



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*



**Municipiul
Oradea**



ORADEA®



**ZONA
METROPOLITANĂ
ORADEA**

2035

CLIMATE NEUTRALITY CONTRACT MUNICIPALITY OF ORADEA

DISCLAIMER

This document 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 adhering to 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.

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ACRONYMS

- ADLO (Oradea Local Development Agency)
 D
- AFOLU (Agricultural, Forestry, and Land Use)
- AI (Artificial Intelligence)
- CCU (Carbon Capture and Utilisation)
- CEF (Connecting Europe Facility)
- CERV (Citizens, Equality, Rights and Values)
- CO2 (Carbon dioxide)
- CSA (Community Supported Agriculture)
- CWMP (County Waste Management Plan)
- DUT (Driving Urban Transitions)
- EAAS (Energy-as-a-Service)
- EIB (European Investment Bank)
- EPR (Extended Producer Responsibility)
- ESCO (energy service company)
- EUI (European Urban Initiative)
- EV (Electric Vehicle)
- GHG (Greenhouse gas)
- HA (hectares)
- HVAC (Heating, Ventilation and Air Conditioning)
- IDA (Intercommunity Development Association)
- IOT (Internet of Things)
- IPCC (Intergovernmental Panel on Climate Change)
- IPPU (Industrial Processes and Product Use)
- IUDS (Integrated Urban Development Strategy)
- LED (Light-emitting diode)
- MA (Metropolitan Area)
- MEL (Monitoring, Evaluation and Learning)
- N/A (Not applicable)
- NIPECC (National Integrated Plan for Energy and Climate Change)
- NRRP (National Recovery and Resilience Plan)
- nZEB (nearly Zero Emission Building)
- NW (North-West)
- OMA (Oradea Metropolitan Area)
- PPP (Public-Private Partnership)
- PV (Photovoltaic)

- **RDA (Regional Development Agency)**
- **RES (Renewable Energy Sources)**
- **SECAP (Sustainable Energy and Climate Action Plan)**
- **SUMP (Sustainable Urban Mobility Plan)**
- **TDP (Territorial Development Plan)**

I.COMMITMENTS

FORMAL AMBITION

Briefly present (in 2-3 pages) the following aspects:

- The local climate neutrality context, highlighting the strategic directions adopted at the local level.
- The significance and / or opportunities associated with developing this Climate Neutrality Action Plan, particularly in relation to relevant European strategic priorities.
- The vision (and / or goal and / or objectives) and targets officially endorsed by this Action Plan for achieving climate neutrality, highlighting the planned reductions in CO2 emissions.
- The key priorities delineated within the Climate Neutrality Action Plan.
- The exclusion areas (if applicable).
- The overall direct impact expected from implementing the interventions outlined in this Action Plan, together with the total estimated budget.

Oradea has undertaken some of the most ambitious and impactful green interventions of any city in Romania. In 1989, there were 315 district heating systems operational in Romania. Of these, 266 have in the meantime closed down, and of the remaining 49, most function well below originally planned capacity and with important sustainability issues.

The City of Oradea now has the the highest performing district heating system in Romania, with investments in modernisation totaling €200 million between 2014 and 2023 (covering around 85% of the network), serving over 60.000 connected users, and is currently developing a new high-efficiency cogeneration unit. The City has invested in the development of a new and efficient co-generation plant, the replacement of the main distribution pipes, and the replacement of the secondary distribution pipes. Furthermore, the municipality has made significant investments in renewable energy, with two existing photovoltaic parks created and plans for the development of five additional ones, along with investments in geothermal energy and hydrogen production and storage.

Increasing the accessibility to green spaces has also been a priority for the City of Oradea, with over 80% of the population of the city having access to green areas within a five-minute walking distance, and plans to increase this share to over 91% by 2030 (as part of the 'Green City Programme'). The urban regeneration of the green areas in residential neighbourhoods and rehabilitation of parks remains a priority, along with their expansion. Projects focused on increasing walkability have been implemented to expand the pedestrian street network in the city centre, and over €65 million is expected to be mobilised for pedestrianisation projects in Oradea from the 2021-2027 North West Regional Operational Programme.

With regards to waste management, a functional integrated system has been implemented in Bihor County, with six collection areas. Bihor County is widely considered to have the most modern solid

waste management system in Romania, and has the highest recycling rate among the 42 counties in Romania. The sorting station, composting station, waste deposit and mechano-biological treatment station located in the municipality of Oradea serve the entire Oradea Metropolitan Area. While recycling rates exceed by three times the national average, continuous efforts are underway to increase separate collection through a stronger focus on ecological education and awareness. This focus is reflected in targeted soft interventions included in the Climate Neutrality Action Plan (CNAP).

The Climate Neutrality Action Plan aims to build on the myriad of completed and unde-preparation green efforts in the City of Oradea, and provide a clear, comprehensive, and realistic blueprint for achieving climate neutrality in Oradea by 2035 – with no exclusion areas considered. The level of GHG emissions in Oradea is already well below the EU average, and the measures undertaken in the past years (e.g. complete modernization of the district heating system) have played a key role in achieving this result.

Overall, the actions from the Climate Neutrality Action Plan aim to reduce GHG emissions by 82% by 2035, as compared to the baseline from 2020.

For the 2023-2035 period, we aim to mobilize around €2.1 bln. to finance the interventions required to achieve climate neutrality in Oradea.

Only 20% of this budget will come from local sources (own revenues), while 50% is expected to be covered by the 2021-2027 and post-2027 EU programmes. The Municipality has already prepared a portfolio of mature projects for various EU programmes, especially the 2021-2027 North-West Regional Operational Programme, the Transport and Sustainable Development programmes. Private funding, under the form of money allocated by household associations (residents), companies, universities or NGOs will contribute with other 20%, also encouraged by the availability of various incentives (tax reductions, EU and national co-financing) and constraints (local regulations, such the energy renovation tax already introduced by the Municipality since 2021). Finally, loans and national funding are expected to cover around 10% of total climate neutrality investment needs for the next 12 years. The table below includes a summary of planned allocations by fields of action, and the expected impact of each package of actions. The document provides more details on planned actions.

Table 1. Summarised Costs and CO2 Reductions by Field of Action

FIELDS OF ACTION	TOTAL COSTS FOR ALL THE COVERED ACTIONS	% OF THE TOTAL BUDGET	TOTAL CO2 REDUCTIONS FOR ALL THE COVERED ACTIONS	% OF THE TOTAL CO2 REDUCTION
ENERGY SYSTEMS	€ 118,922,216	5.75%	57,454.87	8.67%
SUSTAINABLE URBAN MOBILITY	€ 873,927,647	42.24%	66,466.94	10.03%
BUILT ENVIRONMENT	€ 994,860,443	48.08%	345,480.27	52.15%
GREEN INFRASTRUCTURE AND NATURE BASED SOLUTIONS	€ 65,723,023	3.18%	67,172.42	10.14%
WASTE AND CIRCULAR ECONOMY	€ 5,000,000	0.24%	773.93	0.12%
ORGANISATIONAL AND GOVERNANCE INNOVATION	€ 700,000	0.03%	77,080.89	11.64%
SOCIAL AND OTHER INNOVATION	€ 10,010,000	0.48%	48,001.73	7.25%
TOTAL	€ 2,069,143,329	100%	662,431.05	100%

GUIDING PRINCIPLES

Provide a brief overview (1 page) of the principles that directed the Climate Neutrality Action Plan's design process, as well as those that will guide its implementation and monitoring within the designated time frame.

PRINCIPLES THAT INFORMED THE FORMULATION OF THE CLIMATE NEUTRALITY ACTION PLAN

- **Collaborative development:** Involving stakeholders such as citizens and local organisations in refining the Climate Neutrality Action Plan (through input and feedback collection and integration into the document's final version), thereby guaranteeing alignment with their needs and priorities.
- **Climate justice:** Catering for equal opportunities and addressing the prevailing climate injustice at the grassroots level, particularly concerning the marginalised communities and the individuals residing in the rural communes / villages within the Oradea Metropolitan Area.
- **Integration and responsiveness:** Ensuring the seamless integration of the Climate Neutrality Action Plan into the municipality's systems and operations and respecting the needs and priorities of citizens and local stakeholders. As such, the document was designed within a locally grounded framework, ensuring that its final version reflects the local realities (experience, expertise, needs, challenges and specific opportunities) within the designated territory.
- **Evidence-based:** The content relies on existing data sourced from other strategic documents, as well as various analyses, studies, territorial and/or sectoral reports, along with official statistics.
- **Holistic planning:** When formulating the actions proposed within this Plan, consideration was given to ensuring they are coherent, consistent and do not create imbalances among the targeted emission domains, stakeholder categories or types of communities.
- **Convergence:** Encouraging the achievement of climate neutrality, while preventing potential disparities between Oradea Municipality and the other administrative-territorial units within the metropolitan area. Additionally, efforts were directed towards narrowing the existing gaps between cities and communes within the Oradea Metropolitan Area in terms of capacity for the active engagement in climate neutrality endeavours and the execution of relevant projects and programmes.
- **Coordination:** When elaborating the Climate Neutrality Action Plan, consideration was given to its alignment with the other local strategic and sectoral documents, including the 2021-2027 Integrated Urban Development Strategy, the 2021-2027 Territorial Development Plan for the Oradea Metropolitan Area, the 2021-2027 Sustainable Energy and Climate Action Plan and the 2022 Sustainable Urban Mobility Plan.

- **Vertical alignment:** Linking the Climate Neutrality Plan's vision and proposed actions with the objectives and priorities outlined in the relevant regional, national and European strategic documents.
- **Horizontal alignment:** Correlating the emission domains with the specific sectors, while also addressing the inter-jurisdictional dimension, by designing integrated interventions, that are aimed at generating positive impacts across the entire Oradea Metropolitan Area.
- **Action prioritisation:** The criteria used for prioritising the proposed actions cover their direct contribution to achieving the climate neutrality objectives, their potential co-benefits, their responsiveness to the local climate challenges and identified beneficiary needs, their maturity, their alignment with the European and national climate neutrality priorities and also the availability of funding sources for their implementation.
- **Yielding co-benefits:** The proposed actions aim not only to directly reduce local CO2 emissions but also to generate a mix of social, health, economic and ecological co-benefits.

PRINCIPLES THAT WILL GUIDE THE IMPLEMENTATION AND MONITORING OF THE CLIMATE NEUTRALITY ACTION PLAN

During the implementation and monitoring phases of the Climate Neutrality Action Plan, oversight will be led by Oradea City Hall in collaboration with the Oradea Metropolitan Area Intercommunity Association. These phases will be conducted within an open and transparent participatory framework, involving both the community and the local ecosystem. The key principles set to guide the municipality as it implements, evaluates and monitors the Climate Neutrality Action Plan are aimed at ensuring the seamless operation of all the proposed interventions, facilitating an optimal workflow:

- **Responsibility:** Ensuring that all the involved parties are held accountable for fulfilling their commitments and achieving their objectives in reducing emissions and mitigating the climate change impacts.
- **Multi-stakeholder collaboration:** Involving stakeholders in the implementation and monitoring of the proposed actions, in order to actively engage them in the foreseen change, rather than merely treating them as beneficiaries. As such, we will foster robust partnerships with various entities (public institutions, civil society representatives, academia and the private sector), in order to mobilise resources and expertise towards achieving our climate neutrality goals.
- **Openness:** Ensuring that the related information is easily accessible and effectively communicated to the public, stakeholders and other relevant actors.
- **Embracing novel approaches and fostering innovation:** Demonstrating a receptive stance towards exploring and adopting innovative solutions, technologies and methodologies that can enhance the

effectiveness of our climate goals. We will also promote and dedicate resources to relevant research and development projects and activities.

- **Collaborative monitoring, assessment and knowledge sharing:** Regularly evaluating and monitoring the implementation of the Climate Neutrality Action Plan and disseminating the findings and insights to stakeholders, in order to iteratively refine and improve the process.
 - The evaluation will be conducted in a systematic and impartial manner.
 - The monitoring will focus on data and outcomes, employing standardised assessments from credible sources.
 - The periodic improvement will be driven by the evaluation and monitoring results, which will support the adoption of responsive actions.
 - The knowledge dissemination will ensure that the generated information and expertise reach a wide array of stakeholders.
- **Equity in climate action:** By upholding the principles of climate justice, the implementation of the Climate Neutrality Action Plan will ensure that no individual is overlooked in the journey toward a carbon-neutral city. Moreover, by prioritising inclusivity, the Plan will tackle the disproportionate burdens of climate change on marginalised communities and will provide fair opportunities for all. By facilitating inclusive decision-making and offering targeted support to underprivileged groups, we will ensure a just climate neutrality transition, that leaves no one behind, irrespective of their circumstances.

As such, all the signatory stakeholders collectively embrace the local ambition of transitioning towards climate neutrality. Our shared efforts underscore our collective commitment to actively contribute to Oradea's journey towards becoming a climate-neutral and smart city, together with its Metropolitan Area.

SIGNATORIES

In the below table, list the signatories of the Climate Neutrality Action Plan. Include local, regional, and potentially national stakeholders which have the interest and / or capacity to accelerate the implementation of this Action Plan and who can significantly influence the achievement of climate neutrality at the local level.

We, the undersigned, pledge to actively support Oradea Municipality's climate neutrality goals by 2035, as outlined in its 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	SIGNATURE DATE
ORADEA CITY HALL	PUBLIC ADMINISTRATION				
ORADEA LOCAL DEVELOPMENT AGENCY	LOCAL DEVELOPMENT				
ORADEA AND REGIONAL TOURISM PROMOTION ASSOCIATION (VISIT ORADEA)	TOURISM DEVELOPMENT				
ORADEA METROPOLITAN AREA INTERCOMMUNITY DEVELOPMENT ASSOCIATION	TERRITORIAL DEVELOPMENT				

INSTITUTION	SECTOR	REPRESENTATIVE	POSITION	SIGNATURE	SIGNATURE DATE
BIHOR CHAMBER OF COMMERCE, INDUSTRY AND AGRICULTURE	NON-GOVERNMENTAL SECTOR				
NORTH-WEST REGIONAL DEVELOPMENT AGENCY	REGIONAL DEVELOPMENT				
MINISTRY OF EUROPEAN INVESTMENTS AND PROJECTS	PUBLIC ADMINISTRATION				
TERMOFICARE ORADEA	UTILITIES				
DISTRIGAZ VEST SA	UTILITIES				
ECO BIHOR	UTILITIES				
ECOLECT GROUP INTERCOMMUNITY DEVELOPMENT ASSOCIATION	UTILITIES				
ORADEA WATER COMPANY	UTILITIES				
APAREGIO INTERCOMMUNITY DEVELOPMENT ASSOCIATION	UTILITIES				

INSTITUTION	SECTOR	REPRESENTATIVE	POSITION	SIGNATURE	SIGNATURE DATE
APĂ-CANAL NORD-VEST	UTILITIES				
TRANSGEX SA	UTILITIES				
ORADEA LOCAL TRANSPORT	PUBLIC TRANSPORT				
TRANSREGIO INTERCOMMUNITY DEVELOPMENT ASSOCIATION	PUBLIC TRANSPORT				
ORADEA AIRPORT AUTONOMOUS DIRECTORATE	AIR TRANSPORT				
BIHOR DIRECTORATE FOR PUBLIC HEALTH	PUBLIC HEALTH				
VOCATIONAL EDUCATION AND TRAINING RESOURCE CENTRE	EDUCATION AND TRAINING				
EUROBUSINESS ORADEA PROFESSIONAL SCHOOL	EDUCATION AND TRAINING				
ORADEA COMMUNITY FOUNDATION	COMMUNITY DEVELOPMENT				

INSTITUTION	SECTOR	REPRESENTATIVE	POSITION	SIGNATURE	SIGNATURE DATE
BIHOR ENVIRONMENTAL PROTECTION AGENCY	ENVIRONMENTAL PROTECTION				
BIHOR CENTER FOR SUSTAINABLE DEVELOPMENT AND PROTECTED AREAS	ENVIRONMENTAL PROTECTION				
BIHOR AGRICULTURE DIRECTORATE	AGRICULTURE				
ORADEA UNIVERSITY	EDUCATION AND RDI				
BIHOR COUNTY COUNCIL OF STUDENTS	YOUTH				
BIHOR COUNTY SCHOOL INSPECTORATE	EDUCATION				
BIHOR NATIONAL ASSOCIATION FOR RURAL, ECOLOGICAL AND CULTURAL TOURISM	TOURISM				
ROMANIAN GREEN BUILDING COUNCIL	NON-GOVERNMENTAL SECTOR				



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INSTITUTION	SECTOR	REPRESENTATIVE	POSITION	SIGNATURE	SIGNATURE DATE

I. ACTIONS PLANS

INTRODUCTION

Briefly describe (1-2 pages) the local context within which the Action Plan is being formulated and outline the general gap it aims to address, by taking into account relevant local strategies and policies, socio-economic development factors, environmental conditions and climate considerations etc.

The formulation of the Action Plan for the Transition to Climate Neutrality by 2035 is prompted by the ambition to accelerate the reduction of GHG emissions in the city of Oradea. Notable progress has been made at both the city, metropolitan area and county levels, evident in key areas such as waste management, district heating infrastructure, solar energy initiatives, and accessibility to green spaces. However, we recognise that there is significant space for improvement and acceleration of the green transition process, considering the urgency of meeting EU and global climate neutrality targets. Through this Action Plan, the City of Oradea identified the major interventions that contribute to achieving climate neutrality by 2035, quantifying the reduction of GHG emissions and ensuring the monitoring of set targets.

The City of Oradea is the seat of Bihor county and is an urban centre with a socio-economic polarising character. Almost half of the population of Bihor County is concentrated in the Oradea Metropolitan Area, composed of the Oradea Municipality and 11 communes to which belong, in total, 42 villages. The Oradea Metropolitan Area is home to 279.928 inhabitants (2020), of which the population of the Oradea municipality accounts for 78.95%, with 221.015 inhabitants¹. The socio-economic dynamics are also reflected in suburbanisation (the population living in the metropolitan area of Oradea experienced an increase of 2.15% in the period 2013-2022)² and intensive commuting (according to the 2021 national census, the total number of commuters in Bihor county is 46.000 - out of which 30.000 commute daily within the metropolitan area - prompting the need for green public transport options³). Oradea is also the main connective hub of Bihor county, which is “the gate of entry and exit to the West”⁴. This proximity to the Western border is favourable, considering that the majority of exports pass through this border, but also poses important challenges that prompt the need to reduce transit traffic and congestion. In this context, Oradea aims to become “a city of public spaces, a municipality oriented towards people, at the expense of the space used or occupied by cars”⁵.

¹ Integrated Urban Development Strategy 2021-2027, available at: <https://zmo.ro/download/SIDU.pdf>

² Territorial Development Plan 2021-2027, available at: <https://oradea.ro/wp-content/uploads/2023/11/PATZM-ORADEA-4.pdf>

³ Metropolitan train-tram network project: <https://clubferoviar.ro/proiect-aprobat-de-autoritatile-locale-pentru-reteaua-tram-train-la-oradea/>

⁴ Sustainable development strategy of Bihor county in the field of road transport for 2021-2027

⁵ SUMP 2021-2027, available at: <https://oradea.ro/wp-content/uploads/2023/12/Planul-de-Mobilitate-Urbana-Durabila-Oradea.pdf>

The city is acknowledged as a national champion in attracting EU funds and local governance efficiency (the portfolio of non-reimbursable projects between 2008 – 2025 totals € 1,687bln.⁶), coupled with a reduction of operational expenses of the administrative apparatus. In 2024, the budget of the Oradea City Hall reached the highest amount since 1989, of almost €590 million (RON 2,93 billion), out of which 44% is allocated to investments.

The density of businesses in the municipality of Oradea has also been increasing, with a positive evolution of economic results, infusion of foreign capital and creation of new jobs. These can be attributed to the efficiency of support structures for business development, such as industrial parks and business incubators. The number of new jobs created as a result of investments attracted in the industrial parks managed by the Oradea Local Development Agency is expected to reach 10.200 by 2028. Moreover, five new intelligent specialisation parks are under development, aiming to attract innovative businesses with a high-value added.

While the municipality of Oradea and the metropolitan area have experienced a continuous socio-economic development in recent years, this development also has an impact on the environment, in terms of CO2 emissions. To address this, the main strategic documents of Oradea and its metropolitan area (SECAP, IUDS, SUMP, TDP), as well as the relevant county level plans (e.g. waste management plan) are closely aligned and contribute to the achievement of the GHG emission reduction targets for Romania and the EU through the Green Deal (aiming to reduce greenhouse gas emissions by 55% by 2030 from 1990 levels, and become climate neutral by 2050).

In this context, the City of Oradea, in partnership with the Oradea Metropolitan Area and a wide range of actors (see list of signatories), has initiated the formulation of the Action Plan for the Transition to Climate Neutrality by 2035, which is expected to provide a clear framework for accelerating the achievement of national and EU targets. To ensure that planned investments are integrated and are correlated with clear GHG emission targets, the Action Plan is based on the methodological guidance formulated by the European Commission within the 100 Climate Neutral and Smart Cities by 2030 Mission. As part of the Mirror Mission Cities hub⁷ established by the Ministry of Research, Innovation and Digitalisation of Romania, the City of Oradea is committed to advancing a knowledge-based, cross-sectoral approach, bringing together all relevant stakeholders for the shared goal of achieving climate neutrality.

Major advancements contributing to reaching climate neutrality have already been made, and impactful projects are in the course of implementation. The City of Oradea has the highest performing district heating system in Romania, with investments in modernisation totaling €200 million between 2014 and 2023 (covering around 85% of the network), serving over 60.000 connected users, and is currently developing a new high-efficiency cogeneration unit. Furthermore, the municipality has made significant

⁶ Report of the Direction for Management of Projects with International Financing for 2024, available at: <https://oradea.ro/wp-content/uploads/2024/01/Prezentare-raport-DMPFI-2023-22.01.2024.pdf>

⁷ Mirror Mission Cities Hub of Romania: <https://m100.uefiscdi.ro/>

investments in renewable energy, with two existing photovoltaic parks created and plans for the development of five additional ones, along with investments in geothermal energy and

and storage. Increasing the accessibility to green spaces has also been a priority, with over 80% of the population of Oradea municipality having access to green areas within a five-minute walking distance, and plans to increase this share to over 91% by 2030 (as part of the 'Green City Programme'). The urban regeneration of the green areas in residential neighbourhoods and rehabilitation of parks remains a priority, along with their expansion. Projects focused on increasing walkability have been implemented to expand the pedestrian street network in the city centre, and over €65 million is expected to be mobilised for pedestrianisation projects in Oradea from the 2021-2027 NW Regional Programme. With regards to waste management, a functional integrated system has been implemented in Bihor County, with six collection areas. The sorting station, composting station, waste deposit and mechano-biological treatment station located in the municipality of Oradea serve the entire Oradea Metropolitan Area. While the integrated waste management system is in place, and the recycling rates of municipal waste is among the highest in Romania, exceeding by three times the national average, increasing separate collection rates and developing a circular economy also require a stronger focus on ecological education and awareness. This focus is reflected in targeted soft interventions included in the Climate Neutrality Action Plan.

Building on the existing portfolio of projects, the Action Plan creates a comprehensive framework for accelerating the achievement of climate neutrality targets and is structured on seven fields of intervention. In the realm of **energy systems**, the plan includes projects for further upgrading of the public district heating system, green power generation, and the modernisation of public lighting infrastructure. In **sustainable urban mobility**, efforts are focused on alleviating transit traffic congestion, promoting environmentally friendly modes of public transport, and enhancing pedestrian and cycling options within the city and the metropolitan area. The **built environment** is targeted through interventions for renovating both public and private buildings to meet higher energy performance standards. The plan also includes interventions for **green infrastructure and nature based solutions**, through the expansion and enhancement of green areas and the implementation of urban renewal projects aligned with climate neutrality objectives. **Waste and circular economy** are addressed through the implementation of integrated approaches at county level and the extension of separate waste collection infrastructure. In addition to these, the Action Plan also includes soft measures related to **organisational and governance innovation** (establishing a climate neutrality office, joining the M100 Mirror Cities Mission Hub of Romania, implementing green budgeting and procurement and new regulations and policies). Last but not least, the plan places a great emphasis on fostering **social innovation and behaviour changes** through local commitment and citizen empowerment for climate neutrality, alongside the development of relevant skills.

WORK PROCESS

Within the overarching context of the city's journey toward climate neutrality, outline the working steps involved in preparing the Action Plan, including both completed stages and future anticipated ones.

→ **Additionally, delineate the timeline and key milestones for forthcoming iterations in the Action Plan's development.**

The development of the Climate Neutrality Action Plan was supported by technical expertise from the World Bank, as part of the Functional Areas in the EU project. Through this project, launched by the European Commission and the World Bank, the Oradea Metropolitan Area Intercommunity Development Association received direct support, following a selection process.

The process of preparing this documentation was coordinated by Oradea City Hall and the Oradea Metropolitan Area Intercommunity Development Association, in a joint effort to amplify its impact across the entire metropolitan area, striving for the robust and far-reaching effects.

KEY DESIGN STEPS

1. **Incorporation within the overarching strategic directives:** The process started with an in-depth analysis of the European, national and regional strategic priorities concerning climate neutrality. By closely examining the existing strategies, plans, programmes and regulations, the Action Plan was tailored to seamlessly integrate with the larger climate-neutrality framework. This method ensured alignment with the broader objectives, maximising synergies and effectiveness in addressing the imperative of climate neutrality.
2. **Understanding the European methodology for Climate City Contracts:** A key step in formulating the Action Plan involved examining and assimilating the methodology devised by the European Commission for the documents pertaining to the Climate City Contracts, for the 112 cities officially engaged in the EU Mission for Climate-Neutral and Smart Cities. Our objective was to grasp and internalise the European model, in order to facilitate its adaptation to our local characteristics, enabling us to effectively adopt it within our context.
3. **Analysing the local context:** The analysis of the current local context covered a comprehensive examination of the historical data, together with the local barriers, needs, challenges and the existing and projected budget. This evaluation was conducted concurrently with the baseline assessment of the greenhouse gas inventory, by using data sourced from previously-approved local strategic documents, as well as various analyses, studies and reports. Official statistics from national and international sources were also employed in this step.
4. **Setting the vision:** The next milestone involved establishing a clear vision for transitioning to climate neutrality, by leveraging the insights garnered from the preceding steps. By drawing upon the

structured information from the earlier work, we were able to set a vision that reflects our context, laying the groundwork for coordinated and effective action towards our climate neutrality goals.

5. **Identifying the actions:** The subsequent step entailed proposing the interventions needed to achieve climate neutrality and grouping them into actions, based on both emission domains and fields of action. This work also considered the actions' alignment with the priorities, objectives and projects outlined in the other local strategic documents.
6. **Elaborating on the actions:** For the following step, the focus shifted towards detailing the outlined actions, by:
 - a. setting the targeted levers, direct CO₂ reduction impact, co-benefits and climate and financial indicators
 - b. calculating individual and cumulative budgets
 - c. identifying sources and forms of financing
 - d. mapping relevant stakeholders
 - e. addressing associated risks, along with corresponding countermeasures
7. **Formulating the strategy to address residual emissions:** The successive step consisted of identifying solutions for compensating the residual CO₂ emissions.
8. **Assessing the needs and opportunities for future improvements:** Afterwards, we have identified the associated and forthcoming opportunities for enhancing the Action Plan, including the assistance we would need for refining and improving it.
9. **Engagement via public consultation:** Upon the completion of the consolidated draft, it was disseminated to the community and the stakeholders' ecosystem, within a public consultation process. Their feedback was gathered, processed and integrated into the final version of the climate neutrality documentation.
10. **Official approval:** Following the completion of the Climate Neutrality Action Plan, it underwent an official approval process at the local level, ultimately contingent upon a decision made by the Local Council.

FUTURE PHASES

1. **Implementation:** The implementation of the Action Plan will involve Oradea City Hall and the Oradea Metropolitan Area Intercommunity Development Association as the main coordinating actors. Nonetheless, the process will be carried out through collaboration with the mapped stakeholders, underscoring a co-participatory approach, in order to ensure a thorough and equitable engagement at local level.

2. **Assessment and monitoring:** The Oradea City Hall and the Oradea Metropolitan Area Intercommunity Development Association will oversee the monitoring of the Climate Neutrality Action Plan on an annual basis. Every year, an interim assessment will be conducted, in order to evaluate the level and extent of achieving the envisioned goals and executing the planned actions. To ensure continuous, proper and fair monitoring, citizens and stakeholders will be actively engaged, tasked with tracking progress and providing feedback to the municipality for subsequent integration. Additionally, we will leverage the expertise and technologies of the Action Plan's signatories, in order to increase our assessment and monitoring capacity.
3. **Refinement iterations:** An update of the Climate Neutrality Action Plan will be conducted every 2 years, contingent upon the outcomes of the evaluations and monitoring conducted during the preceding 2 years. This update will consider the completed actions, newly identified relevant interventions and any emerging contextual factors, such as new needs, challenges, opportunities and risks. These iterative phases will address the necessary updates based on the evolving local context and forthcoming European and national directives regarding climate neutrality. However, additional sessions would be convened more frequently, as required, to promptly and effectively address any arising situations. The updates will be done by the Oradea City Hall and the Oradea Metropolitan Area Intercommunity Development Association, subject to their approval.

GREENHOUSE GAS EMISSIONS BASELINE INVENTORY

Describe and elaborate on the most recent greenhouse gas (GHG) inventory conducted by the city, in order to establish the baseline emissions and also to identify the emissions gap towards achieving climate neutrality by 2035.

- **Make sure to also assess the greenhouse gas (GHG) baseline inventory - you can refer to: the sources of data collection and their rationale, the baseline emission conversion factors used, proposed measures for improving future data collection processes etc.**

TABLE

The total estimated energy required for Oradea in 2020 was 3,016,470.18 MWh accounting for a total of 811,938.54 tons CO₂. These estimations are based on the SECAP 2021-2027 strategic document.

ENERGY CONVERSION EXPLANATIONS

In the consulted documents, some energy estimates are expressed in different types of units of measure. However, to simplify calculations and ensure the numbers in the current Action Plan will be easy to follow and understand by the general public, all energy requirements will be expressed in MWh. Using information from SEAP 2021-2027 the following conversion factors were calculated:

- **Thermal energy** expressed in giga calorie: $\text{MWh/Gcal} = 0.8620 \Rightarrow$
 $\text{MWh thermal energy} = \text{Gcal} * 0.8620$
 (this factor was derived using information from SEAP, page 97)
- **Natural gas energy** expressed in cubic meters: $\text{MWh/cubic meter of natural gas} = 0.0095361 \Rightarrow$
 $\text{MWh natural gas} = \text{cubic meters} * 0.0095361$
 (calculations for a natural gas density of 0.717 kg/m³ and a net caloric power of 13.3 MWh/tone taken from SEAP, page 78)
- **Diesel energy** expressed in tones/year: $\text{MWh / tone diesel} = 11.9 \Rightarrow$
 $\text{MWh diesel} = \text{tons diesel per year} * 11.9$
 (net caloric power taken from SEAP, page 78)
- **Gasoline energy** expressed in tones/year: $\text{MWh / tone gasoline} = 12.3 \Rightarrow$
 $\text{MWh gasoline} = \text{tons gasoline} * 12.3$
 (net caloric power taken from SEAP, page 78)

Figure 1. Other Net Caloric Power for Different Types of Fuel taken from SEAP, 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

SOURCE: 2021-2027 Sustainable Energy Action Plan of the Oradea Metropolitan Area

Table 2. CO₂ Conversion Factors taken from PAED, Page 78

CONVERSION FACTORS IPPC 2006 - PAED 2021-2027		EXPLANATION
Electrical energy 2020	0.3	Standard IPPC
Diesel 2020	0.267	Standard IPPC
Gasoline 2020	0.249	Standard IPPC
GPL 2020	0.231	Standard IPPC
Natural gas 2020	0.202	Standard IPPC
Wood 2020	0.101	LCA emission factor
Municipal waste 2020	0.33	Standard IPPC

CONVERSION FACTORS IPPC 2006 - PAED 2021-2027		EXPLANATION
Thermal energy 2020	0.202	Thermal energy produced from natural gas
Geothermal energy 2020	0.0143	IPPC standard calculated based on a 14.3 g CO ₂ /kWh
Electrical energy 2030*	0.176	JRC Scientific Information System and Database Report 2022
Green electric energy 2030	0	
Thermal energy 2030**	0.141	Conversion factor calculated based on investments in thermal energy infrastructure made by Oradea

SOURCE: 2021-2027 Sustainable Energy Action Plan of the Oradea Metropolitan Area

*The JRC Scientific Information System and Database Report 2022 provides emission factors for 2030 based on national grid projects.

** Taking into consideration Oradea's sustained efforts to modernise the thermal energy production and distribution infrastructure, as well as the investments made in the cogeneration facilities, hydrogen production facility and geothermal energy usage, the conversion factor for thermal energy 2035 was set to 0.141.

Figure 2. Buildings Sector 2020 Energy Requirements and CO₂ Emissions – 2,603,388.86 MWh Energy | 705,423.77 Tons CO₂ Emissions

Buildings 2020 Energy requirements (MWh/year)								Buildings 2020 CO2 emissions (tons/year)													
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline	Total	%		Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline	Total	%
	S1	S2	S1	S2	S1	S2	S2	S2				S1	S2	S1	S2	S1	S2	S2	S2		
Public buildings 2020		10,022.25		1,057.03	24,180.95			35,260.23	1.17%				3,006.68		213.52	4,884.55			8,104.75	1.00%	
Residential buildings 2020		1,813,808.00		146,484.03	408,418.19			2,368,710.22	78.53%				544,142.40		29,589.77	82,500.47			656,232.65	80.82%	
Tertiary buildings		8,202.60		145,111.03	46,104.78			199,418.41	6.61%				2,460.78		29,312.43	9,313.17			4,086.37	5.06%	
Total S1 and S2		1,832,032.85		292,652.09	478,703.92			2,603,388.86					549,609.86		59,115.72	96,698.19			705,423.77		
Total Sector		1,832,032.85		292,652.09	478,703.92			2,603,388.86	86.31%				549,609.86		59,115.72	96,698.19			705,423.77	86.88%	

● Thermal energy requirements for buildings

PAED 2021-2027 page 80 offers thermal energy estimates for different sectors. This information was correlated with PAED 93 to find out the geothermal energy percentage and thus determine the percentage of Scope 1 thermal energy versus Scope 2 Thermal energy. Residential thermal energy – 408,418.19 MWh. For residential buildings the info can be found in PAED pag 93 and it shows an estimated total of 378,995.54 MWh from direct thermal energy and 29,422.65 MWh from geothermal energy. For public buildings, the thermal energy requirement for 2020 can be found on page 80 in PAED and is estimated at approximately 24,180.95 MWh thermal energy. PAED, page 93 gives a total of 57,361.79 MWh thermal energy delivered to institutions. By subtracting the energy need for public buildings, it leaves a total of 33,180.84 MWh thermal energy delivered to other institutions. The same page offers the total amount of thermal energy delivered to economic agents at approximately 23,554.15 MWh. This leaves a total of 56,734.99 MWh thermal energy for tertiary use. So the total

	IPPU 2020 Energy requirements (MWh/year)								IPPU 2020 CO2 emissions (tons/year)											
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline	Total	%	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline	Total	%
	\$1	\$2	\$1	\$2	\$1	\$2	\$2	\$2			\$1	\$2	\$1	\$2	\$1	\$2	\$2	\$2		
IPPU 2020		10,460.78		30,417.64	9,644.95				50,523.37	1.67%		3,138.23		6,144.36	1,948.28				11,230.88	1.38%
Total S1 and S2		10,460.78		30,417.64	9,644.95				50,523.37			3,138.23		6,144.36	1,948.28				11,230.88	
Total Sector		10,460.78		30,417.64	9,644.95				50,523.37	1.67%		3,138.23		6,144.36	1,948.28				11,230.88	1.38%

- The IPPU sector energy needs were set at 17% of all tertiary energy requirements according to the economic profile of Oradea taken from Metroverse. Thermal energy 17% of remaining tertiary energy which accounts for 9,644.94 MWh out of which 201.80 comes from geothermal energy. Electrical energy – 17% of all tertiary buildings electrical energy consumption which accounts for 10,460.78 MWh. Natural gas – 17% of all natural gas remained in the tertiary sector which accounts for 30,417.64 MWh.

Figure 5. Waste Sector 2020 Energy Requirements and CO2 Emissions –17,892.66 MWh Energy | 4,988.31 Tons CO2 Emissions

Waste 2020 Energy requirements (MWh/year)										Waste 2020 CO2 emissions (tons/year)										
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline	Total	%	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline	Total	%
	S1	S2	S1	S2	S1	S2	S2	S2			S1	S2	S1	S2	S1	S2	S2	S2		
Waste 2020	197.91	17.09	489.40		111.23	53.77	5,630.00	280.00	6,581.49	0.22%	59.37	5.13	161.50		36.71	10.86	1,503.21	69.72	1,846.50	0.23%
Water and wastewater 2020		6,350.06		464.25			4,032.00	266.95	11,113.26	0.37%		1,905.02		93.78			1,076.54	66.47	3,141.81	0.39%
Total S1 and S2	197.91	6,367.15	489.40	464.25	111.23	53.77	9,662.00	546.95	17,694.75		59.37	1,910.15	161.50	93.78	36.71	10.86	2,579.75	136.19	4,988.31	
Total Sector		6,565.06		953.65		165.00	9,662.00	546.95	17,892.66	0.59%		1,969.52		255.28		47.57	2,579.75	136.19	4,988.31	0.61%

- The waste sector comprises the Waste plus Water & wastewater sectors. For the Waste Sector, PAED 2021-2027 offers only information about the natural gas requirements, with a total of 489.40 MWh. Also, the same document offers the total CO2 emissions from the waste sector, averaging 1,846.45 tons CO2 for the year 2020. Taking this information and correlating it with energy requirements for the Waste sector taken from PAED 2017 page 84, energy requirements were adjusted to account for the total emissions for 2020. As such, the energy sector the energy estimates are the following: 215 MWh - electrical energy out of which 197.91 MWh is generated locally, 489.40 MWh – natural gas from waste, 165 MWh – thermal energy out of which 111.23 MWh from waste, 5,630 MWh – diesel and 280 MWh – gasoline. These estimations would average a total of 1,846.50 tons CO2/year. For water and wastewater, PAED 2021-2027, page 90, estimates a total electrical energy requirement of 6,350.06 MWh. According to the same document the natural gas requirements for 2020 were 464.25 MWh which accounted for 93.78 tons CO2. The 2020 CO2 emissions from diesel and gasoline was 1,143.12 tons CO2. Correlating this information with PAED 2017 page 81 and keeping the same proportions between diesel and gasoline, the energy requirements for 2020 would have been approximately 266.95 MWh - gasoline, 4,032 MWh – diesel.

Figure 6. AFOLU Sector 2020 Energy Requirements and CO2 Emissions –17,892.66 MWh Energy | 4,988.31 Tons CO2 Emissions

AFOLU 2020 Energy requirements (MWh/year)										AFOLU 2020 CO2 emissions (tons/year)											
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline	Total	%		Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline	Total	%
	\$1	\$2	\$1	\$2	\$1	\$2	\$2	\$2				\$1	\$2	\$1	\$2	\$1	\$2	\$2	\$2		
AFOLU 2020		1,009.15		2,934.40		930.45			4,874.00	0.16%			302.75		592.75		187.95			1,083.44	0.13%
Total S1 and S2		1,009.15		2,934.40		930.45			4,874.00				302.75		592.75		187.95			1,083.44	
Total Sector		1,009.15		2,934.40		930.45			4,874.00	0.16%			302.75		592.75		187.95			1,083.44	0.13%

- The PAED 2021-2027 document does not offer any information about the AFOLU sector. Green space maintenance was accounted for in the Waste sector. Using information about Oradea's economic profile taken from Metroverse, this sector was estimated at **1.64%** of the total energy consumption

for all energy types accounting for **0.51%** crop production, **0.40%** animal production and aquaculture. **0.39%** mining (except oil and gas), **0.26%** forestry and logging, **0.04%** support activities for forestry and logging, **0.03%** support activities for mining, **0.01%** fishing, hunting and trapping, according to Metroverse. **Electrical energy** – 1.64% of all tertiary buildings electrical energy, which accounts for 1,009.15 MWh electrical energy. **Thermal energy** – 1.64% of all remaining energy from tertiary buildings, which accounts for 930.45 MWh thermal energy. **Natural gas** – 1.64% of all remaining natural gas from the tertiary sector, which accounts for 930.45 MWh.

Buildings 2020 Energy requirements (MWh/year)								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
Public buildings 2020		10,022.25		1,057.03	24,180.95			35,260.23
Residential buildings 2020		1,813,808.00		146,484.03	408,418.19			2,368,710.22
Tertiary buildings		8,202.60		145,111.03	46,104.78			199,418.41
Total S1 and S2		1,832,032.85		292,652.09	478,703.92			2,603,388.86
Total Sector		1,832,032.85		292,652.09	478,703.92			2,603,388.86

Transport 2020 Energy requirements (MWh/year)								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
Municipal transport 2020							551.33	171.55
Public transport 2020		4,245.99					16,398.89	20,644.87
Private and commercial transport 2014							185,215.06	118,530.36
Public lighting 2020		14,678.11						14,678.11
Total S1 and S2		18,924.10					202,165.28	118,701.91
Total Sector		18,924.10					202,165.28	118,701.91

IPPU 2020 Energy requirements (MWh/year)								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
IPPU 2020		10,460.78		30,417.64	9,644.95			50,523.37
Total S1 and S2		10,460.78		30,417.64	9,644.95			50,523.37
Total Sector		10,460.78		30,417.64	9,644.95			50,523.37

Waste 2020 Energy requirements (MWh/year)								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
Waste 2020	197.91	17.09	489.40		111.23	53.77	5,630.00	280.00
Water and wastewater 2020		6,350.06		464.25			4,032.00	266.95
Total S1 and S2	197.91	6,367.15	489.40	464.25	111.23	53.77	9,662.00	546.95
Total Sector		6,565.06		953.65		165.00	9,662.00	546.95

AFOLU 2020 Energy requirements (MWh/year)								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
AFOLU 2020		1,009.15		2,934.40		930.45		4,874.00
Total S1 and S2		1,009.15		2,934.40		930.45		4,874.00
Total Sector		1,009.15		2,934.40		930.45		4,874.00

Total Energy Requirements for energy types 2020								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
Total S1 and S2	197.91	1,868,794.03	489.40	326,468.38	488,460.10	984.22	211,827.28	119,248.86
TOTAL		1,868,991.94		326,957.78		489,444.32	211,827.28	119,248.86

Buildings 2020 CO2 emissions (tons/year)								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
		3,006.68		213.52	4,884.55			8,104.75
		544,142.40		29,589.77	82,500.47			656,232.65
		2,460.78		29,312.43	9,313.17			41,086.37
		549,609.86		59,115.72	96,698.19			705,423.77
Total S1 and S2		549,609.86		59,115.72	96,698.19			705,423.77
Total Sector		549,609.86		59,115.72	96,698.19			705,423.77

Transport 2020 CO2 emissions (tons/year)								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
							147.20	42.72
		1,273.80					4,378.50	5,652.30
							49,452.42	29,514.06
		4,403.43						4,403.43
		5,677.23					53,978.13	29,556.78
Total S1 and S2		5,677.23					53,978.13	29,556.78
Total Sector		5,677.23					53,978.13	29,556.78

IPPU 2020 CO2 emissions (tons/year)								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
		3,138.23		6,144.36	1,948.28			11,230.88
		3,138.23		6,144.36	1,948.28			11,230.88
Total S1 and S2		3,138.23		6,144.36	1,948.28			11,230.88
Total Sector		3,138.23		6,144.36	1,948.28			11,230.88

Waste 2020 CO2 emissions (tons/year)								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
	59.37	5.13	161.50		36.71	10.86	1,503.21	69.72
		1,905.02		93.78			1,076.54	66.47
	59.37	1,910.15	161.50	93.78	36.71	10.86	2,579.75	136.19
Total S1 and S2		1,969.52		255.28		47.57	2,579.75	136.19
Total Sector		1,969.52		255.28		47.57	2,579.75	136.19

AFOLU 2020 CO2 emissions (tons/year)								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
		302.75		592.75		187.95		1,083.44
		302.75		592.75		187.95		1,083.44
Total S1 and S2		302.75		592.75		187.95		1,083.44
Total Sector		302.75		592.75		187.95		1,083.44

Total CO2 Emissions per energy type 2020								
	Electrical energy		Natural gas		Thermal energy		Diesel	Gasoline
	S1	S2	S1	S2	S1	S2	S2	S2
	59.37	560,638.21	161.50	65,946.61	98,683.18	198.81	56,557.88	29,692.97
Total S1 and S2		560,697.58		66,108.12		98,881.99	56,557.88	29,692.97
Total Sector		560,697.58		66,108.12		98,881.99	56,557.88	29,692.97

Figure 7. Energy requirements (MWh/year) - 2020

Energy requirements (MWh/year) - 2020

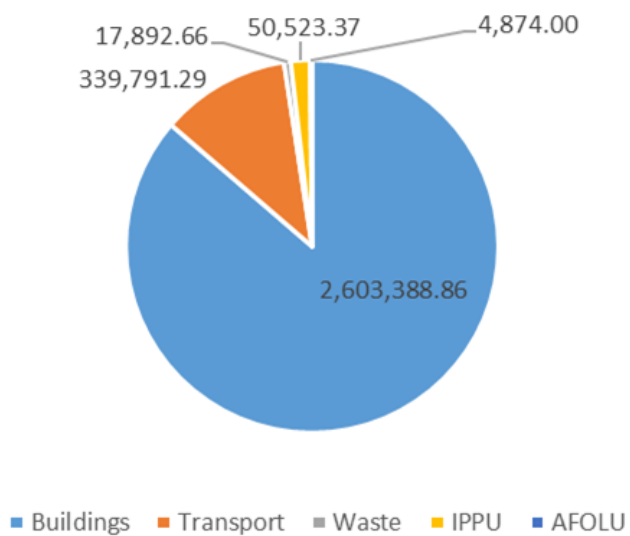


Figure 8. Energy Percentage - 2020

Energy Percentage - 2020

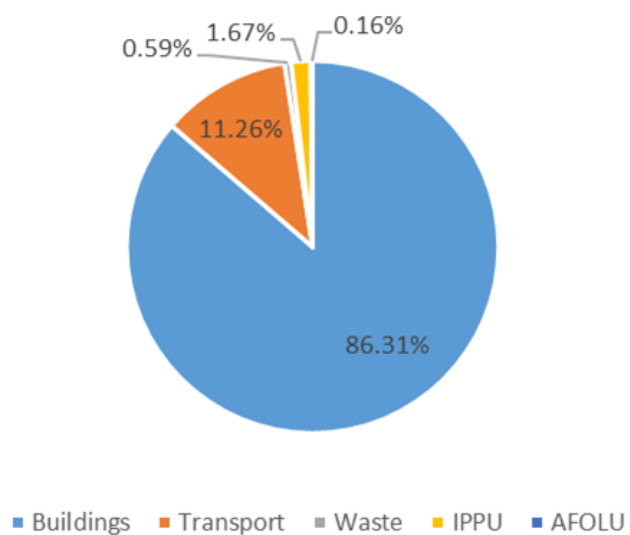


Figure 9. CO2 emissions (tons/year) - 2020

CO2 emissions (tons/year) - 2020

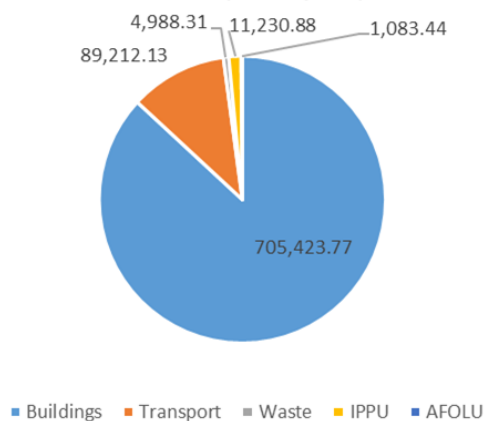


Figure 10. CO2 percentage - 2020

CO2 percentage - 2020

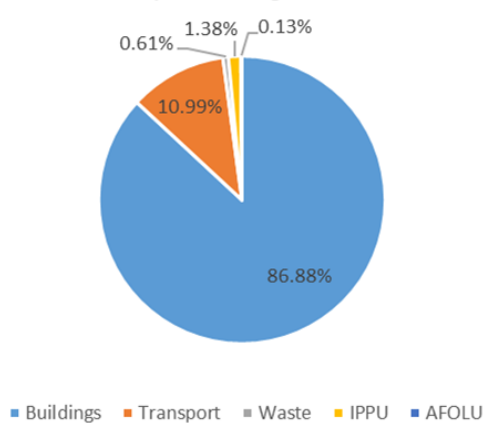


Figure 11. MWh/year 2020

MWh/year 2020

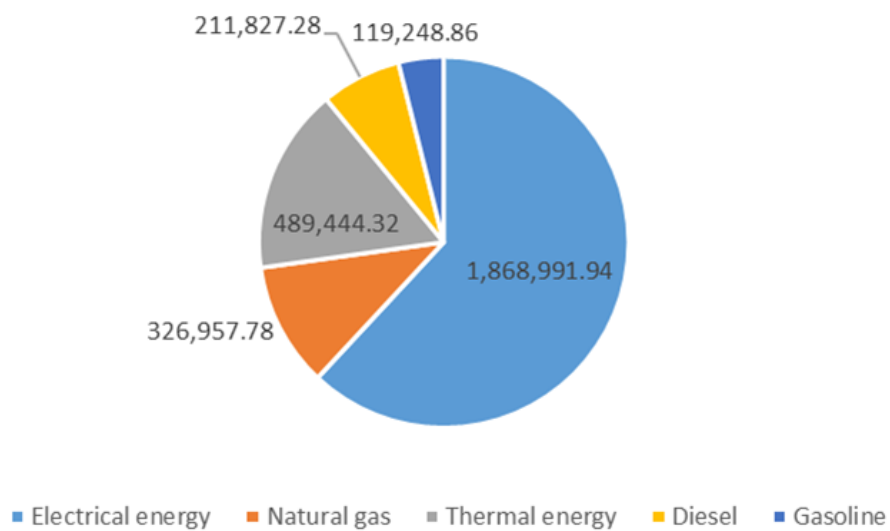


Table 3. Final Energy Use by Source Sectors

→ Indicate the base year: 2020

→ Indicate the used unit: MWh/year

	SCOPE 1	SCOPE 2	SCOPE 3	TOTAL
BUILDINGS	478,703.92	2,124,684.94	N/A	2,603,388.86
FUEL TYPE / ENERGY USED	478,703.92 - thermal energy	1,832,032.85 - electrical energy 292,652.09 - natural gas	N/A	-
TRANSPORT	-	339,791.29	N/A	339,791.29
FUEL TYPE / ENERGY USED	-	18,924.10 - electrical energy 202,165.28 - diesel 118,701.91 - gasoline	N/A	-
WASTE	798.54	17,094.12	N/A	17,892.66
FUEL TYPE / ENERGY USED	197.91 - electrical energy 489.40 - natural gas 111.23 - thermal energy	6,367.15 - electrical energy 464.25 - natural gas 53.77 - thermal energy 9,662.00 - diesel 546.95 - gasoline	N/A	-
INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)	9,644.95	40,878.42	N/A	50,523.37
FUEL TYPE / ENERGY USED	9,644.95 - thermal energy	10,460.78 - electrical energy 30,417.64 - natural gas	N/A	-
AGRICULTURAL, FORESTRY, AND LAND USE (AFOLU)	-	4,874.00	N/A	4,874.00
FUEL TYPE / ENERGY USED	-	1,009.15 - electrical energy 2,934.40 - diesel 930.45 - diesel	N/A	-

Table 4. Emission Factors Applied

→ Indicate the primary energy type and greenhouse gas (GHG) emission factor in accordance with the methodology used: CO₂

→ Indicate the used method, e.g., GPC, IPCC, CRF, national etc.: IPCC

PRIMARY ENERGY/ ENERGY SOURCE	CARBON DIOXIDE (CO ₂)	METHANE (CH ₄)	NITROUS OXIDE (N ₂ O)	F-GASES (HYDROFLUOROCARBONS AND PERFLUOROCARBONS)	SULPHUR HEXAFLUORIDE (SF ₆)	NITROGEN TRIFLUORIDE (NF ₃)
ELECTRICAL ENERGY	0.3	-	-	-	-	-
NATURAL GAS	0.202	-	-	-	-	-
DIESEL	0.267	-	-	-	-	-
GASOLINE	0.249	-	-	-	-	-
GPL	0.231	-	-	-	-	-
THERMAL ENERGY	0.202	-	-	-	-	-
MUNICIPAL WASTE	0.33	-	-	-	-	-
WOOD	0.101	-	-	-	-	-
Electrical energy 2035*	0.176	-	-	-	-	-
Energy from renewable sources (solar, wind)	0	-	-	-	-	-
Thermal energy 2035**	0.141	-	-	-	-	-

* The JRC Scientific Information System and Database Report 2022 provides emission factors for 2030 based on national grid projects.

** Taking into consideration Oradea's sustained efforts to modernise the thermal energy production and distribution infrastructure, as well as the investments made in the cogeneration facilities, geothermal energy usage and hydrogen production for geothermal use, the conversion factor for thermal energy 2035 was set to 0.141

Table 5. GHG Emissions by Source Sectors

→ **Indicate the base year:** 2020

→ **Indicate the unit:** tons CO₂/year

	SCOPE 1	SCOPE 2	SCOPE 3*	TOTAL
BUILDINGS	96,698.19	608,725.58		705,423.77
TRANSPORT		89,212.13		89,212.13
WASTE	257.58	4,730.73		4,988.31
INDUSTRIAL PROCESS AND PRODUCT USE (IPPU)	1,948.28	9,282.61		11,230.88
AGRICULTURAL, FORESTRY AND LAND USE (AFOLU)		1,083.44		1,083.44
TOTAL	98,904.05	713,034.49		811,938.54

Table 6. Planned Actions by Source Sectors

The table categorises emission reductions from each action, based on the scope they affect. For instance, if the covered actions aim to decrease CO₂ emissions linked to grid-supplied electricity, values will be assigned to Scope 2.

→ If the activities are intended to be finalised by 2035, the base year should be adjusted accordingly to 2035.

BASE YEAR: (2035)	SCOPE 1	SCOPE 2	SCOPE 3
BUILDINGS	78,719.01	495,974.49	-
I.1. Upgrade of public district heating system	22,414.81	20,200.00	-
I.2 Local green power generation		10,696.73	
III.1. Energy renovation of public buildings	2,547.45	1,741.55	-
III.2. Energy renovation of private multi-apartment residential buildings	43,026.69	297,021.40	-
III.3. New nZEB public and private buildings	-	1,143.17	-
IV.1. Expansion and improvement of green areas	-	31,915.51	-
IV.2. Urban renewal in the spirit of climate neutrality	-	31,915.51	-
VI.1. Efficient horizontal governance of climate neutrality	-	31,598.02	-
VI.2. Better planning for achieving climate neutrality	5,365.03	34,871.30	-

BASE YEAR: (2035)	SCOPE 1	SCOPE 2	SCOPE 3
VII.1. Encouraging behaviour changes, local commitment and citizen empowerment for climate neutrality	3,219.02	20,922.78	-
VII.2. Developing new skills for climate neutrality	2,146.01	13,948.52	-
TRANSPORT	-	78,509.99	-
I.3. Modernization of public lighting system	-	4,143.34	-
II.1. Transit traffic congestion relieve	-	33,413.96	-
II.2. Promotion of green public transport	-	14,819.74	-
II.3. Attractive pedestrian and cycling alternatives	-	18,233.24	-
IV.1. Expansion and improvement of green areas	-	1,670.70	-
IV.2. Urban renewal in the spirit of climate neutrality	-	1,670.70	-
VII.1. Encouraging behaviour changes, local commitment and citizen empowerment for climate neutrality	-	2,734.99	-
VII.2. Developing new skills for climate neutrality	-	1,823.32	-
WASTE	25.47	1,853.84	-
V.1. Integrated waste management	-	773.93	-
VII.1. Encouraging behaviour changes, local commitment and citizen empowerment for climate neutrality	15.28	641.68	-
VII.2. Developing new skills for climate neutrality	10.19	438.23	-
INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)	1,268.31	5,289.87	-
VI.1. Efficient horizontal governance of climate neutrality	1,014.65	4,231.89	-
VII.1. Encouraging behaviour changes, local commitment and citizen empowerment for climate neutrality	126.83	528.99	-
VII.2. Developing new skills for climate neutrality	126.83	528.99	-
AGRICULTURAL, FORESTRY AND LAND USE (AFOLU)	-	790.08	-
VII.1. Encouraging behaviour changes, local commitment and citizen	-	453.74	-
VII.2. Developing new skills for climate neutrality	-	336.34	-

Table 7. Emissions Gap

\	BASELINE EMISSIONS (PERCENTAGE) ¹		BASELINE EMISSIONS REDUCTION TARGET 80% by 2035 ²		EMISSIONS ADDRESSED BY ACTION PLAN ³		REMAINING RESIDUAL EMISSIONS ⁴		EXCEEDING TARGET AMOUNT ⁵
	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)
BUILDINGS	705,423.77	86.88%	564,339.02	86.88%	574,693.51	86.76%	130,730.26	87.44%	10,354.49
TRANSPORT	89,212.13	10.99%	71,369.71	10.99%	78,509.98	11.85%	10,702.16	7.16%	7,140.27
WASTE	4,988.31	0.61%	3,990.65	0.61%	1,879.30	0.28%	3,109.01	2.08%	-2,111.35
INDUSTRIAL PROCESSES AND PRODUCT USE (IPPU)	11,230.88	1.38%	8,984.70	1.38%	6,558.18	0.99%	4,672.70	3.13%	-2,426.52
AGRICULTU RAL, FORESTRY AND LAND USE (AFOLU)	1,083.44	0.13%	866.76	0.13%	790.08	0.12%	293.36	0.20%	-76.68
TOTAL	811,938.54	100%	649,550.83	100%	662,431.05	100%	186,414.07	100%	2,183.49

1. The baseline emissions are the emissions associated with each sector for the year 2020 expressed in both absolute and percentage values.
2. The baseline emissions reduction target represents the emissions for each sector if they were reduced with 80%. This is the target that emissions from each sector should be reduced with, by the year 2035.
3. The emissions addressed by the action plan are all emissions reductions associated with each sector that are addressed by the current action plan.
4. The residual emissions are emissions that are left, for each sector, after implementing all the interventions in the action plan. These emissions should be addressed by other means.
5. “Exceeding target amount” represents the difference between the emissions addressed by actions corresponding to each sector and the reduction target value. By analysing the data, it can be seen that:
 - a. The planned actions for the Buildings sector exceed the 80% reduction target by 10,354.49 tons CO₂.
 - b. The planned actions for the Transport sector exceed the 80% reduction target by 7,140.27 tons CO₂.
 - c. The planned actions for the Waste sector do not account for the 80% reduction target falling short by 2,111.35 tons CO₂.
 - d. The planned actions for the IPPU sector do not account for the 80% reduction target falling short by 2,426.52 tons CO₂.

- e. The planned actions for the AFOLU sector do not account for the 80% reduction target falling short by 76.68 tons CO₂.
- f. Overall, the actions from the Climate Neutrality Action Plan exceed the 80% reduction target by 12.880.22 tons CO₂, corresponding to **a total CO₂ reduction of 81.59% in 2035, compared to 2020.**

CURRENT POLICIES AND STRATEGIES

Provide a short contextual presentation and assessment of policies, strategies, initiatives, and / or regulations at the local, regional, and national levels that are relevant to the city's transition towards climate neutrality.

The transition to climate neutrality of the City of Oradea is supported by a comprehensive set of strategies, plans, policies, regulations and programmes. The key strategic documents (IUDS, SECAP, SUMP, TDP of the Metropolitan Area) are all updated for the 2021-2027 programming period and are aligned with the goal of sustainable development of Oradea and its metropolitan area.

Table 8. Relevant Policies, Strategies, Initiatives, Regulations

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
STRATEGY	LOCAL	Integrated Urban Development Strategy of Oradea and Oradea Metropolitan Area 2021-2027 (IUDS)	The IUDS guides the development of the city and its metropolitan area for 2030, aiming at the optimal and responsible use of available resources to ensure integrated urban planning.	The third strategic direction of the IUDS is the sustainable development of the Municipality Oradea and the Oradea Metropolitan Area , in compliance with the principles of environmental protection, development sustainable, energy efficiency and sustainable use of resources. The key objective under this development direction is achieving targets for reducing CO ₂ emissions in 2030 (2014 reference year for Oradea Municipality and 2020 for the communes in the Oradea Metropolitan	The Climate Neutrality Action Plan includes an estimation of the CO₂ reduction potential of major projects included in the IUDS, as well as the establishment of a climate neutrality office to coordinate interventions included in the Action Plan, including additional soft interventions (e.g. interventions for encouraging behaviour change, new skills related to climate neutrality among citizens and public officials and other relevant stakeholders, micro-grant schemes).

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
				Area), through two strategic objectives: 1) Environmental Protection and Sustainable Land Management and 2) Promoting Sustainable Development.	
STRATEGY	LOCAL	Sustainable Energy and Climate Action Plan 2021-2027 (SECAP)	The SECAP is the main strategic document targeting the reduction of GHG emissions, prepared according to the methodology of the Covenant of Mayors on Climate and Energy. It includes a baseline inventory of emissions for Oradea and its metropolitan area. It also includes a Climate Adaptation Plan and list of interventions.	The Action Plan for Sustainable Energy aims at the efficient use of energy in the following sectors: buildings, equipment / installations and industry; and transport. It contributes to the reduction of GHG emissions by 55% by 2030 and to neutrality of GHG emissions by 2050. The interventions included in the SECAP aim to reduce the final energy consumption in the Municipality of Oradea by 67.27% in 2030 (2014 reference year) and by 22.53% in 2030 in the Oradea Metropolitan Area (2020 reference year).	The Climate Neutrality Action Plan involves an in-depth assessment of emission sources, going beyond those covered in the SECAP. While the SECAP was drafted based on the methodology of the Covenant of Mayors and Climate Energy, the Climate Neutrality Action Plan is based on the methodological guidance formulated by the EC for the Climate City Contracts of the 100 Climate Neutral and Smart Cities by 2030 Mission. Therefore, it builds on existing information collected in the SECAP, (updating it where data was available), as well as other open-source data. For example, the information in SECAP refers to the Buildings, Transport, Public lighting, Waste and Wastewater sectors, and does not provide specific information about the IPPU and AFOLU sectors. Also, in some instances, the

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
					SECAP offers information about energy requirements in different units of measure, but without specifying the sectors in which that energy is utilised. As such, this Action Plan took all the available information from SECAP and tailored it to the specifics of the 5 sectors included in the Climate City Contracts methodology, ensuring that all energy consumption sources are expressed in the same unit of measure.
STRATEGY	LOCAL	Sustainable Urban Mobility Plan of Oradea and Oradea Metropolitan Area 2021-2027 (SUMP)	The SUMP focuses on the creation and development of a sustainable transport system, which correspond to the expectations and needs of mobility and accessibility of citizens and goods, within an attractive, healthy and environmentally friendly urban environment.	The interventions included in the SUMP are directly linked to achieving climate neutrality. It includes major interventions for sustainable urban mobility corridors, improving public transportation (including a new tram line in the city and a metropolitan train), freight transport, alternative mobility means, traffic management, and interventions for areas with high complexity levels (protected central zones, logistic zones, intermodal zones, etc.) and intermodality.	The Climate Neutrality Action Plan includes major interventions in the realm of sustainable urban mobility, assessing their CO2 emission reduction potential.
STRATEGY	LOCAL	Local Strategy for the provision of the thermal	The main objective of District Heating strategy is to	The municipality of Oradea has the most efficient district heating	According to the SECAP, 34% of total consumption

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
		energy service to the population of Oradea municipality for the period 2022-2030, with a view to 2050 (District Heating Strategy - DHS)	establish the strategic guidelines for the development of the centralised thermal energy supply system from the municipality of Oradea. It aims to develop an accessible, safe and high quality district heating system for all connected consumers and those who may connect in the future.	system in Romania, due to major investments in its energy production and supply infrastructure (with EU funds), leading to a high consumer density (with an increase between 2017-2020). The local strategy establishes clear objectives for the district heating system. By 2027, it aims for the DH system to use at least 50% energy from renewable sources , 50% as residual heat, and 75% co-generated thermal energy or 50% from a combination of energy and heat of the type mentioned above. By 2050, it aims to function exclusively on renewable energy.	energy sources are used for heating. The municipality of Oradea and its metropolitan area have significant geothermal energy sources, which need to be further harnessed for a district heating system based on renewable resources. Therefore, the Action Plan includes interventions for the supply of geothermal energy to the district heating system , accounting for their impact on CO2 emission reduction.
STRATEGY	LOCAL	Territorial Development Plan of Oradea Metropolitan Area 2021-2027 (Metropolitan TDP)	The Metropolitan Territorial Plan has as general objective the sustainable development of the Oradea Metropolitan Area as a competitive, attractive and resilient territory, based on good accessibility and high quality of life, capitalising on local identity and supporting innovation, in order to reduce disparities and support socio-economic cohesion.	The Plan includes improving sustainable mobility within the metropolitan area, as well as the development, promotion and protection of cultural and natural heritage as strategic priorities. The two priorities are translated into several strategic objectives, such as increasing energy efficiency within the metropolitan area, environmental protection and sustainable management of the territory, greening and rehabilitation of lands affected by chemical agents or degraded	The Climate Neutrality Action Plan supports an integrated approach to territorial development, including interventions for reducing transit traffic, cycling infrastructure at the level of the metropolitan area and green metropolitan public transport (train-tram network). These interventions have a direct impact on CO2 emissions in the city of Oradea, as they redirect traffic outside the city and offer alternative means of transport

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
				lands, elimination of pollution of the environment and watercourses.	for residents of the metropolitan area that commute to the city.
STRATEGY	REGIONAL	North-West Regional Development Plan 2021-2027	The plan outlines the vision and key priorities for the North-West region, highlighting major challenges such as significant regional disparities, low energy efficiency in buildings (especially in urban areas), the need for green infrastructure expansion and sustainable urban mobility in urban areas, and the lack of access to public services and the need for integrated development in rural areas.	The main strategic priorities of the NW Regional Development Plan relevant for achieving climate neutrality are Strategic Priority no. 3. A region with environmentally friendly municipalities Strategic Priority 4: A region with sustainable multimodal urban mobility Strategic Priority 5: An accessible region.	The interventions included in the Climate Neutrality Action Plan are aligned with the priorities of the North-West Regional Development Plan. The 2021-2027 Regional Programme is a primary source of financing the interventions, along with the NRRP, State and local budget, complemented by mobilising private financing.
STRATEGY	NATIONAL	The National Integrated Plan for Energy and Climate Change 2021 – 2030 (NIPECC)	The National Plan for Energy and Climate Change was adopted in 2019 and was formulated in accordance with the EU energy policy framework, detailing the main objectives for 2030.	According to the Plan, Romania aims to increase its share of energy from renewable sources in the total energy consumption by 2030 by increasing the installed capacity of wind and photovoltaic plants (additional capacities of 6.9 GW from renewable sources compared to 2015), as well as by increasing the number of prosumers.	Along with the IUDS, SECAP, SUMP and other strategic documents and regulations of Oradea and Oradea Metropolitan Area, the Climate Neutrality Action Plan is aligned with the objectives of the NIPECC in terms of reducing GHG emissions and increasing the capacity of renewable energy generation , accelerating the process of achieving the national targets.

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
PROGRAMME	LOCAL	Green City Programme (2020-2030)	The Oradea Green City Programme 2020-2030 is a strategic planning programme that outlines the priority directions for the development of green urban public space at the level of Oradea municipality, with the general objective of increasing the standard of living of citizens.	The programme objectives are the increase of the area of green spaces to 652 ha by 2030 , i.e. the increase to 91.3% of the population that has access to a public green urban space within a 5-minute walk (approx. 300 m distance to the public green space) ; improving environmental factors, by increasing the indicator of green space per inhabitant to 29.4 m²/inhabitant by 2030 ; creation of new tourist attractions, superior valorization, protection and enhancement of the green heritage of the city.	The Climate Neutrality Action Plan is aligned with the target set for increasing the area of green spaces through the Green City Programme, including interventions for expanding and improving green areas.
PROGRAMME	LOCAL	Multi-annual programme for the rehabilitation of buildings in the historic centre	The programme was started in 2014 and offers owners the free preparation of technical projects for the rehabilitation for building facades in the historic centre of the city.	The programme expedites the rehabilitation of buildings through loans, grants, fiscal incentives and surcharges . Owners of historical monument buildings receive grants of up to 30%. Programme benefits include instalment payments over 5 years, execution grants, technical documentation, building permits, construction site management, and a 5-year tax exemption upon project completion. Owners that are obliged to pay a surcharge of 500% on property tax, until the	The soft interventions contributing to citizen empowerment for achieving climate neutrality are likely to accelerate the implementation of the multi-annual programme for the rehabilitation of buildings in the historic centre.

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
				beginning of the authorised rehabilitation works.	
PROGRAMME	LOCAL	Increasing energy efficiency and deep renovation of residential apartment buildings	The IUDS includes a comprehensive programme for increasing energy efficiency and deep renovation by 2027, to be funded mainly from the NW Regional Programme.	The municipality aims to mobilise primarily EU funds for financing the efficiency renovation of 1000 apartment blocks by 2027, in five areas of the city.	Interventions for energy renovation of multi-apartment residential buildings included in the Climate Neutrality Action Plan aim to cover at least 1500 apartment blocks by 2035 (an additional 500 buildings).
PROGRAMME	LOCAL	Increasing energy efficiency of public buildings	The IUDS also includes a list of interventions for the energy renovation of public buildings, funded from the NRRP, NW ROP, the national Environment Fund Agency and local budget.	The interventions cover major public infrastructure (e.g. City Hall building, county hospital, social assistance direction building, 19 educational infrastructure buildings).	Interventions for energy renovation of public buildings included in the Climate Neutrality Action Plan cover over 50 public buildings to be renovated by 2035 .
STUDY	LOCAL	Endogenous potential and infrastructure development needed to increase employment in Oradea Metropolitan Area	The study was developed as part of an Interreg project and analyses the potential for economic development and employment in the Oradea Metropolitan Area.	The action plan for increasing employment in the Oradea Metropolitan Area highlights the potential of the area to develop a multi-modal logistics park to support sustainable transportation, sensitive to climate change and ecological footprint . Multi-modal transport, combining various methods to reduce emissions and energy consumption is identified as a potential diversification area of the local economy, with high value added.	The Climate Neutrality Action Plan includes interventions for traffic decongestion that support the operation of the recently finalised intermodal terminal . The terminal has easy access to road and rail transport and is situated near the Transylvania A3 highway and a future expressway connecting Oradea to the city of Arad.
REGULATION	LOCAL	Local public parking regulation	The regulation aims to ensure the smooth and safe flow of	The regulation establishes three parking zones, with	The Climate Neutrality Action Plan complements

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
			traffic on public roads, ensuring safe parking of motor vehicles, decongesting public roads in the central area and public roads with heavy traffic, facilitating access to public interest objectives, protecting pedestrians by ensuring favourable conditions for traffic on sidewalks.	different parking tariffs, with the parking tariff in the city centre being the highest, to discourage the use of cars and reduce related GHG emissions.	the local regulations aimed at discouraging private car usage through various interventions for promoting green public transport (e.g. train-tram network, purchase of electric buses and trams, bus depot, tram depot, dedicated lanes for public transport, urban mobility corridors).
REGULATION	LOCAL	Local Sanitation and Waste Management Service Regulation	The regulation creates the legal framework for the management and financing of the sanitation public service, and establishes performance indicators for the operator of these services. It also regulates street sweeping and cleaning, snow removal, and disinfection, disinsection, deratization activities.	The regulation establishes the obligation of the local public administration to organise the separate collection system in 5 fractions (paper, metal+plastic, glass, residual waste and biodegradable waste), which was started in 2023. It also includes the obligation to implement the separate collection system of textile waste and hazardous waste from household waste by January 2025. The regulation also includes an Annex with procedural steps for sanctioning of incorrect waste separation (including a tariff penalty).	The Climate Neutrality Action Plan includes a significant allocation for smart waste collection islands for residential areas. These refer to compact bins for selective collection, equipped with sensors that trigger alerts when full, improving efficiency and promoting sustainable waste management. This intervention is closely linked with additional measures

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
STRATEGY	COUNTY	Bihor County Waste Management Plan 2021-2025 (CWMP)	The Waste Management Plan of Bihor County aims to define county objectives aligned with the National Waste Management Plan, address municipal waste management comprehensively, present the current situation, and inform investment needs and policies for integrated waste management.	The document includes an Action Plan for Waste Generation Prevention, based on implementing the pay-as-you-through instrument (PAYT) and composting, measures increasing selective waste collection to 65% in 2027 for reducing food waste by 50% until 2025 (2020 reference year) and for prevention of printed paper waste generation.	for encouraging behaviour change, local commitment and citizen empowerment for adopting a climate-neutral lifestyle and developing new skills related to climate neutrality.
STRATEGY	COUNTY	Integrated Sustainable Development Strategy of Bihor County 2021-2027 (ISDS)	The strategy is aimed at the sustainable development of Bihor County during the period 2021-2027 and addresses the economic, demographic, environmental, and social challenges of the county, based on an objective analysis of the current situation and trends in these areas.	The Strategy sets clear and ambitious objectives for achieving the 17 SDGs set by the UN. By 2027, all municipalities in Bihor County should rank in the top two quartiles in terms of achieving these goals, while municipalities currently placed in the lowest quartile should make progress on at least half of the 17 objectives, including Objective 11, which focuses on sustainable cities and communities.	The interventions for improving residential selective waste collection in the city of Oradea included in the Climate Neutrality Action Plan contribute to the implementation of the integrated waste management system at the level of the county and achieving targets at the county level. At the same time, projects included in the Integrated Sustainable Development Strategy of Bihor County, such as the establishment of new industrial parks across the county, also contribute to the reduction of CO2 emissions in the city of Oradea, by reducing the need for commuting.

TYPE	LEVEL	TITLE	DESCRIPTION	RELEVANCE	NEED FOR ACTION
POLICY	NATIONAL	Romania Urban Policy 2022-2035 (RUP)	The first Urban Policy of Romania 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 a variety of measures related to the climate adaptation and mitigation, reducing air pollution and improving sustainable urban Mobility, with a 2035 target.	Interventions included in the Action Plan for the transition to climate neutrality are aligned with the objectives and priorities of the Urban Policy of Romania.

ACTION PORTFOLIO

For each action aimed at achieving climate neutrality as outlined in this Plan, fill out a sheet using the template provided below.

→ Make sure to also include, within this section, the actions pertaining to Organisational and Governance Innovation, as well as the actions related to Social and Other Innovation fields.

Table 9. Individual Actions: Upgrade of Public District Heating System

ACTION TITLE	UPGRADE OF PUBLIC DISTRICT HEATING SYSTEM
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Districts (the ones supplied with public central heating)
FIELD OF ACTION	Energy Systems
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Buildings
COVERED INTERVENTIONS	• New high-efficiency cogeneration unit for the supply of heat and electrical energy • Rehabilitation of heat transport and distribution system – Phase III (pipelines, thermal points) • Rehabilitation of heat transport and distribution system – Phase IV • Supply of geothermal energy for the district heating system in Ioșia Sud neighbourhood • Supply of geothermal energy combined with heat pumps and natural gas for the district heating system in Nufărul I neighbourhood • New hydrogen production and storage facility for the district heating & power plant • Supply of geothermal energy for the district heating system in Ioșia Thermal Garden • Supply of geothermal energy for the district heating system in Calea Clujului
BRIEF DESCRIPTION	New high-efficiency cogeneration unit for the supply of heat and electrical energy - this project involves installing a modern cogeneration unit with high efficiency to produce both heat and electricity, effectively addressing energy demands. Rehabilitation of heat transport and distribution system – Phase III (pipelines, thermal points) - Phase III focuses on renovating and enhancing the heat transport and distribution infrastructure, including pipelines and thermal points, to improve efficiency and reliability. Rehabilitation of the heat transport and distribution system – Phase IV - Phase IV continues the renovation efforts, concentrating on further upgrades to pipelines and thermal points to complete the enhancements initiated in earlier phases. Supply of geothermal energy for the district heating system in Ioșia Sud neighbourhood - this initiative aims to implement a geothermal energy supply system specifically tailored to meet the district heating needs of the Ioșia Sud neighbourhood, providing sustainable heating solutions. Supply of geothermal energy combined with heat pumps and natural gas for the district heating system in Nufărul I neighbourhood - In Nufărul I neighbourhood, a district heating system will be established, combining geothermal energy, heat pumps, and natural gas to ensure efficient and reliable heating for the community. New hydrogen production and storage facility for the district heat & power plant - a new facility will be constructed for hydrogen production and storage, integrating hydrogen as an alternative and

ACTION TITLE	UPGRADE OF PUBLIC DISTRICT HEATING SYSTEM
	sustainable energy source in the heat and power generation process. Supply of geothermal energy for the district heating system in Iosia Thermal Garden - Geothermal resources will be utilised to provide eco-friendly heating solutions for the district heating system serving the Iosia Thermal Garden area, contributing to the sustainability of the recreational facility. Supply of geothermal energy for the district heating system in Calea Clujului - Using geothermal energy, the heating system in Calea Clujului will be powered to meet the heating requirements of the area, thus contributing to the provision of efficient and sustainable heating services in the specified region.
OUTCOME	Minimum half of the city's thermal energy supplied from renewable sources
RESPONSIBLE ENTITY / BODY / PERSON	Oradea Municipality, Public Heating Service Operators, Energy Manager
INVOLVED STAKEHOLDERS	Oradea Municipality, Termoficare Oradea, Distrigaz Vest S.A, Gaz Vest, Associations of homeowners in Oradea, North-West Regional Development Agency, Romanian Green Building Council, Energy Private Company
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	42,614.81 tons/CO2 per year from Buildings (20,200 tons CO2 natural gas 22,414.81 tons CO2 thermal energy)
% OF TOTAL CO2 REDUCTION	6.43%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	200,000 MWh (100,000 MWh - natural gas 100,000 MWh - thermal energy) from Buildings associated with savings due to increased efficiency of the municipal heating system.
TIMELINE (START AND END)	2026-2035

Table 10. Individual Actions: Local Green Power Generation

ACTION TITLE	LOCAL GREEN POWER GENERATION
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Municipalities, Energy companies, Public Institutions, Public parking management
FIELD OF ACTION	Energy systems
SYSTEMIC LEVER	Technology/Infrastructure
EMISSION DOMAIN(S)	Buildings
COVERED INTERVENTIONS	• Photovoltaic park on the former slag and ash dump in Santăul Mic • Photovoltaic park on the former slag and ash deposit in Episcopia Bihor • Photovoltaic park on the former landfill – Matei Corvin and Santăului Street (10.162 MWp) • Photovoltaic system for public buildings • Photovoltaic system for Traian Blajovici public parking • Existent photovoltaic park in Borș Commune (Santăul Mare- capacity 1MGWh/day) • Existent photovoltaic Park in Oșorhei Commune (capacity 0,6 MGWh/day)
BRIEF DESCRIPTION	The actions involve the reconversion of former industrial sites and landfills into solar parks, installing photovoltaic systems on public buildings and parking spaces and the exploitation of solar energy from the existing solar parks in Borș and Oșorhei Communes.
OUTCOME	At least two-thirds of the electricity and hot water supply comes from the city's own renewable resources
RESPONSIBLE ENTITY / BODY / PERSON	Oradea Municipality, Public Entities headquartered in targeted public buildings, Energy manager
INVOLVED STAKEHOLDERS	Oradea Municipality, Oradea Development Agency, Oradea Metropolitan Area's Intercommunity Development Association, Bihor Environmental Protection Agency, energy companies operating in Oradea, Public institutions within Oradea, citizens of Oradea and the mentioned communes, potential investors of renewable energy projects, North-West Regional Development Agency.
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	The energy provided by this action was taken into account and placed in the total energy need for 2035, having 0 CO ₂ emission associated with it. All CO ₂ emissions calculations from all the other actions take into account this action. So this energy does not replace electrical energy from the grid, but was calculated as extra energy needed for the city in 2035 (see tables after this section). If it were calculated to replace electrical energy from the grid, that electrical energy from the grid would generate around 10,696.73 tons CO₂ .
% OF TOTAL CO ₂ REDUCTION	1.61%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	30,701 MWh electrical energy from solar
REMOVED / SUBSTITUTED ENERGY,	The 30,701 MWh of electrical energy from solar was not removed from the Buildings sector. This energy was added to the total energy needed in 2035. The calculations were based on the estimated

ACTION TITLE	LOCAL GREEN POWER GENERATION
VOLUME OR FUEL TYPE	budget and used the following assumptions: Solar irradiance: 1,100 kWh/year Efficiency 15% 800 Euro/kW
TIMELINE (START AND END)	2026-2035

Table 11. Individual Actions: Modernisation of Public Lighting System

ACTION TITLE	MODERNISATION OF PUBLIC LIGHTING SYSTEM
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)	Transport
COVERED INTERVENTIONS	• Energy monitoring and analysis system for public lighting • Smart public lighting and sensor system • Energy improvement of public system – phase I+II+III
BRIEF DESCRIPTION	The initiatives outlined focus on enhancing energy efficiency and management of public lighting systems, aiming to optimise energy consumption and reduce environmental impact. These include the implementation of an energy monitoring and analysis system for public lighting, the deployment of a smart public lighting and sensor system, and comprehensive energy improvement projects across multiple phases.
OUTCOME	Energy-efficient and flexible public lighting system
RESPONSIBLE ENTITY / BODY / PERSON	Oradea Municipality, Public Lighting Service Operator, Oradea Local Development Agency
INVOLVED STAKEHOLDERS	Oradea Municipality, Oradea's Public Lighting Service Company, Oradea Local Development Agency, North-West Regional Development Agency, Energy Company
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	4,143.34 tons CO2 per year from Transport
% OF TOTAL CO2 REDUCTION	0.63%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-

ACTION TITLE	MODERNISATION OF PUBLIC LIGHTING SYSTEM
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	10,274.68 MWh from Transport associated with a 70% reduction in electrical energy for public lighting due to LED and dimmable technologies.
TIMELINE (START AND END)	2026-2035

Table 12. Individual Actions: Transit Traffic Congestion Relieve

ACTION TITLE	TRANSIT TRAFFIC CONGESTION RELIEVE
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Metropolitan
FIELD OF ACTION	Sustainable urban mobility
SYSTEMIC LEVER	Technology / Infrastructure
EMISSION DOMAIN(S)	Transport
COVERED INTERVENTIONS	• North Metropolitan Ring-Road • Execution of widening works from two to four lanes on DN19 (E671) between positions km 5+985 and km 9+731 • Execution of widening works from two to four lanes on DN 79 (E671) between Oradea and Nojorid and construction of a roundabout in the Airport area • Modernization of the connecting road between Oradea City and Paleu commune • Connecting road between Oradea City and Sânmartin/ Băile Felix commune • Increasing accessibility on county roads in the Oradea Metropolitan Area – Phase 1 - Rehabilitation of county road DJ 767E Orșorhei-Copăcel and Oșorhei Bypass • Increasing accessibility on county roads in the Oradea Metropolitan Area - Phase 2 Sântandrei Bypass and connecting road between Oradea City (Grigorescu neighbourhood) and Nojorid commune (DN 79/DN 64) • Increasing accessibility on county roads in the Oradea Metropolitan Area – Phase 3 - DJ 767 K (Paleu-Biharia Bypass) • Ensuring connectivity of the Metropolitan Ring-Road with Oradea City, between Nojorid and Sânmartin, by establishing a connecting road from Sânmartin commune/Cihei village to Oradea City, Apateului Street - Oradea Bypass • Metropolitan Ring-Road Oradea - Phase 1: km 0+000 - 9+055 • Metropolitan Ring-Road Oradea - Phase 2: km 9+055 - 17+017 • Widening from 2 to 4 lanes of Matei Corvin Street by expanding the underpass at km 118+501 of Railway 328 Arad – Oradea
BRIEF DESCRIPTION	The Northern Metropolitan Belt project includes a series of infrastructure improvements aimed at improving transport connectivity and accessibility in the Oradea Metropolitan Area. This includes widening works on key national and county roads such as DN19 and DN79 to accommodate four lanes, along with the construction of roundabouts and the upgrading of connecting roads between Oradea and neighbouring municipalities such as Paleu, Sânmartin and Băile Felix. In addition, the project involves efforts to rehabilitate county roads, including DJ767E and DJ767K, to improve road quality and ensure smoother travel experiences. In addition, the establishment of connecting roads

ACTION TITLE	TRANSIT TRAFFIC CONGESTION RELIEVE
	between Oradea and neighbouring communes, such as Sânmartin, facilitates perfect integration with the Metropolitan Belt. The gradual development of the Metropolitan Ring Road itself, which stretches from km 0+000 to km 17+017, is central to the project, improving the overall transport infrastructure in the region. Finally, the project includes works to widen Matei Corvin Street in Oradea (connecting to the national road DN19 to Satu-Mare city), including the extension of an underpass, to further improve connectivity in the area.
OUTCOME	Reduced traffic congestion/jams on major boulevards
RESPONSIBLE ENTITY / BODY / PERSON	Oradea Municipality, Ministry of Transport, Public Transport Operator, Bihor County Council
INVOLVED STAKEHOLDERS	Oradea Municipality, Bihor County Council, Oradea Metropolitan Intercommunity Development Association, Oradea Local Transport, Managing authority from Ministry of Transport
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	33,413.96 tons CO2 per year from Transport (21,591.25 tons CO2 from diesel 11,822.71tons CO2 from gasoline)
% OF TOTAL CO2 REDUCTION	5.04%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	128,346.88 MWh (80,866.11 MWh - diesel 47,480.77 MWh - gasoline) connected to a 40% in fossil fuel use associated with all transport within the city, due to movement of private and commercial transport outside the city.
TIMELINE (START AND END)	2026-2035

Table 13. Individual Actions: Promotion of Green Public Transport

ACTION TITLE	PROMOTION OF GREEN PUBLIC TRANSPORT
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	City-wide streets and districts (both commercial and residential ones)
FIELD OF ACTION	Sustainable urban mobility
SYSTEMIC LEVER	Technology / Infrastructure
EMISSION DOMAIN(S)	Transport
COVERED	Interoperable metropolitan tram-train network (connecting the city with the airport and the

ACTION TITLE	PROMOTION OF GREEN PUBLIC TRANSPORT
INTERVENTIONS	suburbs: Sânmartin – Băile 1 Mai – Băile Felix; Borș (Industrial Park); Sântandrei – Girișu de Criș – Toboliu – Cheresig) • Purchase of green public transport vehicles (25 trams and 40 electric buses) • New public bus depot in the Eurobusiness Industrial Park II • New public tram depot • Rehabilitation of the tram depot • Rehabilitation of tram lines and stations • System of dedicated lanes for public transport on major boulevards • Decebal – Vladimirescu sustainable urban mobility corridor • Republicii – Magheru sustainable urban mobility corridor
BRIEF DESCRIPTION	The initiative of the interoperable metropolitan tram-train network aims to improve public transport connectivity by connecting the city centre with the airport and suburban areas such as Sânmartin, Băile 1 Mai, Băile Felix, Borș, Sântandrei, Girișu de Criș, Toboliu and Cheresig. This includes the purchase of green transport vehicles such as trams and electric buses, along with the establishment of new public transport depots to support fleet operations. In addition, the project involves the rehabilitation of depots, lines and tram stations to improve the quality and reliability of the infrastructure. Moreover, the implementation of lanes dedicated to public transport on major boulevards and the creation of sustainable urban mobility corridors, such as Decebal - Vladimirescu and Republicii - Magheru, contribute to a more efficient and ecological transport system within the city.
OUTCOME	Higher modal share of public transport and decreasing private car use
RESPONSIBLE ENTITY / BODY / PERSON	Municipality, Ministry of Transport, Public Transport Operator, Bihor County Council,
INVOLVED STAKEHOLDERS	Oradea Municipality, Bihor County Council, Oradea Metropolitan Intercommunity Development Association, Oradea Local Transport, Managing authority from Ministry of Transport
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	14,819.74 tons CO2 per year from Transport (10,795.63 from diesel and 5,911.36 from gasoline)
% OF TOTAL CO2 REDUCTION	2.24%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	59,493.44 MWh (40,433.06 MWh from diesel and 23,706.07 MWh from gasoline) connected with a 20% reduction in fossil fuels associated with private and commercial transport due to encouragement of public transportation use. This action also registered an increase of 4,680 MWh in electrical energy needed associated with the new electric buses and trams, that was accounted for in the overall calculations.
TIMELINE (START AND END)	2026-2035

Table 14. Individual Actions: Attractive Pedestrian and Cycling Alternatives

ACTION TITLE	ATTRACTIVE PEDESTRIAN AND CYCLING ALTERNATIVES
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Oradea Metropolitan Area
FIELD OF ACTION	Sustainable urban mobility
SYSTEMIC LEVER	Technology / Infrastructure
EMISSION DOMAIN(S)	Transport
COVERED INTERVENTIONS	• Construction of bicycle lanes in the southeast area of the Oradea Metropolitan Area (Nojorid Commune, Sânmartin Commune) and connection to the metropolitan bicycle lane network • Construction of bicycle lanes in the northwest area of the Oradea Metropolitan Area (Oradea City, Biharia Commune) and connection to the metropolitan bicycle lane network • Construction of bicycle lanes in the south area of the Oradea Metropolitan Area (Oradea City, Nojorid Commune) and connection to the metropolitan bicycle lane network • Construction of bicycle lanes in the north area of the Oradea Metropolitan Area (Oradea City, Paleu Commune and Cetariu Commune) and connection to the metropolitan bicycle lane network • Construction of bicycle lanes from Borș Commune, Santăul Mare locality to Biharia locality • Construction of bicycle lane between Girișu de Criș Commune and Sântandrei Commune • Construction of bicycle lanes in the north area of the Oradea Metropolitan Zone (Paleu Commune and Săldăbagiu de Munte Commune) and connection to the metropolitan bicycle lane network • Construction of bicycle lanes in Sânmartin Commune, Băile 1 Mai-Oșorhei locality • Development of a bicycle lane network in Oradea City and Sântandrei Commune • Bicycle lanes between Grigorescu neighbourhood and Sextil Pușcariu street • Dunărea Street pedestrian zone • Pedestrian area on the left bank of Crișul Repede river: Saint Ladislau Bridge – Sion Synagogue • Rehabilitation of pedestrian bridge over Crișul Repede river (‘Podul Intelectualilor’) • Pedestrianisation of Republicii, Andrei Șaguna, Libertății, Parcul Traian, Episcop Mihai Pavel, Primăriei and Piața Concordiei streets • New pedestrian and bike bridge over Crișul Repede river in the Hilton area and connection with the old fortress • New pedestrian and bike bridge over Crișul Repede river in the Sovata area and link with Tudor Vladimirescu area • Pedestrian and bike overpasses / underpasses along the city belt • Velo Day
BRIEF DESCRIPTION	These interventions involve the construction of bicycle lanes and pedestrian infrastructure across various areas of the Oradea Metropolitan Zone, connecting communities and enhancing mobility options. They aim to improve transportation accessibility and safety for cyclists and pedestrians, while also integrating these lanes into the broader metropolitan bicycle network. Additionally, the development includes pedestrian zones, bridge rehabilitation and the creation of new pedestrian and bike bridges to promote active transportation and create more pedestrian-friendly urban spaces.
OUTCOME	Higher modal share of non-motorized mobility and decreasing private car use

ACTION TITLE	ATTRACTIVE PEDESTRIAN AND CYCLING ALTERNATIVES
RESPONSIBLE ENTITY / BODY / PERSON	Oradea Municipality, Local NGOs that are active in the field of citizens engagement, active citizenship, community initiatives
INVOLVED STAKEHOLDERS	Oradea Municipality, Oradea Local Transport Company, Local innovation ecosystem & Private sector, North-West Regional Development Agency.
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	18,233.24 tons CO2 per year from Transport (1,526.25 from electrical energy 10,795.63 from diesel 5,911.36 from gasoline)
% OF TOTAL CO2 REDUCTION	2.75%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	67,958.26 MWh (3,784.82 MWh electrical energy 40,433.06 MWh diesel 23,740.38 MWh gasoline) associated with a 20% reduction in fossil fuels used in all the transport sector - encouragement of bike use.
TIMELINE (START AND END)	2026-2035

Table 15. Individual Actions: Energy Renovation of Public Buildings

ACTION TITLE	ENERGY RENOVATION OF PUBLIC BUILDINGS
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	Built environment
SYSTEMIC LEVER	Technology / Infrastructure
EMISSION DOMAIN(S)	Buildings
COVERED INTERVENTIONS	• Energy renovation of more than 50 public buildings (nurseries, kindergartens, school, high-schools, hospitals etc.) • Energy renovation of the town hall building • Energy renovation of the maternity building • Energy renovation of the Crişul covered pool • Energy renovation of the DASO building • Towards self-sustainable energy renovation of Metropolitan Centre for Geothermal development on Cazaban 47 Street, Oradea
BRIEF DESCRIPTION	These initiatives involve the energy renovation of various public buildings in Oradea, including nurseries, kindergartens, schools, high schools, hospitals, and municipal facilities such as the town

ACTION TITLE	ENERGY RENOVATION OF PUBLIC BUILDINGS
	hall, maternity building, and Crișul covered pool. Additionally, energy renovation efforts extend to the DASO building and aim towards achieving self-sustainable energy renovation of the Metropolitan Centre for Geothermal Development located on Cazaban 47 street.
OUTCOME	Energy savings of at least 60% in the public building sector
RESPONSIBLE ENTITY / BODY / PERSON	Oradea Municipality, Public Entities headquartered in targeted public buildings, Associations of house owners and citizens in targeted private buildings, Energy Manager
INVOLVED STAKEHOLDERS	Oradea Municipality, Oradea's Public Heating Company, Termoficare Oradea, Associations of homeowners Oradea, North-West Regional Development Agency, Romanian Green Building Council
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	4,289.01 tons CO2 per year from Buildings (1,641.20 from electrical energy 100.35 from natural gas 2,547.45 from thermal energy)
% OF TOTAL CO2 REDUCTION	0.65%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	16,572.31 MWh per year (4,710.46 MWh electrical energy 496.80 natural gas 11,365.05 thermal energy) associated with a 47% possible energy reduction for all public buildings according to a Study from ADR Nord-Vest.
TIMELINE (START AND END)	2026-2035

Table 16. Individual Actions: Energy Renovation of Private Multi-apartment Residential Buildings

ACTION TITLE	ENERGY RENOVATION OF PRIVATE MULTI-APARTMENT RESIDENTIAL BUILDINGS
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Private blocks from Oradea Municipality
FIELD OF ACTION	Built environment
SYSTEMIC LEVER	Technology / Infrastructure Finance & funding
EMISSION DOMAIN(S)	Buildings
COVERED INTERVENTIONS	- Energy renovation of more than 1500 blocks of flats built in the communist period - Public incentives for condominium associations
BRIEF DESCRIPTION	These interventions focus on the energy renovation of over 1500 blocks of flats constructed during

ACTION TITLE	ENERGY RENOVATION OF PRIVATE MULTI-APARTMENT RESIDENTIAL BUILDINGS
	the communist period, aiming to improve their energy efficiency and reduce environmental impact. Additionally, public incentives are provided to condominium associations to support and encourage participation in energy renovation efforts, facilitating the implementation of sustainable building practices and enhancing living conditions for residents.
OUTCOME	Energy savings of at least 50% in the private residential sector
RESPONSIBLE ENTITY / BODY / PERSON	Oradea Municipality, Associations of owners and citizens in targeted private buildings
INVOLVED STAKEHOLDERS	Oradea Municipality, Oradea's Public Heating Company, Termoficare Oradea, Association of property owners from Oradea, North-West Regional Development Agency, Energy manager.
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	340,048.09 tons CO2 from Buildings (297,021.40 from electrical energy 43,026.69 from thermal energy)
% OF TOTAL CO2 REDUCTION	51.33%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	1,044,446.31 MWh per year (852,489.76 MWh electrical energy 191,956.55 MWh thermal energy) linked to a 47% possible reduction of electrical energy associated with cooling and thermal energy associated with heating, from all residential buildings according to a Study from ADR Nord-Vest
TIMELINE (START AND END)	2026-2035

Table 17. Individual Actions: New nZEB Public and Private Buildings

ACTION TITLE	NEW nZEB PUBLIC AND PRIVATE BUILDINGS
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Public and private buildings
FIELD OF ACTION	Built environment
SYSTEMIC LEVER	Technology / Infrastructure Governance & Policy
EMISSION DOMAIN(S)	Buildings
COVERED INTERVENTIONS	• New nurseries (Aluminei and Ion Irimescu streets) • New school (Tompa Mihaly Street)

ACTION TITLE	NEW nZEB PUBLIC AND PRIVATE BUILDINGS
	• New Psychiatric Clinic • New Infectious Diseases and Pneumology Clinic • Contract terms and tax benefits for private green companies hosted in the public industrial parks managed by the municipality
BRIEF DESCRIPTION	Building new nurseries, schools, and clinics to meet nZEB EU standards, by using EU funding opportunities. Promoting environmental responsibility by offering advantageous contract terms and tax benefits to eco-conscious businesses in public industrial parks
OUTCOME	Large portfolio of climate neutral public buildings Energy saving of at least 20% in the private industrial / logistics sector
RESPONSIBLE ENTITY / BODY / PERSON	Oradea Municipality
INVOLVED STAKEHOLDERS	Oradea Municipality, Oradea's Public Heating Company, Public Entities headquartered in targeted public buildings, Oradea Local Development Agency, North-West Regional Development Agency, Bihor Environmental Protection Agency.
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	1,143.17 tons CO₂ from electrical energy
% OF TOTAL CO ₂ REDUCTION	0.17%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	3,281.04 MWh electrical energy linked to a 40% reduction in electrical energy required for tertiary buildings
TIMELINE (START AND END)	2026-2035

Table 18. Individual Actions: Expansion and Improvement of Green Areas

ACTION TITLE	EXPANSION AND IMPROVEMENT OF GREEN AREAS
TYPE OF ACTION	Nature-based solution
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	All citizens within the Oradea Metropolitan Area
FIELD OF ACTION	Green infrastructure and nature-based solutions
SYSTEMIC LEVER	Technology / Infrastructure
EMISSION DOMAIN(S)	Buildings and Transport
COVERED INTERVENTIONS	• Ioșia Thermal Garden • Nufărul Public Garden • Europa Public Garden (Gabor Jozsef Street) • Radu Enescu Green Corridor • Coriolan Horia Green Corridor • Căpșunilor Public Park in Episcopia Bihorului Neighbourhood • New public park in the Grigore Moisil – Ion Irimescu area • Urban forest on the left bank of the Crișul Repede river (Ovidiu Densușianu bridge) • Modernisation of 1 Decembrie, I.C. Brătianu, Libertății, 22 Decembrie, Șanțul Cetății, Petőfi, Rapsodia parks • Consolidation of landslides in Ciuperca Public Garden • Park and natural beach in the Silvaș Area • Project ROHU 401 Cooperation for reducing the air and water pollution in urban and rural areas in Oradea and Békéscsaba • Greening Our City: Building Urban Forests for Climate Neutrality and Community Resilience – EUKI Programme • Partnership agreements with large retailer
BRIEF DESCRIPTION	Creation / rehabilitation of more than 25 green areas accessible to all citizens
OUTCOME	Access of all citizens to a public green area within a 15 minutes walk
RESPONSIBLE ENTITY / BODY / PERSON	Oradea Municipality
INVOLVED STAKEHOLDERS	Oradea Municipality, Bihor County Council, Oradea Metropolitan Area, National Environmental Agency, North-West Regional Development Agency, Local NGOs that are active in the field of environmental protection and urban development.
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	31,915.51 tons CO2 from Buildings (31,915.51 from electrical energy) 1,670.70 tons CO2 from Transport (1,079.56 from diesel 591.14 from gasoline)
% OF TOTAL CO2 REDUCTION	5.07%
GENERATED	-

ACTION TITLE	EXPANSION AND IMPROVEMENT OF GREEN AREAS
RENEWABLE ENERGY (IF APPLICABLE)	
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	91,601.64 MWh per year from Buildings (91,601.64 MWh electrical energy) linked to a 5% decrease in electrical energy required for cooling buildings due to the mitigation of the heat island effect 6,417.34 MWh per year from Transport (4,043.31 MWh diesel 2,374.04 MWh gasoline) linked to a 2% decrease of all fossil fuels associated with private and commercial transport as walking is encouraged
TIMELINE (START AND END)	2026-2035

Table 19. Individual Actions: Urban Renewal in the Spirit of Climate Neutrality

ACTION TITLE	URBAN RENEWAL IN THE SPIRIT OF CLIMATE NEUTRALITY
TYPE OF ACTION	Nature-based solution
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Metropolitan Area
FIELD OF ACTION	Green infrastructure and nature-based solutions
SYSTEMIC LEVER	Technology / Infrastructure Governance & Policy
EMISSION DOMAIN(S)	Buildings and Transport
COVERED INTERVENTIONS	- Urban renewal of Nufărul-Cantemir area - Urban renewal of Nufărul 1 neighbourhood - Urban renewal of marginalised communities – Gutenberg Street - Urban renewal of Metalica Area (Ap. Andrei, Dobreștilor, Sovata Street) - Urban renewal of Veteranilor – Troțușului Area - Rehabilitation of Sovata Sports Center - Playgrounds in residential areas - Recreational area Ceyrat Prima Universității - Dog park in Balogh Istvan ANL area - Analysing and promoting energy storage solutions, developing tools to mitigate the intermittency of RES, contributing to an accelerated transition to renewable energy and more balanced electrical grids, acronym StoreMore – Interreg Danube Transnational Programme - Partnership agreements with large retailers to plant trees in their parking areas and to invest in green roofs
BRIEF DESCRIPTION	Main residential neighbourhoods and public areas undergoing urban renewal interventions aligned with the 15-minute city concept
OUTCOME	Switch to a predominantly non-motorized mobility inside the neighbourhoods Reduce Urban Heat Islands associated with private retail buildings

ACTION TITLE	URBAN RENEWAL IN THE SPIRIT OF CLIMATE NEUTRALITY
RESPONSIBLE ENTITY / BODY / PERSON	Oradea Municipality
INVOLVED STAKEHOLDERS	Oradea Municipality, Bihor County Council, Oradea Metropolitan Area, National Environmental Agency, North-West Regional Development Agency, Local NGOs that are active in the field of environmental protection and the urban sector.
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	31,915.51 tons CO2 from Buildings (31,915.51 from electrical energy) 1,670.70 tons CO2 from Transport (1,079.56 from diesel 591.14 from gasoline)
% OF TOTAL CO2 REDUCTION	5.07%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	91,601.64 MWh per year from Buildings (91,601.64 MWh electrical energy) linked to a 5% decrease in electrical energy required for cooling buildings due to the mitigation of the heat island effect 6,417.34 MWh per year from Transport (4,043.31 MWh diesel 2,374.04 MWh gasoline) linked to a 2% decrease of all fossil fuels associated with private and commercial transport as walking is encouraged
TIMELINE (START AND END)	2026-2035

Table 20. Individual Actions: Integrated Waste Management

ACTION TITLE	INTEGRATED WASTE MANAGEMENT
TYPE OF ACTION	Technical intervention
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Residential districts and areas
FIELD OF ACTION	Waste and circular economy
SYSTEMIC LEVER	Technology / Infrastructure
EMISSION DOMAIN(S)	Waste
COVERED INTERVENTIONS	Smart waste collection islands for residential areas
BRIEF DESCRIPTION	Smart waste collection islands for residential areas use technology to streamline waste collection, featuring compact bins with sensors that trigger alerts when full, improving efficiency and promoting sustainable waste management.

ACTION TITLE	INTEGRATED WASTE MANAGEMENT
OUTCOME	Reuse and recycling of at least 70% of waste collected at municipal level by 2035
RESPONSIBLE ENTITY / BODY / PERSON	Municipality
INVOLVED STAKEHOLDERS	Oradea Municipality, Oradea's Waste Operator, ECO BIHOR, Ecolect Group Intercommunity Development Association Association of property owners, Local NGOs that are active in the field of environmental protection and the urban sector, Local NGOs that are active in the field of citizens engagement, active citizenship, community initiatives, Local innovation ecosystem & Private sector.
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	773.93 tons CO2 from Waste (773.93 from diesel)
% OF TOTAL CO2 REDUCTION	0.12%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	2,898.60 MWh per year of diesel linked to a 30% decrease in diesel consumption associated with the Waste sector.
TIMELINE (START AND END)	2026-2035

Table 21. Individual Actions: Efficient Horizontal Governance of Climate Neutrality

ACTION TITLE	EFFICIENT HORIZONTAL GOVERNANCE OF CLIMATE NEUTRALITY
TYPE OF ACTION	Other interventions
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Oradea Metropolitan Area
FIELD OF ACTION	Organisational and Governance Innovation
SYSTEMIC LEVER	Governance and Policy
EMISSION DOMAIN(S)	Buildings and IPPU
COVERED INTERVENTIONS	- Establishment of a climate neutrality office run by a Chief Climate Officer within the municipality / metropolitan IDA - Adhesion of the municipality to the M100 Mirror Mission Cities Hub active at national level
BRIEF DESCRIPTION	Two impactful interventions for advancing sustainability within municipalities include the

ACTION TITLE	EFFICIENT HORIZONTAL GOVERNANCE OF CLIMATE NEUTRALITY
	establishment of a Climate Neutrality Office, led by a Chief Climate Officer and the adhesion of the municipality to the M100 Mirror Mission Cities Hub at the national level. The Climate Neutrality Office serves as a dedicated entity responsible for coordinating and implementing strategies to achieve climate neutrality goals, focusing on initiatives like carbon emissions reduction and renewable energy adoption. In the same time, joining the M100 Mirror Mission Cities Hub provides municipalities with access to a network of cities committed to sustainability, facilitating collaboration, knowledge sharing and resource access to support local sustainability efforts.
OUTCOME	Increase internal capacity to plan, implement and monitor climate neutrality municipal and metropolitan policies.
RESPONSIBLE ENTITY / BODY / PERSON	All stakeholders foreseen for the Climate Neutrality Action Plan implementation
INVOLVED STAKEHOLDERS	All the stakeholders involved in implementing the Climate Neutrality Action Plan
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	31,598.02 tons CO2 from Buildings (31,598.02 from electrical energy) 5,246.54 tons CO2 from IPPU (1,774.15 from electrical energy 2,457.75 from natural gas 1,014.65 from thermal energy)
% OF TOTAL CO2 REDUCTION	5.56%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	90,690.40 MWh electrical energy linked to the Buildings sector associated with a 5% decrease in electrical energy for all residential buildings. 20,209.35 MWh per year (4,184.31 MWh electrical energy 12,167.06 MWh natural gas 3,857.98 MWh thermal energy) linked to a 40% decrease in all energy required for the IPPU sector.
TIMELINE (START AND END)	2026-2035

Table 22. Individual Actions: Better Planning for Achieving Climate Neutrality

ACTION TITLE	BETTER PLANNING FOR ACHIEVING CLIMATE NEUTRALITY
TYPE OF ACTION	Other interventions
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Oradea Metropolitan Area
FIELD OF ACTION	Organisational and Governance Innovation
SYSTEMIC LEVER	Finance & funding

ACTION TITLE	BETTER PLANNING FOR ACHIEVING CLIMATE NEUTRALITY
EMISSION DOMAIN(S)	Buildings
COVERED INTERVENTIONS	• Implementation of annual green budgeting at city / metropolitan level • Annual green procurement plan • New regulations and urban policies for critical areas of intervention (property taxation and fiscal incentives for green buildings, administration of condominiums, urban planning etc.)
BRIEF DESCRIPTION	Three essential interventions for advancing sustainability at the city or metropolitan level include the implementation of annual green budgeting, the adoption of an annual green procurement plan and the establishment of new regulations and urban policies for critical areas of intervention. The implementation of annual green budgeting involves integrating environmental considerations into budget allocations, prioritising funds for green initiatives such as renewable energy projects and green infrastructure development. In the same time, the adoption of an annual green procurement plan ensures that sustainability criteria are incorporated into procurement processes, promoting the purchase of environmentally friendly products and services. In addition, the establishment of new urban regulations and policies targets critical areas such as property taxation, tax incentives for green buildings, condominium management and urban planning, encouraging sustainable practices and fostering urban resilience to environmental challenges.
OUTCOME	Increase internal capacity to plan, implement and monitor municipal and metropolitan policies for climate neutrality
RESPONSIBLE ENTITY / BODY / PERSON	All stakeholders foreseen for the Climate Neutrality Action Plan implementation
INVOLVED STAKEHOLDERS	All the stakeholders involved in implementing the Climate Neutrality Action Plan.
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	40,236.33 tons CO2 from Buildings (31,915.51 from electrical energy 2,955.79 from natural gas 5,365.03 from thermal energy)
% OF TOTAL CO2 REDUCTION	6.07%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	130,169.44 MWh per year (91,601.64 MWh electrical energy 14,632.60 MWh natural gas 23,935.20 MWh thermal energy) linked to a 5% decrease in all energy associated with all buildings.
TIMELINE (START AND END)	2026-2035

Table 23. Individual Actions: Encouraging Behaviour Change, Local Commitment and Citizen Empowerment for Climate Neutrality

ACTION TITLE	ENCOURAGING BEHAVIOUR CHANGE, LOCAL COMMITMENT AND CITIZEN EMPOWERMENT FOR CLIMATE NEUTRALITY
TYPE OF ACTION	Other interventions
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Oradea Metropolitan Area
FIELD OF ACTION	Social and Other Innovation
SYSTEMIC LEVER	Democracy / participation Learning & capabilities
EMISSION DOMAIN(S)	Buildings, Transport, IPPU, Waste, AFOLU
COVERED INTERVENTIONS	• Implementation of various campaigns / initiatives aimed at encouraging a climate neutral lifestyle (e.g. free public transport for limited time intervals; "Earth Hour" – lights out for a certain period of time; "Street Delivery" – reclaiming public areas for pedestrians etc.) • Encouraging climate-neutrality volunteership through a set of tools • "Climathon" – annual hackathon organised for the identification of green solutions to various local challenges • Participatory budgeting for climate neutral interventions • Establishment of a Climate Neutrality Consultative Committee at city / metropolitan level • Micro-grants for projects carried out by NGOs active in the field of climate neutrality
BRIEF DESCRIPTION	Key interventions for promoting climate neutrality and sustainability at the city or metropolitan level include the implementation of various campaigns and initiatives aimed at encouraging a climate-neutral lifestyle, such as offering free public transport and organising events like "Earth Hour" and "Street Delivery." Furthermore, cities can encourage climate-neutrality through a set of tools, engage in annual hackathons like "Climathon" to identify green solutions to local challenges and adopt participatory budgeting processes to allocate funds for climate-neutral interventions with citizen input. Establishing a Climate Neutrality Consultative Committee provides a forum for stakeholder collaboration and decision-making on climate-related issues, while providing micro-grants for NGO projects on climate neutrality supports grassroots initiatives and amplifies community engagement in addressing climate change.
OUTCOME	Building a functional and sustainable support ecosystem for municipal and metropolitan climate transition
RESPONSIBLE ENTITY / BODY / PERSON	All stakeholders foreseen for the Climate Neutrality Action Plan implementation
INVOLVED STAKEHOLDERS	All the stakeholders involved in implementing the Climate Neutrality Action Plan.
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION	24,141.80 tons CO2 from Buildings (19,149.31 from electrical energy 1,773.47 from natural gas 3,219.02 from thermal energy) 2,734.99 tons CO2 from Transport (228.94 from electrical energy 1,619.34 from diesel 886.70 from

ACTION TITLE	ENCOURAGING BEHAVIOUR CHANGE, LOCAL COMMITMENT AND CITIZEN EMPOWERMENT FOR CLIMATE NEUTRALITY
SOURCE SECTOR	gasoline) 655.82 tons CO2 from IPPU (221.77 from electrical energy 307.22 from natural gas 126.83 from thermal energy) 656.96 tons CO2 from Waste (554.42 from electrical energy 5.78 from natural gas 15.28 from thermal energy 77.39 from diesel 4.09 from gasoline) 453.74 tons CO2 from AFOLU (80.41 from electrical energy 233.81 from natural gas 139.52 from thermal energy)
% OF TOTAL CO2 REDUCTION	4.32%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	3% decrease in all energy associated with all sectors, and 5% decrease from IPPU 78,101.67 MWh per year from Buildings (54,960.99 MWh electrical energy 8,779.56 MWh natural gas 14,361.12 MWh thermal energy) 10,193.74 MWh per year from Transport (567.72 MWh electrical energy 6,064.96 MWh diesel 3,561.06 MWh gasoline) 2,526.17 MWh per year from IPPU (523.04 MWh electrical energy 1,520.88 MWh natural gas 482.25 MWh thermal energy) 536.78 MWh per year from Waste (196.95 MWh electrical energy 28.61 MWh natural gas 4.95 MWh thermal energy 289.86 MWh diesel 16.41 MWh gasoline) 146.22 MWh per year from AFOLU (30.27 MWh electrical energy 88.03 MWh natural gas 27.91 MWh thermal energy)
TIMELINE (START AND END)	2026-2035

Table 24. Individual Actions: Developing New Skills for Climate Neutrality

ACTION TITLE	DEVELOPING NEW SKILLS FOR CLIMATE NEUTRALITY
TYPE OF ACTION	Other interventions
SCALE AND TARGET GROUP (ADDRESSED ENTITIES)	Metropolitan
FIELD OF ACTION	Social and Other Innovation
SYSTEMIC LEVER	Democracy / participation
EMISSION DOMAIN(S)	Buildings, Transport, IPPU, Waste, AFOLU
COVERED INTERVENTIONS	- In-depth stakeholder mapping and needs assessment - Setting-up a training programme (a Climate Neutrality Academy) for public officials and policymakers, public servants, pupils and students, other relevant stakeholders)

ACTION TITLE	DEVELOPING NEW SKILLS FOR CLIMATE NEUTRALITY
BRIEF DESCRIPTION	Essential interventions for advancing climate neutrality and sustainability within cities include conducting an in-depth stakeholder mapping and needs assessment to identify key players and their requirements in climate action initiatives. Additionally, establishing a comprehensive training program, known as a Climate Neutrality Academy, targets public officials, policymakers, public servants, pupils, students, and other stakeholders. Through this academy, participants gain knowledge and skills to support climate action efforts, fostering innovation and driving sustainable development
OUTCOME	Building a functional and sustainable support ecosystem for municipal and metropolitan climate transition
RESPONSIBLE ENTITY / BODY / PERSON	All stakeholders foreseen for the Climate Neutrality Action Plan implementation
INVOLVED STAKEHOLDERS	All the stakeholders involved in implementing the Climate Neutrality Action Plan.
GHG EMISSIONS REDUCTION ESTIMATE (TOTAL) PER EMISSION SOURCE SECTOR	16,094.53 tons CO2 from Buildings (12,766.21 from electrical energy 1,182.31 from natural gas 2,146.01 from thermal energy) 1,823.32 tons CO2 from Transport (152.63 from electrical energy 1,079.56 from diesel 591.14 from gasoline) 655.82 tons CO2 from IPPU (221.77 from electrical energy 307.22 from natural gas 126.83 from thermal energy) 448.41 tons CO2 from Waste (380.06 from electrical energy 3.85 from natural gas 10.19 from thermal energy 51.60 from diesel 2.72 from gasoline) 336.34 tons CO2 from AFOLU (53.61 from electrical energy 155.88 from natural gas 126.86 from thermal energy)
% OF TOTAL CO2 REDUCTION	2.92%
GENERATED RENEWABLE ENERGY (IF APPLICABLE)	-
REMOVED / SUBSTITUTED ENERGY, VOLUME OR FUEL TYPE	2% decrease in all energy associated with all sectors and 5% decrease from IPPU 52,067.78 MWh per year from Buildings (36,640.66 MWh electrical energy 5,853.04 MWh natural gas 9,574.08 MWh thermal energy) 6,795.83 MWh per year from Transport (378.48 MWh electrical energy 4,043.31 MWh diesel 2,374.04 MWh gasoline) 2,526.17 MWh per year from IPPU (523.04 MWh electrical energy 1,520.88 MWh natural gas 482.25 MWh thermal energy) 357.85 MWh per year from Waste (131.30 MWh electrical energy 19.07 MWh natural gas 3.30 MWh thermal energy 193.24 MWh diesel 10.94 MWh gasoline) 97.48 MWh per year from AFOLU (20.18 MWh electrical energy 58.69 MWh natural gas 18.61 MWh thermal energy)
TIMELINE (START AND END)	2026-2035



Municipiul
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ORADEA

			Buildings		Transport		IPPU		Waste		AFOLU	
			ES	CO2	ES	CO2	ES	CO2	ES	CO2	ES	CO2
I. Energy systems	I.1. Upgrade of public district heating system	Electrical energy										
		Natural gas	100,000.00	20,200.00								
		Thermal energy	100,000.00	22,414.81								
		Diesel										
		Gasoline										
		RE Generated										
Total			200,000.00	42,614.81								
I. Energy systems	I.2. Local green power generation	Electrical energy	30,701.00	10,696.73								
		Natural gas										
		Thermal energy										
		Diesel										
		Gasoline										
		RE Generated	-30,701.00									
Total			-30,701.00	10,696.73								
I. Energy systems	I.3. Modernization of public lighting system	Electrical energy			10,274.68	4,143.34						
		Natural gas										
		Thermal energy										
		Diesel										
		Gasoline										
		RE Generated										
Total					10,274.68	4,143.34						
II. Sustainable urban mobility	II.1. Transit traffic congestion relieve	Electrical energy										
		Natural gas										
		Thermal energy			80,866.11	21,591.25						
		Diesel			47,480.77	11,822.71						
		Gasoline										
		RE Generated										
Total					128,346.88	33,413.96						
II. Sustainable urban mobility	II.2. Promotion of green public transport	Electrical energy			-4,680.00	-1,887.24						
		Natural gas										
		Thermal energy										
		Diesel			40,433.06	10,795.63						
		Gasoline			23,740.38	5,911.36						
		RE Generated										
Total					59,493.44	14,819.74						
II. Sustainable urban mobility	II.3. Attractive pedestrian and cycling alternative	Electrical energy			3,784.82	1,526.25						
		Natural gas										
		Thermal energy										
		Diesel			40,433.06	10,795.63						
		Gasoline			23,740.38	5,911.36						
		RE Generated										
Total					67,958.26	18,233.24						
III. Built environment	III.1. Energy renovation of public buildings	Electrical energy	4,710.46	1,641.20								
		Natural gas	496.80	100.35								
		Thermal energy	11,365.05	2,547.45								
		Diesel										
		Gasoline										
		RE Generated										
Total			16,572.31	4,289.01								
III. Built environment	III.2. Energy renovation of private multi-	Electrical energy	852,489.76	297,021.40								
		Natural gas										
		Thermal energy	191,956.55	43,026.69								
		Diesel										
		Gasoline										
		RE Generated										
Total			1,044,446.31	340,048.09								
III. Built environment	III.3. New nZEB public and private buildings	Electrical energy	3,281.04	1,143.17								
		Natural gas										
		Thermal energy										
		Diesel										
		Gasoline										
		RE Generated										
Total			3,281.04	1,143.17								
IV. Green infrastructure and nature-based solutions	IV.1. Expansion and improvement of green	Electrical energy	91,601.64	31,915.51								
		Natural gas										
		Thermal energy										
		Diesel			4,043.31	1,079.56						
		Gasoline			2,374.04	591.14						
		RE Generated										
Total			91,601.64	31,915.51	6,417.34	1,670.70						
IV. Green infrastructure and nature-based solutions	IV.2. Urban renewal in the spirit of climate	Electrical energy	91,601.64	31,915.51								
		Natural gas										
		Thermal energy										
		Diesel			4,043.31	1,079.56						
		Gasoline			2,374.04	591.14						
		RE Generated										
Total			91,601.64	31,915.51	6,417.34	1,670.70						
V. Waste and circular economy	V.1. Integrated waste management	Electrical energy										
		Natural gas										
		Thermal energy							2,898.60	773.93		
		Diesel										
		Gasoline										
		RE Generated										
Total								2,898.60	773.93			
VI. Organisational and Governance Innovation	VI.1. Efficient horizontal governance of	Electrical energy	90,690.40	31,598.02			4,184.31	1,774.15				
		Natural gas					12,167.06	2,457.75				
		Thermal energy					3,857.98	1,014.65				
		Diesel										
		Gasoline										
		RE Generated										
Total			90,690.40	31,598.02			20,209.35	5,246.54				
VI. Organisational and Governance Innovation	VI.2. Better planning for achieving climate	Electrical energy	91,601.64	31,915.51								
		Natural gas	14,632.60	2,955.79								
		Thermal energy	23,935.20	5,365.03								
		Diesel										
		Gasoline										
		RE Generated										
Total			130,169.44	40,236.33								
VII. Social and Other Innovation	VII.1. Encouraging behaviour changes, local	Electrical energy	54,960.99	19,149.31	567.72	228.94	523.04	221.77	196.95	554.42	30.27	80.41
		Natural gas	8,779.56	1,773.47			1,520.88	307.22	28.61	5.78	88.03	233.81
		Thermal energy	14,361.12	3,219.02			482.25	126.83	4.95	15.28	27.91	139.52
		Diesel			6,064.96	1,619.34			289.86	77.39		
		Gasoline			3,561.06	886.70			16.41	4.09		
		RE Generated										
Total			78,101.67	24,141.80	10,193.74	2,734.99	2,526.17	655.82	536.78	656.96	146.22	453.74
VII. Social and Other Innovation	VII.2. Developing new skills for climate neutrality	Electrical energy	36,640.66	12,766.21	378.48	152.63	523.04	221.77	131.30	380.06	20.18	53.61
		Natural gas	5,853.04	1,182.31			1,520.88	307.22	19.07	3.85	58.69	155.88
		Thermal energy	9,574.08	2,146.01			482.25	126.83	3.30	10.19	18.61	126.86
		Diesel			4,043.31	1,079.56			193.24	51.60		
		Gasoline			3,744.04	591.14			10.94	2.72		
		RE Generated										
Total			52,067.78	16,094.53	6,795.83	1,823.32	2,526.17	655.82	357.85	448.41	97.48	336.34

	2035 ENERGY REQUIREMENTS AND CO2 EMISSIONS											
	Buildings 2035		Transport 2035		IPPU 2035		Waste 2035		AFOLU 2035			
	MWh	CO2	MWh	CO2	MWh	CO2	MWh	CO2	MWh	CO2		
Electrical energy	514,454.62	90,544.01	8,598.40	1,513.32	5,230.39	920.55	6,236.81	1,097.68	958.69	168.73		
Natural gas	162,890.08	32,903.80			15,208.82	3,072.18	905.97	183.01				
Thermal energy	127,511.93	17,979.18			4,822.47	679.97	156.75	22.10	883.93	124.63		
Diesel			22,238.18	5,937.59			6,280.30	1,676.84	0.00	0.00		
Gasoline			13,057.21	3,251.25			519.60	129.38	0.00	0.00		
RE Generated	30,701.00	-10,696.73										
Total	835,557.63	130,730.26	43,893.79	10,702.16	25,261.68	4,672.70	14,099.43	3,109.01	1,842.62	293.36	2035 MWh	2035 CO2
											920,655.15	149,507.49

Present the targeted actions grouped together according to each field of action. Use one sheet for each distinct field of action, following the template provided below.

→ Make sure to also include within this section the actions pertaining to Organisational and Governance Innovation, as well as the actions related to Social and Other Innovation fields.

Table 25. Portfolio of Actions

FIELD OF ACTION	ENERGY SYSTEMS
LIST OF COVERED ACTIONS	- Upgrade of public district heating system - Local green power generation - Modernization of public lighting system
FIELD OF ACTION	SUSTAINABLE URBAN MOBILITY
LIST OF COVERED ACTIONS	- Transit traffic congestion relieve - Promotion of green public transport - Attractive pedestrian and cycling alternatives
FIELD OF ACTION	BUILT ENVIRONMENT
LIST OF COVERED ACTIONS	- Energy renovation of public buildings - Energy renovation of private multi-apartment residential buildings - New nZEB public and private buildings
FIELD OF ACTION	GREEN INFRASTRUCTURE AND NATURE-BASED SOLUTIONS
LIST OF COVERED ACTIONS	- Expansion and improvement of green areas - Urban renewal in the spirit of climate neutrality
FIELD OF ACTION	WASTE AND CIRCULAR ECONOMY
LIST OF COVERED ACTIONS	Integrated waste management

FIELD OF ACTION	ORGANISATIONAL AND GOVERNANCE INNOVATION (CROSS-CUTTING)
LIST OF COVERED ACTIONS	● Efficient horizontal governance of climate neutrality ● Better planning for achieving climate neutrality

FIELD OF ACTION	SOCIAL AND OTHER INNOVATION (CROSS-CUTTING)
LIST OF COVERED ACTIONS	● Encouraging behaviour change, local commitment and citizen empowerment for climate neutrality ● Developing new skills for climate neutrality

CARBON CAPTURE INTERVENTIONS OUTLINED IN THE ACTION PLAN

Below we provide a summary of the offsetting actions and interventions which have already been incorporated into the Action Plan:

- **Enlargement and enhancement of green spaces:** The trees and plants to be planted as part of the interventions aimed at developing the existing green areas and creating new ones will contribute to capturing carbon emissions.
- **Establishing partnership agreements with major retailers to plant trees in their parking areas and invest in green roofs:** The green spaces to be developed by the major retailers will contribute to capturing carbon emissions.
- **Urban renewal aligned with climate neutrality:** The urban renewal interventions (eg., upgrading sidewalks, creating playgrounds and recreational areas) will inherently integrate nature-based solutions, which will aid in capturing carbon emissions.
- **Governance Innovation actions (particularly the new regulations and urban policies targeting key areas of intervention) and the Social Innovation actions (especially those promoting behavioural change, local engagement and citizen empowerment for climate neutrality, but also the Climate Neutrality Academy):** The interventions covered within these types of actions will foster more environmentally and climate conscious behaviours, facilitating the adoption of practices that will aid in capturing the locally generated carbon. We anticipate that, through the changes we will induce in the attitudes and behaviours of both individuals and organisations, we will successfully encourage them to implement their own carbon capture solutions.
 - **Examples envisioned for citizens:** Apartment dwellers could set up green balconies within their units, while homeowners could landscape their yards and gardens to maximise the green coverage. The residents from the metropolitan villages could enhance soil carbon sequestration through sustainable agricultural practices. Moreover, the participatory budgeting programmes for climate neutrality will encourage community-led projects that

could increase the local carbon capture capacity, complementing the initiatives aimed at directly reducing CO2 emissions.

- **Examples envisioned for companies and other private organisations:** Overall, we anticipate an increased use of outdoor spaces by private companies and organisations for extensive greenery areas. We also foresee local innovative companies, particularly startups, developing advanced technological solutions for carbon capture and storage. For factories, an example that piques our interest is the Carbon Capture Utilisation and Storage (CCUS), through which the industrial companies could implement CCUS technologies to capture the CO2 emissions from their processes, by using or storing them in products. Additionally, we anticipate larger corporations voluntarily adopting carbon offsetting programs over time, in order to mitigate their emissions.
- **Examples envisioned for real estate developers:** The public administration will encourage the real estate developers to implement carbon sequestration measures for their buildings, mainly by incorporating green spaces (not only within the areas surrounding the buildings, but also through green walls, terraces and roofs). Additionally, we will promote investments in advanced carbon capture solutions, such as integrating carbon sequestration technologies into building materials.

In the medium and long term, the Municipality will collaborate with Oradea Metropolitan Area IDA and other local, national and international partners, in order to explore the feasibility of implementing innovative carbon sequestration measures, such as: urban forestry, bioenergy with carbon capture and storage, direct air capture, blue carbon projects (including blue carbon restoration), carbon farming, waste-to-energy with carbon capture, landfill methane capture. Our main approach to obtaining the necessary funds will involve our participation in national and particularly international RDI projects, by accessing the funding calls to be launched through European programmes such as Horizon Europe, LIFE, EUKI, DUT, I3 and the Innovation Fund, in collaboration with other partners.

IMPACT PATHWAYS

Provide a brief description of the theory of change you will use to achieve climate neutrality.

- Use both textual and visual elements, as appropriate, to illustrate the impact pathways, which will be further presented in the subsequent table.
- Make sure to also include within this section the actions pertaining to Organisational and Governance Innovation, as well as the actions related to Social and Other Innovation fields.

Figure 12. Impact Pathways: Energy Systems

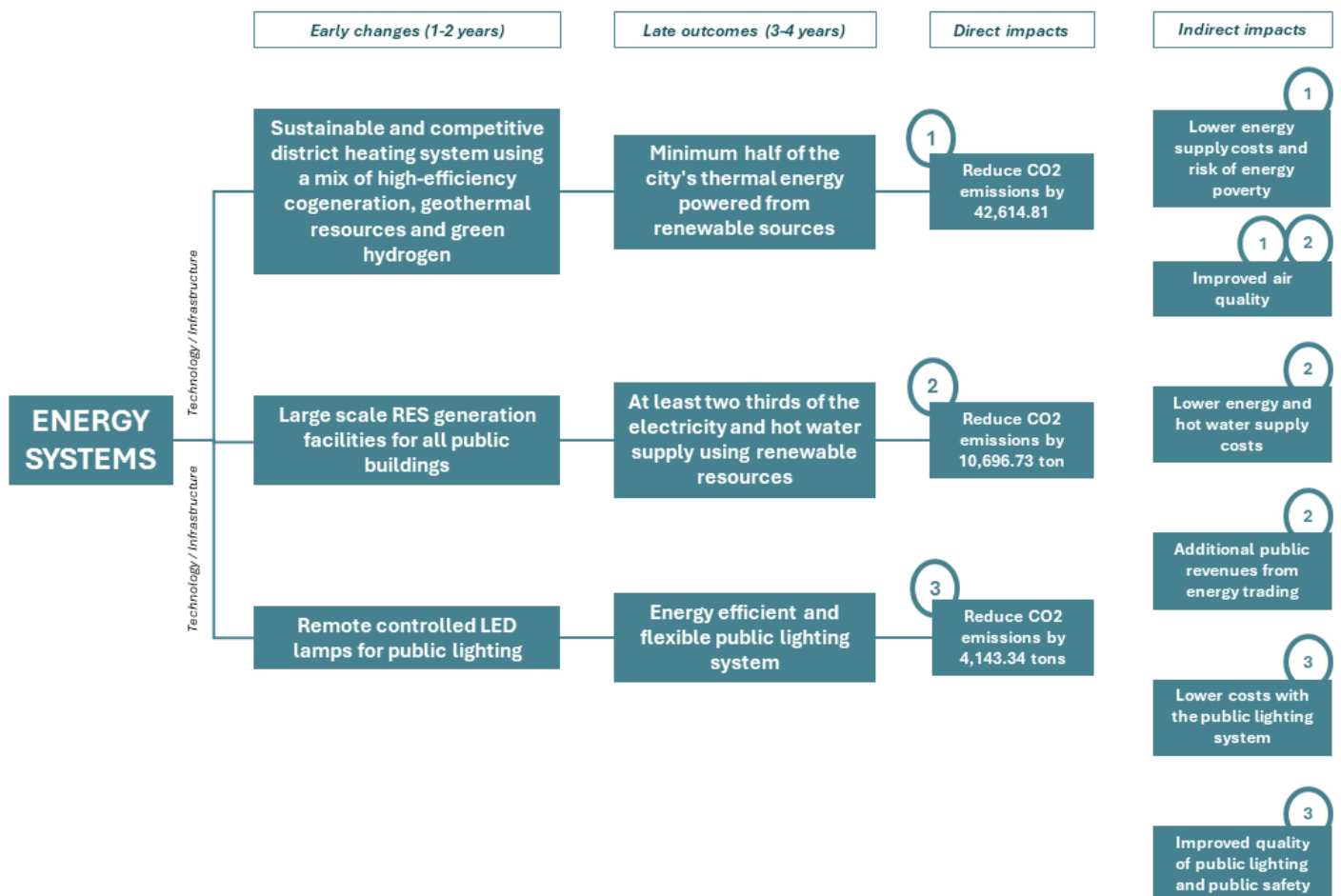


Figure 13. Impact Pathways: Built Environment

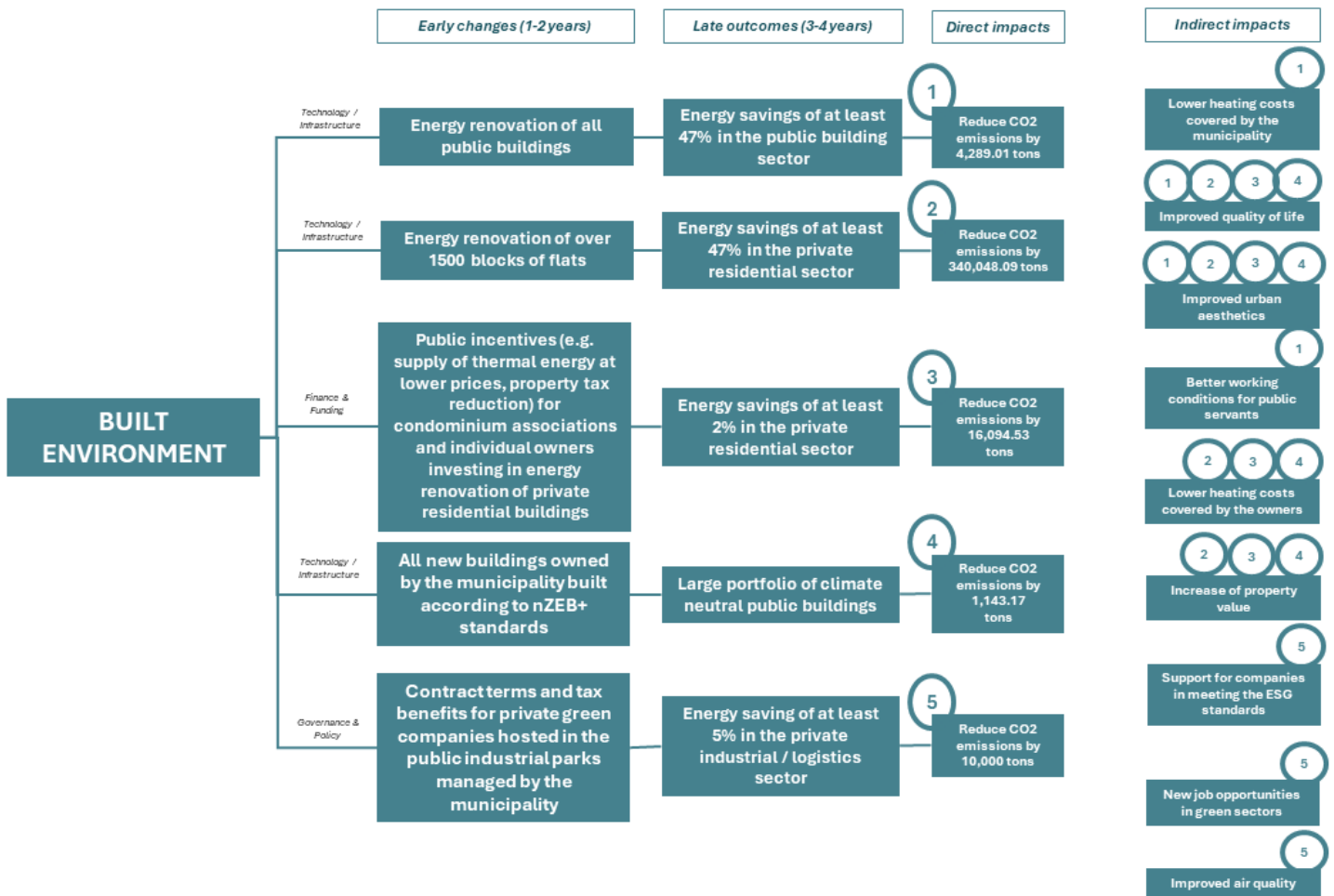


Figure 14. Impact Pathways: Mobility and Transport

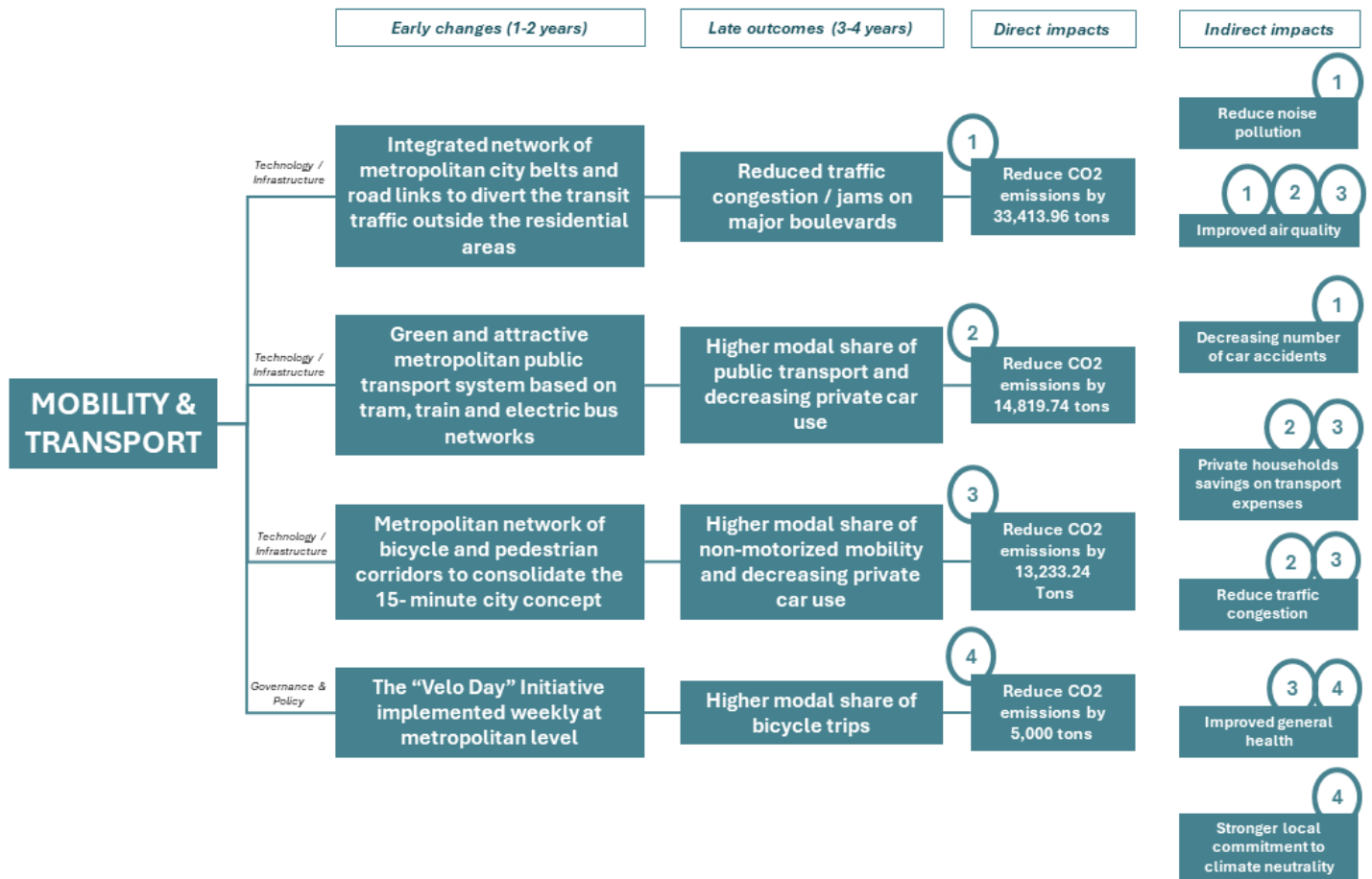


Figure 15. Impact Pathways: Green Infrastructure and Nature Based Solutions

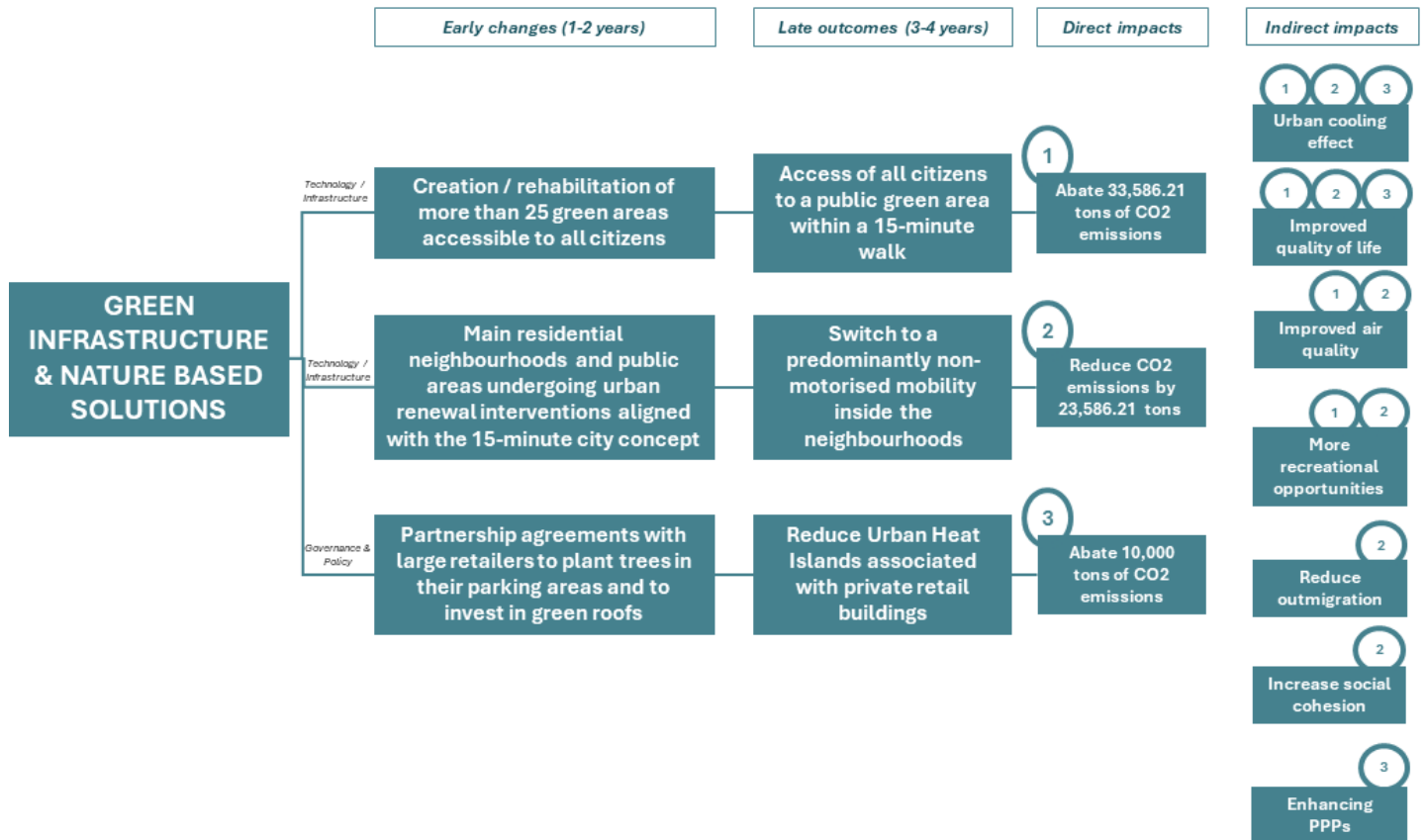


Figure 16. Impact Pathways: Waste and Circular Economy

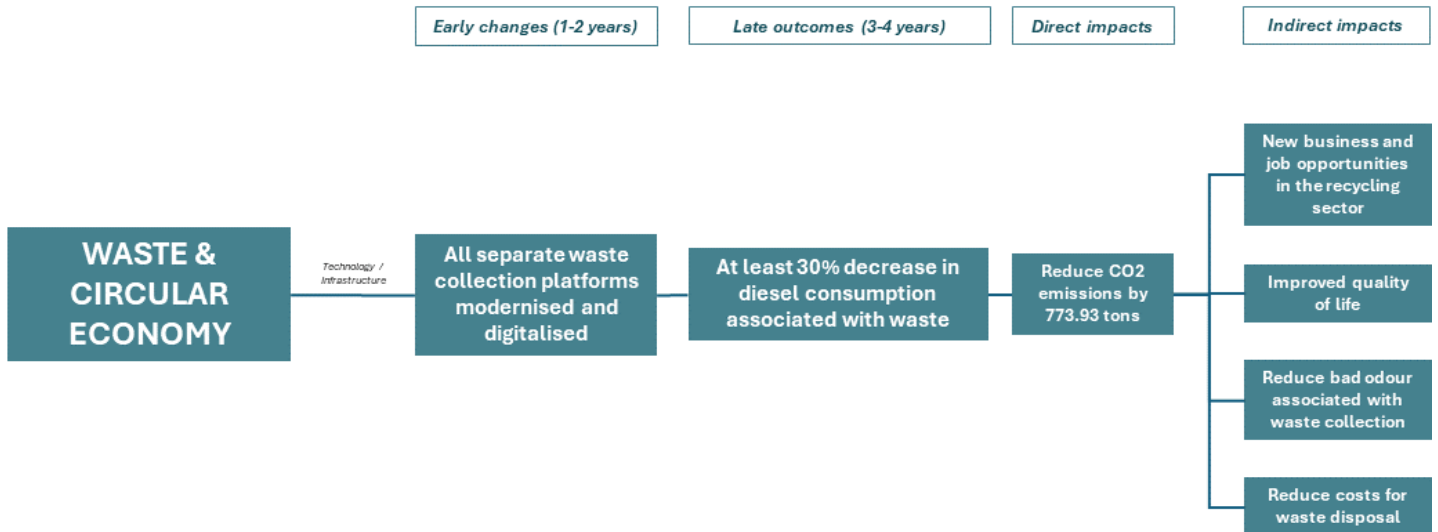


Figure 17. Impact Pathways: Organisational and Governance Innovation

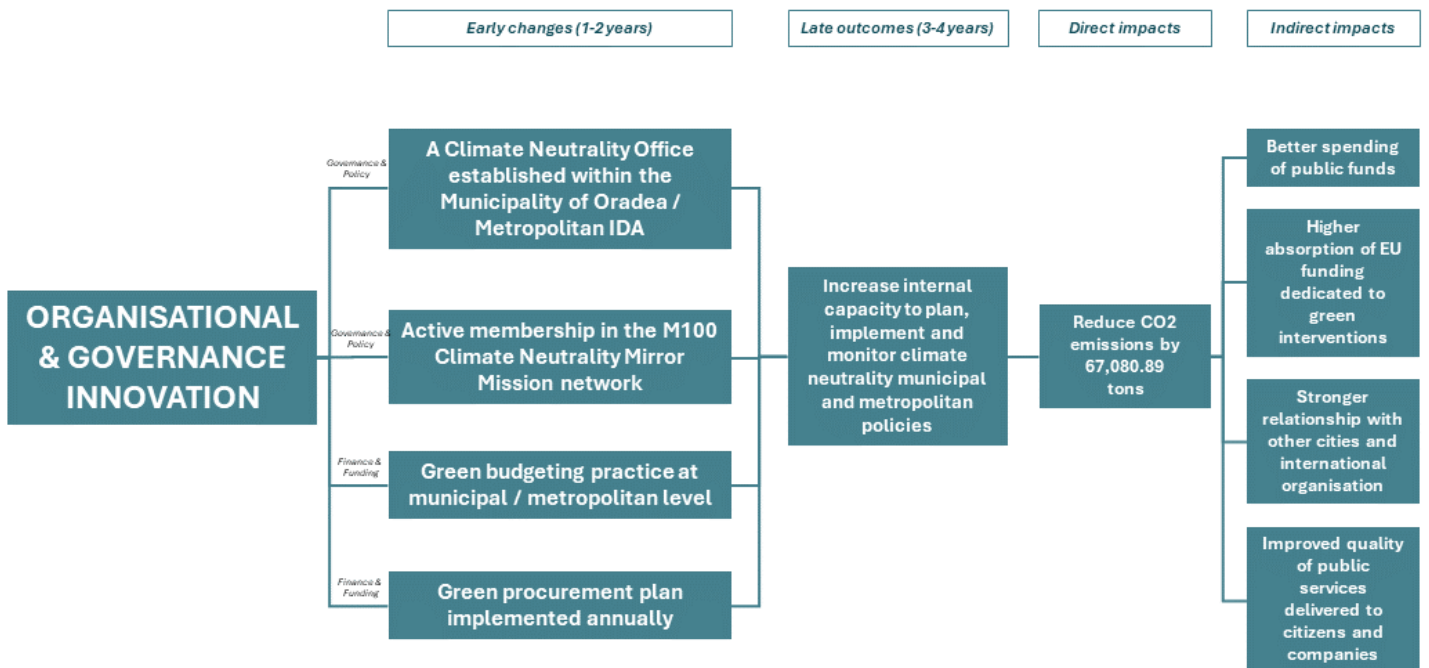
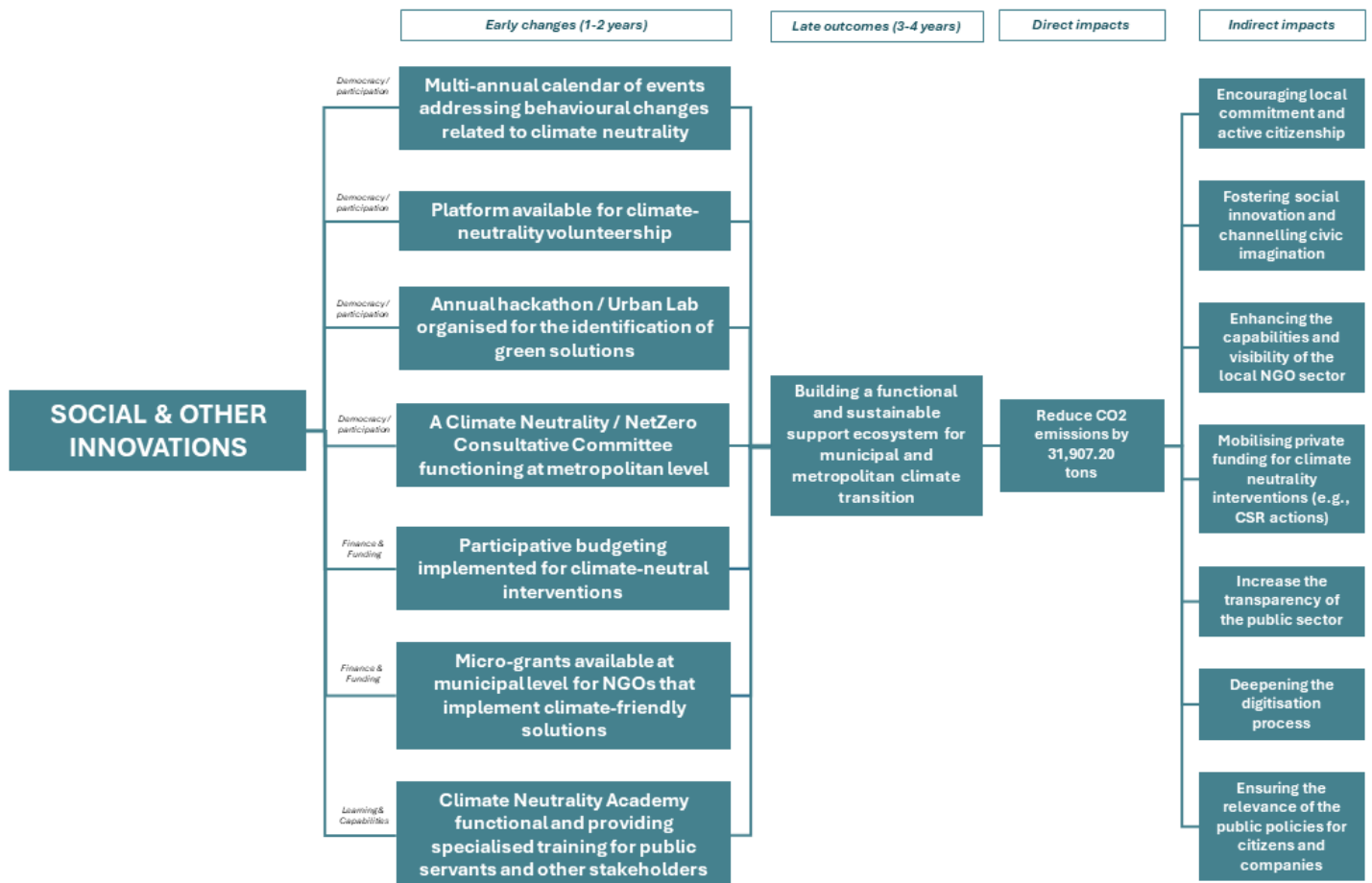


Figure 18. Impact Pathways: Social and Other Innovations



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)
ENERGY SYSTEMS	Technology / Infrastructure	Sustainable and competitive district heating system using a mix of high-efficiency cogeneration, geothermal resources and green hydrogen	Minimum half of the city's thermal energy powered from renewable sources	Reduce CO2 emissions by 42,614.81 tons	Lower energy supply costs and risk of energy poverty Improved air quality
	Technology / Infrastructure	Large scale RES generation facilities for all public buildings	At least two thirds of the electricity and hot water supply using renewable resources	Reduce CO2 emissions by 10,696.73 ton	Lower energy and hot water supply costs Improved air quality Additional public revenues from energy trading
	Technology / Infrastructure	Remote controlled LED lamps for public lighting	Energy efficient and flexible public lighting system	Reduce CO2 emissions by 4,143.34 tons	Lower costs with the public lighting system Improved quality of public lighting and public safety
MOBILITY & TRANSPORT	Technology / Infrastructure	Integrated network of metropolitan city belts and road links to divert the transit traffic outside the residential areas	Reduced traffic congestion / jams on major boulevards	Reduce CO2 emissions by 33,413.96 tons	Improved air quality Reduce noise pollution Decreasing number of car accidents
	Technology / Infrastructure	Green and attractive metropolitan public transport system based on tram, train and	Higher modal share of public transport and decreasing private car use	Reduce CO2 emissions by 14,819.74 tons	Improved air quality Private households savings on transport expenses

FIELDS OF ACTION	SYSTEMIC LEVERS	EARLY CHANGES (1-2 YEARS)	LATE OUTCOMES (3-4 YEARS)	DIRECT IMPACTS (EMISSION REDUCTIONS)	INDIRECT IMPACTS (CO-BENEFITS)
		electric bus networks			Reduce traffic congestion
	Technology / Infrastructure	Metropolitan network of bicycle and pedestrian corridors to consolidate the 15-minute city concept	Higher modal share of non-motorized mobility and decreasing private car use	Reduce CO2 emissions by 13,233.24 tons	Improved air quality Private households savings on transport expenses Improved general health Reduce traffic congestion
	Governance & Policy	The “Velo Day” Initiative implemented weekly at metropolitan level	Higher modal share of bicycle trips	Reduce CO2 emissions by 5,000 tons	Stronger local commitment to climate neutrality Improved general health
BUILT ENVIRONMENT	Technology / Infrastructure	Energy renovation of all public buildings	Energy savings of at least 47% in the public building sector	Reduce CO2 emissions by 4,289.01 tons	Lower heating costs covered by the municipality Improved quality of life Improved urban aesthetics Better working conditions for public servants
	Technology / Infrastructure	Energy renovation of over 1500 blocks of flats	Energy savings of at least 47% in the private residential sector	Reduce CO2 emissions by 340,048.09 tons	Lower heating costs covered by the owners Improved quality of life

FIELDS OF ACTION	SYSTEMIC LEVERS	EARLY CHANGES (1-2 YEARS)	LATE OUTCOMES (3-4 YEARS)	DIRECT IMPACTS (EMISSION REDUCTIONS)	INDIRECT IMPACTS (CO-BENEFITS)
					Improved urban aesthetics Increase of property value
	Finance & funding	Public incentives (e.g. supply of thermal energy at lower prices, property tax reduction) for condominium associations and individual owners investing in energy renovation of private residential buildings	Energy savings of at least 2% in the private residential sector	Reduce CO2 emissions by 16,094.53 tons	Lower heating costs covered by the owners Improved quality of life Improved urban aesthetics Increase of properties value
	Technology / Infrastructure	All new buildings owned by the municipality built according to nZEB+ standards	Large portfolio of climate neutral public buildings	Reduce CO2 emissions by 1,143.17 tons	
	Governance & Policy	Contract terms and tax benefits for private green companies hosted in the public industrial parks managed by the municipality	Energy saving of at least 5% in the private industrial / logistics sector	Reduce CO2 emissions by 10,000 tons	Support for companies in meeting the ESG standards New job opportunities in green sectors Improved air quality
GREEN INFRASTRUCTURE & NATURE BASED SOLUTIONS	Technology / Infrastructure	Creation / rehabilitation of more than 25 green areas accessible to all citizens	Access of all citizens to a public green area within a 15 minutes walk	Abate 33,586.21 tons of CO2 emissions	Improved quality of life Urban cooling effect

FIELDS OF ACTION	SYSTEMIC LEVERS	EARLY CHANGES (1-2 YEARS)	LATE OUTCOMES (3-4 YEARS)	DIRECT IMPACTS (EMISSION REDUCTIONS)	INDIRECT IMPACTS (CO-BENEFITS)
					Improved air quality More recreational opportunities
	Technology / Infrastructure	Main residential neighbourhoods and public areas undergoing urban renewal interventions aligned with the 15-minute city concept	Switch to a predominantly non-motorised mobility inside the neighbourhoods	Reduce CO2 emissions by 23,586.21 tons	Improved quality of life Urban cooling effect Improved air quality More recreational opportunities Reduce outmigration Increase social cohesion
	Governance & Policy	Partnership agreements with large retailers to plant trees in their parking areas and to invest in green roofs	Reduce Urban Heat Islands associated with private retail buildings	Abate 10,000 tons of CO2 emissions	Improved quality of life Urban cooling effect Enhancing PPPs
WASTE AND CIRCULAR ECONOMY	Technology / Infrastructure	All separate waste collection platforms modernised and digitalised	At least 30% decrease in diesel consumption associated with waste	Reduce CO2 emissions by 773.93 tons	New business and job opportunities in the recycling sector Improved quality of life Reduce bad odour associated with waste collection

FIELDS OF ACTION	SYSTEMIC LEVERS	EARLY CHANGES (1-2 YEARS)	LATE OUTCOMES (3-4 YEARS)	DIRECT IMPACTS (EMISSION REDUCTIONS)	INDIRECT IMPACTS (CO-BENEFITS)
					Reduce costs for waste disposal
ORGANISATIONAL AND GOVERNANCE INNOVATION	Governance & Policy	A Climate Neutrality Office established within the Municipality of Oradea / Metropolitan IDA	Increase internal capacity to plan, implement and monitor climate neutrality municipal and metropolitan policies	Reduce CO2 emissions by 67,080.89 tons	Better spending of public funds
	Governance & Policy	Active membership in the M100 Climate Neutrality Mirror Mission network			Higher absorption of EU funding dedicated to green interventions
	Finance & funding	Green budgeting practice at municipal / metropolitan level			Stronger relationship with other cities and international organisation
	Finance & funding	Green procurement plan implemented annually			Improved quality of public services delivered to citizens and companies
SOCIAL AND OTHER INNOVATION	Democracy / participation	Multi-annual calendar of events addressing behavioural changes related to climate neutrality	Building a functional and sustainable support ecosystem for municipal and metropolitan climate transition	Reduce CO2 emissions by 31,907.20 tons	Encouraging local commitment and active citizenship
	Democracy / participation	Platform available for climate-neutrality volunteership			Fostering social innovation and channelling civic imagination
	Democracy / participation	Annual hackathon / UrbanLab organised for the identification of green solutions			Enhancing the capabilities and visibility of the local NGO sector
					Mobilising private funding for climate

FIELDS OF ACTION	SYSTEMIC LEVERS	EARLY CHANGES (1-2 YEARS)	LATE OUTCOMES (3-4 YEARS)	DIRECT IMPACTS (EMISSION REDUCTIONS)	INDIRECT IMPACTS (CO-BENEFITS)
	Democracy / participation	A Climate Neutrality / NetZero Consultative Committee functioning at metropolitan level			neutrality interventions (eg. CSR actions)
	Finance & funding	Participative budgeting implemented for climate-neutral interventions			Increase the transparency of the public sector
	Finance & funding	Micro-grants available at municipal level for NGOs that implement climate-friendly solutions			Deepening the digitisation process
	Learning & capabilities	A Climate Neutrality Academy functional and providing specialised training for public servants and other stakeholders			Ensuring the relevance of the public policies for citizens and companies

STRATEGY FOR RESIDUAL EMISSIONS

Describe your approach to managing residual emissions.

Notwithstanding the proposed interventions aimed at reducing the CO₂ emissions by 80.27%, there will remain a volume of 162,387.71 of CO₂ (equivalent to 19.73%), namely the residual emissions that are not susceptible to reduction through the proposed climate actions and that will be compensated for by the measures delineated below. The residual emissions values were calculated for the emissions which are not covered by the interventions proposed in the Action Plan. The rationale behind this decision was that neither the Municipality nor OMA IDA can directly take responsibility for interventions beyond those included.

As such, when designing the Action Plan, we opted for a pragmatic stance in assessing the Municipality's and OMA IDA's implementation capacity, especially concerning the interventions for which the public administration holds direct accountability. Concurrently, by proposing interventions involving the private sector and the local community, we aim to go beyond the scope of the set actions, striving to abate the emissions unaccounted for in this Action Plan.

BUILDINGS - 130,730.26 | 87.44%

Implementing Smart Building Systems could stand as a pivotal consideration in the strategy for substantially diminishing CO₂ emissions within Oradea. The introduction of sophisticated building automation systems could enable the intelligent regulation of heating, cooling, ventilation, and lighting according to occupancy and prevailing weather conditions, thus streamlining energy consumption and minimising unnecessary energy use. Furthermore, the encouragement for Renewable Energy Installations holds great potential; there is a possibility for the city to explore the enactment of mandates and the offering of incentives for the installation of solar PV panels, solar thermal units, and small-scale wind turbines on suitable buildings. Additionally, the encouragement towards adopting on-site energy generation and storage systems could aid in enhancing the stability of the energy supply and reducing the reliance on conventional power grids.

Alongside energy management initiatives, exploring options like the implementation of Solar Reflective Surfaces could serve to minimize air conditioning requirements by reflecting solar radiation, which in turn would lower electricity demands and CO₂ emissions. Introducing living walls and other greening measures on the exteriors of buildings has the potential to bolster thermal insulation and help in counteracting urban heat islands. These efforts, together with the advocacy for incorporating natural ventilation in building designs to decrease the dependence on mechanical cooling, provide a solid foundation for accomplishing notable reductions in emissions. To further motivate advancements, contemplating the introduction of carbon pricing for building operations might stimulate CO₂ reduction efforts, and considering Energy-as-a-Service (EaaS) models could pave the way for energy service companies to finance energy efficiency improvements. This approach, where costs are recouped through the energy savings achieved, would promote an economic model that benefits energy preservation.

TRANSPORT - 10,702.16 | 7.16%

To achieve a reduction in CO₂ emissions within the transport sector by 10,702.16 tons, exploring the introduction of app-based, on-demand transit services could represent a groundbreaking step for Oradea. By taking advantage of technology and real-time route optimization, this approach has the potential to lower the number of vehicles on the streets, thereby improving trip efficiency and reducing emissions. In parallel, considering a significant enhancement of the electric vehicle (EV) infrastructure, including the establishment of a comprehensive network of EV charging stations throughout the city, might greatly encourage the uptake of electric vehicles among residents and businesses.

In support of these efforts, the possibility of rolling out incentives for low-emission vehicles, such as tax rebates and lower registration fees, could further drive the transition towards EVs and other environmentally friendly transport options. Additionally, the concept of creating Green Logistics Zones, which requires the use of electric or hybrid vehicles for delivery activities, would aim to lower emissions from logistics operations. Innovative urban planning could also include developing car-free zones in the city centre and organising regular car-free days to promote public transport usage and pedestrian movement.

Encouraging businesses to adopt telecommuting and flexible working arrangements could serve as another strategy to mitigate peak-time traffic congestion and associated emissions. Furthermore, the provision of Eco-Driving Training Programs, targeted at educating drivers on ways to reduce fuel consumption and CO₂ emissions, could lay the foundation for a sustainable and environmentally efficient future in Oradea's transport sector. These initiatives, collectively, could significantly contribute to the city's environmental goals, fostering a greener, more sustainable urban transport system.

WASTE - 3,109.01 | 2.08%

To tackle the goal of reducing 3,109.01 tons of CO₂ emissions from the waste sector, Oradea could explore a range of innovative waste management strategies. Among these potential initiatives, the city could consider the further development of the already in use waste-to-energy plants that would transform non-recyclable waste into electricity and heat even more efficiently. Alongside this, could strengthen even more its commitment to explore zero waste initiatives. These community-led efforts aim to drastically cut waste at its source, encourage product reuse, and involve the community in sustainable waste practices through educational and awareness campaigns.

To further advance efforts for waste reduction, the city could introduce Extended Producer Responsibility (EPR) regulations. Such regulations would make manufacturers responsible for the entire lifecycle of their products, promoting the creation of more recyclable products and those with lesser environmental impacts, thus encouraging a circular economy. Moreover, to prevent organic waste from ending up in landfills, Oradea could consider offering incentives for residential and community composting programs. These programs could convert organic waste into compost, enriching local agriculture and gardening, thereby reducing landfill use and associated methane emissions. Lastly, the idea of establishing local upcycling centers could be considered, which would enable the repurposing of waste materials into new products, diminishing the

need for raw materials and the emissions from their extraction and processing, aiding the city in achieving its ambitious CO2 reduction goals.

IPPU - 4,672.70 | 3.13%

To tackle the goal of reducing 2,246.18 tons of CO2 emissions within Oradea's Industrial Processes and Product Use (IPPU) sector, the city could consider a strategic focus on implementing Carbon Capture and Utilisation (CCU) technologies. These technologies have the potential to capture CO2 emissions directly from industrial sources and transform them into valuable products like biofuels, plastics, and concrete, effectively reducing greenhouse gas emissions. Additionally, the exploration of a program for Energy Efficiency Upgrades might be on the agenda, aimed at conducting detailed energy audits and updating outdated industrial equipment and processes. By equipping these systems with state-of-the-art HVAC, lighting, and motor solutions, it's possible to achieve a considerable reduction in energy use and associated CO2 emissions.

Simultaneously, the adoption of Process Optimization strategies that utilise Artificial Intelligence (AI) and the Internet of Things (IoT) could represent a transformative approach to manufacturing processes. The use of smart sensors and machine learning algorithms has the potential to significantly improve operational efficiency, reduce waste, and lower energy consumption and emissions. Furthermore, the integration of Green Chemistry Practices in chemical production could limit the use and creation of hazardous substances, enhancing environmental outcomes as well as safety and efficiency. This approach could be complemented by encouraging the use of Advanced Manufacturing Techniques, such as 3D printing and modular construction, which promise to substantially cut down on material waste and energy demands. To support these technological innovations, Circular Economy Initiatives might be developed to promote the reuse, recycling, and recovery of materials and energy within the industrial sector, thus decreasing the reliance on new raw materials.

AFOLU - 293.36 | 0.20%

To significantly reduce CO2 emissions from the Agriculture, Forestry, and Land Use (AFOLU) sector, Oradea could explore initiating key conservation and restoration strategies, particularly focusing on peatland restoration and wetland conservation. Given the importance of peatlands and wetlands as critical carbon sinks, the city might consider dedicating efforts towards the protection and restoration of these areas, recognizing that such restoration is vital for preventing further CO2 emissions and forms a crucial component of the wider climate change mitigation strategy. Additionally, advocating for the adoption of biochar as a soil amendment could represent another potential measure. By incorporating biochar, a stable carbon form derived from biomass, into the soil, it could be possible to improve soil health and sequester carbon effectively, thereby reducing emissions from agricultural lands in the long term.

Concurrently, Oradea could look into embracing both technological and community-driven approaches to further decrease its carbon footprint. Encouraging the use of renewable energy sources, such as solar and wind power, in agricultural operations may help lessen the sector's dependence on fossil fuels, thus

mitigating related CO₂ emissions. The implementation of precision agriculture technologies could be considered to enhance farming practices through the use of data and analytics, with a focus on precision irrigation, fertilisation, and crop monitoring to reduce waste and emissions efficiently. Moreover, encouraging Community Supported Agriculture (CSA) programs and promoting the development of local food systems could serve as pivotal steps.

OTHER LOCAL STRATEGIC DOCUMENTS COVERING SUPPLEMENTARY MEASURES FOR EMISSION REDUCTION IN THE TARGETED EMISSION DOMAINS

In addition to the measures outlined in the current Action Plan, the local, metropolitan and county strategies, plans and programmes incorporate complementary measures for emission reduction in the targeted emission domains, as already outlined in the previous sections. The projects covered by these documents will further reduce the emissions generated by these sectors, complementing the interventions detailed in this Plan and partially addressing the existing emission gap.

The below table lists the key strategic documents containing measures for each emission domain. It's worth noting that aside from these, the Integrated Urban Development Strategy, the Metropolitan Territorial Development Plan and the Sustainable Energy and Climate Action Plan also address these sectors, through dedicated priorities and projects.

Table 26. Key Strategic Documents Containing Additional Measures for the Emission Domain

EMISSION DOMAIN	RESIDUAL EMISSIONS FOLLOWING THE IMPLEMENTATION OF THE PLANNED ACTIONS	OTHER LOCAL STRATEGIC DOCUMENTS AND PROGRAMS AIMED AT ADDRESSING EMISSIONS WITHIN THE EMISSION DOMAIN
BUILDINGS	130,730.26 87.44%	- Oradea Municipality's Local Strategy for Residential Thermal Energy Supply Service - The multi-annual programme for the rehabilitation of buildings in the historic centre - Programme for increasing energy efficiency and deep renovation of residential apartment buildings - Programme for increasing energy efficiency of public buildings
TRANSPORT	10,702.16 7.16%	- The Sustainable Urban Mobility Plan - The Local Public Parking Regulation - Territorial Development Plan of Oradea Metropolitan Area
WASTE	3,109.01 2.08%	- The Local Sanitation and Waste Management Service Regulation - Bihor County's Waste Management Plan - Integrated Sustainable Development Strategy of Bihor County

EMISSION DOMAIN	RESIDUAL EMISSIONS FOLLOWING THE IMPLEMENTATION OF THE PLANNED ACTIONS	OTHER LOCAL STRATEGIC DOCUMENTS AND PROGRAMS AIMED AT ADDRESSING EMISSIONS WITHIN THE EMISSION DOMAIN
INDUSTRIAL PROCESS AND PRODUCT USE (IPPU)	4,672.70 3.13%	The report regarding the endogenous potential and infrastructure development needed to increase employment in Oradea Metropolitan Area
AGRICULTURAL, FORESTRY, AND LAND USE (AFOLU)	293.36 0.20%	Oradea “Green City” Programme

ADDITIONAL / COMPLEMENTARY MEASURES

In terms of carbon reduction and sequestration, we also mention the forthcoming projects that are currently unknown, such as those that might emerge from invitations extended by external partners for collaborative projects developed by international consortia, or the various initiatives originating from the local ecosystem (especially for accessing the funding calls that will be launched in the coming years, both nationally and internationally).

Moreover, within the European framework where the climate neutrality requirements and standards are increasingly imperative for the private sector, we anticipate that the private operators will voluntarily intensify their efforts and allocate more resources towards enhancing their sustainability in the medium and long term. Additionally, through the non-reimbursable financing which is expected to be allocated by 2027 (particularly via the North-West Regional Programme, notably within the priorities 1 - Enhancing regional competitiveness through innovation, digitalization and dynamic enterprises and 3 - Fostering environmentally-friendly localities, alongside other national and European programmes), we expect many local companies to develop projects aimed at reducing their environmental and climate footprint through the secured funds. In this regard, the Climate Neutrality Consultative Committee will play a key role, by engaging the private companies in the journey toward climate neutrality, such as to become reliable sources of funding and technological innovations.

Additionally, we aim to improve our communication with private enterprises (including through the Oradea Local Development Agency), with the goal of persuading them to actively advocate for and facilitate sustainable lifestyles among their employees, as well as to promote climate-neutral practices among their clients and partners (e.g. suppliers, distributors).

We will also continue to welcome collaboration with various partners, in order to create strategic partnerships that could yield significant benefits for our local climate neutrality transition, in terms of CO₂ reduction and capture. As such, we will explore the advantages that might derive from affiliating with relevant associative structures, such as the regional clusters (e.g. Transylvania Energy Cluster, AgroTransylvania Cluster).

MONITORING THE RESIDUAL EMISSIONS

In order to effectively assess the outcomes achieved in terms of residual emissions, the monitoring process outlined in the other sections of the Action Plan will also cover the carbon capture dimension, alongside the actual reduction of the CO2 emissions.

INDICATORS FOR MONITORING, EVALUATION AND LEARNING

Table 27. Portfolio of Indicators

ACTION	OUTCOME / IMPACT ADDRESSED	INDICATOR TITLE	INDICATOR CODE	TARGET VALUES		
				2027	2030	2035
All actions	Reduction of CO2 emissions from 811,938.54 baseline in 2020	CO2 emissions	O-NZC-I1	10 %	50 %	80 %
All actions	Percentage of people fully satisfied to be living in the city	Quality of life	O-NZC-I3	97%	98%	99%
All actions	Euro saved per total households gas consumption from 10,138,260.00 Euro Baseline 2020 (per year)	Household savings	O-NZC-I4	2,027,652 Euro	5,069,130 Euro	8,110,608 Euro
Upgrade of public district heating system Local green power generation Modernization of public lighting system Energy renovation of public buildings New nZEB public and private buildings Promotion of green public transport	Euro spent by City Hall for energy and fuel from 4,357,693 Euro baseline in 2020	Public sector savings	O-NZC-I5	3,486,154 Euro	2,178,846 Euro	871,538 Euro



ACTION	OUTCOME / IMPACT ADDRESSED	INDICATOR TITLE	INDICATOR CODE	TARGET VALUES		
				2027	2030	2035
Expansion and improvement of green areas Urban renewal in the spirit of climate neutrality	Hectares of green spaces in Oradea municipality	Green spaces	O-NZC-I6	620 ha	652 ha	663 ha
Attractive pedestrian and cycling alternatives Transit traffic congestion relieve	Percentage of daily trips done by public transport and/or non-motorised means	Modal share	O-NZC-I7	50%	60%	70%
Energy renovation of private multi-apartment residential buildings	Number of renovated multi-apartment buildings	Energy renovation of multi-apartment buildings	O-NZC-I8	1000	300	200
Integrated waste management	Rate of selective waste collection from total collected waste (at county level)	Selective waste collection	O-NZC-I9	65%	80%	100%
Efficient horizontal governance of climate neutrality	Participation of representatives of the Oradea municipality and the metropolitan area in meetings and events dedicated to climate neutrality	Governance for climate neutrality	O-NZC-I10	6	6	6
Better planning for achieving climate neutrality	Share of green procurement in total purchases	Green procurement	O-NZC-I11	100%	100%	100%
Encouraging behaviour changes, local commitment and citizen empowerment for climate neutrality Developing new skills for climate neutrality	Number of community events, trainings and workshops dedicated to climate neutrality organised by the climate neutrality office or in partnership with	Behaviour change	O-NZC-I13	15	15	15

ACTION	OUTCOME / IMPACT ADDRESSED	INDICATOR TITLE	INDICATOR CODE	TARGET VALUES		
				2027	2030	2035
	local organisations (per year)					

For every proposed indicator, fill out one Metadata Indicator sheet, by using the template provided below.

Table 28. Indicator Metadata: CO2 Emissions

INDICATOR NAME	CO2 emissions
INDICATOR UNIT	Tons of CO2 per year
DEFINITION	Reduction in CO2 emissions
CALCULATION	Detailed assessment by sector and regular monitoring, as described in the Action Plan
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	yes
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	Buildings, Transport, Waste, IPPU, AFOLU
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	yes
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Improved air quality; Reduced outmigration; Improved general health
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	yes
EXPECTED DATA SOURCE	Comprehensive monitoring reports
EXPECTED AVAILABILITY (1-5)	3
SUGGESTED COLLECTION INTERVAL	Annually
DELIVERABLES DESCRIBING THE INDICATOR	Monitoring report
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Reference framework for sustainable cities, ISO 37110:2022 Sustainable cities and communities, Romania Urban Policy Indicators.

Table 29. Indicator Metadata - Quality of Life

INDICATOR NAME	Quality of life
INDICATOR UNIT	Percent
DEFINITION	Share of people fully satisfied to be living in the city
CALCULATION	survey (Urban Barometer on Quality of Life)
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	yes
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	Buildings, Transport, Waste, IPPU, AFOLU
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	yes
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Improved air quality; Lower heating costs covered by the owners; Private households savings on transport expenses; Improved quality of public services delivered to citizens and companies; Deepening the digitisation process; More recreational opportunities; Urban cooling effect; Reduced outmigration
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	yes
EXPECTED DATA SOURCE	Urban Barometer undertaken by the Romanian Ministry of Development, Public Works, and Administration
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 5 years
DELIVERABLES DESCRIBING THE INDICATOR	Comprehensive survey to assess people's satisfaction with living in the city
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Romania Urban Policy Indicators

Table 30. Indicator Metadata - Household savings

INDICATOR NAME	Household savings
INDICATOR UNIT	Euro
DEFINITION	Average energy cost savings per household
CALCULATION	Comprehensive Household Survey
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	yes
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	Buildings, Transport, Waste
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	yes
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Improved air quality; Improved quality of life; Increase of property value
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	yes
EXPECTED DATA SOURCE	EU-SILC; Surveys undertaken by National Institute for statistics
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Every 5 years
DELIVERABLES DESCRIBING THE INDICATOR	Comprehensive household surveys
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	EU-SILC

Table 31. Indicator Metadata - Public Sector Savings

INDICATOR NAME	Public sector savings
INDICATOR UNIT	Euro
DEFINITION	Average energy cost savings of public institutions
CALCULATION	Detailed budget executions of public administrations
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	yes
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	Buildings, Transport, Waste
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	yes
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Better spending of public funds; Lower heating costs covered by the municipality; Lower costs with the public lighting system
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	yes
EXPECTED DATA SOURCE	Ministry of Finance; Consolidated budget executions of public institutions.
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Annually
DELIVERABLES DESCRIBING THE INDICATOR	Municipal Financial Assessment
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Reference Framework for Sustainable Cities, ISO 37110:2022 Sustainable cities and communities, Romania Urban Policy Indicators

Table 32. Indicator Metadata - Green Spaces

INDICATOR NAME	Green spaces
INDICATOR UNIT	Hectares
DEFINITION	Increase in area covered with green spaces
CALCULATION	Data is monitored through the local register of green spaces
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 MEASURE?	Improved air quality; Improved quality of life; Improved general health
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	yes
EXPECTED DATA SOURCE	CORINE Land Cover, National Institute of Statistics
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Annually
DELIVERABLES DESCRIBING THE INDICATOR	Detailed land use analysis
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Reference Framework for Sustainable Cities, ISO 37110:2022 Sustainable cities and communities, Romania Urban Policy Indicators

Table 33. Indicator Metadata - Modal Share of Public and Non-motorized travel

INDICATOR NAME	Modal share of public and non-motorized travel
INDICATOR UNIT	percent
DEFINITION	Increase in share of trips done by public transport and non-motorized means
CALCULATION	Traffic study
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; improved quality of life; Private households savings on transport expenses; Reduce noise pollution
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	yes
EXPECTED DATA SOURCE	Comprehensive traffic study
EXPECTED AVAILABILITY (1-5)	4
SUGGESTED COLLECTION INTERVAL	Every 5 years
DELIVERABLES DESCRIBING THE INDICATOR	Traffic study
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Reference Framework for Sustainable Cities, ISO 37110:2022 Sustainable cities and communities, Romania Urban Policy Indicators

Table 34. Indicator Metadata - Energy renovation of multi-apartment building

INDICATOR NAME	Energy renovation of multi-apartment buildings
INDICATOR UNIT	Number
DEFINITION	Number of multi-apartment buildings renovated for energy efficiency
CALCULATION	Count of buildings
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 energy supply costs and risk of energy poverty; Improved urban aesthetics
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	yes
EXPECTED DATA SOURCE	Internal team
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Annually
DELIVERABLES DESCRIBING THE INDICATOR	Annual report of the Direction for Management of Projects with International Financing
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	2021-2027 ERDF-CF-JTF Common Indicators (RCO18)

Table 35. Indicator Metadata - Selective Waste Collection

INDICATOR NAME	Selective waste collection
INDICATOR UNIT	Percent
DEFINITION	The rate of selective waste collection from total collection, measured at county level.
CALCULATION	Monitoring of selective waste collection rate
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; Improved quality of life; New business and job opportunities in the recycling sector; Reduce bad odour associated with waste collection Reduce costs for waste disposal; Improved general health
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	yes
EXPECTED DATA SOURCE	County Environmental Protection Agency
EXPECTED AVAILABILITY (1-4)	5
SUGGESTED COLLECTION INTERVAL	Annually
DELIVERABLES DESCRIBING THE INDICATOR	Annual report of the County Environmental Protection Agency
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	2021-2027 ERDF-CF-JTF Common Indicators (RCR103)

Table 36. Indicator Metadata - Governance for Climate Neutrality

INDICATOR NAME	Governance for climate neutrality
INDICATOR UNIT	Number
DEFINITION	The number of events and meetings related to climate neutrality in which representatives of the municipality and the metropolitan area participate
CALCULATION	Count of events and meetings
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	no
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	N/A
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	yes
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Stronger local commitment to climate neutrality; Stronger relationship with other cities and international organisations
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	no
EXPECTED DATA SOURCE	Internal reports
EXPECTED AVAILABILITY	5
SUGGESTED COLLECTION INTERVAL	Annually
DELIVERABLES DESCRIBING THE INDICATOR	Reports of the newly established climate neutrality office
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	N/A

Table 37. Indicator Metadata - Green Procurement

INDICATOR NAME	Green procurement
INDICATOR UNIT	Percent
DEFINITION	Percentage of procurement applying the green procurement criteria established by the National Agency for Public Procurement and the Ministry of Environment, Water and Forests in total procurement.
CALCULATION	Percentage of green procurement in total procurement at municipal level
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	no
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	N/A
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	yes
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Stronger local commitment to climate neutrality; Improved quality of public services delivered to citizens and companies; Higher absorption of EU funding dedicated to green interventions; Better spending of public funds;
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	yes
EXPECTED DATA SOURCE	Internal report
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Annually
DELIVERABLES DESCRIBING THE INDICATOR	Reports of the public procurement service within the Oradea City Hall
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	Reference Framework for Sustainable Cities, Romania Urban Policy Indicator

Table 38. Indicator Metadata - Behaviour Change

INDICATOR NAME	Behaviour change
INDICATOR UNIT	number
DEFINITION	Number of community events, trainings and workshops dedicated to climate neutrality organised by the climate neutrality office or in partnership with local organisations (per year)
CALCULATION	Count of event, trainings and workshops
DOES THE INDICATOR MEASURE DIRECT IMPACTS (I.E. REDUCTION IN GREENHOUSE GAS EMISSIONS?)	no
IF YES, WHICH EMISSION SOURCE SECTORS DOES IT IMPACT?	N/A
DOES THE INDICATOR MEASURE INDIRECT IMPACTS (I.E. CO-BENEFITS)?	yes
IF YES, WHICH CO-BENEFIT DOES IT MEASURE?	Encouraging local commitment and active citizenship; Fostering social innovation and channelling civic imagination; Enhancing the capabilities and visibility of the local NGO sector; Mobilising private funding for climate neutrality interventions (e.g., CSR actions)
IS THE INDICATOR CAPTURED BY THE EXISTING CDP/ SCIS/ COVENANT OF MAYORS PLATFORMS?	no
EXPECTED DATA SOURCE	Internal activity reports
EXPECTED AVAILABILITY (1-5)	5
SUGGESTED COLLECTION INTERVAL	Annually
DELIVERABLES DESCRIBING THE INDICATOR	Activity reports - Oradea Municipality and Oradea Metropolitan Area
OTHER INDICATOR SYSTEMS USING THIS INDICATOR	N/A

GOVERNANCE AND DEDICATED ROLES

1. Dedicated Roles and Responsibilities

The Municipality of Oradea, in close coordination with the Oradea Metropolitan Area Intercommunity Development Association (IDA), will establish dedicated roles and responsibilities within the City Hall and metropolitan structures to guide and coordinate the implementation of the Climate City Contract (CCC).

These roles are not intended to be fixed or rigid; they will be defined and strengthened progressively throughout the implementation phase, depending on available resources, funding opportunities, and evolving priorities. Foreseen elements include:

- Appointment of a Climate Action Coordinator at the municipal level, responsible for ensuring overall coherence and alignment across sectors.
- Designation of sectoral officers in key departments (energy, mobility, buildings, adaptation, circular economy, digitalization) to manage and monitor sector-specific actions.
- Gradual development of reporting lines and accountability mechanisms to ensure transparency, responsiveness, and adaptability to emerging challenges.
- Integration of monitoring, evaluation, and learning functions into existing administrative processes to support continuous improvement and evidence-based decision-making.

Activation of the NetZero City Coalition

To strengthen collaboration and establish a broad platform for action, the Municipality of Oradea, together with the Oradea Metropolitan Area, will activate a local/metropolitan NetZero City Coalition.

The Coalition's composition will be defined and expanded progressively during implementation to ensure inclusivity and adaptability to emerging needs. It is expected to bring together:

- Local authorities across the Oradea Metropolitan Area.
- Key private sector actors, including energy providers and mobility operators.
- Civil society organizations and community representatives.
- Academic and research institutions supporting innovation and knowledge transfer.

The Coalition's functions will be further developed over time, with the main directions anticipated to include:

- Coordinating joint climate initiatives and actions across the metropolitan area.
- Facilitating knowledge exchange, capacity building, and stakeholder engagement.
- Mobilizing funding opportunities, particularly through European, national, and international programs.
- Monitoring progress toward the NetZero 2035 target and ensuring transparent, participatory reporting to the municipality and the public.

Adaptive Governance Framework

The Climate City Contract combines dedicated municipal and metropolitan roles with the activation of the NetZero City Coalition, forming a strategic, collaborative, and adaptable framework to guide the transition toward climate neutrality by 2035.

This framework is not fully predetermined. Structures, actions, and priorities will be shaped and adjusted throughout the implementation phase, depending on available funding, technological developments, and lessons learned from practice.

By adopting an iterative and flexible approach, the Municipality of Oradea and the Metropolitan Area will be able to continuously adjust priorities, strengthen collaboration with local stakeholders, and leverage emerging opportunities. In this way, the CCC functions not only as a roadmap but also as a dynamic governance instrument, ensuring that the transition toward climate neutrality is ambitious yet realistic, context-sensitive, and firmly anchored in broad community engagement.

STAKEHOLDERS

Provide a concise overview of the key stakeholders who hold significant influence or impact on the local transition to climate neutrality.

→ **Make sure to also address the internal and external stakeholders that are relevant to the climate neutrality transition in terms of the necessary financing. For these stakeholders, address the funding issues both in the influence and interest columns, where applicable.**

Meeting the goal of climate neutrality as outlined in this Action Plan demands substantial work, unprecedented in its scale and impact. To achieve the envisioned transformation of Oradea into a net-zero city, Oradea City Hall and Oradea Metropolitan Area, as the driving forces behind this effort, aim to engage a comprehensive network of stakeholders, which span from the local to the county, regional and national levels. The below stakeholders are not only beneficiaries of the anticipated positive direct outcomes but also stand to gain from the associated co-benefits.

- **Public sector:** This collaboration involves mobilising representatives from multiple neighbouring public administrations, such as to extend the local impact to the metropolitan and county levels. Other public institutions able to actively support the consolidation and expansion of public efforts are also important, as they can facilitate connections with private sector entities. Here, we have included the public utility operators and service providers (e.g. transportation, education, sports), whose role in achieving climate neutrality stems from their management of natural resources, infrastructure and services. The public institutions that activate in the social sectors also play a key role, because they work directly with the groups that are the most vulnerable to climate change. We also mention the environmental regulation agencies, given that they are the ones overseeing the reduction of anthropogenic impact on the climate.
- **Private sector:** Collaborating with the private sector is essential for catalysing the necessary momentum to achieve the local vision of climate neutrality within the required timeframe, because

the private entities are significant contributors to emissions but also possess the potential (resources, activities, products, services and target groups) to drive the transformation Oradea requires.

- **Non-governmental sector:** Local NGOs have the potential to catalyse the anticipated change by mobilising resources, forging partnerships and fostering innovation to assist the municipality in meeting its climate neutrality objectives and cultivating a sustainable, resilient community. Strengthening the collaboration with the local NGOs could yield tangible outcomes, such as advocacy, community engagement, capacity building, education, partnership cultivation, project implementation and support, together with monitoring and reporting efforts.
- **Citizens:** Citizens are pivotal as active participants, advocates and catalysts of change in propelling the transition towards climate neutrality at the local level. Primarily, their contribution lies in the behavioural and mindset changes, which should manifest through the widespread adoption of climate-friendly practices in their daily lives: reducing energy consumption, conserving water, minimising waste generation, using eco-friendly transportation (walking, cycling, using public transport). Additionally, the citizens could make personal investments to curb their emissions, both in terms of financial resources (e.g. adopting renewable energy sources, enhancing energy efficiency in their homes) and time (e.g. engaging in community-based climate initiatives, educating themselves and others about climate change impacts, raising awareness). Furthermore, the citizens' involvement will be needed for monitoring the local climate action progress, for instance by tracking key metrics and holding the public administration accountable for its commitments to climate neutrality.
- **Other catalysts:**
 - **Funding providers:** By allocating resources strategically (financial resources, expertise, incentives) and prioritising climate-friendly investments, the funding entities could help Oradea to transition towards a more climate neutral and resilient future, because they can facilitate the implementation of climate mitigation projects at the local level.
 - **Interjurisdictional associations:** The interjurisdictional associations of which Oradea is a part can serve as the collaborative platforms for neighbouring territorial-administrative units, enabling the pooling of resources, expertise and best practices for climate action at a larger scale. By fostering partnerships, facilitating knowledge exchange and capacity building among members and initiating joint projects between member localities, these associations have the potential to leverage economies of scale in addressing common climate challenges, including those at the level of Oradea Metropolitan Area. Additionally, these associations could even facilitate the development of larger-scale climate plans and advocate for supportive policies.
 - **RDI entities:** The local universities could offer valuable expertise and solutions for addressing local climate challenges through their research, innovation projects and educational programs: interdisciplinary research on climate change mitigation, integrating climate-related topics into their educational curricula.

- **Educational institutions:** The local educational institutions are the hubs for promoting awareness and education on climate change, for instance by integrating climate education into their curriculum or by fostering climate stewardship and empowering students with relevant knowledge and skills.

Table 39. Stakeholders Analysis

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
ORADEA CITY HALL	PROCESSES	PUBLIC ADMINISTRATION	Collaborating with the community of citizens, the local ecosystem and various relevant external stakeholders, to develop, implement, evaluate and monitor the interventions outlined in the Climate Neutrality Action Plan.	Achieving the vision and objectives set forth in the Climate Neutrality Action Plan.	high
ORADEA LOCAL COUNCIL	PROCESSES	PUBLIC ADMINISTRATION	Endorsement of the interventions outlined in the Climate Neutrality Action Plan.	Addressing climate-related local concerns and issues.	high
ORADEA LOCAL DEVELOPMENT AGENCY	FUNDS	PUBLIC SECTOR	Facilitating private investments which can advance the local climate neutrality goals and integrating climate neutrality principles into the professional education curricula.	Minimising the environmental footprint of the managed industrial parks and attracting investors who develop businesses or projects that support climate neutrality or are inherently climate neutral.	high
ORADEA AND REGIONAL TOURISM PROMOTION ASSOCIATION (VISIT ORADEA)	PROCESSES	PUBLIC SECTOR	Accelerating sustainable and climate-friendly tourism practices.	Developing, supporting and promoting tourism initiatives, programs and projects that align with environmental conservation principles and minimise the carbon footprint.	moderate
ORADEA METROPOLITAN AREA'S INTERCOMMUNITY	ALLIANCES	INTERJURISDICTIONAL ASSOCIATION	Expanding the climate neutrality vision and measures from the local level to encompass the entire	Scaling the climate neutrality projects throughout the Oradea metropolitan area and replicating them in	high

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
DEVELOPMENT ASSOCIATION			Oradea metropolitan area.	member administrative territories, by facilitating the transfer of know-how and best practices from the local to the metropolitan level.	
BIHOR COUNTY COUNCIL	ALLIANCES	PUBLIC ADMINISTRATION	Assisting other local public administrations within the county in their climate neutrality endeavours, showcasing Oradea as an example of best practices and actively aiding its transition to a carbon-neutral municipality.	Replicating Oradea's climate neutrality transition model in other urban and rural areas across the county.	moderate
BIHOR PREFECTURE	ALLIANCES	PUBLIC ADMINISTRATION	Advocating for Government interests and overseeing the decentralised public services of ministries and other central public administration bodies at the county level.	Alleviating the burden on the county emergency situations committee caused by the significant adverse impacts of climate change.	moderate
BIHOR CHAMBER OF COMMERCE, INDUSTRY AND AGRICULTURE	ALLIANCES	PUBLIC SECTOR	Conveying the concept of climate neutrality to the local business network and advocating for the interests that local businesses have in making this transition.	Developing climate neutrality projects and programs tailored to the needs of local companies.	low
TERMOFICARE ORADEA	INFRASTRUCTURES	PUBLIC SECTOR	Minimising the environmental footprint of the energy system (infrastructure and energy provision methods), to mitigate its impact on the climate.	Upgrading the owned infrastructure, internal processes and provided services, in order to facilitate the operators' transition to climate neutrality.	high
TRANSELECTRICA SA	INFRASTRUCTURES	PRIVATE SECTOR			moderate
RES ENERGY SOLUTIONS	INFRASTRUCTURES	PRIVATE SECTOR			moderate
DISTRIBUȚIE ENERGIE ELECTRICĂ SA	INFRASTRUCTURES	PRIVATE SECTOR			moderate

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
TERMOREGIO	INFRASTRUCTURES & ALLIANCES	INTERJURISDICTIONAL ASSOCIATION	Minimising the climate impact of the services it oversees in terms of centralised thermal energy production, transportation, distribution and supply.	Securing funding to facilitate the transition to climate neutrality for the coordinated services across all served territories.	high
DISTRIGAZ VEST SA	INFRASTRUCTURES	PRIVATE SECTOR	Reducing the environmental footprint of the natural gas supply and distribution systems, in order to mitigate their impact on the climate.	Upgrading the owned infrastructure, internal processes and provided services, in order to facilitate the operators' transition to climate neutrality.	moderate
GAZ VEST	INFRASTRUCTURES	PRIVATE SECTOR			high
TRANSGAZ	INFRASTRUCTURES	PUBLIC SECTOR			moderate
ECO BIHOR	INFRASTRUCTURES	PRIVATE SECTOR	Adopting, supporting and promoting the implementation of circular economy principles and sustainable waste management practices, in order to mitigate the carbon footprint associated with waste and its adverse effects on the environment and community.	Increasing the selective collection rates, enhancing recycling efforts and expanding other sustainable waste management practices, in order to decrease waste volumes and the pollution it generates.	high
RER ECOLOGIC SERVICE	INFRASTRUCTURES	PRIVATE SECTOR			high
ECOLECT GROUP INTERCOMMUNITY DEVELOPMENT ASSOCIATION	INFRASTRUCTURES & ALLIANCES	INTERJURISDICTIONAL ASSOCIATION			high
ORADEA WATER COMPANY	INFRASTRUCTURES	PUBLIC SECTOR	Preserving and rejuvenating freshwater ecosystems, eradicating water pollution and transitioning water usage to be carbon-neutral and circular.	Enhancing the safeguarding of water resources by promoting their sustainable utilisation, ensuring high-quality services that provide safe water to all beneficiaries and increasing the rate of wastewater reclamation.	high
APAREGIO INTERCOMMUNITY DEVELOPMENT ASSOCIATION	INFRASTRUCTURES & ALLIANCES	INTERJURISDICTIONAL ASSOCIATION			high
APĂ-CANAL NORD-VEST	INFRASTRUCTURES	PUBLIC SECTOR			high
TRANSGEX SA	INFRASTRUCTURES	PRIVATE SECTOR			high
ORADEA TRANSPORT LOCAL	INFRASTRUCTURES	PUBLIC SECTOR	Providing high-quality public transportation that efficiently serves all citizens, facilitating the shift towards low-carbon emission mobility.	Upgrading the fleet, along with optimising and expanding the green public transportation network, in order to achieve carbon	high
TRANSREGIO INTERCOMMUNITY DEVELOPMENT ASSOCIATION	INFRASTRUCTURES & ALLIANCES	INTERJURISDICTIONAL ASSOCIATION			high

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
				neutrality in public transport.	
ORADEA AIRPORT AUTONOMOUS DIRECTORATE	INFRASTRUCTURES	PUBLIC SECTOR	Given that air transportation significantly contributes to pollution, the operator's influence can consist in the identification of solutions aimed at diminishing the climate footprint, such as enhancing operational efficiency, implementing carbon offset initiatives and promoting education and awareness.	Identifying solutions aimed at reducing the climate impact and more importantly, securing the required funding for such endeavours.	high
CRIȘANA BIHOR INSPECTORATE FOR EMERGENCY SITUATIONS	CAPACITIES	PUBLIC SECTOR	Enhancing resilience capabilities (knowledge, equipment, infrastructure, public awareness) to effectively withstand the adverse impacts of climate change.	Minimising the emergencies caused by the adverse impacts of climate change (such as urban heat islands, extreme temperatures, storms, floods).	moderate
BIHOR DIRECTORATE FOR PUBLIC HEALTH	CAPACITIES	PUBLIC SECTOR	The swift actions to address health issues exacerbated by the adverse impacts of climate change, such as the proper and fast management of emergency situations arising from urban heat islands during the summer months.	Minimising the health issues (ranging from individual symptoms to diseases and even injuries or accidents) resulting from the adverse impacts of climate change (such as urban heat islands, extreme temperatures, storms, floods).	moderate
SMURD BIHOR	CAPACITIES	PUBLIC SECTOR			low
ORADEA COUNTY EMERGENCY HOSPITAL	CAPACITIES	PUBLIC SECTOR			moderate
ORADEA MUNICIPAL HOSPITAL	CAPACITIES	PUBLIC SECTOR			moderate
BIHOR COUNTY EMPLOYMENT AGENCY	CAPACITIES	PUBLIC SECTOR	Supporting the expansion of green employment opportunities at the municipal and county levels, along with providing professional	Enhancing the internal capabilities to facilitate the provision of training, education and professional development programs tailored for green jobs	moderate

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
			training to the local workforce to prepare them for such roles.	or which integrate their specific principles.	
ORADEA DIRECTORATE OF SOCIAL ASSISTANCE	CAPACITIES	PUBLIC SECTOR	Implementing tangible measures to reduce the exposure of vulnerable communities to the adverse effects of climate change and/or providing support to enhance their resilience against such impacts.	Mitigating the adverse effects of climate change on vulnerable populations, particularly those belonging to marginalised communities.	high
BIHOR GENERAL DIRECTORATE FOR SOCIAL ASSISTANCE AND CHILD PROTECTION	CAPACITIES	PUBLIC SECTOR			moderate
BIHOR COUNTY AGENCY FOR PAYMENTS AND SOCIAL INSPECTION	CAPACITIES	PUBLIC SECTOR			moderate
VOCATIONAL EDUCATION AND TRAINING RESOURCE CENTRE	CAPACITIES	NGO	Incorporating climate neutrality skills into the training provided to beneficiaries.	Modernising the professional education system, such as to include opportunities for learning and employment in green industries, as well as integrating elements of climate neutrality into student training (which will be essential for future employment prospects).	high
ORADEA COMMUNITY FOUNDATION	ALLIANCES	NGO	Engaging the community in the public administration's endeavours towards achieving climate neutrality.	Enhancing the life quality of the local community by mitigating the adverse effects of climate change on their well-being and transitioning to a carbon-neutral city.	moderate
BIHOR ENVIRONMENTAL PROTECTION AGENCY	INFRASTRUCTURES, PROCESSES, CAPACITIES	PUBLIC SECTOR	Implementing various projects, including educational and awareness initiatives, to increase the resilience of natural	Diminishing the adverse anthropogenic and climatic effects on environmental elements (including soils, flora, fauna,	high
BIHOR CENTER FOR SUSTAINABLE	ALLIANCES	NGO			moderate

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
DEVELOPMENT AND PROTECTED AREAS			elements against climate change and advocating for the climate neutrality transition through the competencies at hand.	waters, etc.) while increasing their resilience against the impacts of climate change.	
BIHOR AGRICULTURE DIRECTORATE	INFRASTRUCTURES, CAPACITIES, FUNDS	PUBLIC SECTOR	Supporting and promoting sustainable and resilient agricultural practices amidst climate change, such as farmer training and promotion of climate-friendly agricultural technologies and processes.	Promoting the uptake of sustainable agricultural practices (such as ecological farming, crop rotation, precision agriculture), while mitigating the harm inflicted on agricultural crops by extreme weather events.	moderate
ORADEA UNIVERSITY	CAPACITIES	RDI	Actively contributing to the local shift towards climate neutrality through the implementation of RDI projects in relevant fields and the development / incorporation of study curricula focused on climate neutrality.	Enhancing the quality of university education and academic offerings, by aligning with the European principles and practices that advocate for climate neutrality.	high
AGORA UNIVERSITY	CAPACITIES	RDI			high
BIHOR COUNTY COUNCIL OF STUDENTS	CAPACITIES, ALLIANCES	REPRESENTATIVE ASSOCIATION	Playing a pivotal role in engaging students in climate neutrality initiatives, fostering their adoption of sustainable and responsible attitudes, and nurturing a mindful approach towards the environment and climate.	Acquiring skills and knowledge related to climate neutrality, which could enhance personal well-being and contribute to educational advancement and future professional growth.	moderate
GHEORGHE ȘINCAI COUNTY LIBRARY	CAPACITIES	RDI	Storing and distributing educational and informative materials related to climate neutrality.	Keeping abreast of trending books, reading materials, and study resources, given that one of the current hot topics is the	low

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
				transition to climate neutrality.	
PARTNERSHIP FOR EDUCATION ASSOCIATION	CAPACITIES	NGO	Incorporating the notion of climate neutrality into the educational curriculum.	Enhancing, modernising, and optimising the efficiency of the educational system at all levels, aligned with European Union standards.	moderate
BIHOR COUNTY SCHOOL INSPECTORATE	CAPACITIES	PUBLIC SECTOR	Encouraging schools to align with the local climate neutrality mission and engage in relevant projects, aiming to involve students in such initiatives and cultivate the requisite behaviours.	Enhancing the quality of teaching and learning activities while ensuring adherence to national standards and performance indicators in schools.	high
ORADEA MUNICIPAL SPORTS CLUB	ALLIANCES	PUBLIC SECTOR	Facilitating the participation of stakeholders within the sports sector to promote climate-neutral behaviours among fans and enthusiasts.	Converting sports facilities into climate-neutral establishments and engaging athletes in environmental and climate responsibility endeavours, as a supplementary means of contributing to the communities they represent.	high
BIHOR NATIONAL ASSOCIATION FOR RURAL, ECOLOGICAL AND CULTURAL TOURISM	ALLIANCES	NGO	Promoting and cultivating environmentally and climate-conscious forms of tourism while minimising tourist activities that negatively affect nature and climate.	Advocating for and fostering sustainable tourism.	moderate
BIHOR COUNTY DIRECTORATE FOR STATISTICS	CAPACITIES	PUBLIC SECTOR	Collecting and disseminating targeted environmental and climate data along with corresponding indicators.	Providing support to the community of stakeholders through the conducted research.	low

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
NORTH-WEST REGIONAL DEVELOPMENT AGENCY	FUNDS	REGIONAL DEVELOPMENT AGENCY	Funding public and private projects aimed at achieving climate neutrality, in line with the priorities and objectives set forth in the North-West Regional Program.	Meeting the priorities outlined in the North-West Regional Program - a green and smart region with sustainable mobility, focused on the well-being and education of its residents, which is characterised by innovation, competitiveness and connectivity.	high
ROMANIAN GREEN BUILDING COUNCIL	ALLIANCES	NGO (CERTIFICATION BODY)	Having an impact on the potential for climate neutrality in buildings, while also overseeing the “Green Building Professional” Certification and Training Program.	Transitioning the built environment into a climate-neutral sector, particularly by promoting energy-efficient buildings, including green schools and green residences.	moderate
INVESTMENTS AND EUROPEAN PROJECTS MINISTRY	FUNDS	PUBLIC SECTOR	Providing the required funding for the climate neutrality projects according to the sectors represented by each ministry, politically supporting the public administration's efforts to transform Oradea into a carbon-neutral city and promoting its model among other Romanian municipalities that could benefit from its positive example.	Acknowledging their contribution to the endeavours of Romanian local public administrations in accelerating the achievement of climate neutrality across the national territories.	moderate
FINANCE MINISTRY	FUNDS	PUBLIC SECTOR			moderate
DEVELOPMENT, PUBLIC WORKS, AND ADMINISTRATION MINISTRY	FUNDS	PUBLIC SECTOR			moderate
TRANSPORT MINISTRY	FUNDS	PUBLIC SECTOR			moderate
ENERGY MINISTRY	FUNDS	PUBLIC SECTOR			moderate
ENVIRONMENT MINISTRY	FUNDS	PUBLIC SECTOR			moderate
RESEARCH, INNOVATION AND DIGITALISATION MINISTRY	FUNDS	PUBLIC SECTOR			moderate
COMMERCIAL BANKS	FUNDS	BANKING INSTITUTIONS	Funding the public investments aimed at achieving climate neutrality, which are beyond the scope of	Strengthening the reputation of the financial institution by aligning with European principles and goals for	moderate

STAKEHOLDER	SYSTEM	NETWORK	INFLUENCE	INTEREST	ENGAGEMENT
			local budget allocations and supporting private projects that can contribute to lowering local greenhouse gas emissions.	climate neutrality, while also developing a portfolio of climate-friendly banking services.	
PRIVATE COMPANIES	FUNDS	PRIVATE SECTOR	Developing projects aimed at achieving climate neutrality, (e.g. enhancing energy efficiency in operational buildings, minimising CO2 emissions from production and service processes, developing climate-friendly products and services) and providing support for public and community climate neutrality projects, including financial assistance through CSR.	Enhancing brand identities by boosting awareness and participation in the fight against climate change, consequently drawing in a greater number of clients and partners who share similar ambitions.	moderate
CITIZENS	CAPACITIES, PROCESSES, ALLIANCES, FUNDS	CIVIL SOCIETY	The ultimate beneficiaries of this Action Plan, which also serve as stakeholders, actively shaping its implementation through their involvement in local initiatives developed for the municipality's transition to climate neutrality.	Achieving a higher level of well-being, as well as a superior quality of life, being resilient in the face of climate change and experiencing fulfilment through active participation in local initiatives aimed at environmental stewardship and climate protection.	high

Shortly describe the participatory model for achieving climate neutrality, highlighting collaboration with the local community (citizens), local stakeholders (e.g., private companies, NGOs, research organisations) and external partners (e.g., other public administrations, regional development agencies, national ministries, other organisations).

- **Relevant aspects may include the local context, prior experience in community and stakeholder collaboration (e.g., jointly developed and implemented projects, strategic partnerships), and engagement with various external partners.**
- **Present the participatory measures used in developing this Action Plan (if applicable) and the participatory method (approaches, processes, mechanisms, instruments, structures, capacity building) to be employed in order to ensure both implementation and monitoring of the current Climate Neutrality Action Plan.**
- **Make sure to also describe the actions pertaining to Organisational and Governance Innovation, as well as the actions related to Social and Other Innovation fields.**
- **Do not forget to make reference to upholding the principles of climate justice, particularly for marginalised communities.**

The public administration operates extensively within a participatory framework, by engaging with citizens, the private sector, the education sector and other local stakeholders such as NGOs. Furthermore, Oradea City Hall, together with the Oradea Metropolitan Area's Intercommunity Development Association, foster numerous partnerships with various national entities (including the Romanian Green Building Council, UrbanizeHub, the Romanian-German Chamber of Commerce and Industry) as well as international organisations (such as the World Bank). The present Action Plan is envisioned to follow a similar approach, characterised by openness, accountability, transparency, fairness and mutually beneficial collaboration throughout its design, implementation, monitoring and evaluation phases.

Currently, Oradea enjoys a robust collaboration with both its citizens and private organisations (companies, NGOs), which is undergoing further consolidation. At the local level, the major projects, important political decisions, regulations with widespread impact and strategic planning and development documents undergo public consultations, where citizens are encouraged to suggest enhancements and modifications, with their feedback being later incorporated into the final versions.

- The development of key strategic documents (such as the Integrated Urban Development Strategy for the Municipality of Oradea and the Oradea Metropolitan Area 2021-2027) adopts a co-design approach. These processes start with engaging citizens and relevant stakeholders and continue with forming working groups aimed at collecting place-based input from the community and the local ecosystem, which is subsequently reflected in the documents' content.
- In order to foster civic engagement and active citizen participation in initiatives aimed at enhancing the quality of life within the Oradea Municipality, as well as to broaden the municipality's project portfolio, participatory budgeting is annually implemented, with the goal of engaging citizens in civic projects.
- The public administration consistently implements projects financed through EU and Romanian funding programmes, through which it caters to the needs of citizens and private entities. A selection of the most recent projects implemented in this regard is outlined in the table below.

- Furthermore, a suite of digital solutions comprising applications and online platforms enhances the public administration's interaction with citizens and businesses. These solutions are exemplified in the table below.

Table 40. Local Projects Implemented to Strengthen Collaboration with Citizens and Private Entities

PROJECT	SUMMARY
FOSTERING CREATIVE ENTREPRENEURSHIP VIA THE ESTABLISHMENT OF THE CRESC ORADEA MARE BUSINESS INCUBATOR	This project seeks to foster innovation, cultivate an entrepreneurial environment and facilitate local, regional and national synergies, with 15 companies slated for incubation by the project's conclusion.
REVITALISATION OF UNDERPRIVILEGED COMMUNITIES IN GUTENBERG STREET	This project seeks to increase the use of social services provided by the Day Center and engage residents in educational, cultural and recreational activities held in the multipurpose room designated for public use, thereby enhancing the participation of marginalised individuals from the Gutenberg community.
ACTIONS TO STREAMLINE ADMINISTRATIVE PROCESSES AND STRATEGIC PLANNING FOR RESIDENTS OF ORADEA MUNICIPALITY AND THE METROPOLITAN AREA	This project aims to enhance, integrate and broaden the scope of the strategic planning process, while also simplifying administrative procedures to alleviate bureaucratic hurdles in urban planning for citizens.
IMPROVE EMPLOYMENT IN BIHOR COUNTY, ORADEA AND HAJDUBOSZORMENY THROUGH THE DEVELOPMENT OF THE LOCAL POTENTIAL INFRASTRUCTURES	This Interreg project focuses on fostering entrepreneurial infrastructure and generating employment opportunities by creating an Entrepreneurship Hub in Oradea, the Mobile Center to assist local producers in Bihor County and the Inclusive Entrepreneurship Center in Hajduboszormeny (Hungary).
INTEGRATED IT SOLUTIONS FOR STREAMLINING ADMINISTRATIVE PROCESSES AND MINIMISING BUREAUCRACY WITHIN ORADEA MUNICIPALITY	The overarching aim of the project was to improve the institutional capacity and optimise the operations within Oradea Municipality, by simplifying the administrative processes and minimising the bureaucracy for citizens. The project consisted of implementing back-office measures (e.g., adjusting the internal work procedures and digitising the archives) and improving the front-office public services.
CAMPUS ORADEA	Campus Oradea is a dual education project, which provides the opportunity for students to enrol and pursue jobs that are well-paid and in high demand in the job market. Available fields of study include mechanics, construction, installations and public works, electromechanics, electronics and automation and industrial chemistry. Students receive a monthly financial scholarship, complimentary accommodation, daily meals and

PROJECT	SUMMARY
	transportation. The campus will feature fully equipped laboratories, practical workshops tailored to various specialisations, classrooms for theoretical instruction, a dormitory with a capacity of 140 students, a dining facility, medical facilities, as well as a swimming pool and gymnasium.
“ENTREPRENEUR FOR BIHOR” GALA	The “Entrepreneur for Bihor” Gala is organised yearly by the Oradea City Hall and the Bihor County Council, to acknowledge the contributions of local entrepreneurs to the development of Oradea and the Bihor county.

Table 41. Local Programmes Implemented to Strengthen Collaboration with Citizens and Private Entities

PROGRAMME	SUMMARY
MAKE IT IN ORADEA	“Make IT in Oradea” is a non-profit joint initiative of local IT companies and the local administration. Through the Oradea Local Development Agency, the local administration collaborates with representatives of IT companies to develop the IT ecosystem of Oradea. This initiative aims to enhance collaboration among the municipality, local high schools, the university and IT companies in Oradea. It provides a tangible opportunity for enthusiastic young individuals to either remain in Oradea or return to the city. Through this programme, the Municipality of Oradea offers scholarships for students, covers accommodation and meal expenses, provides fiscal incentives for Class A offices and funds a support programme for startups in the IT sector.
BRIGHT LABS INCUBATOR	In collaboration with the Make IT in Oradea association, Oradea Local Development Agency has launched an incubation programme with the objective of enticing and helping young professionals interested in launching a startup in the technology sector. The startup incubation programme has an annual budget of €300,000, granted by the City Hall.
PARTICIPATORY BUDGETING PROGRAMME	The Oradea Municipality implemented a participatory budgeting programme starting with 2017, in order to increase the portfolio of project ideas and encourage citizens to participate in activities to improve the quality of life. The programme has been streamlined over the years, with a focus on neighbourhood-level project proposals that can be

PROGRAMME	SUMMARY
	implemented within a short timeline.

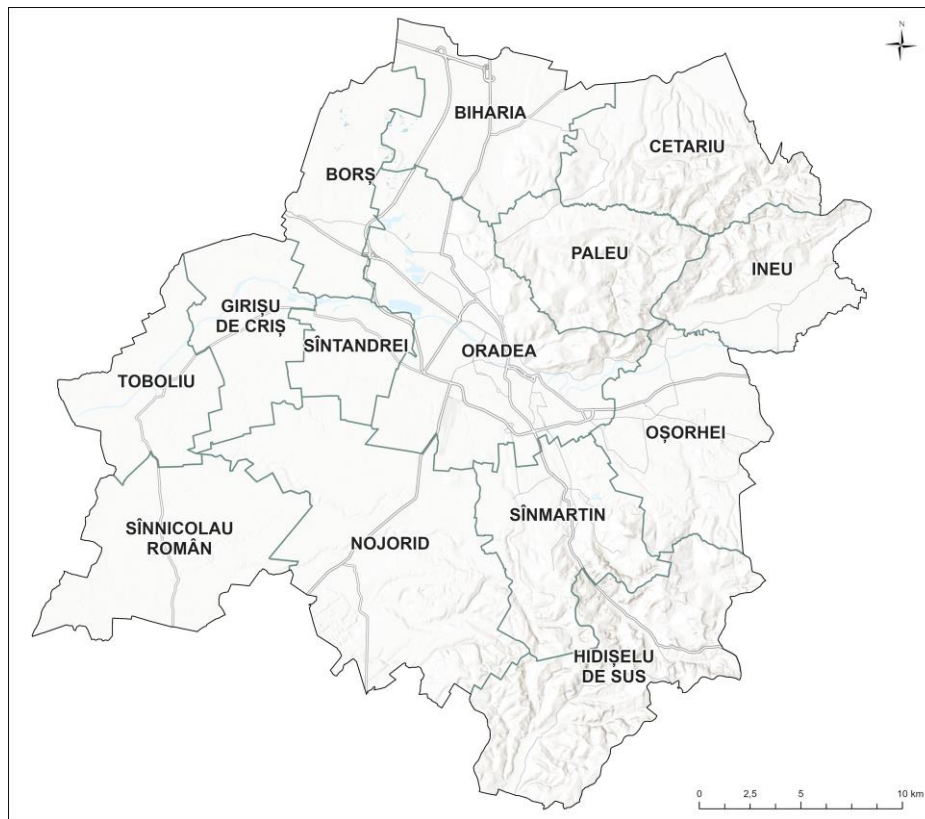
Table 42. Digital Tools Implemented to Strengthen Collaboration with Citizens and Private Entities

DIGITAL TOOL	SUMMARY
ORADEA CITY REPORT	A free, user-friendly mobile application for smartphones or tablets, which has been developed to enable the citizens to report various incidents and issues to Oradea City Hall and local public service operators such as the Oradea Water Company, Oradea Local Transport, Oradea Heating, Oradea Local Police and RER Ecological Service.
DIGITAL ORADEA.RO	The digital.oradea.ro service portal covers more than 60 digitised workflows, encompassing all service categories offered to the citizens and businesses by the Oradea City Hall.
GHIȘEUL.RO	The portal offers access to 14 of the online services provided by Oradea City Hall.
MOBILEPAY	The application is designed for users of mobile devices running the Android operating system. It facilitates the management of electronic payments, allowing users to pay fiscal obligations, including taxes owed by individuals or legal entities to the local budget, as well as fines for traffic violations and parking tickets, using a bank card via the internet.
PARKING ORADEA	The Parking Oradea mobile application is designed for accessing parking space availability and making payments for parking within the city.

ORADEA METROPOLITAN AREA INTERCOMMUNITY DEVELOPMENT ASSOCIATION

We also mention the efforts which have been made to coordinate collaboration with neighbouring administrative-territorial units surrounding the municipality of Oradea. In this regard, the Oradea Metropolitan Area Intercommunity Development Association was established in 2005, comprising the municipality of Oradea and 13 adjacent communes. The Association is tasked with fostering sustainable territorial development within the metropolitan area, reducing the disparities in the standard of living between the urban and rural areas, creating a joint territorial planning system, developing and extending the main infrastructure facilities and preparing the implementation of integrated public services. Additionally, it aims to enhance economic and social cohesion within the area.

Figure 19. Oradea Metropolitan Area



ORADEA LOCAL DEVELOPMENT AGENCY

Among the local notable initiatives, we also highlight the endeavours undertaken by the Oradea Local Development Agency, a public company whose majority shareholder is the Municipality of Oradea. The agency manages the complete process of interacting with both foreign and Romanian investors, covering the entire cycle of investment (starting from the initial contact phase, assistance in selecting the location for investment, making the investment and preparing the location, to post-investment assistance). Going beyond investor promotion and attraction, ADLO facilitates the relationship of investors with public utility companies, the Bihor County School Inspectorate and school institutions (including dual education programmes and infrastructure development), and offers services for the administration of common spaces and assets. Alongside this effort, the Oradea Local Development Agency also engages with various strategic partners both domestically and internationally. It actively participates in and organises events for the business community and engages in delegations to create strategic partnerships for Oradea's economic development. The agency also plays a key role in fostering community cohesion, inspiring young individuals towards technological entrepreneurship and promoting the local community on both national and international platforms. To this end, the Agency organises both local community events and international conferences, such as the Unchain Fintech Festival. Additionally, as part of its activities, the Agency allocates funds from its annual budget to support technology startups demonstrating high growth potential, provided they have at least one Minimum Viable Product.

ASSOCIATION FOR THE PROMOTION OF TOURISM IN ORADEA AND THE REGION (VISIT ORADEA)

Another avenue through which the local public administration cooperates with the local associations and the private sector is via the Association for the Promotion of Tourism in Oradea and the Region (Visit Oradea). This organisation, established in 2015, operates as a destination management entity under a public-private partnership arrangement. It involves collaboration between the Oradea local authority and key stakeholders in the tourism sector, from both Oradea and Băile Felix. The Association for the Promotion of Tourism in Oradea and the Region is also a member of the Sustainable Tourism Thematic Partnership under the Urban Agenda for the EU, established in 2023.

CLUSTHERM TRANSYLVANIA

Clustherm Transylvania operates as a cluster associative structure, comprising 10 business entities, 4 academic and research institutions, 12 public administrations and 3 catalysts (the North-West Regional Development Agency, a local action group and the Oradea Metropolitan Area) as its founding members. The primary focus of the collaborative efforts within this cluster is centred on the use of geothermal resources, thermal and therapeutic minerals and natural resources.

Table 43. Flagship Collaboration Projects with International Partners

PROJECT	SUMMARY
FUNCTIONAL AREAS IN THE EU	The Oradea Metropolitan Area Intercommunity Development Association has been chosen as one of the beneficiaries of the <i>Functional Areas in the EU</i> project, launched by the European Commission and the World Bank. This project aims to strengthen the capacity of participating functional areas to strategize and fund investments and services that promote sustainable development, crossing administrative boundaries for green transition and sustainable growth.
ART NOUVEAU EUROPEAN NETWORK	Oradea is the only Romanian city included in the European Art Nouveau network, joining renowned cities like Barcelona, Brussels, Budapest, Glasgow, Munich, Paris, and Vienna.
ARTNOUVEAU2 (INTERREG)	The City of Oradea was the lead partner of the ARTNOUVEAU2 project (2020-2022), financed by the Interreg Danube Transnational Programme. The project focused on strengthening the regional cultural identity and economic growth of the Danube region by building on the common heritage of Art Nouveau.

PROJECT	SUMMARY
THRIVING STREETS (URBACT)	The Oradea Metropolitan Area Intercommunity Development Association participated, in collaboration with Parma, Antwerp, Igoumenitsa, Radom, Santo Tirso, Nova Gorica and Debrecen in the “Thriving Streets” project (2019-2022), which was funded through the Urbact programme.
STOREMORE (INTERREG)	The Oradea Metropolitan Area Intercommunity Development Association is a partner in the StoreMore international project (2024-2026)- will explore energy storage solutions, with the aim of creating tools to alleviate the intermittent nature of renewable energy sources. This effort contributes to expediting the transition to renewable energy and fostering more stable electrical grids in the Danube Region.

DEVELOPING THE ACTION PLAN FOR THE TRANSITION TO CLIMATE NEUTRALITY

The development of this document followed a participatory approach, consisting of two stages:

- The first stage entailed drafting the document, by drawing upon the key local strategic development documents that had already received approval. Prior to their official approval, these documents had undergone public consultations with the community and local stakeholders. Additionally, for the main reference document, namely the Integrated Urban Development Strategy for the Municipality of Oradea and the Oradea Metropolitan Area 2021 – 2027, additional participatory methods were used, as follows:
 - Field research, which entailed engaging in community consultations, by conducting interviews with relevant stakeholders. Furthermore, insights were shared with local planners and surveys were disseminated, in order to pinpoint the existing local urban challenges and explore potential solutions.
 - Thematic focus groups were convened to consult experts, comprising specialists from the local public administration and collaborating professionals. Working groups were formed to address various themes, including Economic Development & Efficiency, Local Infrastructure & Public Administration, Metropolitan Development & Urban Mobility, Health & Environment, Tourism & Culture & Sport and Education & Human Resource Development.
- After finalising the consolidated draft of the Action Plan, it was subjected to public consultations. The feedback and additional input collected from citizens and stakeholders concerning the content of the document were organised and integrated, in order to improve it. These revisions were then included in the final version of the documentation.

IMPLEMENTING THE ACTION PLAN FOR THE TRANSITION TO CLIMATE NEUTRALITY

The implementation of the Action Plan will also follow a participatory approach. Consequently, the planned Social Innovation interventions in this regard cover:

- **Conducting a thorough stakeholder mapping and needs assessment, for gaining deeper insights into both the barriers and potential characterising the local stakeholders:** These research instruments will aid in identifying all the relevant local actors, building upon the mapping work done within the Action Plan. Additionally, they will facilitate a clear understanding of the needs, expectations and challenges inherent in the local ecosystem regarding climate change, while also locating the local resources that can be leveraged in order to expedite the transition towards a carbon-free future.
- **Establishment of a Climate Neutrality Consultative Committee:** This collaborative framework will be the main platform for interactions between the public administration and the private entities. It will promote discovery, dialogue and collaboration among the stakeholders, providing a space for local actors to offer input and feedback that will be used for strengthening the local initiatives aimed at achieving climate neutrality.
- **Creation of a Climate Neutrality Office, to be overseen by a Chief Climate Officer:** The Climate Neutrality Office will serve as the primary liaison for citizens and other local stakeholders. The Chief Climate Officer will be tasked with ensuring the participatory dimension in all the initiatives launched within the Climate Neutrality Office, by implementing the requisite procedures, mechanisms and tools.
- **Developing new regulations and urban policies for key intervention areas:** This intervention will create the framework that will support the involvement of citizens and other local stakeholders in advancing climate neutrality. Additionally, it will help penalise the individual behaviours that adversely affect the climate.
- **Creating a Climate Neutrality Academy:** This training programme will be designed to increase the capabilities of the entire ecosystem, extending beyond the public administration. The Academy will provide the knowledge needed in order to accelerate the journey towards climate neutrality across diverse sectors (public administration, business, NGOs, citizens), with the aim that participants will subsequently share the gained knowledge more widely, across their networks and groups.
- **Introducing campaigns and other soft initiatives aimed at advocating for a climate-neutral lifestyle:** These initiatives will be one of the means to actively involve citizens in the local pursuit of achieving climate neutrality. Through promotional efforts, raising awareness, disseminating information and conducting educational campaigns, we aim to stimulate a proactive community engagement and encourage the adoption of climate-friendly attitudes and behaviours.

- **Implementing participatory budgeting schemes for climate-neutral projects:** This process will empower the community to propose its own climate-neutrality ideas, enabling the development of projects that align with the citizens' needs and aspirations. We aim for the funded projects to embody the community's identity and serve as tangible outcomes of its active role in creating a carbon-free city.
- **Empowering homeowners' associations:** Efforts will be made to incentivise homeowners' associations to secure private funding from individual owners for energy renovation projects in residential condominiums, aiming to enhance quality of life and reduce CO2 emissions. The process of offering public incentives to condominium associations for investing in energy renovations of private residential buildings will play a significant role here.
- **Providing micro-grants for projects led by NGOs engaged in climate neutrality:** This funding mechanism will equip the civil society with the financial resources needed to develop customised solutions for the communities they serve. It also seeks to promote the adoption of the local climate neutrality goals within the NGO sector, positioning it as a key catalyst for the foreseen transformation.
- **Encouraging volunteerism for climate neutrality:** This approach will empower citizens to champion climate neutrality, offering them the avenues for an active involvement in the local transition towards a climate-friendly community and motivating them to be key drivers of the envisioned change.
- **Establishing partnership agreements with major retailers to mitigate the urban heat island effect:** This strategic initiative seeks to actively engage large retailers in the journey towards climate neutrality, while concurrently providing solutions to shield the population from vulnerabilities associated with the adverse impacts of climate change. For instance, this may involve initiatives such as tree planting in parking areas and investments in green roofs.
- **Providing contractual terms and tax advantages to private green companies located within municipally-managed public industrial parks:** This initiative will be spearheaded by the Oradea Local Development Agency (which is responsible for overseeing a comprehensive network of industrial parks), aiming to incentivize companies within these parks to embrace climate neutrality by investing in climate-friendly technologies and operations.
- **Organising annual "Climathons" to create green solutions for the local challenges:** These thematic hackathons will encourage the business sector to prioritise climate-neutral products, services, processes and operations (thereby creating a carbon-free local economy), will nurture innovation and entrepreneurial drive within the local private sector (inspiring and supporting young entrepreneurs and local startups) and will pave the way for transforming the private sector into a leading force of accelerating the local climate neutrality.

- **Adhering to the M100 Hub:** Engaging with the M100 Mirror Mission Cities National Hub will provide us access to capacity-building resources that will enhance our capability to inclusively and effectively involve the citizens and other local stakeholders in our local initiatives towards climate neutrality.

In addition to the main interventions outlined above, we will also take into account:

- **Promoting and facilitating access to the North-West Regional Programme funding:** The engagement of the private sector is vital in attaining climate neutrality and the collaboration with the NW Regional Development Agency will be very important in encouraging the private companies to access funds from the North-West Regional Programme. Its funds present a substantial opportunity for private companies to invest in energy efficiency, circular economy, renewable energy and other sustainability and climate neutrality projects.
- **Fostering climate neutrality CSR interventions:** We will encourage local companies to enhance the public administration's efforts towards climate neutrality, by implementing their own initiatives to support this endeavour, through corporate social responsibility actions and/or projects.
- **Expanding collaborations:** We will strengthen and expand the partnerships with commercial banks and explore additional avenues for the private financing of the carbon transition. Additionally, we will furtherly develop public-private partnerships, in order to effectively address the ongoing climate challenges.

Furthermore, throughout the implementation phase, the aforementioned Associations and Agencies will also be actively engaged, alongside the relevant Intercommunity Development Associations (such as Ecolect Group in the waste sector, Aparegio in the water sector and Transregio in the public transport sector). Their participation will cover multiple forms of involvement:

- Engaging in dialogue sessions with the public administration and the other stakeholders, in order to periodically assess, monitor, revise and enhance the Action Plan.
- Collaborating as partners in projects and various initiatives (ranging from specific actions to comprehensive programs) aimed at achieving climate neutrality at the local level.
- Initiating their own climate neutrality projects, in order to reinforce and expedite the desired transformation.

Moreover, as members of several national associations (such as the Romanian Association of Municipalities or the Federation of Romanian Metropolitan Areas and Urban Agglomerations) and international networks (including the Network of European Metropolitan Regions and Areas - METREX, and the network of functional areas within the *Functional Areas in the EU* project), we aim to share the knowledge and best practices acquired during the implementation of this Action Plan. Simultaneously, we are eager to learn from our partners, enhancing our preparedness and capacity to effectively execute this Plan.

MONITORING THE ACTION PLAN FOR THE TRANSITION TO CLIMATE NEUTRALITY

The main responsibility for monitoring and evaluating this Action Plan will be jointly shared by the Oradea City Hall and the Oradea Metropolitan Area Intercommunity Development Association. They will oversee the coordination, centralization and dissemination of data, as well as the implementation of corrective or improvement measures when necessary. However, as we aim for a participatory monitoring process, we will follow the below approach:

- Upon its establishment, the Climate Neutrality Office, under the direction of the Chief Climate Office, will be tasked with overseeing the Action Plan, by following the frequency and methodology outlined in the Guiding Principles, Work Process and Outlook Steps sections. The monitoring process will focus on 3 main elements: the Monitoring, Evaluation and Learning (MEL) indicators and the economic-financial indicators delineated in this document, as well as the uncertainties highlighted in the Risks section.
- To uphold transparency, fairness and active involvement in the monitoring process, the Climate Neutrality Consultative Committee, upon its establishment, will actively involve its members, such as to achieve results that are correct and draw from a diverse pool of expert perspectives.
- To enhance the monitoring capacities within the public administration, while leveraging knowledge sources from various platforms (such as M100 Hub or NetZeroCities), our objective is to gradually increase the resources allocated to the Energy Manager, such as to empower them to carry out more comprehensive and thorough energy consumption monitoring activities.
- In the areas where deficiencies will be identified, we will initiate or strengthen (as needed) partnerships with representatives from the academic and research sectors (e.g. the University of Oradea, the research institutes located in the North-West Region) and private entities (e.g. companies offering solutions for monitoring energy consumption in buildings).

CLIMATE JUSTICE

In order to address climate injustice, mitigate the impact of climate change on the marginalised communities and ensure their voices are heard, we are committed to the following actions:

- Establishing ongoing collaboration with the public institutions which are responsible for providing social services, as they directly engage with vulnerable groups.
- Engaging in collaboration, ranging from strategic discussions to joint project implementation, with the local NGOs that interact with marginalised communities. In this regard, we will leverage the strong partnership we have established with the Oradea Community Foundation.
- Collaborating with the Oradea Metropolitan Area Intercommunity Development Association, which maintains continuous communication channels with the rural administrative-territorial units.

- Enhancing our database and indicators, in order to gain a clearer understanding of the relationship between climate change and marginalised communities, focusing on impact assessment, solutions and engaging them in the transition to climate neutrality.

BARRIERS

Provide a summary of the main local barriers impeding the city's transition towards climate neutrality.

- **For each barrier, briefly outline its impact on hindering climate neutrality achievement and describe the approach / intervention / solution for overcoming it through the implementation of the current Climate Neutrality Action Plan.**
- **Make sure to also incorporate barriers related to climate investment: structural, policy, economic, and financial obstacles that could hinder the deployment of capital to support climate action.**

Currently, within both the Oradea municipality and its metropolitan area, several obstacles exist, impeding and / or delaying the local shift towards climate neutrality. These barriers cover both individual and organisational aspects, with some of them being specific to the local context, while others are prevalent at the national level.

As such, for each emissions domain, we have identified the main hindrances impacting the journey towards a carbon-free future. These barriers manifest in various forms — structural, infrastructural, procedural, capacity-related, behavioural, financial and policy-related — each exerting differing degrees of influence on the local zero-carbon objectives. This mix of obstacles arises from both the current capabilities of the administrative and public institutions and the hesitance of the private sector, together with the lack of awareness and education among citizens, resulting in behaviours and practices that do not align with the local ambition of achieving climate neutrality by 2035.

Nevertheless, for each of the mapped barriers, we have identified the most viable and impactful solutions aimed at mitigating their adverse impacts on the achievement of our envisioned carbon neutrality goals. The majority of these solutions are rooted in the interventions outlined in this Action Plan, while others complement them, drawing from additional efforts to be pursued by the public administration. The supplementary efforts include seeking external support, both domestically and internationally. The needed assistance is anticipated to come predominantly from the central public authorities, but also from various private third-party partners.

In both identifying the key barriers and determining their solutions, we have also leveraged other relevant local strategic documents, including the IUDS, SECAP and SUMP. These documents aided in substantiating our main local and metropolitan issues and exploring the most efficient ways to address them. Additionally, we have incorporated specific obstacles and tailored solutions, according to the local context and potential regarding climate change mitigation.

Table 44. Key Barriers

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
ENERGY SYSTEMS	The resources used for generating energy	This resource barrier primarily refers to the heavy reliance on fossil fuels to guarantee energy security, with additional factors such as limited waste-to-energy conversion (due to inadequate regulations and lack of data on waste, which impede the use of circular economy principles in the energy systems).	The deployment of solutions aimed at increasing the local renewable energy generation, with a particular focus on developing new photovoltaic parks and systems (including installations on public buildings and parking facilities), coupled with the optimisation of current photovoltaic parks to maximise their use.
ENERGY SYSTEMS	The low engagement of citizens and private stakeholders in enhancing energy production and consumption patterns	This barrier involves both behavioural aspects and actual capacity, stemming from the low citizen and stakeholder (e.g. local companies and organisations) engagement in both clean energy production (e.g. through photovoltaic panels) and the adoption of individual-level energy efficiency solutions (e.g. in households and at the workplace) which can be mainly attributed to insufficient awareness and education.	Implementing, in collaboration with private and NGO partners, the soft interventions proposed in this Action Plan, especially the Awareness and Educational Campaigns, the annual Climathons and the Climate Neutrality Academy, all of which will include sessions focusing on energy efficiency and green energy production. Additionally, we will identify EU-funded (e.g. through Horizon Europe or Life Programme) relevant (inter)national RDI projects (e.g. for creating local energy communities and positive-energy districts) and network with private suppliers which offer solutions for reducing energy consumption in households / companies (e.g. the Romanian startup Renergia).
BUILT ENVIRONMENT	Low energy efficiency in residential buildings	This structural barrier arises from inadequate energy efficiency in residential buildings, compounded by rising natural gas prices, while the proportion of GHG emissions from	Combining both hard investments (the energy renovation of over 100 blocks of flats built during the communist period) with soft interventions (such as the Awareness and Educational Campaigns

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		residential buildings continues to rise. Despite funding from EU / State Budget for thermal rehabilitation, some owners either refuse or lack the funds to cover the co-financing required for such interventions. One cause could be the lack of awareness about the benefits of energy-efficient buildings and the potential cost savings from energy-efficient practices. Another factor is the limited resources (competencies, knowledge, funds) of the current Associations of Residential Buildings' Owners to initiate and support climate neutrality interventions. The main stakeholders are the citizens, and the adverse effects primarily affect the built sector, manifesting through increased household energy costs and diminished quality of life due to thermal comfort issues.	and the Climate Neutrality Academy and especially the new / revised local regulations and policies). Moreover, in order to expedite the process of overcoming this barrier, we will design public incentives for condominium associations investing in private residential energy renovations.
BUILT ENVIRONMENT	Low energy efficiency in other types of buildings	Most of the built environment is represented by structures built prior to the enforcement of energy efficiency regulations. These buildings, being energy-inefficient, pose challenges in retrofitting to meet current standards, leading to high energy consumption and carbon emissions. Additionally, the upfront costs associated with implementing energy-efficient technologies and building systems can be prohibitive for building owners and developers. Despite the potential for long-term cost savings, these expenses can discourage investments in energy-efficient technologies. Consequently, the affected stakeholders span a broad spectrum, especially the owners of older commercial and industrial buildings, such as headquarters or factories.	Combining both hard investments (the energy renovation of public buildings, building new public and private buildings in line with the nZEB standards) with soft interventions (especially the new / revised local regulations and policies and the Climate Neutrality Office). Moreover, in order to expedite the process of overcoming this barrier, we will create contractual arrangements and tax advantages for private climate-friendly enterprises that operate within the municipally-managed industrial parks.

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
BUILT ENVIRONMENT	Policy barriers slowing the adoption of energy efficiency processes and solutions	This policy barrier covers multiple factors, including the lack of standardised mechanisms for monitoring building energy efficiency, which hinders accurate evaluation by policymakers, investors and consumers. Additionally, local regulations and incentives lack the necessary rigour to effectively promote energy-efficient practices.	The solutions target 2 levels: - At the local level, we will set a Climate Neutrality Office overseen by a Chief Climate Officer (who will be responsible to address the local policy aspects related to climate neutrality), while also developing new regulations and urban policies for the key intervention areas (eg., mobility, energy efficiency, waste, green areas etc.). - At the national level, through our participation in the M100 Hub, we will address the national policy matters, by co-working alongside M100 representatives and other members, in order to develop the solutions needed to enhance the problematic policies.
MOBILITY & TRANSPORT	Legal obstacles in adopting emissions-free transportation	This legal barrier refers to aspects such as the absence of a regulatory framework for metropolitan transport or the inadequacy of regulations for autonomous public transport vehicles. Consequently, the primary stakeholders are the institutions responsible for regulating such legal aspects.	
MOBILITY & TRANSPORT	High use of cars powered by fossil fuels	This behavioural barrier stems from the rapid increase in car ownership rates driven by ingrained habits of multiple vehicle ownership per household and frequent use of personal cars for short distances. This barrier is worsened by the influx of cheap, environmentally harmful second-hand cars from other EU countries and lenient residential parking policies. The main stakeholders are the citizens and the adverse effects include deteriorating air quality, increased noise levels and heightened stress due to traffic congestion.	Investments in infrastructure aimed at facilitating climate-friendly transportation (public transit, green vehicles, cycling, walking), coupled with complementary initiatives to promote climate-conscious mobility: velo days, awareness campaigns, educational programs, dedicated training sessions, urban regulations, participatory budgeting for climate-neutral initiatives and micro-grants for climate neutrality projects conducted by NGOs (where part of the focus could be on mobility).
MOBILITY & TRANSPORT	Low use electric vehicles	This infrastructural barrier stems from the lack of sufficient charging stations for electric vehicles. Moreover, citizens and private agents are hesitant to purchase such cars due to their high cost and limited autonomy (making them less practical for long journeys). The main stakeholders include citizens and companies (which manage car fleets),	

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		with similar adverse impacts as mentioned in the previous barrier.	
MOBILITY & TRANSPORT	Low use of cycling as a means of transport	This barrier is mainly infrastructural, resulting from inadequate cycling infrastructure - insufficient kilometres of bike lanes and support facilities. Citizens, who are hesitant to use bicycles regularly due to both behavioural barriers and these infrastructure issues, are the primary stakeholders.	
MOBILITY & TRANSPORT	Public reluctance to carbon-neutral transportation	As already illustrated above, this behavioural barrier primarily concerns the public resistance to adopting carbon-neutral modes of transportation such as cycling, walking and public transit, in favour of using private vehicles. According to the IUDS, one of the causes consists in the deficient green mobility infrastructure within OMA, which includes, among others, the lack of bicycle tracks, the subpar public transport quality and the absence of a metropolitan rail transport system.	
WASTE & CIRCULAR ECONOMY	Low implementation of circular economy principles	This process barrier refers to the fact that the reuse of waste is minimal, such as composting or converting wastewater into energy. Therefore, we are confronted with the necessity to create new economic circuits for waste revaluation within a circular economy framework. The main stakeholders are both the public administration and the private waste operators.	Deployment of smart waste collection islands in residential areas; Implementation of various campaigns, including partnerships with environmental NGOs and public environmental organisations (raising awareness, providing information, delivering training) on the importance of waste reduction and sustainable waste management practices (particularly through selective collection and recycling);
WASTE & CIRCULAR ECONOMY	Challenges in infrastructure that hinder the recycling of waste	This infrastructural barrier includes, among other factors, the insufficient eco-stations, the absence of a disposal system for hazardous waste, the lack of security systems on waste disposal bins, the high costs of new infrastructure and the disruptions in resource flows due to varying capacities of private contractors.	Policy measures (both as incentives and as penalties) to encourage waste minimization; Designating a part of the funds earmarked for participatory budgeting projects and micro-grants for NGOs towards local

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		The current infrastructural problems contribute to relatively low rates of waste separation among all stakeholders - citizens, institutions, companies and other organisations.	initiatives aimed at minimising waste, promoting selective collection and increasing the recycling / reuse rates; Initiating dialogues with the private operators involved in waste management, aiming for their representation within the Climate Neutrality Consultative Committee and also for a greater adoption of circular economy processes among their operations;
WASTE & CIRCULAR ECONOMY	Limited comprehension of the consequences of irresponsible waste generation and management	This behavioural barrier encompasses various factors, including a lack of shared vision or understanding of the circular economy and the limited awareness about waste significance, its impact on personal and environmental health, recycling opportunities or reduction strategies. This barrier primarily concerns individuals, encompassing both citizens of all ages and private entities.	Participating in sector-specific associative organisations, such as national or regional clusters focused on circular economy or environmental actions.
WASTE & CIRCULAR ECONOMY	Statistical data deficits	This procedural barrier highlights the inadequate collection, synthesis, monitoring and use of waste data. As such, the main stakeholders are the Environmental Agencies responsible for data management and impedes evidence-based decision-making and interventions by public administration.	This barrier has a national scale, being directly related to the capacity of the responsible central institutions and thus constraining the range of interventions available at the local level. Nonetheless, efforts will be directed towards improving the data collection and management capabilities within the Climate Neutrality Office (once it will become operational), while concurrently advocating for addressing this issue at the national level through the engagement within the M100 hub.
WASTE & CIRCULAR ECONOMY	Policy deficiencies concerning waste generation, management, and reuse	Currently, public policies lack incentives for waste reduction practices or innovative products. For example, there is no correlation between the amount of waste generated and taxes, as the pay-as-you-throw concept remains unimplemented. Therefore, all stakeholders at the local level are impacted.	This is another national barrier, where the only influence we can exert lies in highlighting the issue at the national level, through the collaborative discussions to be organised within the M100 hub.
GREEN INFRASTRUCTURE & NATURE-BASED SOLUTIONS	Deficient green infrastructure	Regarding this infrastructural barrier, as outlined in the IUDS, the main factors include the insufficient green areas and recreational spaces, highlighting the	In order to address this shortfall, a comprehensive set of interventions has been included in the Action Plan, such as to improve and expand the green spaces:

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		necessity for expanding and improving the urban parks, especially through the regeneration of parks located in residential areas. These factors impact all citizens, contributing to lower air quality and noise pollution, among other issues.	enhancements to existing public parks and neighbourhood green spaces, creation of new parks, green corridors, public gardens, measures for landslide consolidation. Alongside the infrastructure works, we are actively engaged in international collaborative projects centred on the development of green areas. Additionally, in order to encourage the private sector's support in overcoming this barrier, we will focus on setting partnership agreements with major retailers, to implement tree planting in their parking areas and invest in green roofs.
GREEN INFRASTRUCTURE & NATURE-BASED SOLUTIONS	Obstacles in adopting nature-based solutions	This barrier encompasses a blend of behavioural factors (such as the building owners' hesitance to adopt nature-based solutions) and policy factors (for instance, the need for updates of the local public policies regarding NBS solutions). Consequently, the main stakeholders include both public institutions and individuals.	Overcoming this barrier relies on implementing the interventions that belong to both the Governance Innovation (regulations and urban policies) and the Social Innovation (awareness and education campaigns, allocation of dedicated funds through Climathons, participatory budgeting and micro-grants for NGOs, training programmes).
OTHER TRANSVERSAL BARRIERS	Low administrative capacity	This structural barrier pertains to the constrained administrative and operational capacity of the public administration staff, stemming from a shortage of public experts. This limitation may manifest as difficulties in investment design and insufficient human resources for project implementation and management. The main stakeholders include the public administration and utility companies.	This barrier was the primary driver behind the interventions proposed within the Governance Innovation category - establishing the Climate Neutrality Office, instituting the Chief Climate Officer Position, providing training for public officials and policymakers through the Climate Neutrality Academy. Moreover, the capacity building that we will leverage through the expertise and technical support offered by M100 will be pivotal in overcoming this barrier.

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
OTHER TRANSVERSAL BARRIERS	Limited individual and organisational capacity to act due to a lack of unified understanding and shared vision on climate neutrality	This capacity barrier stems from the low familiarity of most residents and local organisations with the concept of climate neutrality, resulting in a lack of deep comprehension and personal and collective commitment. Additionally, it's noteworthy that the population of OMA is ageing, potentially heightening the reluctance to embrace climate-neutral behaviours. Moreover, the absence of local and metropolitan data regarding the average level of knowledge and competence among citizens and the local ecosystem hampers the identification of effective entry points for promoting pro-climate-neutrality behaviours.	This barrier lacks a singular / unique solution, as its resolution hinges on the comprehensive execution of the entire Action Plan. The implementation of the projects, programs, campaigns and other soft initiatives outlined in this document will serve as a compelling model for citizens and stakeholders: through these initiatives, we aim to inspire and implicitly encourage them to rally together towards the climate neutrality targets, mirroring the example set by the public administration through its work.
OTHER TRANSVERSAL BARRIERS	Gaps that may slow down the pace and effectiveness of transitioning to climate neutrality	This process barrier highlights the divide between public administration and citizens, as well as urban and peri-urban environments. It emphasises the insufficient / improper dialogue among these actors and territorial levels and the need to address discrepancies in interests, expectations, needs, vision and commitment. Additionally, we highlight the disparities in territorial infrastructure between the urban and rural areas within the OMA. As such, the main stakeholders include citizens (and civil society organisations) and public administrations.	The proposed Social Innovation interventions aim to bridge the gap between the public administration and the citizens, the Climate Neutrality Consultative Committee being the main instrument for amplifying the citizens' voices at the central level. The Action Plan considers the metropolitan scale, particularly in order to mitigate the urban-rural divide. Upon the implementation of the municipality projects, OMA IDA will facilitate their replication in rural areas, fostering knowledge transfer and best practices dissemination from the urban centre to the rural localities.
OTHER TRANSVERSAL BARRIERS	Limited incorporation of climate neutrality targets and principles in strategic development documents	This planning barrier arises because although the Municipality possesses current urban planning documents that analyse different climate-related aspects, they do not prioritise climate neutrality as a central component of urban development. This requires a shift in the approach to urban planning at the local level.	The process of developing the current Action Plan directly addresses this barrier. Additionally, in order to prevent any potential discrepancies with the current strategic documentation, the Action Plan is built upon it, ensuring seamless integration and coherence and thereby reinforcing mutual support

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		In this scenario, the primary stakeholders are the public administrations of Oradea and of the other LAUs within its metropolitan area.	among the officially approved development planning documents.
OTHER TRANSVERSAL BARRIERS	Local policies inadequately addressing climate challenges	This policy barrier refers to the fact that local policies are not effectively promoting climate neutrality and lack sufficient grounding in scientific evidence, leading to a lack of data and capacity for scenario planning and thus impacting the existing climate strategies, policies and plans. The limited database interoperability also contributes to the slow and bureaucratic project implementation processes. Consequently, the public administrations are the key stakeholders at this level.	The interventions proposed to address this barrier consist of: introducing annual green budgeting at the city/metropolitan level, developing annual green procurement plans and enacting new regulations and urban policies for key intervention areas (such as property taxation and fiscal incentives for green buildings, condominium management, urban planning etc.).
OTHER TRANSVERSAL BARRIERS	Urban sprawl	This barrier is structural in nature, as it refers to the ongoing and inadequately regulated urban sprawl, particularly in the municipality's suburban LAUs, which complicates the transition to climate neutrality. Moreover, the urban expansion and suburbanisation lead to extensive development and inefficient use of territories, resulting in increased costs associated with technical-building infrastructure and circulation.	The primary instrument for overcoming this barrier is the Territorial Development Plan for the Oradea Metropolitan Area for the 2021-2027 period, which complements Oradea Metropolitan Area's 2021-2027 IUDS, focusing on 3 strategic directions: enhancing the economic competitiveness, improving the quality of life and fostering a sustainable infrastructure development across the entire Oradea Metropolitan Area. Moreover, the ongoing investments aim to promote both the compact city concept and the specific principles of the 15-minute city at the local level.
OTHER TRANSVERSAL BARRIERS	Challenges in executing major investment projects - infrastructure and urban renewal	This structural barrier hampers successful project implementation due to various constraints: financial challenges, insufficient public property, public opposition, limited capacity of contractors to meet deadlines and quality standards, labour shortages, unethical practices by some companies. The main stakeholders are the public administrations overseeing these	While this barrier presents a significant challenge, it has already and repeatedly been encountered in the previous major projects implemented within the OMA. As a result, the public administration has gained the capacity to navigate such obstacles and intends to leverage the previously-acquired capabilities, in order to successfully execute the investment projects outlined in this Action Plan.

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		projects and the companies subcontracted to execute them.	
OTHER TRANSVERSAL BARRIERS	Barriers concerning national-level regulatory processes, laws and administrative aspects	This process-related barrier includes the insufficient regulations and standards at the central level for achieving climate neutrality in key sectors, the bureaucratic hurdles in expropriating land for public infrastructure, the inadequate regulation at the central level (e.g. the unclear micro-mobility laws, the unclear legislation on hazardous waste and used cooking oil storage, recovery and disposal) and the ineffective public procurement legislation. Additionally, sector-specific regulatory constraints, influenced by ministries such as Transport and Energy, especially amidst frequent political changes, can dampen investment interest and innovation potential. For instance, the regulatory and tax uncertainty contributes to a burdensome regulatory environment, resulting in deficiencies in national public administration quality, efficiency and transparency. This barrier also involves a lack of coordination among various services and sectors within the national public administration. Consequently, the ongoing deficiencies in the national governance discourage both the public and private investments. The main stakeholders cover the national authorities.	The primary platform we will use in order to raise awareness of this issue is the M100 Hub. Additionally, we will leverage other channels, mainly through our involvement in the national networks, such as The Romanian Federation of Metropolitan Areas and Urban Agglomerations and the Association of Romanian Municipalities.
OTHER TRANSVERSAL BARRIERS	The absence of previous comparable initiatives	This alliance barrier underscores the lack of prior local alliances for climate neutrality. As a result, all stakeholder categories are impacted.	Despite the novelty character of our initiative, we will leverage the existing partnerships (such as the Intercommunity Development Associations of which Oradea Municipality is a member), relevant past experiences (such as our participation in projects like <i>Functional Areas in the EU</i>), and the capacity-building opportunities provided by M100 and other learning resources (such as the

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
			materials and tools provided by NetZeroCities, Urbact, EUI etc., on relevant topics - e.g. climate neutrality, interjurisdictional cooperation, citizen and stakeholder engagement, innovation).
OTHER FUNDING - RELATED BARRIERS	Inadequate local funding	This funding barrier stems from the mismatch between the extensive responsibilities of the public administration and its limited financial resources within the local budget. The primary stakeholder in this scenario is the public administration.	Addressing these barriers will be done through our ongoing efforts to access the non-reimbursable funds provided by Romanian Operational and Governmental Programmes, the Regional Programme and other European financing programmes.
OTHER FUNDING - RELATED BARRIERS	Prohibitive investment costs, as the overall expense of new infrastructure exceeds the local budgeting capacity	The majority of the proposed actions entail substantial initial capital outlays, far exceeding what the local budget can accommodate, particularly amid rising inflation, which may impede or delay the public procurement processes. Additionally, the constant spikes in inflation underscore the necessity to regularly update the investment costs, in order to maintain their appeal to contractors.	Additionally, we intend to intensify our efforts in terms of attracting private capital, but also to find the proper avenues for increasing our local revenue streams, in order to bridge the funding gap for achieving climate neutrality.

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
OTHER FUNDING - RELATED BARRIERS	Limited public-private partnerships (PPPs) for investments in climate neutrality	The scarcity of public-private partnerships (PPPs) for climate neutrality investments stems from various challenges: lengthy procedures, fragmented and uncertain legal frameworks (including frequent revisions of public procurement laws), complexity, lack of PPP expertise, supervision and control difficulties, inadequate competition in tendering and the complexity of the public procurement framework. As such, the primary stakeholders include both the public administration and the private companies.	This barrier is a difficult one to overcome, but the main efforts we undertake to make in this regard consist of: - Strengthening the collaboration with private operators, in order to identify potential partnership opportunities for climate neutrality projects; - Building the capacity of our staff to effectively engage in PPPs through training and knowledge absorption in PPP development and management; - Preparing well-defined and bankable climate neutrality projects (including feasibility studies, cost-benefit analyses and risk assessments), in order to attract private operators; - Ensuring transparency and accountability in our forthcoming PPP processes. The Oradea Local Development Agency, which has an extensive experience and expertise in initiating and managing private sector partnerships, will be instrumental in this effort.
OTHER FUNDING - RELATED BARRIERS	Challenges in integrating various public and/or private funding sources	This funding barrier relates to the complexity of blending finance for the necessary investments, particularly given the dual financing risk and the lack of experience in such approaches. The primary stakeholder in this case is the public administration.	Currently, the only viable approach we can adopt in order to mitigate the impact of this barrier consists of consolidating our knowledge on blended finance and EU financial instruments, by dedicating time to accessing the available learning resources, such as the European Fi-compass tool.
OTHER FUNDING - RELATED BARRIERS	Difficulties in securing EU funds for public investments	This funding barrier extends at the national scale and primarily concerns: delays in launching national funding calls, instability and unpredictability, cumbersome rules and procedures, protracted and expensive compliance demands, planning uncertainties and occasional delays in payment and/or reimbursement. As such, all the relevant	As mentioned before, the main platform for raising awareness on these barriers will be the M100 Hub. Additionally, we will use other channels (the Romanian Federation of Metropolitan Areas and Urban Agglomerations, the Association of Romanian Municipalities) and also discuss these issues with North-West RDA

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		stakeholders, particularly the private companies, are affected.	and the relevant Ministries (Investments and European Projects, Transport, Energy etc.).
OTHER FUNDING - RELATED BARRIERS	Challenges faced by the private sector in obtaining (EU) financing	This funding barrier is particularly prominent for private companies, leading to insufficient access to finance, especially concerning the EU funds that are distributed through national operational programmes. Consequently, these actors are unable to implement the necessary investments, in order to fully leverage their potential in contributing to climate neutrality.	
OTHER FUNDING - RELATED BARRIERS	Insufficient coordination among different tiers of government and ineffective multilevel governance	This funding barrier refers to the slow communication with the national government due to multiple hierarchical levels, which delays certain processes. The bureaucracy and lack of standardisation at the central level, notably affect the implementation timeline of many projects, a delay which is particularly critical for the projects financed by the NRRP, which must conclude by the end of 2026. The primary stakeholder affected is the public administration.	
OTHER FUNDING - RELATED BARRIERS	The private sector's hesitance to allocate own capital to climate neutrality projects	This funding barrier refers to the challenge of motivating private investors to engage in climate neutrality projects within the local industry. The key obstacles contributing to investor reluctance include concerns about profitability, uncertainty surrounding novel technologies, regulatory barriers and deficits in knowledge and awareness regarding climate neutrality investment opportunities.	In this case, we will engage the Oradea Local Development Agency in order to consolidate the dialogue and collaboration with the private sector, regarding the private funding of climate neutrality projects. We also aim to involve private sector representatives in the Climate Neutrality Consultative Committee and to address this issue through the development of local regulations and policies aimed at accelerating the transition to climate neutrality. Furthermore, the Action Plan includes several soft measures aimed at engaging the private sector in climate neutrality initiatives, with the goal of fostering a

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
			culture of engagement and openness among companies.
OTHER FUNDING - RELATED BARRIERS	Reluctance to innovative private financing solutions	Venture capital funding and other innovative financing solutions (eg., blockchain tokens) and schemes are not widely recognized or understood at the local level, leading to a reluctance among local private companies to engage with financing schemes that involve risks.	To the extent of available resources, we will engage the Oradea Local Development Agency to tackle these aspects, for instance through thematic discussions, workshops, training sessions and matchmaking events.
OTHER FUNDING - RELATED BARRIERS	The limited growth prospects of enterprises specialising in climate-neutral solutions	At the OMA level, various economic shortcomings are evident, including the weak entrepreneurial culture, the absence of scientific and technological parks and the underdeveloped IT&C sector. Such factors can hamper the capacity of the local and metropolitan private sector to participate in climate neutrality projects, whether through new ventures or through innovation in processes (such as production methods) or products (such as eco-friendly services or dedicated climate neutrality solutions).	Furthermore, we will continue our efforts, such as investment projects for business support infrastructure and programs aimed at aiding entrepreneurs and investors, in order to increase their growth prospects. Additionally, the Climathon intervention was specifically proposed in order to nurture innovative business ideas centred around climate-neutral solutions.
OTHER FUNDING - RELATED BARRIERS	Restrictions on the level of indebtedness for both public and private entities	In the case of this funding barrier, often, neither the public administration nor other institutions, public or private, possess the necessary resources for significant investments. This constraint is particularly prohibitive as institutions have limits on debt accumulation, restricting their ability to borrow large sums for essential projects.	The solution to overcome this barrier is multifaceted, as it involves both increasing the revenues to the local budget and repaying the existing debts (current credits).
OTHER FUNDING - RELATED BARRIERS	Susceptibility to economic instability and slow economic recovery following market disruptions	Considering Romania's level of development, regardless of a city's relative strength compared to others in the country, it remains significantly vulnerable to economic turmoil and the associated risks of potential financial imbalances. Moreover, various international shocks such as geopolitical conflicts, health crises and market growth disparities can hinder and diminish	We dedicate ongoing, consistent efforts to fortify our local and metropolitan economy. As such, mitigating the impact of this barrier is already part of the constant work we do for increasing our overall financial capacity.

EMISSION DOMAIN	IDENTIFIED BARRIER	DESCRIPTION	PROPOSED SOLUTION
		investments due to the challenge of recovering from their impactful effects and the reduced risk appetite of Romanian investors. Therefore, in the case of this funding barrier, all the covered stakeholders are affected.	
OTHER FUNDING - RELATED BARRIERS	Differing priorities, based on citizens' comprehension levels	Securing funding for climate action, especially for long-term projects, can be challenging, as the local budget is limited, and resources may need to be redirected to other priorities, making it difficult to invest in low-carbon projects. Climate action may not be a top priority for all citizens, especially those in poverty-prone communities, or with a limited understanding of climate-related issues. Consequently, we anticipate opposition from some residents to the significant financial investments required for proposed climate neutrality interventions.	The Action Plan's portfolio was designed by prioritising the projects that address the sectors with the highest CO2 output, thereby possessing the highest potential to achieve climate neutrality. In order to counteract opposition from citizens, in addition to implementing the proposed Social Innovation interventions, we will allocate dedicated efforts to showcase the wide array of benefits (including health, well-being, economic and educational advantages, etc.) that the implementation of climate neutrality projects will provide citizens, in a comprehensive, appealing and user-friendly way.

RISKS

Provide a short summary of the main risks that may affect the achievement of the city's climate-neutrality goals by 2035.

- **For each risk, briefly outline its impact on hindering climate neutrality achievement and describe the approach / intervention / solution for overcoming it through the implementation of the current Climate Neutrality Action Plan.**
- **Make sure to also incorporate the risks related to the financing of the climate investments.**

The second table within this section delineates the main risks that both the Oradea Municipality and the other public administrations within Oradea Metropolitan Area may encounter on their path to achieving climate neutrality. We have pinpointed the most prominent risks for each field of action, together with the overarching ones and those related to funding. The risks were identified through an analysis aligned with the Action Plan's scope, coupled with the review of the other relevant strategic documents, namely the IUDS, SECAP, SUMP and the TDP.

Most of the mapped risks will be mitigated through the implementation of the interventions outlined in the Action Plan, while others will require complementary measures. It is also worth noting that efforts are already

underway within the public administration to address many of these risks, or previous measures have been taken in order to mitigate them, as described in the table below (Main risks).

Furthermore, to mitigate the risks arising from the complexity of the actions outlined in this Plan, the progress in its implementation will be annually monitored by internal teams from both the Oradea Municipality and OMA IDA. However, following the operationalization of the Climate Neutrality Office, the primary responsibility for this task will lie with the Climate Neutrality Officer.

The monitoring will also integrate an uncertainty framework, in order to ensure that the process continuously tracks not only the predetermined indicators (technical, financial and economic), but also the main potential uncertainties. For monitoring the uncertainties, we will adopt the model proposed for strategic environmental assessments by M. Bodde, K. Van der Wel, P. Driessen and A. Wardekker⁸. This model outlines 4 types of uncertainties which are relevant for the strategic environmental assessments, as they influence the decision-making processes and can guide future courses of action:

- **Inherent uncertainties**, which arise from the complexity of systems, such as the intricate cause-effect relationships in climate change, compounded by cumulative effects and their scale.
- **Scientific uncertainties**, which stem from challenges in obtaining relevant data, often due to limited access and potential inaccuracies over time, including measurement errors and predictive limitations.
- **Social uncertainties**, which emerge from the diverse values, interpretations, needs and interests of the stakeholders involved in climate neutrality, further influenced by the political climate shaping the approaches to climate issues.
- **Legal uncertainties**, which revolve around the variability and ambiguity within the legal framework, including the emergence of new laws and specific regulatory procedures.

Apart from the aforementioned risks (which are also detailed in the last table), we also highlight the main vulnerabilities that may affect the physical environment as a result of natural disasters triggered by the adverse effects of climate change. These vulnerabilities have been mapped within the 2021-2027 Sustainable Energy Action Plan of the Oradea Metropolitan Area.

⁸ Strategies for Dealing with Uncertainties in Strategic Environmental Assessment: An Analytical Framework Illustrated with Case Studies from The Netherlands

Table 45. The Main Vulnerabilities to Climate Change within the Oradea Metropolitan Area (Physical Environment)

SECTOR EXPOSED TO VULNERABILITIES	ANTICIPATED IMPACT	LIKELIHOOD	EXPECTED LEVEL
BUILDINGS	Increases in energy consumption	likely	average
	Decreases in the housing quality (e.g. through basement flooding or structural damages)	unlikely	low
TRANSPORT	Deterioration of road transportation infrastructure	likely	average
	Road obstructions, resulting from heavy traffic congestion	possibly	average
ENERGY	Exceeding the energy transportation capacities (e.g. interruptions caused by overloads in the electricity, gas or thermal networks)	possibly	average
	Increases in energy consumption, resulting from extreme temperatures	likely	average
WATER	Decreases in the quality of drinking water, during prolonged droughts or periods of heavy rainfall	likely	average
	Decreases in water flows	likely	high
WASTE	Soil and water contamination stemming from inadequate waste management	likely	low

SOURCE: 2021-2027 Sustainable Energy Action Plan of the Oradea Metropolitan Area

The Sustainable Energy Action Plan presents dedicated measures for each of the vulnerabilities mentioned above, which were also used to substantiate the interventions delineated within this Action Plan.

Table 46. Main Risks

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
ENERGY SYSTEMS	The complexity of the works needed for upgrading the public district heating system	The foreseen works impose a diverse and complex portfolio of technical solutions, posing challenges in identifying dependable suppliers capable of delivering these solutions promptly, but also at competitive prices.	In addition to the public administration's ongoing efforts to locate and contract the required suppliers, we also explore the possibility of seeking assistance from specialised organisations (e.g. the European Heat Pump Association, Transylvania Energy Cluster) to identify suitable suppliers.
ENERGY SYSTEMS	Fluctuations in prices caused by inflation	The inflation-driven price fluctuations may impact the budget allocated for modernising the public lighting system, particularly as the growing demand for environmentally friendly and smart lighting technologies, equipment and works could drive the prices higher.	During the contracting of works and the procurement of equipment and technologies, extensive market research will be conducted, in order to identify the most favourable offers (balancing price, quality and efficiency). Furthermore, as the primary financing will be sourced from non-reimbursable European funds, any discrepancies resulting from inflation will be covered by the local budget.
BUILT ENVIRONMENT	Inadequate staffing capacity	This organisational risk concerns the capacity of the public staff to execute the numerous proposed interventions, given their considerable size and complexity.	Both the municipality and OMA IDA have previously proved the capability to absorb EU funds, for numerous energy efficiency projects. However, eventual capacity shortages, particularly in deficient areas, will be addressed primarily through the engagement of external expertise. Additionally, the previous efforts done to improve the internal administrative capacity and streamline the workflows partially mitigate this risk.
BUILT ENVIRONMENT	Rising expenses within the construction industry	The risk of escalating costs for the foreseen projects, due to inflation, coupled with the imbalance between demand and supply in the Romanian construction sector, could result in higher budgets for the proposed interventions. This risk can impact both the construction of new nZEB buildings and the energy efficiency works of existing structures.	The main financing will be covered through non-reimbursable funds, with any budget disparity between submitting the initial financing requests and the reimbursement date being covered by the local budget.

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
BUILT ENVIRONMENT	The risks posed by urban sprawl on both urban and rural natural habitats	The urban development (and particularly the residential expansion) puts a high pressure on the natural areas and green spaces, posing potential risks to the local biodiversity.	To address this risk, the Climate Neutrality Office, under the guidance of the Chief Climate Officer, will offer insights to the public administrations' urban planning departments and also collaborate with the environmental departments. Furthermore, the issue will be deliberated within the Climate Neutrality Consultative Committee, where real estate developers will be engaged alongside other experts, including environmental specialists from both the public administration and independent agencies, in order to explore the solutions for mitigating this risk. Additionally, the forthcoming sets of regulations and local policies will consider this aspect.
MOBILITY & TRANSPORT	Financial risks associated with transport and mobility infrastructure projects	The financial risks associated with the transport and mobility infrastructure projects are heightened by the substantial implementation costs and escalating inflation, as these factors strain the local budget, which has limited resources. Moreover, periodic updates to investment costs are necessary in order to attract contractors, despite the time-consuming and expensive nature of such processes. The energy price hikes (which are exacerbated by the global geopolitical conflicts) further compound these risks. This dynamic particularly impacts the adoption of energy-powered mobility solutions like electric buses and cars, especially among citizens.	The previous efforts undertaken by the public administration, especially through the lobby done during the formulation of the new national Operational and Regional Funding Programmes (eg., the Operational Transport Programme, the North-West Regional Programme), have already partially mitigated this risk. Furthermore, due to the limitations of the local budget, Oradea Municipality will continue to prioritise the efforts of attracting external funding for the transport and mobility projects. The dedicated teams of experts from Oradea Municipality and OMA IDA will remain focused on securing non-reimbursable European funds in this regard. Additionally, as the European policies advocate for the shift towards electric vehicle usage, we will allocate efforts for incentivizing citizens while also implementing coercive measures, if needed. In order to mitigate the energy supply

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
			risks, we have proposed interventions aimed at increasing our capability to produce renewable energy through our own capacities.
MOBILITY & TRANSPORT	Political risks	The central authorities' pace of executing the major transport infrastructure projects is slow, with minimal attention directed towards metropolitan areas.	The Municipality, in collaboration with OMA IDA and the public administrations within the metropolitan area, are taking the responsibility for the preparation of major projects— a task typically associated with the central administration— by mobilising their own efforts and attracting the needed resources.
GREEN INFRASTRUCTURE & NATURE-BASED SOLUTIONS	Bureaucratic and regulatory risks	These risks cover the bureaucratic procedures related to various expropriation measures for public use, inadequate regulation at the central level and sometimes ineffective legislation, all of which can potentially disrupt the implementation timeline of such actions.	In order to mitigate such risks, both the Municipality and OMA IDA have already undertaken preparations for these projects, allocating time for the entire bureaucratic process (securing spaces, obtaining all the necessary legal approvals, preparing for implementation).
GREEN INFRASTRUCTURE & NATURE-BASED SOLUTIONS	Environmental risks linked with the anthropogenic interventions within the natural areas	The interventions planned for the natural areas (including the development of existing parks, urban gardens and the creation of new green spaces, as well as the establishment of green corridors and natural beaches) demand careful environmental consideration, as these works must be executed in a manner that preserves local biodiversity and natural habitats, with minimal and non-invasive impact.	In order to execute the necessary works, we will seek professionals which have technical expertise in environmental preservation and we will opt for swift and minimally intrusive interventions, such as to mitigate the risk of harming the natural ecosystems during project completion.
WASTE & CIRCULAR ECONOMY	Limited public engagement in selective waste collection efforts	Citizens' unfamiliarity with selective waste collection stems from various factors, including the lack of collective culture open towards waste reduction, insufficient education on the topic, limited understanding of circular economy principles and their benefits and inadequate availability of suitable spaces for selective waste disposal. As a result, it might take citizens a longer time	The Action Plan proposes both tangible measures (dedicated infrastructure) and intangible measures (various awareness and education initiatives) to encourage individuals and organisations to participate in waste reduction and enhance the potential for its subsequent reuse.

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
		to embrace sustainable waste disposal practices, possibly leading to delays in achieving the intended impact.	
GOVERNANCE AND SOCIAL INNOVATION	Limited governance capacity for achieving climate neutrality	The novelty of tools such as the Climate Neutrality Office and Climate Neutrality Consultative Committee comes with multiple uncertainties, including the unfamiliarity with specific operational procedures, governance structures, collaborative tools and intervention methodologies. Additionally, we anticipate the rise of various future challenges, such as the lack of understanding some specific / technical climate neutrality aspects, the difficulties in attracting the necessary resources, the staffing limitations or the challenge of aligning the European ambitions with the local circumstances.	To mitigate these risks, our focus will be on capacity building, primarily by using the knowledge resources offered by both the M100 Hub and the organisations involved in the EU Mission for 100 climate-neutral and smart cities, such as those available on the NetZeroCities platform. Moreover, in those cases where internal expertise is lacking, we will seek external expertise through outsourcing.
GOVERNANCE AND SOCIAL INNOVATION	The risk that the public vision may not be embraced by the community of citizens and stakeholders	The potential ineffectiveness of the communication efforts may undermine the visibility, accessibility and impact of the proposed climate neutrality actions. This could result from the key messages failing to reach the audience, leading to difficulties in their acceptance of the local climate neutrality vision. Thus, misunderstandings regarding the benefits they stand to gain from the implementation of interventions outlined in the Action Plan may arise as a consequence.	Alongside the Social Innovation measures, which were designed to enhance citizen and stakeholder engagement in the local climate neutrality agenda, comprehensive communication and dissemination efforts will be integrated throughout the Plan's implementation period. The communication work will prioritise coherence, openness, user-friendliness and inclusivity, spanning both online and offline channels. As such, both the Municipality (including its subordinate public institutions and organisations) and OMA IDA will be actively involved in the communication work.
OTHER TRANSVERSAL RISKS	Challenges in hiring operators for project execution	This risk refers to the potential challenges in identifying and contracting companies capable of delivering the required works with optimal efficiency, quality and cost-effectiveness, as such difficulties could hinder the achievement of the actions' objectives and outcomes.	To mitigate this risk, we will undertake a thorough market research (in order to identify the firms with the requisite expertise, capacity and resources to undertake the projects), along with establishing clear pre-qualification criteria for eligible firms (to ensure that only qualified and reputable firms are

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
			eligible to bid for the projects).
OTHER TRANSVERSAL RISKS	Limited public engagement	This risk may manifest due to either negative perceptions of climate-neutral interventions or delays in achieving their intended impacts, resulting from an inadequate public engagement.	This risk will be mitigated through the outcomes expected from implementing the proposed Social Innovation interventions, as their purpose is to actively involve the community and local stakeholders in the local climate neutrality projects, where they will contribute proactively as agents of change, rather than mere beneficiaries.
OTHER TRANSVERSAL RISKS	Labour migration	The migration of the workforce (particularly the specialised personnel and the young talents) to other urban centres within Romania, but also abroad, poses the risk of diminishing the overall openness towards innovative and novel approaches, while also reducing the local potential for generating innovative solutions (eg., startups developing climate-neutral technologies or environmentally friendly products). Moreover, in light of the escalating impact of climate changes (e.g. urban heat islands) on public health, the emigration of medical professionals abroad could heighten the citizens' exposure and vulnerability to these negative effects. This risk is further exacerbated by the notable surge in fatalities resulting from circulatory and respiratory diseases, as well as tumours.	The IUDS and the OMA Territorial Development Plan include a range of solutions aimed at mitigating the migration of labour and young talents.
OTHER TRANSVERSAL RISKS	The potential for a rise in the population vulnerable to climate change	This risk encompasses various factors, including the rising number of unemployed individuals registered at the OMA level and the growing segregation between the urban and rural areas, both of which may contribute to a potential increase in the population that is vulnerable to climate change.	In addition to the specific measures outlined in the IUDS and the OMA Territorial Development Plan to address this risk, OMA IDA consistently works to diminish the urban-rural disparities, by fostering a solid collaboration between the two counterparts. In this regard, the Oradea Municipality actively supports the rural public administrations within its metropolitan area. Furthermore, the actions proposed in this Action Plan adhere to the climate

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
			justice principles. Additionally, the public administration already possesses data on the marginalised urban and rural communities, which have been clearly mapped and ongoing efforts are being made to ameliorate their conditions. These efforts will persist throughout the implementation of this Action Plan.
OTHER TRANSVERSAL RISKS	The potential increase in the adverse effects of industrial activities on the climate and the environment	Regarding this risk, a combination of factors is at play: the heightened pollution risks stemming from local industrial expansion, the unsustainable industrial growth endangering the environment, the outdated data and reports from economic entities regarding the contamination of specific sites, alongside the substantial expenses linked with conducting environmental assessments for potentially polluted areas.	Apart from the measures proposed in the IUDS and the OMA Territorial Development Plan for mitigating this particular risk, the Action Plan covers both tangible and intangible interventions which are specifically tailored for the private sector. For instance, through the initiative targeting the green companies within the municipally-owned industrial parks, we aim to catalyse the desired change within the industrial sector, by promoting a greater openness and commitment to climate neutrality. The Climate Neutrality Consultative Committee will play a key role in overcoming this risk, supported by the forthcoming local regulations and policies aimed at compelling the private sector to align with the local objectives of transitioning towards a carbon-neutral economy. Additionally, the engagement campaigns will also aim to encourage the private sector's participation in advancing the local climate neutrality agenda.
OTHER TRANSVERSAL RISKS	Other external risks	This blend of risks covers additional macro-level concerns, which include, among others: -Political instability, which could result in policy and regulatory changes; -Legal and regulatory hurdles stemming from changes in laws and regulations; -Technical risks associated with the performance of new or emerging	The main response to these external challenges consists in improving our internal capacity, by ensuring the availability of the resources (competencies, structures, work procedures, intervention strategies) needed in order to mitigate or address such challenges, as needed. Additionally, this Action Plan serves as a

FIELD OF ACTION	IDENTIFIED RISK	RISK DESCRIPTION	MITIGATION SOLUTION
		technologies; -Market fluctuations affecting the availability of products and services.	valuable exercise in integrated strategic planning: it is both coherent and well-grounded, taking into account local specifics as well as external expectations, requirements and challenges. As such, the clarity and structure of the proposed actions will facilitate their smooth future development.
OTHER FUNDING RELATED RISKS	The low capacity of citizens to invest in their own climate neutrality solutions	The limited purchasing power, particularly amidst inflation, may impact the citizens' willingness to invest in individual climate neutrality solutions, such as electric cars, photovoltaic panels / heat pumps for household energy or digital applications for monitoring energy consumption at home.	We will actively encourage the citizens' participation in various national support initiatives (such as the "Rabla" programmes for light bulbs, household appliances and cars, and the "Green Home" financing programme for purchasing photovoltaic panels). Additionally, we will develop a set of local policies and regulations to incentivize individual climate-friendly behaviours.

OPPORTUNITIES

Outline the main opportunities you aim to leverage in order to accelerate the local transition towards climate neutrality.

The main opportunities which we aim to leverage in order to accelerate our local transition towards climate neutrality cover:

- **Infrastructure:** Regarding the infrastructure, there have been several relevant investment projects implemented within both the municipality of Oradea and its metropolitan area, as already outlined in the above sections. We aim to use these projects as the foundation for the upcoming actions aimed at achieving climate neutrality, because seizing this already-existing opportunity will ensure a climate neutrality transition which leverages the local characteristics, builds upon an existing groundwork and effectively capitalises on the already made progress.
- **Capacities:** In terms of capacities, our objective is to seize the specialised services, technical assistance and the knowledge dissemination work to be facilitated by the M100 Mirror Mission Cities Hub, in order to enhance our capacity across all the areas to be supported by the Romanian Hub for climate neutrality.
- **Processes:** In what concerns the processes, we will try to adopt, at the local level, the methodologies and approaches (procedures, structures, solutions, participatory models) developed within the EU Mission for Climate-Neutral and Smart Cities. Despite not being among the 112 cities in the cohort, we are keen to embrace the European model in order to properly address our climate-related challenges.
- **Resource flows:** Concerning the resource flows, our key objective will be to augment the already identified public financing with complementary private funding sources. In this regard, our efforts will be directed towards exploring avenues for accessing additional private funds from private financial institutions, citizens and local businesses. Moreover, in order to dynamise and broaden the resource streams needed for achieving climate neutrality, we will seek to enhance the activities of the collaborative entities which operate at the metropolitan level, such as the clusters (e.g., Clustherm Transylvania) and the intercommunity development associations, while simultaneously supporting the establishment of new such entities, which should have a stronger direct focus on climate neutrality.
- **Alliances:** In terms of alliances, we are taking into consideration several opportunities. Firstly, we aim to strengthen our role within the national associations (such as the Romanian Federation of Metropolitan Areas and Urban Agglomerations and the Romanian Association of Municipalities), through which we aim to highlight the importance of initiating climate neutrality actions among more Romanian cities and metropolitan or functional areas. Additionally, we want to enhance the relationships which we have previously established with various international partners through our collaborative projects, in order to direct these partnerships towards future climate neutrality projects.

Furthermore, we will dedicate more efforts to establishing strategic partnerships for climate neutrality with other relevant stakeholders, particularly from the private and NGO sectors. We also want to explore the learning, visibility and networking opportunities provided by various European programmes, such as the European Urban Initiative, URBACT, Interreg or the New European Bauhaus.

- **Funds:** Regarding the funding, our primary focus will be on accessing the non-reimbursable funds which are available for climate neutrality and sustainability projects through the national programmes and the NRRP. Additionally, we hope that, in the medium term, the Ministries, the Regional Development Agency and the other national financing entities will allocate more resources for climate neutrality projects, as we need substantial support from them in order to achieve our transition targets. Furthermore, in order to complement the national public funding, we aim to also access European funding programmes such as LIFE, Horizon Europe, Citizens, Equality, Rights and Values (CERV), Driving Urban Transitions (DUT), EU Development Education and Awareness Raising and the Connecting Europe Facility (CEF).

ASSISTANCE NEEDS

Provide a brief overview of the key areas or aspects where external support would be required, in order to overcome local barriers, mitigate external risks, and capitalise on available opportunities, such as to achieve climate neutrality.

- **Take into account the gaps that need to be fulfilled (e.g., financing, data collection, monitoring and assessment, knowledge deficiencies, governance, citizen engagement, stakeholder collaboration, innovative approaches etc.).**

The key areas where external assistance would be required, in order to overcome local barriers, mitigate external risks and capitalise on available opportunities, such as to achieve climate neutrality, refer mainly to strengthening our existing capacities and accessing the needed financing.

- **Financing:** One major challenge consists in closing the funding gap for carrying out the actions specified in the Plan - accessing non-reimbursable funds (given the insufficiency of national resources specifically allocated for climate neutrality), leveraging private funding sources and exploring innovative financing mechanisms (such as green budgeting, green bonds or ESCO arrangements).
- **Data collection and scenario planning:** We would need support to strengthen our capacity to manage climate neutrality data (collection, interpretation, use, monitoring), especially given the limited availability of relevant statistical indicators at the national level. We would also benefit from enhancing our capacity for climate neutrality scenario planning, because we need to make better-informed decisions, formulate more effective policies and properly navigate the complexity of climate action with foresight and agility.
- **Governance:** We would also benefit from assistance to develop a solid governance model for achieving climate neutrality (framework and structure, operational methodologies, supporting

mechanisms and tools), in order to streamline our decision-making processes, improve coordination with the local stakeholders and ensure the effective implementation of our proposed actions.

- **Stakeholder engagement:** Additional support would be required to enhance our stakeholder engagement strategies, enabling us to involve local stakeholders more inclusively, efficiently and impactfully in our climate neutrality journey. We need to acquire the necessary knowledge and skills to effectively identify, engage and collaborate with our various stakeholders, in order to be able to develop meaningful partnerships and to integrate the local perspectives into our decision-making processes.
- **Innovation adoption:** It would also prove beneficial for us to strengthen our capacity to adopt innovative solutions for climate neutrality (both technical advancements and process-related innovations), which could enable us to seamlessly integrate cutting-edge technologies and novel methodologies into our current frameworks, fostering a more dynamic ecosystem, conducive to achieving our climate neutrality objectives.
- **Monitoring:** Improving our monitoring capacity, including tools, processes and models for citizen and stakeholder involvement in monitoring, would also be valuable. Such support would enable us to effectively monitor the implementation of the actions outlined in this Plan and to accurately assess progress (especially in terms of CO2 reductions), identify areas for improvement and ensure accountability and ownership.
- **Mirroring:** Assistance is also needed for replicating the climate neutrality actions successfully implemented within the Oradea municipality, throughout the other public administrations in its metropolitan area. Facilitating the replication of proven initiatives through such support would not only encourage the adoption of climate-neutral practices among our neighbours, but also stimulate interjurisdictional collaboration towards our common climate objectives. Particular support would be required in conducting technical studies and analyses, formulating project concepts and securing the necessary financing for the metropolitan localities.
- **Visibility:** We also seek avenues to increase the visibility of our efforts in achieving climate neutrality, because, by showcasing our journey, we can extend our impact and inspire other cities to adopt a similar commitment towards climate-neutral development. Moreover, enhancing visibility would not only elevate our profile but also foster collaboration and solidarity in our shared pursuit towards a climate-neutral future.

II. INVESTMENTS

EXISTING FUNDING AND FINANCING

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

Oradea is one of the Romanian municipalities that already allocated a large share of its budget to climate-related projects and a top performer in attracting EU funding for this purpose. Between 2020 and 2022, the Municipality of Oradea has invested over €50 mil. only in the district heating system, including the supply of geothermal energy for a large neighbourhood and for the Sports Hall. Another important investment was the purchase of 20 new trams for €50 mil. Another important area of intervention (over €50 mil.) was the energy renovation of public buildings (two large hospitals and schools) and residential buildings. Sustainable urban mobility benefited from €30 mil. allocated for two important corridors (Gojdu and Nufărul-Cantemir). Furthermore, 30.8% of the total municipal budget (and more than 50% of the investment funding) for 2024 has been allocated to green interventions. Most funds will target the district heating system, especially a new high-efficiency cogeneration unit and a geothermal energy source for the loşia neighbourhood. The rehabilitation of the thermal supply network will also continue, as well as the subsidies for final consumers. Significant funds will cover the energy renovation of many public buildings (nurseries, kindergartens, schools) and multi-apartment residential buildings. A new hospital and two nurseries consistent with the nZEB standards will be built in Oradea. Public transportation and non-motorized mobility will continue to play a central role, especially through the purchase of new trams and the urban regeneration of public areas.

EU programmes will remain the main source of funding for the municipal and metropolitan green projects. The Municipality has already secured over €50 mil. from the National Recovery and Resilience Plan for new trams, EV charging stations, energy renovation of public and residential buildings. The local authorities will submit new projects under the 2021-2027 North-West Regional Programme for urban renewal, green areas, public transport and energy renovation. State-budget programmes will complement the EU funding for public lighting and district heating. Own financial sources will be allocated for co-financing of EU projects, subsidies for thermal energy and public transportation, small-scale interventions.

Table 47. Funding Allocation by Field of Action

The capital flow table needs to also incorporate capital stock.

FIELDS OF ACTION	SECTOR SUBSECTION	% CURRENT BUDGET ALLOCATION
TRANSPORTATION	<i>Public transportation (investment, subsidies)</i>	2.50
	<i>Non-motorized (pedestrian and cycling) mobility</i>	1.63
	<i>Smart traffic management</i>	0.15
BUILT ENVIRONMENT	<i>Energy renovation of public buildings</i>	3.90
	<i>Energy renovation of private residential buildings</i>	0.87
	<i>New NZEB public buildings (hospitals, schools)</i>	6.38
ENERGY SYSTEMS	<i>District Heating System (rehabilitation of supply & distribution infrastructure, subsidies)</i>	11.24
	<i>RES generation (photovoltaic, hydrogen)</i>	0.15
	<i>Public lighting (energy improvement, maintenance)</i>	1.38
GREEN INFRASTRUCTURE AND NATURE BASED SOLUTIONS	<i>Green areas (expansion, rehabilitation, maintenance)</i>	1.64
	<i>Urban renewal in the spirit of climate neutrality</i>	0.60
WASTE AND CIRCULAR ECONOMY	<i>Municipal waste management</i>	0.36

STRATEGIC FUNDING AND FINANCING

Assess the city's current financial policies, in order to illustrate how the public administration is allocating capital towards becoming climate neutral.

- **This evaluation should encompass existing strategies and resources available to the city to facilitate the transition.**
- **Identify the various forms of capital available for the city, particularly those specific to local climate neutrality targets.**

Oradea is one the fastest growing cities in Romania and a main destination for both foreign investors and local entrepreneurs. The number of employees working in the city jumped from 93,200 in 2018 to 95,600 in 2022, while the average net monthly salary grew by 48% in RON and 40% in EUR. This visible economic development also meant more money for the local budget of Oradea. The income tax revenues more than doubled in the last five years from €31.1 mil. to almost €80 mil. nowadays. The Municipality has managed to

also gather significant more income from the lease of public assets and dividends. This budget line has also doubled only in the last four years as a direct effect of the very performant asset management. Oradea is the city in Romania with the largest area of public industrial parks, a real magnet for investors all over the world.

However, the own revenues of the Municipality are usually directed to staff, social care, subsidies, interest rates and loan reimbursements, public asset maintenance costs. For large investment projects the local administration has been dependent on EU and national funding. From this perspective, the city is one of the front runners in Romania in absorbing such external funding. The budget adopted for 2024 actually shows that almost one third of the total local revenues will be fueled by various EU and state budget funded projects.

The bank loans have also eased the implementation of major projects, especially by ensuring the necessary co-financing and cash-flow for the EU projects. The indebtedness rate was 12.8% in 2023 and is expected to reach 21.7% in 2024, respectively 23.1% in 2025. This growth is the result of two loans totalising €40 mil. contracted with the European Investment Bank (EIB) in 2022 and 2023.

For the whole 2023-2035 period, we have projected an infusion of almost €2.1 bln. in the climate neutrality transition of Oradea. Only 20% of this budget will come from local sources (own revenues), while half is expected to be covered by the 2021-2027 and post-2027 EU programmes. The Municipality has already prepared a portfolio of mature projects for various EU programmes, especially the 2021-2027 North-West RP, the Transport and Sustainable Development programmes. Thus, we consider the target of over €1 bln. of EU money to be invested by 2035 very realistic. This means that the City Hall should spend, on average, almost €100 mil. of external funding per year only for climate neutrality, less than what was budgeted for 2024 if we also consider the NRRP. Private funding, under the form of money allocated by owners(residents), companies, universities or NGO will contribute with other 20%, also encouraged by the availability of various incentives (tax reductions, EU and national co-financing) and constraints (local regulations, such the energy renovation tax already introduced by the Municipality since 2021). Finally, loans and national funding are expected to represent less than 10% of the total climate neutrality for the next 12 years. On one hand, the indebtedness rate will be relatively high after the two subsequent loans already contracted from EIB, leaving less room for new such agreements. The replacement of bank loans with green bonds is strongly considered for the next coming years. On the other hand, national programmes (including an envisaged one for the M100 Hub) will probably have limited budgets and will be used for small-scale interventions.

Table 48. Income Sources for the City

INCOME CATEGORY	CITY INCOME	% OF CITY BUDGET
INCOME TAX	€79.7 mil.	13.6
PROPERTY TAX (LAND & BUILDINGS)	€26.9 mil.	4.6
GOOD AND SERVICES TAX (VAT)	€23.0 mil.	3.9
OTHER TAXES (VEHICLES, LICENCES, PERMITS)	€7.1 mil.	1.2
NON-FISCAL INCOME (LEASE OF PUBLIC ASSETS, INTEREST RATES, FINES)	€39.6 mil.	6.7
SUBVENTIONS FROM THE NATIONAL BUDGET (INCLUDING NRRP, NLDP, TERMOFICARE PROGRAMME)	€93.4 mil.	15.9
EU FUNDS (ERDF, SEE, ESF)	€90.8 mil.	15.5
BUDGET EXCEDENT FOR 2023	€15.7 mil.	2.7
LOANS / BONDS	€30.2 mil.	5.1
OWN INCOME OF SUBORDINATED INSTITUTIONS (HOSPITALS, SCHOOLS)	€181.3 mil.	30.8
TOTAL INCOME	€587.7 mil.	100%

Table 49. Capital Sources for the City

TYPE	SIZE RANGE	LEVEL	DESCRIPTION
LOCAL BUDGET	€480 mil.	Public	Rough estimates indicate that the City Hall can invest up to €40 mil. per year in climate neutrality projects, except loans, national and EU funding. The focus will be on diverting the transit traffic outside the city, as far as possible from the main residential areas.
NATIONAL RECOVERY AND RESILIENCE PLAN	€200 mil.	Public	Over half of this sum will be allocated to the new hospitals for infectious diseases and pneumology, consistent with the nZEB standard, and the rest for approximately 20 other projects for energy renovation of public and residential buildings, purchase of green public transport fleet, EV charging stations, eco-island for separate waste collection etc.
2021-2027 NORTH-WEST RP	€180 mil.	Public	The Municipality is expected to attract at least €180 mil. for green infrastructure (parks, green-blue corridors), sustainable urban mobility (fleet, depot, mobility corridors), energy renovation and nZEB public buildings.
OTHER EU PROGRAMMES FOR 2021-2027 (TRANSPORT PROGRAMME, SUSTAINABLE DEVELOPMENT PROGRAMME,	€300 mil.	Public	The main envisaged project is the metropolitan tram-train system to be financed under the 2021-2027 Transport Programme. Additional EU funding is expected for major interventions in the heating distribution network (phase IV), waste management, RES generation, new green public buildings, energy improvement of enterprises etc.

TYPE	SIZE RANGE	LEVEL	DESCRIPTION
MODERNIZATION FUND, HU-RO INTERREG VI-A)			
POST 2027 EU FUNDING	€300 mil.	Public	Although the configuration of the post 2027 EU programmes is still unknown, we expect climate-related interventions to remain a priority and even receive higher allocations. The focus of the municipality will be to reduce the GHG emissions of cars (by encouraging the purchase and use of EVs, public transport and non-motorized mobility), respectively of residential buildings (by continuing to invest in the energy renovation of multi-apartment buildings).
NATIONAL PROGRAMMES (TERMOFICARE , CNI, AFM)	€90 mil.	Public	Almost €40 mil. will be used only for the new cogeneration unit supplying the city with thermal energy, while the rest will be used for the rehabilitation of the heating distribution network, of the public lighting system, for building new public facilities in line with the nZEB standards etc.
LOANS / GREEN BONDS	€50 mil.	Private	The EIB loan already contracted will be used for the modernization of public lighting, parks and the purchase of electric buses. Other subsequent loans will cover co-financing and cash-flow for EU-funded projects.
CONTRIBUTION OF RESIDENTS	€250 mil.	Private	We have estimated that each apartment owner will invest at least €5000 in the next 12 years in climate proofing. This will cover the (co)financing for energy renovation works, purchase of energy efficient home appliances, LED interior bulbs, electric vehicles etc.
CONTRIBUTION OF LOCAL COMPANIES	€170 mil.	Private	We have estimated that local SMEs (with an annual turnover of at least €200,000) will invest, on average, €75,000 in the next 12 years in improving their energy performance in various forms (buildings, equipment, processes, vehicles), in expanding the planted areas in their property, in supporting CSR campaigns and NGOs active in field of climate neutrality etc.
CONTRIBUTION OF NGOS, UNIVERSITIES AND OTHER RELEVANT STAKEHOLDERS	€50 mil.	Private	We believe that the University of Oradea can attract significant funding for research, development and innovation in the field of climate neutrality. The University also owns a large portfolio of educational and non-educational buildings that will be subject of climate proofing interventions. Local NGOs can also attract EU funding,

COST SCENARIOS AND CAPITAL PLANNING

Present the estimated costs and capital planning associated with the actions outlined in the Climate Neutrality Action Plan. These should ideally serve as targets to optimise towards.

- Assess the anticipated financial implications for the city, both as implementation and ongoing operational costs, to inform adjustments to the city budget for their incorporation.
- Make sure that all the proposed actions are listed, including those pertaining to Governance Innovation and Social Innovation.
- Feel free to provide cost projections for the measures detailed in the Action Plan as appropriate.
- Outline the city's capital objectives and how you aim to achieve them, by leveraging various sources of capital.

The total implementation costs associated with the actions included in the Plan are estimated at €2.07 billion. The highest values are associated with the energy renovation of residential buildings and the traffic transit congestion relief, both with approximately one third of the total budget. While for the road belts EU and own resources will be predominant, the rehabilitation of multi-apartment buildings will involve the mobilisation of both EU and private funding. Other areas of intervention with large budgets are public transportation and new nZEB municipal buildings, both benefiting from significant EU funding under the NRRP and the 2021-2027 North-West Regional Programme.

Operational costs are estimated at over €39 mil., most of them associated with mobility-related interventions, such as subsidies for public transportation or the maintenance of the smart traffic management for the transit deviation. The public buildings undergoing energy renovation works, as well as those newly built will still require significant costs with the supply of public utilities, maintenance of surrounding green areas, small repairs etc.

For each action we have identified specific sources of capital. As indicated before, priority was given to EU and national programmes that are suitable in terms of eligibility for each type of action. We have to bear in mind that the exact configuration of the post-2027 programmes available at EU level is still unknown. Thus, the investment plan should be periodically revised to include new financing opportunities.

Table 50. Costs, Capital Planning and Economic Indicators by Action

Make sure to list every one of the actions proposed in the previous chapter.

→ If feasible, in the fifth column, divide the costs based on the mentioned funding sources and indicate the amount that can be secured from each source individually.

FIELDS OF ACTION	ACTION	IMPLEMENTATION COSTS/ CAPEX	OPERATIONAL COSTS	POSSIBLE SOURCES OF CAPITAL	% OF THE TOTAL CLIMATE NEUTRALITY BUDGET	% OF THE TOTAL CO2 REDUCTION
ENERGY SYSTEMS	Upgrade of public district heating system	€51,414,029	€1,542,420.87	2021-2027 Sustainable Development Programme Termoficare National Programme Local budget (IID)	2.48 %	6.43%
	Local green power generation	€57,508,187	€862,622.81	Modernisation Fund	2.78%	1.61%
	Modernisation of public lighting system	€10,000,000	€200,000	EIB Loans National Programmes (AFM) Own budget	0.48%	0.63%
SUSTAINABLE URBAN MOBILITY	Transit traffic congestion relieve	€734,400,000	€14,688,000	2021-2027 Transport Programme 2021-2027 North-West Regional Programme Local budget	35.49%	5.04%
	Promotion of green public transport	€110,005,347	€8,250,401.025	2021-2027 North-West Regional Programme National Recovery and Resilience Plan Local budget	5.32 %	2.24%

FIELDS OF ACTION	ACTION	IMPLEMENTATION COSTS/ CAPEX	OPERATIONAL COSTS	POSSIBLE SOURCES OF CAPITAL	% OF THE TOTAL CLIMATE NEUTRALITY BUDGET	% OF THE TOTAL CO2 REDUCTION
	Attractive pedestrian and cycling alternatives	€29,522,299	590,445.98	2021-2027 North-West Regional Programme	1.43 %	2.75%
BUILT ENVIRONMENT	Energy renovation of public buildings	€73,914,481	€739,144.81	2021-2027 North-West Regional Programme National Recovery and Resilience Plan National Programmes (AFM)	3.57%	0.65%
	Energy renovation of private multi-apartment residential buildings	€755,000,000	€7,550,000	2021-2027 North-West Regional Programme National Recovery and Resilience Plan Private co-financing	36.49%	51.33%
	New nZEB public and private buildings	€165,945,962	€4,148,649.05	2021-2027 North-West Regional Programme National Recovery and Resilience Plan National Programmes (CNI, ANL) Private financing (companies)	8.02%	0.17%
GREEN INFRASTRUCTURE AND NATURE	Expansion and improvement of green areas	€50,723,023	€760,845.34	2021-2027 North-West Regional Programme	2.45%	5.07%

FIELDS OF ACTION	ACTION	IMPLEMENTATION COSTS/ CAPEX	OPERATIONAL COSTS	POSSIBLE SOURCES OF CAPITAL	% OF THE TOTAL CLIMATE NEUTRALITY BUDGET	% OF THE TOTAL CO2 REDUCTION
BASED SOLUTIONS				Local budget EIB loans		
	Urban renewal in the spirit of climate neutrality	€15,000,000	€225,000	2021-2027 North-West Regional Programme Local budget	0.72 %	5.07%
WASTE AND CIRCULAR ECONOMY	Integrated waste management	€5,000,000	€375,000	National Recovery and Resilience Plan 2021-2027 Sustainable Development Programme	0.24 %	0.12%
ORGANISATIONAL AND GOVERNANCE INNOVATION	Efficient horizontal governance of climate neutrality	€200,000	€60,000	EU funding (Horizon, Urbact, Interreg, SEE etc.) National Funding (M100 Hub etc.) Local budget	0.01%	5.56%
	Better planning for achieving climate neutrality	€500,000	€48,000	EU funding (Horizon, Urbact, Interreg, SEE etc.) National Funding (M100 Hub etc.) Local budget	0.02%	6.07%
SOCIAL AND OTHER INNOVATION	Encouraging behaviour changes, local commitment and citizen empowerment	€9,510,000	€500,000	EU funding (Horizon, Urbact, Interreg, SEE etc.)	0.46 %	4.32%

FIELDS OF ACTION	ACTION	IMPLEMENTATION COSTS/ CAPEX	OPERATIONAL COSTS	POSSIBLE SOURCES OF CAPITAL	% OF THE TOTAL CLIMATE NEUTRALITY BUDGET	% OF THE TOTAL CO2 REDUCTION
	for climate neutrality			National Funding (M100 Hub etc.) Private funding (CSR budget, NGOs) Local budget		
	Developing new skills for climate neutrality	€500,000	€80,000	EU funding (Horizon, Urbact, Interreg, SEE etc.) National Funding (M100 Hub etc.) Private funding (CSR budget, NGOs) Local budget	0.02 %	2.92%

Table 51. Summarised Costs and CO2 Reductions by Field of Action

FIELDS OF ACTION	TOTAL COSTS FOR ALL THE COVERED ACTIONS	% OF THE TOTAL BUDGET	TOTAL CO2 REDUCTIONS FOR ALL THE COVERED ACTIONS	% OF THE TOTAL CO2 REDUCTION
ENERGY SYSTEMS	€118,922,216	5.75%	57,454.87	8.67%
SUSTAINABLE URBAN MOBILITY	€873,927,647	42.24%	66,466.94	10.03%
BUILT ENVIRONMENT	€994,860,443	48.08%	345,480.27	52.15%

FIELDS OF ACTION	TOTAL COSTS FOR ALL THE COVERED ACTIONS	% OF THE TOTAL BUDGET	TOTAL CO2 REDUCTIONS FOR ALL THE COVERED ACTIONS	% OF THE TOTAL CO2 REDUCTION
GREEN INFRASTRUCTURE AND NATURE BASED SOLUTIONS	€65,723,023	3.18%	67,172.42	10.14%
WASTE AND CIRCULAR ECONOMY	€5,000,000	0.24%	773.93	0.12%
ORGANISATIONAL AND GOVERNANCE INNOVATION	€700,000	0.03%	77,080.89	11.64%
SOCIAL AND OTHER INNOVATION	€10,010,000	0.48%	48,001.73	7.25%

FIELDS OF ACTION	TOTAL COSTS FOR ALL THE COVERED ACTIONS	% OF THE TOTAL BUDGET	TOTAL CO2 REDUCTIONS FOR ALL THE COVERED ACTIONS	% OF THE TOTAL CO2 REDUCTION
TOTAL	€2,069,143,329	100%	662,431.05	100%

FINANCIAL INDICATORS FOR MONITORING, EVALUATION AND LEARNING

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

A set of financial indicators were defined for all interventions, providing a framework for reporting on the progress of investments. The values are based on the CO₂ emission reduction values (see Action Portfolio) and the estimated budget (implementation costs /CAPEX) for each intervention, expressed in CO₂ kilograms / euro.

Table 52. Financial Indicators by Field of Action

FIELDS OF ACTION	INDICATOR	INDICATOR VALUE AND UNIT
ENERGY SYSTEMS	Upgrade of public district heating system	0.83 CO ₂ kg / euro
	Local green power generation	0.19 CO ₂ kg / euro
	Modernization of public lighting system	0.41 CO ₂ kg / euro
	TOTAL CO₂ REDUCTION / CAPITAL INVESTED	(57,454.88 CO₂ tons / 118,922,216 euro) x 1000 = 0.48 CO₂ kg / euro
MOBILITY AND TRANSPORT	Transit traffic congestion relieve	0.05 CO ₂ kg / euro
	Promotion of green public transport	0.13 CO ₂ kg / euro
	Attractive pedestrian and cycling alternatives	0.62 CO ₂ kg / euro
	TOTAL CO₂ REDUCTION / CAPITAL INVESTED	(66,466.94 CO₂ tons / 873,927,647 euro) x 1000 = 0.08 CO₂ kg/euro
WASTE AND CIRCULAR ECONOMY	Integrated waste management	0.15 CO ₂ kg / euro
	TOTAL CO₂ REDUCTION / CAPITAL INVESTED	(774 CO₂ tons / 5,000,000 euro) x 1000 = 0.15 CO₂ kg/euro
GREEN INFRASTRUCTURE & NATURE-BASED SOLUTIONS	Expansion and improvement of green areas	0.66 CO ₂ kg / euro
	Urban renewal in the spirit of climate neutrality	2.24 CO ₂ kg / euro
	TOTAL CO₂ REDUCTION / CAPITAL INVESTED	(412,652.69 CO₂ tons / 1,060,583,466 euro) x 1000 = 0.39 CO₂ kg/euro
BUILT ENVIRONMENT	Energy renovation of public buildings	0.06 CO ₂ kg / euro
	Energy renovation of private multi-apartment residential buildings	0.45 CO ₂ kg / euro
	New nZEB public and private buildings	0.01 CO ₂ kg / euro
	TOTAL CO₂ REDUCTION / CAPITAL INVESTED	(345,480.27 CO₂ tons / 994,860,443 euro) x 1000 =0.35 CO₂ kg/euro
SOFT INTERVENTIONS (GOVERNANCE INNOVATION AND SOCIAL INNOVATION)	Efficient horizontal governance of climate neutrality	184.22 CO ₂ kg / euro
	Better planning for achieving climate neutrality	80.47 CO ₂ kg / euro
	Encouraging behaviour changes, local commitment and citizen empowerment for climate neutrality	3.01 CO ₂ kg / euro
	Developing new skills for climate neutrality	38.72 CO ₂ kg / euro

FIELDS OF ACTION	INDICATOR	INDICATOR VALUE AND UNIT
	TOTAL CO2 REDUCTION / CAPITAL INVESTED	(125,082.62 CO2 tons / 10,710,000 euro) x 1000 = 11.68 CO2 kg/euro

CLIMATE POLICIES FOR CAPITAL FORMATION AND DEPLOYMENT

Shortly describe the climate policies you will develop and use for capital accumulation and deployment.

Achieving the right balance between the public and private efforts in reaching climate neutrality is a priority for Oradea. Among all the municipalities in Romania, Oradea is probably the most active in attracting foreign direct investment and is supporting the development of local entrepreneurs. Almost 300 ha of public industrial parks managed by the Local Development Agency are available for private investors. Over 120 companies have already invested more than 1 bln. Euro in these industrial parks. Some of these investors have already complied with the climate neutrality standards, even if the Municipality did not have a clear policy in this regard. The goal is, however, to require all future investors to align with the city's ambition to become climate neutral by 2035.

Despite being a popular option in other EU Member States and supported by the Covenant of Mayors, green bonds are at an incipient stage of implementation in Romania (in 2024 Romania issued its the first green bonds on international financial markets, and a single municipality issued green bonds so far, also in 2024). **The municipality of Oradea** intends to explore this option and use the local capital market in order to consolidate its financial capacity to implement large green transition projects.

While the energy performance in the public sector (e.g., the district heating system, public transport, municipal buildings) is improving, private buildings and cars remain the main source of local GHG emissions. Public funding is available for companies and individuals that plan to cut emissions, but private co-financing should play the main role. The Municipality will implement a mix of regulations, legal constraints and fiscal benefits for the private owners in order to mobilise their contributions, without putting an extreme pressure on the vulnerable individuals and companies. The City Hall has experience in using the approach for the rehabilitation of private buildings in the historical centre.

Although separate waste collection has significantly improved in recent years, extensive efforts are required to meet EU targets for waste recycling and recovery. The rate of municipal waste recycled or recovered has increased steadily over the past 5 years, reaching 39.93% from the EU target of 60%, significantly higher than the national average for municipal waste recycling rate, currently at approximately 13%. Also, the opportunities associated with the development of a strong circular economy are still unfamiliar for most public and private actors. Oradea has the chance to become a regional hub for this sector, considering its strategic position, industrial parks and industrial tradition in various sub-sectors (plastics, textiles, electronics etc.). A dedicated strategy/action plan for circular economy will be drafted in the next few years.

Table 53. Climate Policies to Enable Capital Deployment

CLIMATE POLICY	DESCRIPTION OF THE POLICY	INTENDED OUTCOME FOR CAPITAL FORMATION
ATTRACT AND RETAIN “GREEN INVESTORS”	The Municipality (through the Local Development Agency - ADLO) plays a central role in attracting new investors. The local administration directly operates a number of four industrial parks and a smart specialisation one with available plots of land, a competitive advantage against other cities in Romania. The vision for the future 12 years is to select only private investors that demonstrate their compliance with the climate neutrality principles. The last one to come Oradea will invest €650 mil. in a zero CO2 emission tyre factory.	By creating new well-paid and green jobs the city will create a strong foundation for increasing its own budget revenues. These additional financial resources will subsequently be invested in climate friendly public projects.
ISSUING GREEN BOND TO REPLACE BANK LOANS	The Municipality will be using the local capital market (the Bucharest Stock Exchange) as a way to cover its funding gap. The idea is to replace classical bank loans with green bonds open to private institutional and individual investors. The funds collected this way will be used only for climate interventions.	By opening the local finances to the capital market, the Municipality will manage to mobilise extra funding, increase its visibility and reliability and even enhance a stronger local commitment to climate transition from local investors.
STIMULATING THE MOBILISATION OF PRIVATE CO-FINANCING FOR CLIMATE TRANSITION	The City Hall has already introduced an energy renovation special tax for the apartment owners that do not want to cofinance the rehabilitation works implemented with the EU funding. The Municipality will design new fiscal benefits and local regulations to determine residents and companies to invest in increasing the energy efficiency of buildings, equipment and appliances, purchasing electric vehicles, planting trees etc.	The mobilisation of private funding will not only help the achievement of the climate neutrality targets, but also create new jobs and business opportunities at the local level.
ENCOURAGE A VIBRANT LOCAL CIRCULAR ECONOMY	Current interventions are targeting a better separate collection of waste. The next step is to close the loop and develop a recycling and reuse sector. A dedicated action plan will be elaborated for this purpose.	The circular economy will generate new jobs and extra revenues for the local budget.
DEVELOPING A STRONG ESG AND CSR CULTURE AMONG LOCAL COMPANIES	Local companies, especially the large ones and those that are part of international groups/holdings, are becoming more interested in meeting the ESG standards. Among other actions, we can expect companies to invest more in CSR campaigns with a focus on climate neutrality. The Municipality will try to channel these actions towards areas of public interest (eg. planting trees, modernising small green areas, waste recycling etc.)	CSR actions have multiple benefits, starting with the attraction of private funding for small-scale projects, stronger local commitment of local stakeholders

III. OUTLOOK AND NEXT STEPS

Provide a short overview of the future steps for the Action Plan, including the methods, tools, frequency, and milestones for implementation, monitoring, updating, and improvement.

- **Mention the main implementation thresholds and areas requiring future improvement of documentation, including the envisioned approach for addressing them.**
- **Make note of periodic iteration and review sessions.**

The official endorsement of this Action Plan marks the start of a climate neutral decade for the municipality of Oradea and its metropolitan area.

KEY IMPLEMENTATION THRESHOLDS AND MILESTONES

- **2024-2026:** We will continue the climate neutrality investment projects initiated under the National Recovery and Resilience Plan until 2026, according to their specified deadlines.
- **2024-2027:** Until the conclusion of the current programming period, we will prepare and implement investment projects to be funded by the North-West Regional Programme (particularly under the priorities 3 - environmentally friendly region, 4 - sustainable multimodal urban mobility, 2 - smart localities, 1 - innovation, digitization and dynamic enterprises and 6 - advancing education). Additionally, we will access the financial resources available through the other relevant National Programmes, including but not limited to the Sustainable Development Programme, the Transport Programme, the Education and Employment Programme, the Health Programme and the Inclusion and Social Dignity Programme.
- **2027-2033:** As the current programming period will conclude, our efforts will be directed towards attracting additional financing from both public and private sources, in order to further support our climate neutrality projects.
- **2033-2035:** In the final two years of the Action Plan's implementation, our focus will fall on replicating the climate neutrality projects implemented within the Oradea Municipality across the other territories within its metropolitan area, in the aim to scale the reach and impact of these initiatives, such as to benefit a broader spectrum of beneficiaries.

Over this timeframe, the continuous exploration of alternative funding sources will remain a top priority. We will also access the other national funding programmes, such as those managed by the Environment Fund

Administration or the National Investment Company, as well as European programmes, such as LIFE or Horizon Europe. Concurrently, we will encourage our local private entities (companies, NGOs, universities), along with the other public administration within the Oradea Metropolitan Area, to access the aforementioned financial resources. Additionally, we will actively seek solutions to further engage citizens in our climate neutrality pursuit, with particular attention to the marginalised communities.

FREQUENCY

Besides implementing the Climate Neutrality Action Plan, the following aspects will also be taken into account:

- **Annually:** The Oradea City Hall and the Oradea Metropolitan Area Intercommunity Development Association will monitor the Climate Neutrality Action Plan annually. Interim assessments will be conducted each year, in order to assess the objective achievement and action execution. Citizen and stakeholder engagement is foreseen, in order to ensure a thorough monitoring, with their feedback being integrated for continuous improvement. The expertise and technologies owned by the Action Plan signatories will be also used in this regard, in order to increase our monitoring capabilities.
- **Every two years:** The Climate Neutrality Action Plan will be updated every two years, guided by the evaluations and monitoring outcomes from the preceding period. The update process will incorporate completed actions, new interventions and emerging contextual factors. These iterative phases will ensure the alignment with the evolving local context and forthcoming European and national directives on climate neutrality. Additional sessions may be convened more frequently, as needed, to address emerging situations promptly and effectively. The updates will be overseen and approved by the Oradea City Hall and the Oradea Metropolitan Area Intercommunity Development Association.

AREAS FOR FUTURE IMPROVEMENT

Regarding the areas for future improvement, resources will be directed and support will be sought for the areas outlined in the Assistance Needs section, namely financing, data collection, scenario planning, governance, stakeholder engagement, innovation adoption, monitoring, mirroring and visibility.

Additionally, it's important to address the methodological and financial issues encountered during the preparation phase of the Climate Neutrality Action Plan, which may impact its implementation.

- One significant concern is the monitoring and reporting procedures for greenhouse gas emissions at both national and local levels. To address this challenge, efforts will be made in order to enhance the collaboration with the local Energy Manager, allocate additional resources for their work and advocate at the national level (particularly through the M100 Hub), to address data issues and establish relevant indicators for climate neutrality.
- Considering the current economic landscape, updates of the financial indicators may be necessary within the Investment Chapter, particularly in response to the inflationary pressures.

SUBSIDIARY PURSUITS

- Strengthening the collaboration with the local stakeholders, in order to accelerate the progress towards climate neutrality, while concurrently broadening and cultivating strategic partnerships with diverse regional and national entities, especially the North-West Regional Development Agency to the relevant ministries.
- Enhancing the participation of the localities within the Oradea Metropolitan Area in our climate neutrality endeavours, through our commitment to sharing expertise and best practices in terms of climate neutrality. Simultaneously, we will actively advocate for their support from relevant authorities, particularly the North-West Regional Development Agency and relevant ministries.
- Increasing our participation in international projects, networks and collaborations centred on achieving climate neutrality.
- Using the available international opportunities for learning, policy development, networking and visibility, such as those offered by initiatives like the European Urban Initiative (EUI), URBACT, Interreg or New European Bauhaus.
- Adopting expertise and best practices from District 2 of Bucharest, Suceava and Cluj-Napoca— the three Romanian cities participating in the EU Mission for Climate-Neutral and Smart Cities.
- Taking an active role in the initiatives to be launched under the M100 umbrella, including the exchange of know-how and experiences with the other cities joining the Romanian climate neutrality hub. We also aim to access the financial and technical support provided by M100, after acquiring the M100 Label.
- While acknowledging the significant effort involved in our endeavour, we firmly believe that through a collaborative strategic approach, we can mobilise citizens, companies, organisations and institutions to collectively pursue an unprecedented transition towards climate neutrality.

V. ANNEXE 1⁹

List of Priority Actions for Achieving Climate Neutrality in the Municipality of Oradea and the Oradea Metropolitan Area (Horizon 2035)

Introduction

This annex includes the main strategic actions identified as priorities for achieving the climate neutrality objective by 2035 in the Municipality of Oradea and in the Local Administrative Units (LAUs) of the Oradea Metropolitan Area.

The actions are structured by fields of intervention, with specification of their importance, indicative budget, and potential funding sources. The list serves as a guiding tool and will be periodically updated in line with the evolution of funding opportunities and community needs.

Field 1 – Energy and Energy Efficiency

1.1. **Description: Exploitation of geothermal resources at the municipal and metropolitan levels as part of the transition towards sustainable, energy-efficient district heating systems with low carbon emissions** (Geothermal + Green Cogeneration)

- **Importance:** reduction of emissions in the residential sector, improved comfort and access to affordable energy.
- **Estimated budget:** EUR 120 million

Funding sources: ERDF, SDP (Sustainable Development Program - EU funding), MF (Modernisation Fund -EU instrument to support investments in modernising energy systems and improving energy efficiency in beneficiary Member States), EEA and Norway Grants, LIFE, HORIZON, Local budget, EIB.

1.2. **Deep energy renovation of public and residential buildings**

- **Description:** comprehensive retrofitting of buildings to achieve 40–60% energy savings (insulation, LED lighting, smart control systems), NZB solution.
- **Importance:** increased energy efficiency, reduction of energy poverty.
- **Estimated budget:** EUR 200 million
- **Funding sources:** National Program for Enhancing Energy Efficiency and Intelligent Energy Management in Public Buildings, European funds (ERDF, Horizon), local support ,

Field 2 – Sustainable Mobility and Metropolitan Connectivity

2.1. **Development of the electric/metropolitan public transport network**

- **Description:** extension of tram lines, procurement of electric buses, integration of metropolitan routes.
- **Importance:** reduced individual car traffic and air pollution.
- **Estimated budget:** EUR 150 million
- **Funding sources:** NRRP, ERDF, CEF Transport, , local budget, EBRD.

2.2. **Expansion of cycling and micro-mobility infrastructure**

- **Description:** creation of green corridors and metropolitan cycling lanes, bike-sharing and e-scooter stations.
- **Importance:** promotion of active mobility, improved public health, reduced emissions.
- **Estimated budget:** EUR 30 million

⁹ The amounts presented in Annex V are indicative and are provided solely as a reference for strategic planning and the identification of potential funding sources.

- **Funding sources:** Life, Horizon, ERDF, public health programs, private partnerships.

Field 3 – Decentralized Renewable Energy

3.1. Development of metropolitan photovoltaic parks and energy communities

- **Description:** installation of solar parks at LAU level, integration of local energy communities.
- **Importance:** energy independence, affordable green energy.
- **Estimated budget:** EUR 100 million
- **Funding sources:** ERDF, Horizon, LIFE, InvestEU, PPP.

3.2. Integration of residential and industrial prosumers

- **Description:** support for households and companies to install solar panels, compensation and storage schemes.
- **Importance:** increased installed local capacity and citizen engagement.
- **Estimated budget:** EUR 50 million
- **Funding sources:** NRRP, national programs, private investments.

Field 4 – Nature-Based Solutions and Climate Adaptation

4.1. Rehabilitation of green-blue corridors (Crișul Repede River and tributaries)

- **Description:** ecological rehabilitation of riverbanks, biodiversity protection, development of recreational green areas.
- **Importance:** increased resilience to floods, reduced urban heat island effect.
- **Estimated budget:** EUR 40 million
- **Funding sources:** LIFE, Horizon, Interreg, ERDF., National and Local Budget

4.2. Metropolitan urban tree planting and shelterbelt program

- **Description:** large-scale tree planting campaigns and peri-urban forest belts.
- **Importance:** improved air quality, carbon storage, reduction of heat stress.
- **Estimated budget:** EUR 20 million
- **Funding sources:** LIFE, Horizon, national programs, private sponsorships.

Field 5 – Circular Economy and Waste Management

5.1. Implementation of advanced collection and recycling centers

- **Description:** development of modern centers for separate collection and valorization of materials.
- **Importance:** reduced landfilling, stimulation of the circular economy.
- **Estimated budget:** EUR 35 million
- **Funding sources:** Life, Horizon, ERDF, national programs.

5.2. Energy recovery from biodegradable waste and sewage sludge

- **Description:** production of biogas and compost from organic waste streams.
- **Importance:** contribution to the green energy mix and reduction of environmental impact.
- **Estimated budget:** EUR 25 million
- **Funding sources:** Horizon, InvestEU, PPP.

Field 6 – Digitalization and Digital Twins

6.1. Creation of a metropolitan Digital Twin for urban planning and emission monitoring

- **Description:** digital platform enabling real-time simulations for traffic, energy, and air quality.
- **Importance:** data-driven and rapid decision-making; transparency and civic engagement.
- **Estimated budget:** EUR 15 million

- **Funding sources:** Horizon, Digital Europe, CEF Digital.

Addendum – Biodiversity Restoration

As a cross-cutting priority, the Municipality and the Metropolitan Area aim to support the conservation and restoration of near-extinct biodiversity zones, with a specific focus on the unique thermal ecosystems of Oradea and its surroundings.

- **Description:** implementation of actions for the restoration of critical habitats and degraded ecosystems .
- **Importance:** safeguarding Oradea's unique natural heritage, restoring biodiversity zones on the brink of extinction, strengthening ecosystem services, enhancing climate resilience, and promoting local identity through natural values.
- **Estimated budget:** EUR 8 million
- **Funding sources:** LIFE Programme, Horizon Europe (calls dedicated to biodiversity and ecosystem restoration), EEA and Norway Grants, national and local programs, private partnerships.

Conclusion

The implementation of these actions represents the foundation of the Municipality of Oradea's and the Metropolitan Area's pathway towards climate neutrality. The list is indicative and open to updates, ensuring alignment with funding opportunities and the evolving needs of local communities.

VI.ANEXE 2

Decarbonisation – Sustainability

Projects implemented, in progress by the municipality of Oradea and the Metropolitan area

NB	Project Name and Brief Description	Investment Value (Euro, including VAT)	Estimated CO2 Emission Reductions (tons/year)	STATUS
1	"Improving Energy Efficiency and Smart Energy Management at Nicolae Bălcescu Secondary School in Oradea Municipality"	2,800,460	113.35	Under implementation
2	Improving Energy Efficiency and Smart Energy Management at Lucian Blaga High School, Oradea Municipality	3,740,900	166.34	Under implementation

3	Improving Energy Efficiency and Smart Energy Management at Octavian Goga Secondary School, Oradea Municipality	2,446,543	59.74	Under implementation
4	Improving Energy Efficiency at Kindergarten No. 41	575,113	43.94	Under implementation
5	Improving Energy Efficiency at Kindergarten No. 52 and Nursery No. 3 - Tărâmul Fermecat, located in Oradea Municipality, Călugăreni Street, No. 8/A	1,978,332	111.87	Under implementation
6	Improving Energy Efficiency and Smart Energy Management at "Aurel Lazăr" Theoretical High School, Avram Iancu Street No. 10	4,619,318	53.56	Under implementation
7	Improving Energy Efficiency and Smart Energy Management in Public Buildings for Educational Purposes – Friedrich Schiller German Theoretical High School	1,773,133	58.02	Under implementation
8	Improving Energy Efficiency and Smart Energy Management at Oltea Doamna Secondary School, Oradea	6,055,149	258.60	Under implementation
9	Improving Energy Efficiency and Smart Energy Management at Iosif Vulcan High School - Jean Calvin Street No. 3, Oradea Municipality	6,445,937	353.53	Under implementation
10	Improving Energy Efficiency and Smart Energy Management at Iosif Vulcan High School - Decebal Boulevard No. 76, Oradea Municipality	2,286,353	79.79	Under implementation
11	Energy Efficiency – Rehabilitation and Modernization of the Covered Crișul Pool	2,559,560	337.40	Under implementation
12	Improving Energy Efficiency and Smart Energy Management at Extended Program Kindergarten No. 42	1,310,190	44.51	Under implementation

13	Rehabilitation and Energy Efficiency Improvement of Lucreția Suciu Secondary School Building	2,116,921	41.42	Under implementation
14	Improving Energy Efficiency at "Vasile Voiculescu" Health High School, Calea Măreșal Alexandru Averescu No. 53	2,741,327	83.31	Under implementation
15	Rehabilitation and Energy Efficiency Improvement at Secondary School No. 16	5,830,449	59.84	Under implementation
16	Improving Energy Efficiency at Constantin Brâncuși Technical High School, Alexandru Cazaban Street No. 48	10,157,049	168.10	Under implementation
17	Improving Energy Efficiency at Dimitrie Cantemir Secondary School, Sextil Pușcariu Street, Oradea	2,048,193	36.51	Under implementation
18	Improving Energy Efficiency at Dimitrie Cantemir Secondary School, Dimitrie Cantemir Street, Oradea	1,974,035.71	49.53	Under implementation
19	Improving Energy Efficiency at the Art High School, Menumorut Street No. 33	1,111,612	231.77	Under implementation
20	Improving Energy Efficiency at the Art High School, Menumorut Street No. 33B	1,729,657	55.91	Under implementation
21	Improving Energy Efficiency at Extended Program Kindergarten No. 55 and Nursery No. 5 - Voinicel	2,032,907	76.90	Under implementation
22	Improving Energy Efficiency at Ion Bogdan Secondary School and Kindergarten No. 14	736,960	59.67	Under implementation
23	Improving Energy Efficiency at Kindergarten No. 14	420,801	47.13	Under implementation

24	Improving Energy Efficiency at Ioan Slavici Secondary School, Calea Clujului No. 193	394,640	8.36	Under implementation
25	Improving Energy Efficiency at Extended Program Kindergarten No. 46, Feldioarei Street No. 17, Oradea Municipality	2,326,737	71.16	Under implementation
26	Improving Energy Efficiency at Mihai Eminescu National College, Stănișoarei Street	406,589	41.84	Under implementation
27	Improving Energy Efficiency and Smart Energy Management in Public Buildings for Educational Purposes – Friedrich Schiller German Theoretical High School	3,173,426	76.77	Under implementation
28	Rehabilitation of Juhász Gyula Secondary School	2,298,714	76.83	Under implementation
29	Rehabilitation of the Art High School Oradea	4,066,676	5.92	Under implementation
30	Improving Energy Efficiency at Kindergarten No. 45 and Nursery No. 6 – Căsuța Veseliei, located in Oradea, Aluminei Street No. 100	4,912,910	173.90	Under implementation
31	Rehabilitation of "Mihai Eminescu" National College, Buildings A+B+C, and Exterior Arrangements	19,863,111	822.73	Under implementation
32	Construction of Bicycle Lanes in the South-East Area of the Oradea Metropolitan Area (Nojorid Commune, Sânmartin Commune) and Connection with the Metropolitan Bicycle Lane Network	2,339,178	7,38	feasibility study
33	Construction of Bicycle Lanes in the North-West Area of the Oradea Metropolitan Area (Oradea Municipality, Biharia Commune) and Connection with the Metropolitan Bicycle Lane Network	626,571.	1,8	feasibility study

34	Construction of Bicycle Lanes in the South Area of the Oradea Metropolitan Area (Oradea Municipality, Nojorid Commune) and Connection with the Metropolitan Bicycle Lane Network	1,004,080	6,24	feasibility study
35	Construction of Bicycle Lanes in the North Area of the Oradea Metropolitan Area (Oradea Municipality, Paleu Commune, and Cetariu Commune) and Connection with the Metropolitan Bicycle Lane Network	2,588,100	9,18	feasibility study
36	Construction of Bicycle Lanes in Borş Commune, from Sântăul Mare to Biharia Village	837,351	2,76	feasibility study
37	Construction of a Bicycle Lane between Girişu de Criş Commune and Sântandrei Commune	1,727,276	5,1	feasibility study
38	Construction of Bicycle Lanes between Paleu Village and Săldăbagiu de Munte Village	1,201,430	3,36	feasibility study
39	Construction of Bicycle Lanes in Sânmartin Commune, from Băile 1 Mai to Oşorhei Village	1,683,011	3,33	feasibility study
40	Use of geothermal energy, for the production of heating agent for consumers of thermal point PT 902 with reinjection of thermally used geothermal water into the reservoir.	3.800.000	1.779	Completed
41	The best use of geothermal water with primary heating agent to produce heating agent and hot water in the Sports and Events Hall	1.700.000	6.188	Completed
42	Valorization of geothermal energy in association with primary heat agent, for the production of heating agent and hot water in Iosia - South	3.529.218	3.290	Completed

43	Valorification of geothermal energy in association with heat pumps and natural gas, and, for the production of heating agent and hot water preparation of consumption to the consumers of the district Nufarul I	25.600.000	7.601	Completed
44	Rehabilitation of the urban district heating system at the level of Oradea Municipality for the period 2009 - 2028 in order to comply with the environmental legislation and increase energy efficiency – Stage I	77.772.000	560.000	Completed
45	Rehabilitation of the urban district heating system at the level of Oradea Municipality for the period 2009 - 2028 in order to comply with the environmental legislation and increase energy efficiency – Stage II	33.500.000	22. 558	Completed
46	Rehabilitation of the urban district heating system at the level of Oradea Municipality for the period 2009 - 2028 in order to comply with the environmental legislation and increase energy efficiency – Stage III	31.722.622	20.688	Under implementation
47	Rehabilitation of the urban district heating system at the level of Oradea Municipality for the period 2009 - 2028 in order to comply with the environmental legislation and increase energy efficiency – Stage IV	75.399.000	3015	signed contract
48	Valorization of geothermal energy on the CET Oradea platform"		98.620,3 to/year	feasibility study
49.	LIFE COOL ZONE- Innovative Municipal Cooperation and Integrated Solutions for Managing Heatwaves in Functional Urban Areas	1.000.000		Signed Contract
50	Extension of the geothermal district heating network on Calea Clujului and development of a geothermal heating station in Oradea	1.900.000		Signed Contract

