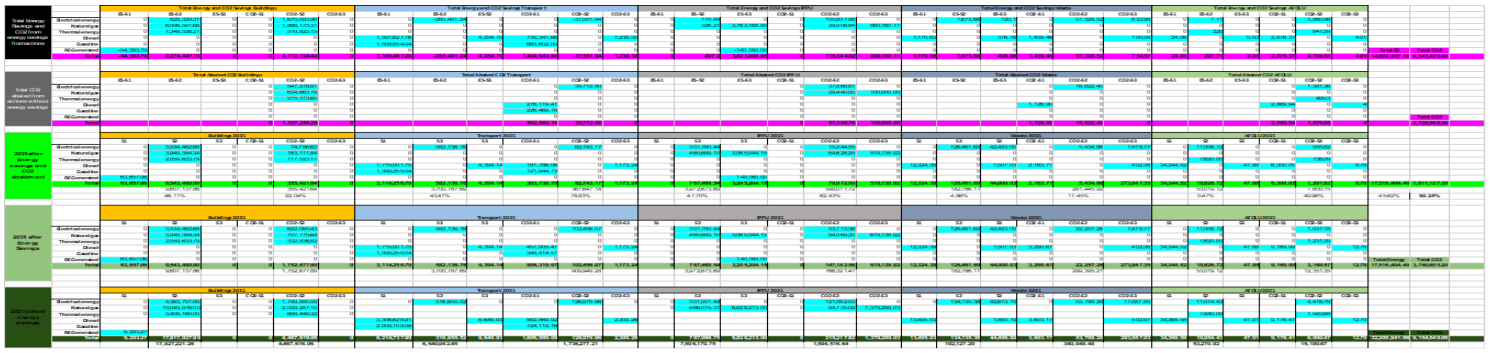
Corresponding measures:

1. Events for promoting innovative and sustainable technological solutions and concepts
2. Hackathons on climate neutrality topics for the innovation ecosystem

Logic behind estimations:

1. A possible 0-1% in energy savings from the buildings and transport sector.
2. A possible 0-1% in energy savings from the buildings and transport sector.

Table 64.Calculations



Source: Author

Table 65. Sources for calculations

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2	https://www.ncesc.com/how-many-watts-does-it-take-to-run-a-train/
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4.1	Electric Mobility Europe: Trolley Systems 4 Smart Cities
4.2	Reducing car use through parking policies: an evidence review
5	QUALITY OF BUS SERVICES PERFORMANCE: BENEFITS OF REAL TIME PASSENGER INFORMATION SYSTEMS
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9.3	DEPLOYING CHARGING INFRASTRUCTURE FOR ELECTRIC TRANSIT BUSES Best practices and lessons learned from deployments to date
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10.2	https://research.monash.edu/en/publications/modelling-the-direct-impact-of-tram-operations-on-traffic
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14.1	SWOT ANALYSIS OF PUBLIC TRANSPORT SYSTEM IN BUCHAREST
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