NET ZERO CITIES

EU MISSION PLATFORM | CLIMATE NEUTRAL AND SMART CITIES

Climate City Contract

2030 Climate Neutrality Action Plan

2030 Climate Neutrality Action Plan

of the City Cluj-Napoca

PRIMĂRIA ŞI CONSILIUL LOCAL CLUJ-NAPOCA

Cluj 2030

CLIC

CENTRUL DE INOVARE ŞI IMAGINAŢIE CIVICĂ CLUJ-NAPOCA

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Summary

On December 12, 2015, during the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21), **195 States, Romania included, adopted the Paris Agreement, which strives to limit the increase in global temperatures to well below +2°C**. The European Union has committed under the Paris Agreement to reduce greenhouse gas (GHG) emissions by at least 55% below 1990 levels by 2030, and to achieve climate neutrality by 2050. To achieve these ambitious targets, the European Green Deal was developed, which makes reaching climate neutrality by 2050 legally binding in the EU, and around 1 trillion Euro of public and private funds have been mobilized through the Sustainable Europe Investment Plan, to help achieve the target.

Cluj-Napoca Municipality apprehends the significant potential of cities and their metropolitan areas to contribute substantially to the successful implementation of the European Green Deal. As cities, we have a considerable chance to accelerate the transition towards zero-emission urban environments, by implementing a systemic mechanism, that works from governance structures to resource absorption. We, as cities, can be both cecentersf social innovation and pilot sites for pioneering technologies related to climate neutrality. Thus, we are responsible to for acting as the main climate neutrality catalyst, albeit this cannot be achieved without well-orchestrated, cross-sectoral, and multi-level collaboration with our local ecosystem, and most notably with the community we represent.

In support of the European Green Deal, the European Commission has also set the “100 Carbon Neutral Cities by 2030” Mission. The scope of the Mission is to: Support, promote and showcase 100 European cities in their systemic transformation towards climate neutrality by 2030 and make these cities into experimentation and innovation hubs for all cities, thus leading on the European Green Deal and on Europe’s efforts to become climate neutral by 2050. **Cluj-Napoca has been selected as one of the 100 Mission cities. As such, it is committing to accelerate efforts to achieve climate neutrality and serve as an example for other urban areas to follow.**

Already in the Integrated Urban Development Strategy 2021-2030-2050, adopted in early 2022, Cluj-Napoca has committed to becoming a Net Zero City by 2030 and has already sset upseveral ambitious areas of intervention, milestones, and timeline. Moreover, following the Covid-19 crisis, the City of Cluj-Napoca has also prepared a Resilience Plan, which tackles issues ranging from demographic decline and aging, to sound urban planning, urban food logistics, health issues, climate change, economic competitiveness, and social inclusion. Other relevant strategic documents include the 2022-2030 Sustainable Energy and Climate Action Plan (SECAP) (currently available for public consultation), the Sustainable Urban Mobility Plan 2021-2030, the Energy Efficiency Improvement Program (updated each year), and the 2020-2024 Air Quality Improvement Plan.

The scope of this document is to pull together the key relevant interventions and show how

these can help achieve the target of climate neutrality by 2030. The document, while it includes concrete impact pathways, is not meant to be seen as a rigid document. Rather, this Action Plan is meant to be dynamic, in the spirit of the "mission approach" promoted by Mariana Mazzucato, which proposes that once a target is set, various pathways could be pursued to achieve that target, and some of these pathways will not be known at the start of the journey. Mazzucato herself frequently uses the example of the mission set by US President John F. Kennedy in 1961 to achieve the goal of "landing a man on the Moon and returning him safely to the Earth". As we all know, Kennedy's Mission was achieved, and in the process, several breakthrough innovations have been developed, which impact our lives in myriad ways – from solar panels to fire-protecting suits, microwaves, or heart monitors. **Similarly, it is hoped that Cluj-Napoca's Mission to become a Net Zero City will give birth to several innovations that may benefit other cities with similar ambitions.**

The portfolio of interlinked interventions that are proposed in this Action Plan closely follows the recommendations of the Climate Neutral and Smart Cities Mission, being **designed in a cross-sectoral and actor-inclusive manner**, in our **ultimate goal of reducing the local GHG emissions by at least 80%, until 2030**. In this sense, the Action Plan includes multiple levers of change as enabling factors for the devised portfolio of clustered actions and, at the same time, roots in a multi-level, evidence-based perspective.

Finally, the Action Plan combines both of the Mission-proposed logical approaches: we have pursued a measurable, reportable and verifiable climate action planning process, by applying a comprehensive theory of change, in the **joint ambition to generate systemic changes for our local decarbonization, that needs to be not only rapid but also optimized in terms of efficiency and equity.**

Abbreviations and acronyms

ABBREVIATIONS AND ACRONYMS	DEFINITION
AFOLU	Agricultural, Forestry, and Land Use
AP	Action Plan
BA	Business Angels
BBU	Babeș-Bolyai University
BREEAM	Building Research Establishment Environmental Assessment Method
CIIC	Civic Imagination and Innovation Center
CMA	Cluj Metropolitan Area
CNM	Cluj-Napoca Municipality
CO2	Carbon Dioxide
COSME	Programme for the Competitiveness of Entreprises and SMEs
CRF	Common Reporting Format
CSR	Corporate Social Responsability
CTP	Compania de Transport Public (Public Transport Company)
DG	Directorate General
DGNB	German Sustainable Building Council
DIH	Digital Innovation Hub
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EEC	European Economic Community
EEIP	Energy Efficiency Improvement Program
EIB	European Investment Bank
ERDF	European Regional Development Plan
ETS	Emissions Trading System
EU	European Union
GHG	Greenhouse gas

ABBREVIATIONS AND ACRONYMS	DEFINITION
GIS	Geographic Information System
GPC	The Global Protocol for Community-Scale Greenhouse Gas Emission Inventories
GPL	Liquefied Petroleum Gas
ha	Hectar
HOP	Health Operational Programme
IDA	Intercommunity Development Association
INCDTIM	National Research and Development Institute for Isotopic and Molecular Technologies
IPCC	Intergovernmental Panel on Climate Change
IPPU	Industrial Process and Product Use
IRCEM	Institute for Circular Economy and Environment
IUDS	Integrated Urban Development Strategy
LCD	Liquid-Crystal Display
LED	Light-Emitting Diode
LEED	Leadership in Energy and Environmental Design
MA	Metropolitan Area
MA	Metropolitan Area
MWh	Megawatt-Hour
N/A	Not Applicable
NGO	Non-governmental Organization
NIPECC	National Integrated Plan for Energy and Climate Change
NO2	Nitrogen Dioxide
NRRP	National Recovery and Resilience Plan
NW	North West
NZ	Net Zero
nZEB	nearly Zero Emission Building
PPP	Public-Private Partnership
RD	Research-Development
RDI	Research-Development-Innovation

ABBREVIATIONS AND ACRONYMS	DEFINITION
RES	Renewable energy source
RES	Renewable energy source
RNMC	Romanian New Material Cluster
RO	Romanian
ROAT	The Romanian Order of Architects, Transilvania branch
ROP	Regional Operational Programme
RRF	Recovery and Resilience Facility
S.R.L.	Private Limited Company
SECAP	Sustainable Energy and Climate Action Plan
Sqm	Square meters
SUMP	Sustainable Urban Mobility Plan
SWM	Solid Waste Management
TAIEX	Technical Assistance and Information Exchange
TDIH	Transylvania Digital Innovation Hub
TITC	Transilvania IT Cluster
TREC	Transylvania Energy Cluster
TUCN	Technical University of Cluj-Napoca
UASVM	University of Agricultural Sciences and Veterinary Medicine
UHI	Urban Heat Island
VC	Venture Capital
EUFHERDI	The Executive Unit for Financing Higher Education, Research, Development and Innovation

1 Introduction

Cluj-Napoca is the largest secondary city in Romania, but also the most dynamic in terms of both demographic and economic growth (5,000 new jobs and inhabitants only in 2021, at metropolitan level, meaning +2,7%, respectively +1% in just one year). According to a World Bank survey, the city is the most attractive destination for internal migration, surpassing even Bucharest, and it is perceived by the Romanians as the one with the highest quality of life in the country. **This growth also comes at the cost of a high level of GHG emissions, especially associated with the rapidly growing housing sector and motorization rate.** The ambition of the local ecosystem, stated in the IUDS adopted in January 2022, is to place Cluj-Napoca among the cities with the highest quality of life in the EEC area and to promote it aaan European Lab City for testing the most innovative solutions, technologies and processes related to sustainable urban development.

Following this ambitious vision set by the 2021-2027 Metropolitan IUDS - as the coordinating planning document, the city was the first growth pole in Romania to elaborate and adopt all relevant sectoral development strategies and plans in 2022, starting with the SUMP, the District Heating System development strategy, the Digital Transformation one and the SECAP. The Air Quality Improvement Plan has been previously adopted (June 2020) and the revision of the General Urban Plan has already been initiated after the elaboration of the strategic documents mentioned above. The leitmotif stated in all these documents is the target to reduce GHG emissions by at least 80% in the following 8 years. Another strategic option that arises from the set of metropolitan/city planning documents is the focus on the two sectors with the highest level of GHG emissions, buildings (especially residential ones) and transport, respectively on the integrated interventions carried out in dense multi-apartment residential neigneighborhoodsere ¾ of the total residents live.

It is also important to mention here that the Municipality has initiated a series of climate neutrality initiatives long before the adoption of the planning documents for 2021-2027 and the selection of the city to become part of the EU Mission for 100 climate-neutral and smart cities by 2030. Among the local flagship programmes already drafted between 2015 and 2020, ”Green Cluj” (almost 200 hectares of new / rehabilitated parks and 100,000 trees planted by 2030), ”Walkable City” (a plan to implement the 15 minute-city concept in every major neighborhood of the city), the Zonal Urban Plan for the largest smart and green neighbourhood (Sopor) to be built in Romania on 250 hectares, based on a participative approach, or the policy to organise international architecture & design competitions for over 10 major urban renewal projects funded by ERDF are the most important ones.

In this broader local context, the selection of the city to become part of the EU Mission, as well as the elaboration of the Climate Neutrality Action Plan, Investment Plan, and Commitments was a perfect opportunity to deepen the planning efforts already initiated during the preparation of the relevant metropolitan/municipal strategies already approved and to frame existing and envisaged climate neutrality initiatives and measures into a single and sound roadmap for 2030. But the main outcome of the Climate City components preparation phase was the unique chance to consolidate the local and metropolitan climate neutrality ecosystem (local public authorities and metropolitan intercommunity development association, clusters in the field of energy or digital transformation, the DIH, universities, professional associations of architects and engineers, NGOs and civic society

organisations etc.), in the pursuit of our next milestone, respectively the establishment of a Net Zero City Local Coalition, a model for other cities in Romania and in the EU with the same ambitions. **The first test for this ecosystem was the successful preparation and submission of a project proposal under the Horizon 2020 call for NetZero Cities.**

2 Work Process

The Action Plan's preparation was based on adapting EU trends, strategic directions and policies to the specific local context, the whole process being a co-participatory one: although the Municipality coordinated the implementation of the Action Plan, the document was developed by constantly consulting the local stakeholders, because they are the NZC Coalition's pillars. **Thus, several virtual consultative sessions and workshops were organized, where stakeholders debated how this Action Plan can put into practice the local and international strategic documents aimed at climate neutrality, so that its implementation to generate a tangible impact and to fit Cluj-Napoca's profile.** All the NZC Coalition's stakeholders were invited to the work sessions. Although their participation was not mandatory, the Municipality enjoyed their constant presence at the meetings. During the meetings, we have started with a brainstorming session, which we have ultimately managed to materialise into a cohesive set of concrete intervention and action proposals, generated by the participants. Finally, the Municipality took on the role of integrating, in the present document, all the ideas that were co-created during our ideation and iteration sessions. This document thus illustrates the clear and directed alignment of existing local climate action planning and strategy processes in a unitary, sound intervention framework.

As part of our local NZC Coalition, the main stakeholders that were constantly consulted during the development of the Action Plan, covering all relevant dimensions: RDI and university education (mainly with the participation of TUCN and BBU), business sector (with the participation of the TREC and TITC clusters), NGOs (especially Urbannect) and citizens (through the discussions with the federation of owners' associations), all under the coordination of the public administration (the Municipality, with the support of its entire cohort of departments specialized in the field, of public service companies, of the City Council and with the help of the Energy Manager). A special support in this process was given by the Ministry of Investments and European Projects, through the participation in the discussions of Mr. Ovidiu Cîmpean, State Secretary and former Development Director for 10 years at Cluj-Napoca Municipality.

The intensive stakeholder collaboration used in the action portfolio's co-design respected the Framework for effective climate action planning presented in the Info Kit for Cities. Thus, by undertaking a co-creation working method, the Municipality has managed to validate the entire course of action with the local ecosystem and community:

1. **Setting the vision:** the Action Plan's vision was built on IUDS and SECAP, which were submitted to extensive public consultations at the moment of their elaboration.
2. **Establishing the governance structure:** Cluj NZC Local Coalition is the structure that governs the co-design, co-implementation and co-monitoring of the Action Plan under the big umbrella of CIIC – Civic Imagination and Innovation The Coalition's composition came naturally, given the numerous initiatives already carried out jointly within the local ecosystem.
3. **Baseline assessment & climate neutrality target:** the portfolio of indicators was concluded by taking into account the calculations already prepared in SECAP.
4. **Identifying actions:** The portfolio of actions is the result of local stakeholder collaboration, starting from the local context and from the steps already pursued by Cluj-Napoca, respectively considering the portfolios of projects prepared within IUDS and SECAP for the 2030 time horizon.

Together with the Investment Plan, the Action Plan resulted in an integrated proposal to jointly reach the local climate-neutrality goal and its related targets. **The effort invested by Municipality and by the local stakeholders in the elaboration of the 2 documents will be officially recognized by signing the 2030 Climate Neutrality Commitments.**

3 Part A – Current State of Climate Action

3.1 Module A-1 Greenhouse Gas Emissions Baseline Inventory

A-1.1: FINAL ENERGY USE BY SOURCE SECTORS				
Base year	**2021**			
Unit	**MWh/year**			
	Scope 1	Scope 2	Scope 3*	Total
Buildings	**2,372,076**	**231,941**	N/A	**2,604,017**
(Fuel type/ energy used)	**Natural gas 2,372,076	Electrical energy 231,941	N/A	
Transport	**585,137**	**16,030**	N/A	**601,167**
(Fuel type/ energy used)	GPL 5,771 Diesel 302,387 Gasoline 235,481 Biofuel 41,498	Electrical energy 16,030	N/A	
Waste	**5,400**	N/A	**81,197**	**86,597**
(Fuel type/ energy used)	Diesel 5,400	N/A	Electrical energy 81,197	
Industrial Process and Product Use (IPPU)	**450,710**	**303,045**	N/A	**753,755**
(Fuel type/ energy used)	Natural gas 450,710	Electrical energy 303,045	N/A	
Agricultural, Forestry, and Land Use (AFOLU)	**30,601**	**4,995**	N/A	**35,596**

A-1.1: FINAL ENERGY USE BY SOURCE SECTORS				
Base year	**2021**			
Unit	**MWh/year**			
	Scope 1	Scope 2	Scope 3*	Total
(Fuel type/ energy used)	Diesel 30,601	Electrical energy 4,995	N/A	

* Scope 3 energy use for the Buildings, Transport, IPPU and AFOLU sectors was not available. Coalition Partners will address this matter in future iterations of this Action Plan, as explained in section A-1.6

** The SECAP document does not offer clear information on how much natural gas is used for district heating, or for individual home heating or cooking, thus making it impossible at this moment to determine Scope 2 gas energy use for the building sector. This challenge will be addressed by coalition partners in the following iterations of the Action Plan, as explained in section A-1.6

A-1.2: EMISSION FACTORS APPLIED****						
(please specify for primary energy type and GHG emission factor according to methodology used)						
For calculation in t or MWh of primary energy						
(Please indicate method used, e.g. GPC, IPCC, CRF, national, etc.) **IPCC 2006**						
Primary energy/ energy source	Carbon Dioxide (CO_2)	Methane (CH_4)	Nitrous Oxide (N_2O)	F-gases (hydrofluorocarbons and perfluorocarbons)	Sulphur hexafluoride (SF_6)	Nitrogen trifluoride (NF_3)
Electrical energy 2021 *	0.701	N/A	N/A	N/A	N/A	N/A
Natural gas	0.202	N/A	N/A	N/A	N/A	N/A
Diesel	0.267	N/A	N/A	N/A	N/A	N/A
Gasoline	0.249	N/A	N/A	N/A	N/A	N/A
GPL	0.227	N/A	N/A	N/A	N/A	N/A
Bio-fuel	0.001	N/A	N/A	N/A	N/A	N/A
Renewable energy **	0	N/A	N/A	N/A	N/A	N/A
Electrical energy 2030 ***	0.1	N/A	N/A	N/A	N/A	N/A

* CO2 estimates for grid supplied energy in 2021 (MWh/year to tons Co2/year) are set at 0.701 according to IPCC 2006

** According to SECAP 2021, emission factors related to energy generated from renewable sources are equal to 0.

*** Due to the fact that by 2030 the majority of the electricity from the national grid will be generated from renewable sources, the emission factor for grid supplied energy in 2030 was set to 0.1 (SECAP 2021). Estimates for 2030 will take into account this emission factor when calculating CO2 emissions. Additional explanation related to this matter can be found in section A-1.6

**** SECAP 2021, the official document approved by the Cluj-Napoca City Council, did not offer any information about the emission factors for other greenhouse gases. This matter will be addressed by Coalition Partners in the next iterations of the Action Plan, as explained in section A-1.6.

A-1.3: ACTIVITY BY SOURCE SECTORS			
Base year: **2030** (Emission reduction from each activity contained in section B-2.1 are categorized in this table in accordance to the scope they will influence. For example, if the activities will reduce CO2 emissions associated with grid-supplied electrical energy, values will be placed in Scope 2. As the activities are to be completed by 2030 the base year was set to 2030). *			
	Scope 1	**Scope 2**	**Scope 3**

A-1.3: ACTIVITY BY SOURCE SECTORS			
Base year: **2030** (Emission reduction from each activity contained in section B-2.1 are categorized in this table in accordance to the scope they will influence. For example, if the activities will reduce CO2 emissions associated with grid-supplied electrical energy, values will be placed in Scope 2. As the activities are to be completed by 2030 the base year was set to 2030). *			
Buildings	**679,533 MWh/year | 137,266 tons CO2/year reduction**	**1,149,773 MWh/year | 114,977 tons CO2/year reduction**	**N/A**
Line 2 - Action 1.1 (from section B-2.1)	13,573 tons CO2/year reduction associated with natural gas	31,670 tons CO2/year reduction associated with electrical energy	**N/A**
	• 19 power plants with improved energy efficiency • 13 energy islands • 3 thermal points transformed • 1 positive energy district • 1 rehabilitation of the heat energy distribution network		**N/A**
Line 3 - Action 1.2 (from section B-2.1)	11,100 tons CO2/year reduction associated with natural gas	25,900 tons CO2/year reduction associated with electrical energy	**N/A**
	• 2 public buildings RES generation facilities • 2,000 blocks and 5,000 houses RES generation facilities		**N/A**
Line 4 - Action 1.3 (from section B-2.1)		3,000 tons CO2/year reduction associated with electrical energy	**N/A**
		• 80% of streets lights equipped with LED, remote management, and dimming systems	**N/A**
Line 13 - Action 5.1 (from section B-2.1)	47,195 tons CO2/year reduction associated with natural gas	22,805 tons CO2/year reduction associated with electrical energy	**N/A**
	• 40,000 apartments in communal housing renovated • 80,000 residents targeted by pilot Masterplan for public spaces in the neighbourhood to reduce car usage and promotclimate-neutraltral lifestyle		**N/A**
Line 14 - Action 5.2	3,371 tons CO2/year reduction associated with natural gas	1,629 tons CO2/year reduction associated with electrical energy	**N/A**

A-1.3: ACTIVITY BY SOURCE SECTORS			
Base year: **2030** (Emission reduction from each activity contained in section B-2.1 are categorized in this table in accordance to the scope they will influence. For example, if the activities will reduce CO2 emissions associated with grid-supplied electrical energy, values will be placed in Scope 2. As the activities are to be completed by 2030 the base year was set to 2030). *			
(from section B-2.1)		• 50 public buildings renovated	**N/A**
Line 15 - Action 5.3 (from section B-2.1)	8,090 tons CO2/year reduction associated with natural gas	3,910 tons CO2/year reduction associated with electrical energy	**N/A**
		• 100 ha of brownfield redeveloped • 50 new commercial green buildings included in a property tax reduction	**N/A**
Line 16 - Action 6.1 (from section B-2.1)	2,292 tons CO2/year reduction associated with natural gas	1,108 tons CO2/year reduction associated with electrical energy	**N/A**
	• 1 behavior change program composed of knowledge and competence audits, civic imagination and innovation mmodeling monitoring climate neutrality, marketing campaign, study visits, NetZero Caravans		**N/A**
Line 17 - Action 6.2 (from section B-2.1)	42,475 tons CO2/year reduction associated with natural gas	20,525 tons CO2/year reduction associated with electrical energy	**N/A**
	• 2 comprehensive climate-neutrality masterplans, updates for local planning regulations, and governance models related to the climate neutrality ecosystem		**N/A**
Line 18 - Action 6.3 (from section B-2.1)	9,169 tons CO2/year reduction associated with natural gas	4,431 tons CO2/year reduction associated with electrical energy	**N/A**
	• 1 climate neutrality Digital Twin • 1 International Climate Neutrality Summit • 1 Digital platform for climate neutrality management		**N/A**
Transport	**301,270 MWh/year | 36,555 tons CO2/year reduction**	**118,970 MWh/year | 11,897 tons CO2/year reduction**	**N/A**
	236 tons CO2/year reduction associated with	8,661 tons CO2/year reduction associated	**N/A**

A-1.3: ACTIVITY BY SOURCE SECTORS			
Base year: **2030** (Emission reduction from each activity contained in section B-2.1 are categorized in this table in accordance to the scope they will influence. For example, if the activities will reduce CO2 emissions associated with grid-supplied electrical energy, values will be placed in Scope 2. As the activities are to be completed by 2030 the base year was set to 2030). *			
Line 5 - Action 2.1 (from section B-2.1)	GPL 8,167 tons CO2/year reduction associated with Diesel 7,281 tons CO2/year reduction associated with Gasoline 7 tons CO2/year reduction associated with Biofuel	with electrical energy (encourage all citizens even those with electric vehicles to use public transport)	
	• 9 new metro stations, and 1 new metro line • 43 km of train line and 23 stations rehabilitated • 24 km of a new city belt • 20 km of new connecting roads • 200 new electric busses • 90 bus stations modernized		**N/A**
Line 6 - Action 2.2 (from section B-2.1)	1,650 tons CO2/year reduction associated with GPL 6,900 tons CO2/year reduction associated with Diesel 6,300 tons CO2/year reduction associated with Gasoline 2 tons CO2/year reduction associated with Biofuel		**N/A**
	• 200 new public charging stations for EVs • 300 new private charging stations for EVs • benefits for residents purchasing EVs		**N/A**
Line 7 - Action 2.3 (from	19 tons CO2/year reduction associated with GPL 671 tons CO2/year reduction associated with	711 tons CO2/year reduction associated with electrical energy (encourage all citizens	**N/A**

A-1.3: ACTIVITY BY SOURCE SECTORS			
Base year: **2030** (Emission reduction from each activity contained in section B-2.1 are categorized in this table in accordance to the scope they will influence. For example, if the activities will reduce CO2 emissions associated with grid-supplied electrical energy, values will be placed in Scope 2. As the activities are to be completed by 2030 the base year was set to 2030). *			
section B-2.1)	Diesel 598 tons CO2/year reduction associated with Gasoline 1 ton CO2/year reduction associated with Biofuel	even those with electric vehicles to cycle or walk)	
	• 19.8 ha of public spaces renovated to promote cycling, walking, and play and the transformation of streets into low-speed ones		
Line 8 - Action 2.4 (from section B-2.1)	69 tons CO2/year reduction associated with GPL 2,381 tons CO2/year reduction associated with Diesel 2,123 tons CO2/year reduction associated with Gasoline 2 tons CO2/year reduction associated with Biofuel	2,525 tons CO2/year reduction associated with electrical energy (encourage all citizens even those with electric vehicles to cycle)	**N/A**
	• 50 km of new bike lanes • 20 new bike-sharing stations • 1,000 new public regular and electric bikes		
Waste	**3,216 MWh/year | 859 tons CO2/year reduction**	**N/A**	**151,410 MWh/year | 15,141 tons CO2/year reduction**
Line 9 - Action 3.1 (from section B-2.1)	859 tons CO2/year reduction associated with less Diesel required for transporting selected waste		15,141 tons CO2/year reduction associated with electrical energy (selected waste would be processed more economically)
	• 270 digitized eco-islands for the selective collection of household and packaging		

A-1.3: ACTIVITY BY SOURCE SECTORS			
Base year: **2030** (Emission reduction from each activity contained in section B-2.1 are categorized in this table in accordance to the scope they will influence. For example, if the activities will reduce CO2 emissions associated with grid-supplied electrical energy, values will be placed in Scope 2. As the activities are to be completed by 2030 the base year was set to 2030). *			
	waste ● 2 collection centers for voluminous and hazardous waste, including construction packaging. ● 100 new street-smart waste bins powered by solar energy		
Industrial Process and Product Use (IPPU)	**N/A**	**N/A**	**N/A**
N/A	N/A	N/A	N/A
Agricultural, Forestry and Land Use (AFOLU)	**8,403 MWh/year | 2,244 tons CO2/ year reduction**	**9,615 MWh/year | 962 tons CO2/ year reduction**	**N/A**
Line 10 - Action 4.1 (from section B-2.1)	266 tons CO2/year reduction associated with less Diesel as citizens will be encourage to walk more and not use their cars	114 tons CO2/year reduction associated with electrical energy as citizens would be encouraged to walk more	**N/A**
	● 63 ha of parks rehabilitated ● 120 ha of new parks ● 100,000 new trees planted		**N/A**
Line 11 - Action 4.2 (from section B-2.1)	1,855 tons CO2/year reduction associated with less Diesel as citizens would be encouraged to bike more and not use their cars	795 tons CO2/year reduction associated with electrical energy (all citizens would be encouraged to bike, even those with electric vehicles)	**N/A**
	● 75 km of new bike lanes along the Somes River		**N/A**
Line 12 -	123 tons CO2/year reduction associated with less Diesel (green roofs	53 tons CO2/year reduction associated with electrical energy	**N/A**

A-1.3: ACTIVITY BY SOURCE SECTORS			
Base year: **2030** (Emission reduction from each activity contained in section B-2.1 are categorized in this table in accordance to the scope they will influence. For example, if the activities will reduce CO2 emissions associated with grid-supplied electrical energy, values will be placed in Scope 2. As the activities are to be completed by 2030 the base year was set to 2030). *			
Action 4.3 (from section B-2.1)	would act as carbon sinks for CO2 used in AFOLU maintenance)	required for cooling equipment	
	• 20 green roofs for public buildings • 50 green roofs for private buildings		**N/A**

*Information about the energy requirements of each sector in 2021 can be found in table A-1.1 and information about CO2 emission associated with each sector in 2021 can be found in Table A-1.4

A-1.4: GHG EMISSIONS BY SOURCE SECTORS				
Base year	**2021**			
Unit	**t CO2 equivalent/year**			
	Scope 1	**Scope 2**	**Scope 3***	**Total**
Buildings	479,160	162,590	N/A	**641,750**
Transport	140,725	11,237	N/A	**151,962**
Waste	1,442	N/A	56,919	**58,361**
Industrial Process and Product Use (IPPU)	91,043	212,435	N/A	**303,478**
Agricultural, Forestry and Land Use (AFOLU)	8,170	3,502	N/A	**11,672**
Total	**720,540**	**389,764**	**56,919**	**1,167,223**

*Information related to Scope 3 emissions for the Buildings, Transport, IPPU and AFOLU sectors was not available at this time. Coalition Partners will address this matter in future iterations of this action plan as explained in section A-1.6

A-1.5: GRAPHICS AND CHARTS

Figure 1 CLUJ-NAPOCA'S CITY ENERGY PROFILE, 2021

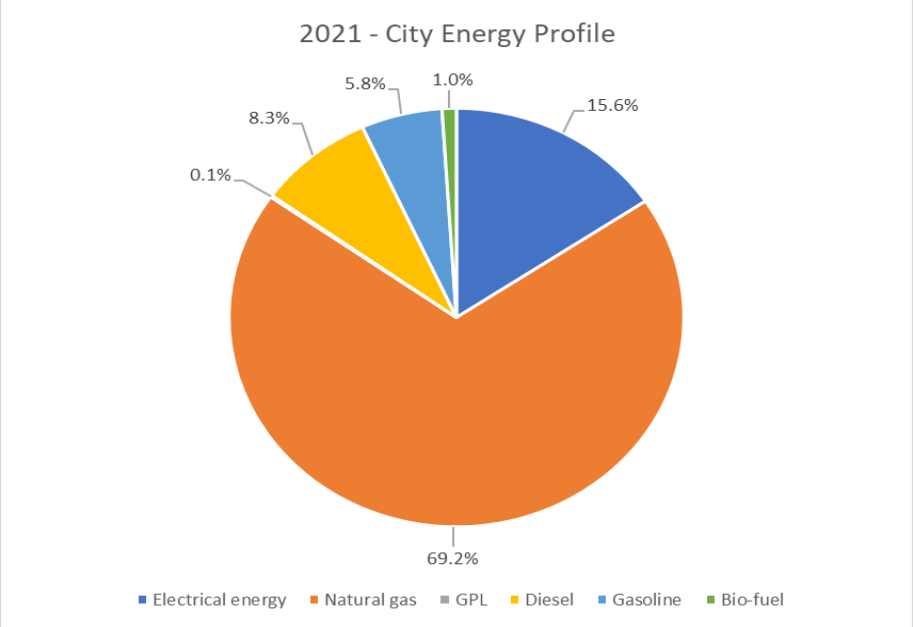


Figure 2 CLUJ-NAPOCA'S CITY ENERGY PROFILE, 2030

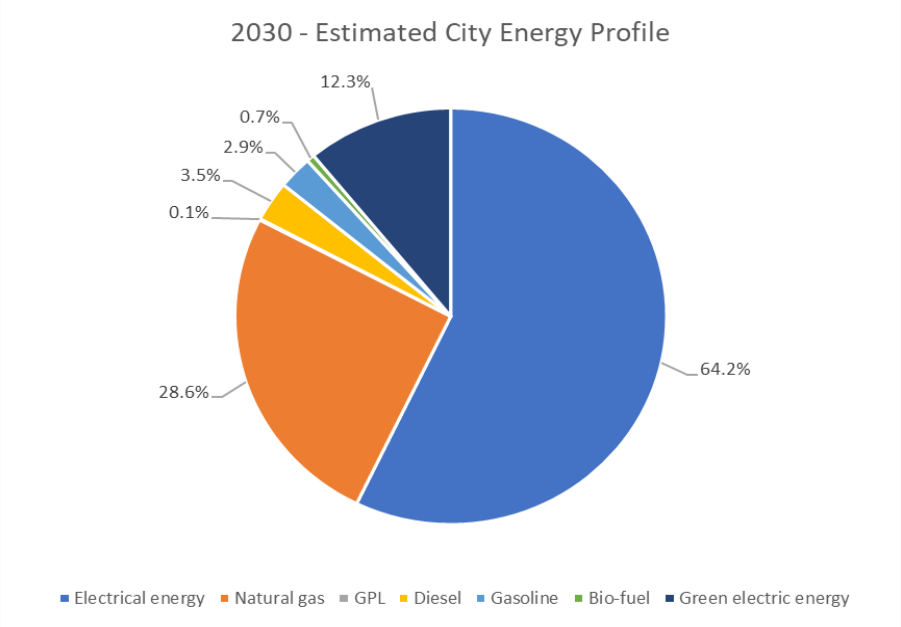


Figure 3 ENERGY REQUIREMENTS, 2021

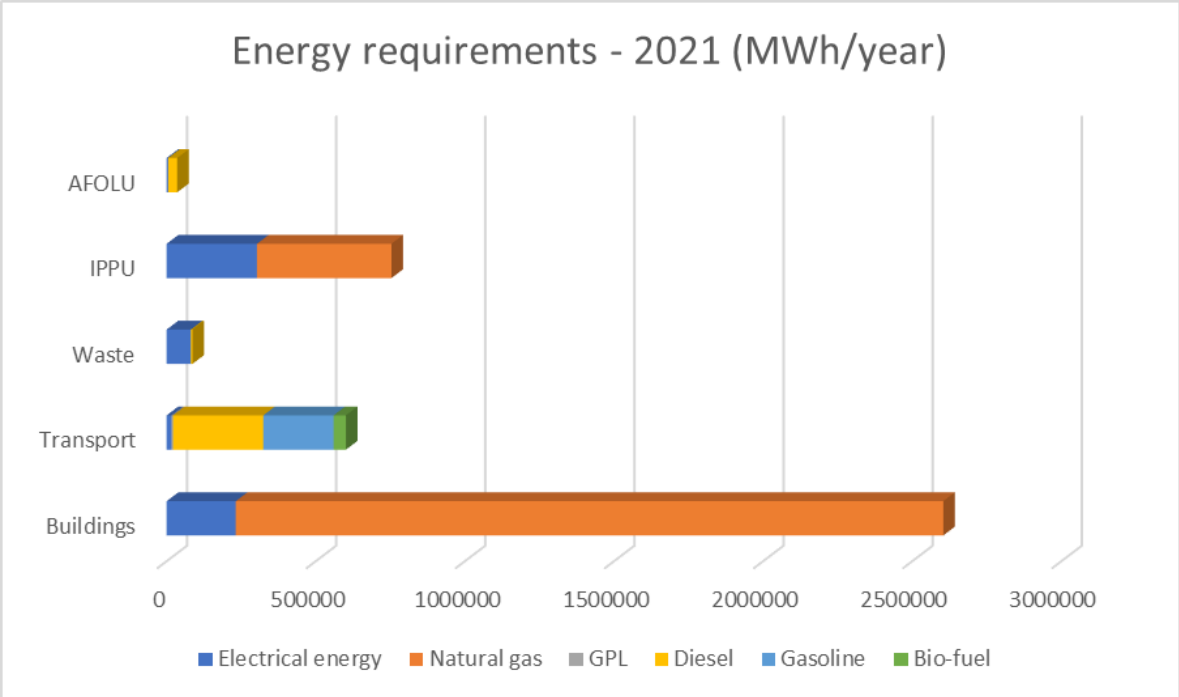


Figure 4 ENERGY REQUIREMENTS, 2030

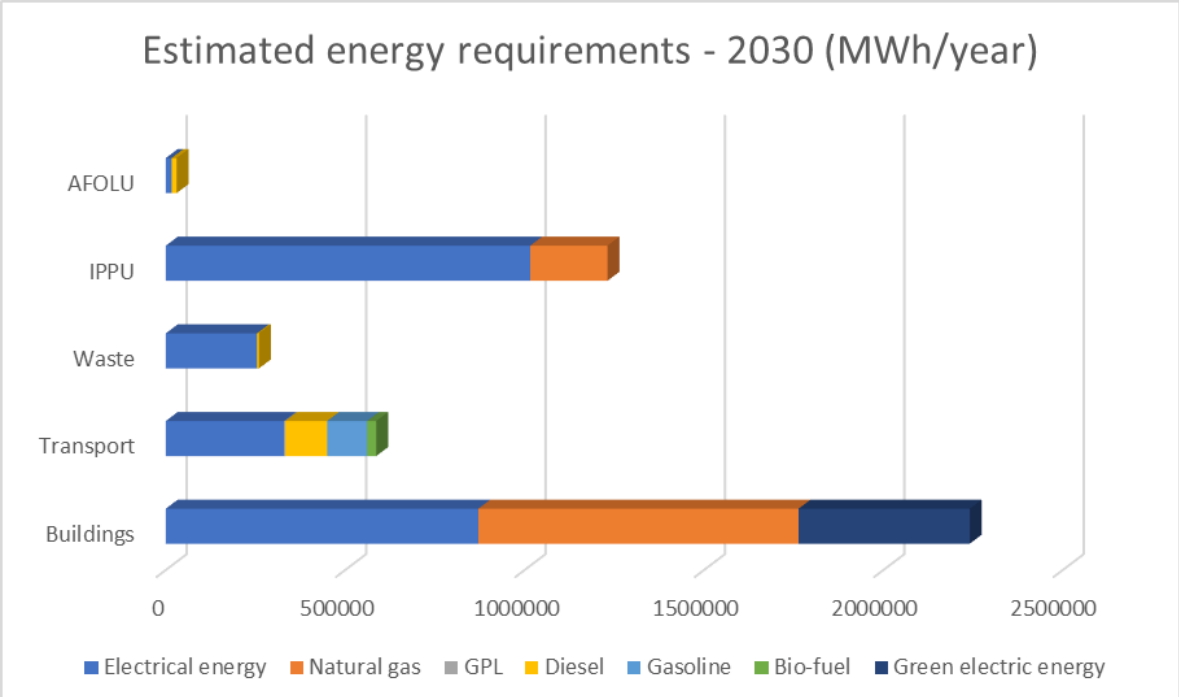


Figure 5 ENERGY REQUIREMENTS IN BUILDINGS, 2021 VS 2030

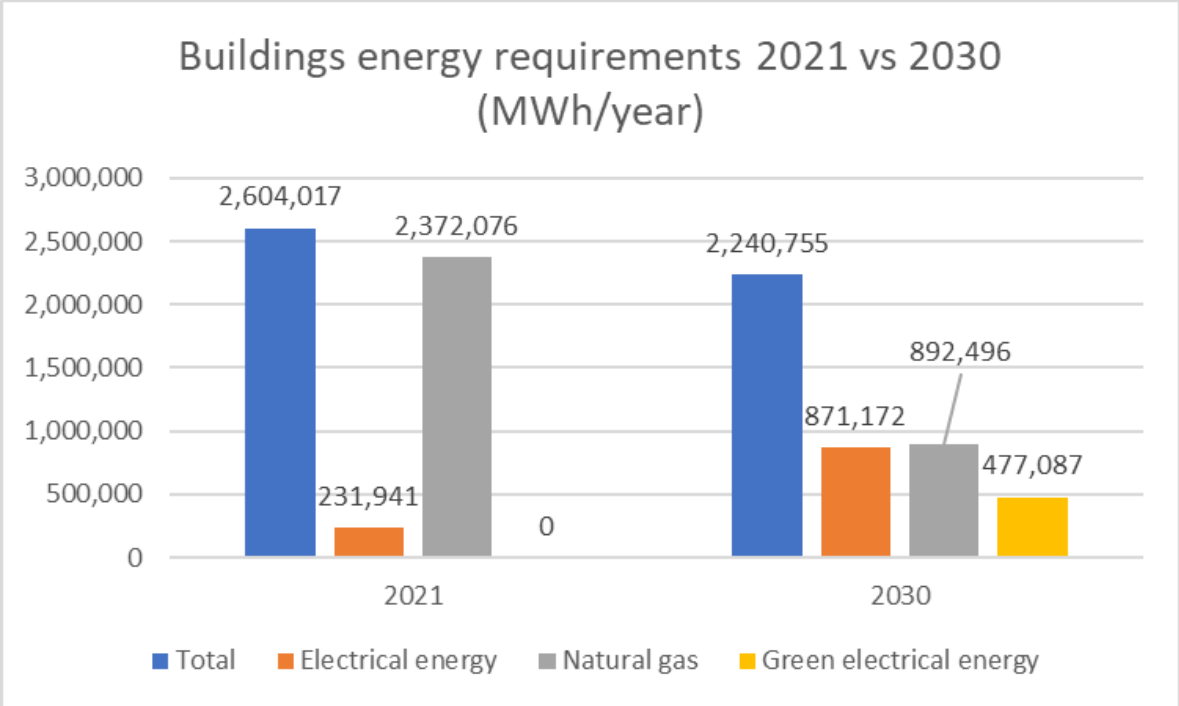


Figure 6 ENERGY REQUIREMENTS IN TRANSPORT, 2021 VS 2030

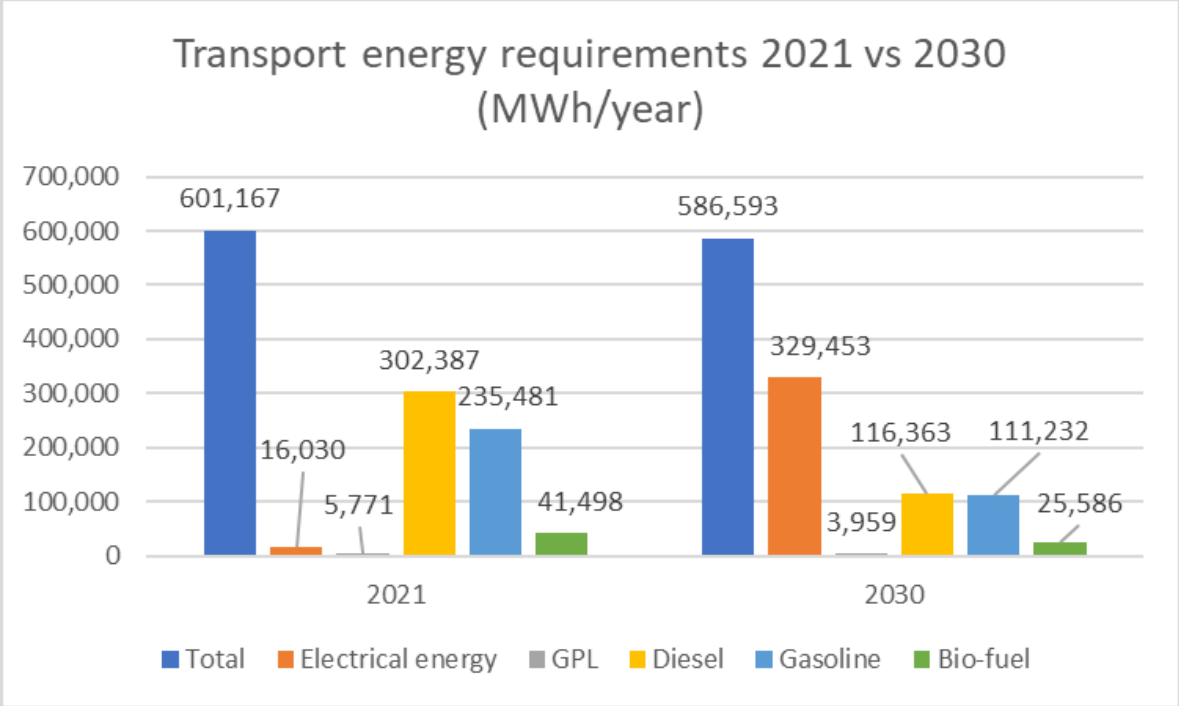


Figure 7 ENERGY REQUIREMENTS IN WASTE, 2021 VS 2030

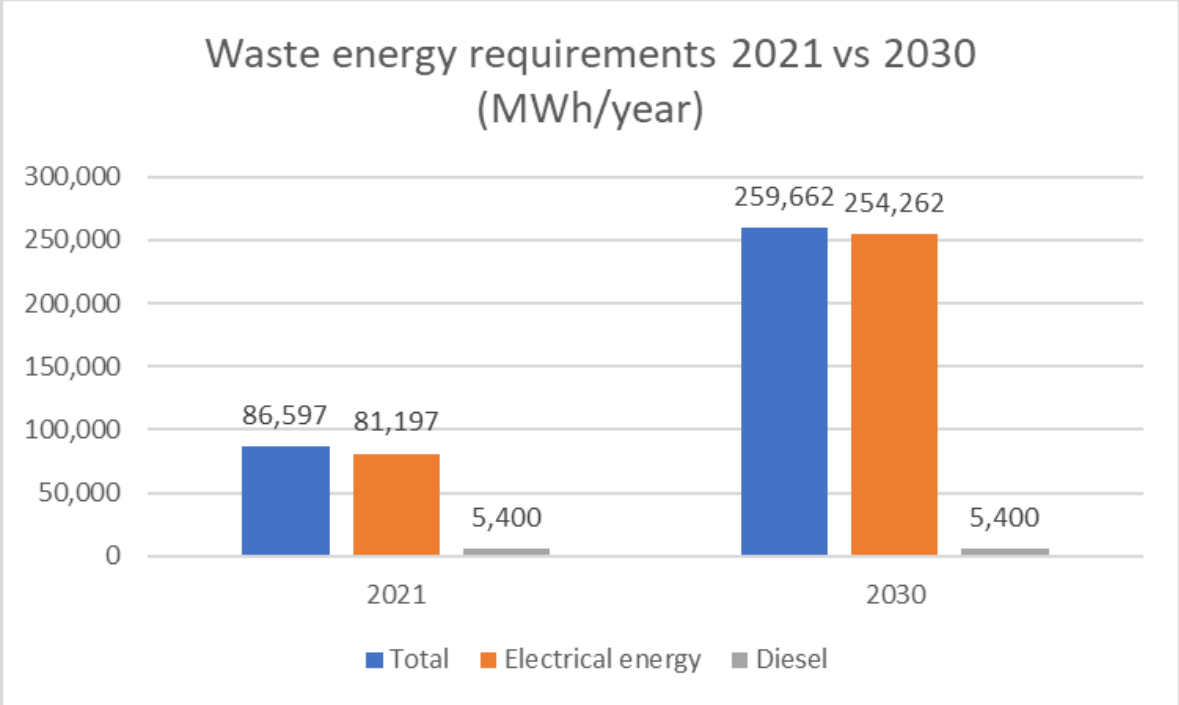


Figure 8 ENERGY REQUIREMENTS IN IPPU, 2021 VS 2030

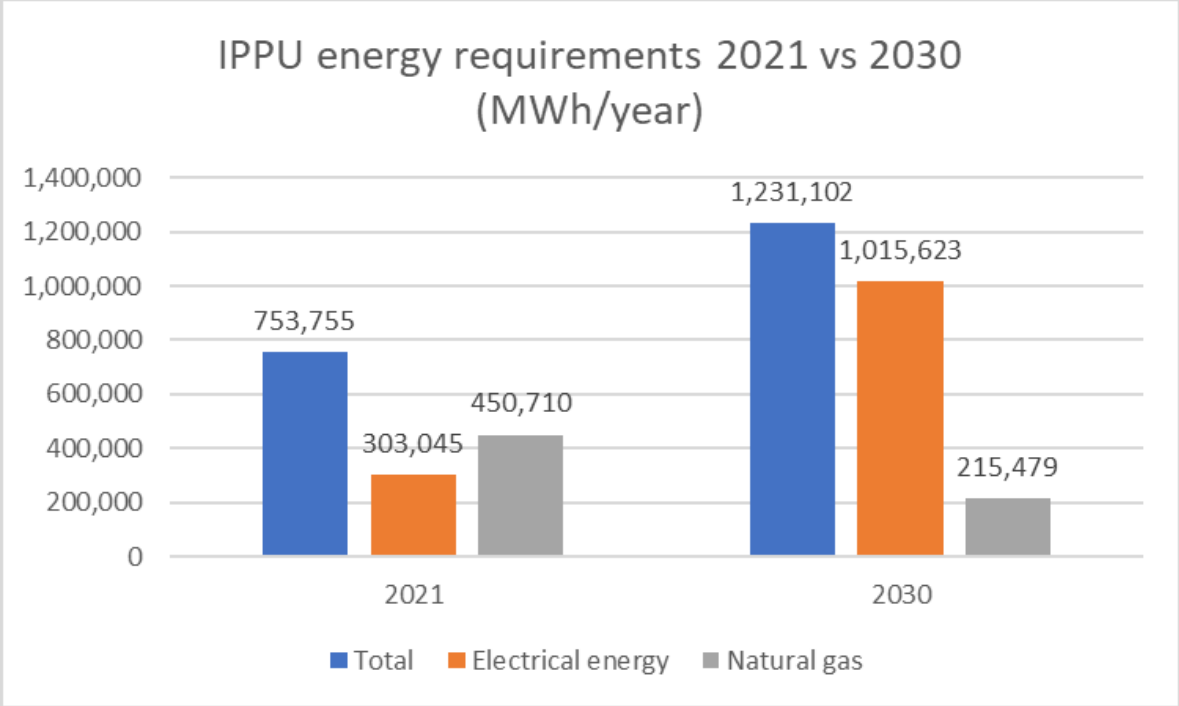


Figure 9 ENERGY REQUIREMENTS IN AFOLU, 2021 VS 2030

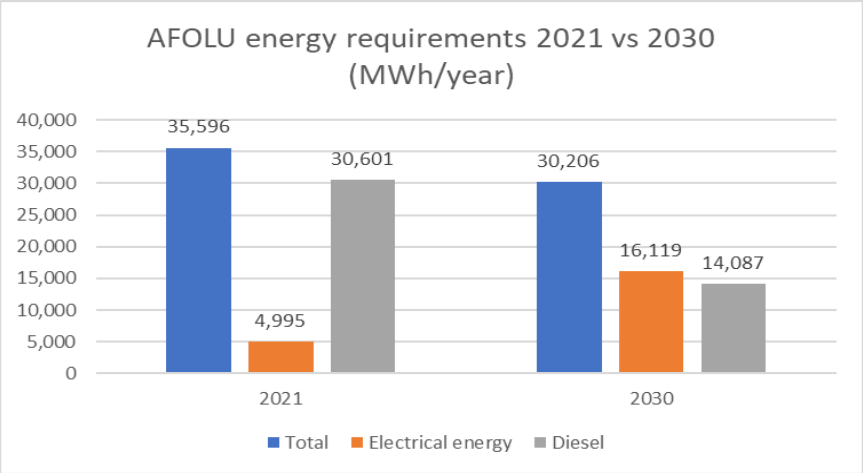


Figure 10 DATA ON THE CITY ENERGY NEEDS PER SECTOR AND CO2 EMISSIONS - 2021 VS 2030

2021 (PACED 100)				2030 TARGETS (PACED 116)						
	MWh/year	CO2/year	Percentage		MWh/year	Real CO2/year from energy conversion	CO2 reduction from proposed actions	Total emissions after actions 2030	Target CO2	Percentage
Buildings	2,604,017	**641,750**	55%	**Buildings**	**2,240,755**	**267,401**	**252,243**	**15,158**	**101,592**	**46%**
Electrical energy	231,941	162,590.64	25%	Electrical energy	871,172	87,117	*a			
Natural gas	2,372,076	479,159.35	75%	Natural gas	892,496	180,284	*d			
				Green electric energy	477,087	0				
Transport	601,167	**151,962**	13%	**Transport**	**586,593**	**92,635**	**48,452**	**44,183**	**45,635**	**21%**
Electrical energy	16,030	11,237	7%	Electrical energy	329,453	32,945	*b			
GPL	5,771	1,310	1%	GPL	3,959	899				
Diesel	302,387	75,294	50%	Diesel	116,363	31,069				
Gasoline	235,481	58,635	39%	Gasoline	111,232	27,697				
Bio-fuel	41,498	41	0%	Bio-fuel	25,586	26				
Waste	86,597	**58,361**	5%	**Waste**	**259,662**	**26,868**	**16,000**	**10,868**	**11,672**	**5%**
Electrical energy	81,197	56,919	98%	Electrical energy	254,262	25,426	*c			
Diesel	5,400	1,442	2%	Diesel	5,400	1,442				
IPPU	753,755	**303,478**	26%	**IPPU**	**1,231,102**	**145,089**		**145,089**	**60,696**	**27%**
Electrical energy	303,045	212,435	70%	Electrical energy	1,015,623	101,562				
Natural gas	450,710	91,043	30%	Natural gas	215,479	43,527				
AFOLU	35,596	**11,672**	1%	**AFOLU**	**30,206**	**5,373**	**3,205**	**2,168**	**2,334**	**1%**
Electrical energy	4,995	3,502	40%	Electrical energy	16,119	1,612	*e			
Diesel	30,601	8,170	60%	Diesel	14,087	3,761				
Total	4,081,132	**1,167,223**	100%	**Total**	**4,348,317**	**537,367**	**319,900**	**217,467**	**221,929**	**100%**
								81.37%	80%	

*a - CO2 reductions taken from Theory of Change BUILT ENVIRONMENT

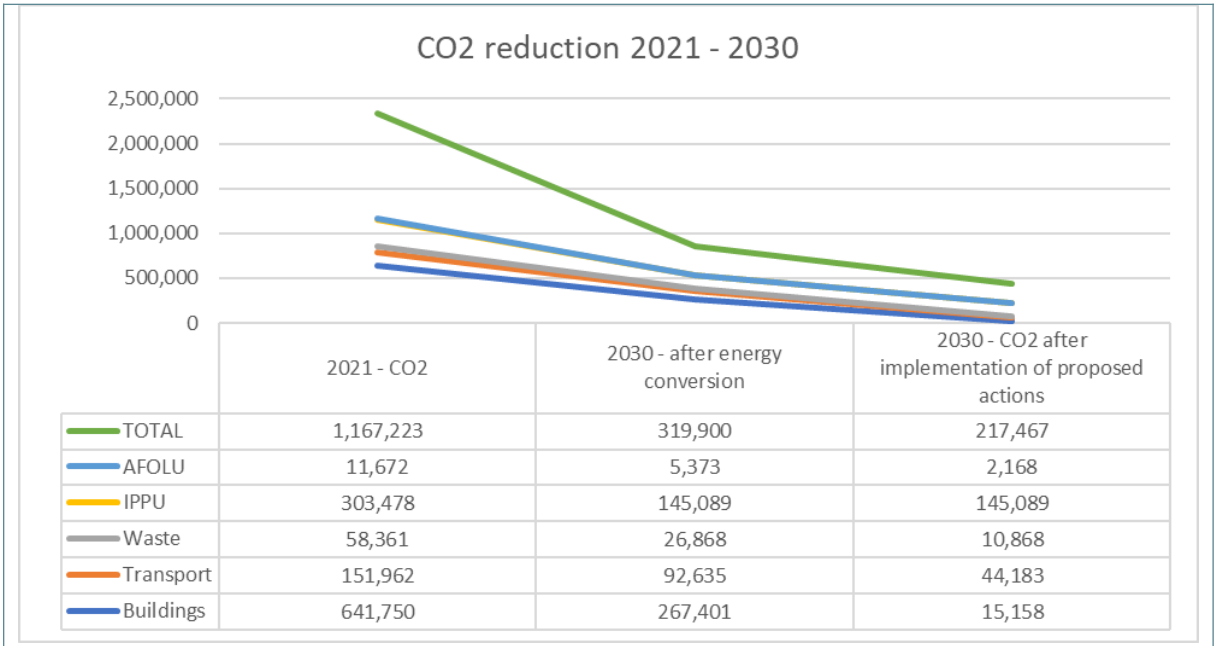
*b - CO2 reductions taken from Theory of Change MOBILITY & TRANSPORT

*c - CO2 reductions taken from Theory of Change WASTE & CIRCULAR ECONOMY

*d - CO2 reductions took from Theory of Change ENERGY SYSTEMS

*e - CO2 reductions taken from Theory of Change GREEN INFRASTRUCTURE & NATURE BASED SOLUTIONS

Figure 11 CO2 REDUCTIONS, 2021-2030



	2021 - CO2	2030 - after energy conversion	2030 - CO2 after implementation of proposed actions
TOTAL	1,167,223	319,900	217,467
AFOLU	11,672	5,373	2,168
IPPU	303,478	145,089	145,089
Waste	58,361	26,868	10,868
Transport	151,962	92,635	44,183
Buildings	641,750	267,401	15,158

A-1.6: DESCRIPTION AND ASSESSMENT OF GHG BASELINE INVENTORY

Where data from the baseline inventory was sourced from and why:

When determining where to capture data for the baseline inventory, several data sources as well as official strategic documents developed by experts were consulted. The main challenge was that GHG emissions for Cluj-Napoca were calculated using different methodologies, for different years or for different sectors in each source that was consulted. For example: The Sustainable Urban Mobility Plan for Cluj-Napoca offered CO2 reduction values for the implemented projects, but did not offer information on how the emissions were calculated. The Integrated Urban Development Strategy factors in CO2 emissions calculated in the Sustainable Energy Action Plan 2011-2020. The Thermofication Strategy of Cluj-Napoca 2021-2030 offers CO2 emission values, energy requirements associated with public transportation and buildings as well as information related to the emissions factors applied using the IPCC 2006 methodology. Google Environmental Insights offers GHG emissions for the buildings and transportation sector calculated using the CURB tool and the GPC methodology. After consulting all available official documents, different online tools, as well as the requirements for this document, the decision was made to use data from the SECAP 2021 document as the official data for baseline emissions. The reasons why SECAP 2021 was used were the following:

- It is the most recent official strategic document approved by the Cluj-Napoca City Council
- It provides detailed information on how energy demand was calculated for different sectors in the city and takes into account estimations from the other approved strategic documents
- It provides detailed information on how CO2 emissions were calculated and what methodology and emission factors were used
- It provides detailed Energy and CO2 emissions information on different sectors in the city

- It provided energy and CO2 estimations for 2030

There were, however, a few challenges that need to be overcome by using the SECAP document as the official source of data:

- Data was not available for all sectors required for the NZC Action Plan. For example, the SECAP did not include data about the Waste, IPPU and AFOLU sectors. This challenge was addressed by using percentual estimations for the missing sectors (explained in the paragraphs below)
- Not all gases required in the NZC Action Plan were accounted for. CO2 was the only greenhouse gas estimated in the SECAP document. This challenge will be addressed by Coalition members (explained below)
- In SECAP, the grid supplied energy conversion factor for 2030 was calculated to 0.1 according to progress made by Romania in generating energy from renewable sources. Information taken from the Electrical Energy Grid of Romania shows that power produced from renewables has increased by 76% between 2012 and 2021, currently accounting for 42% of the total energy generated and on trend to achieving the NetZero target. Furthermore, large public and private companies in the Cluj Metropolitan Area have set ambitions to increase the energy production from renewables and achieve climate neutrality by 2030. Such an example is the Somes Water Company, which manages water supply and wastewater treatment facilities in the metropolitan area, and that plans to become climate neutral by 2035.

What will be done in the future to improve data collection:

The Local Net Zero Coalition includes TUCN (also worked for SECAP) and BBU, plus other partners will be mobilised to ensure more accurate, timely and regular collection of energy and GHG emission data. The coalition will also take full advantage of available data sources, such as the World Bank Curb Tool, Google Environmental Insights, NASA Earth Data Platform, HeatMaps, THERMOS and other open source information to ensure easier and more accurate data capture. A series of online tools were already used by Coalition partners to determine the photovoltaic potential for all the buildings in Cluj-Napoca.

Moreover, Coalition Partners will also collect data from the regional Water Company, the Directorate of Administration of the Public Domain, the County Council and other local stakeholders and will analyse in detail the impact of each proposed intervention while mapping CO2 interconnections between emitters, in order to ensure that reductions in Scope 1 and Scope 2 emissions do not lead to a sharp increase in Scope 3 emissions. Future iterations of the current Action Plan will take into consideration local interdependencies and properly address them for even better strategic design choices.

2021 - A CITY THAT RUNS ON NATURAL GAS

The 2021 baseline for the total energy required and ultimately the total CO2 emissions associated with that energy consumption for each sector was calculated in accordance with the SECAP document, Scenario 1 - calculations based on the IPCC 2006 methodology. For information that was not available, estimates were used in order to calculate the full spectrum of the CO2 emission

and energy consumption.

With this in mind, the baseline information for 2021 is the following:

Total CO2 emissions for 2021: 1,167,223 tons CO2/year

Total energy consumption for 2021: 4,081,133 MWh/year

Buildings sector - estimates sourced from SECAP 2021

Information related to the energy requirements of public buildings, residential buildings and tertiary buildings is available in the SECAP document. CO2 emissions in tons/year were calculated by multiplying the conversion factor with the energy type expressed in MWh/year. The electrical energy needed to power the buildings comes directly from the energy grid, and the natural gas requirements include both the natural gas used for heating and the natural gas used for generating electricity.

- 2,604,017 MWh/year energy required
    - Electrical energy: 231,941 MWh/year
    - Natural gas: 2,372,076 MWh/year
- 641,750 tons total CO2 emissions (55% of total CO2 emissions)

Transport sector - estimates sourced from SECAP 2021

The transport energy requirements and CO2 emissions aggregate data about the Municipality's transport, public transport as well as private and commercial transport. Data related to this sector was taken from the SECAP document - Scenario 1.

- 601,167 MWh/year energy required
    - Electrical energy: 16,030 MWh/year
    - GPL: 5,771 MWh/year
    - Diesel: 302,387 MWh/year
    - Gasoline: 235,481 MWh/year
    - Biofuel (carbon neutral): 41,498 MWh/year
- 151,962 (SECAP 2021) - 146,517 total tons CO2 emissions (13% of total CO2 emissions)

Waste sector - estimated at 5% from total CO2 emissions (Science Direct)

Emissions connected to the waste sector were estimated at 5% of the total city's emissions. This percentage was set by analysing a series of scientific papers from Science Direct and it is assumed that in 2030 waste will still account for 5% of the total city's emissions. In regards to the energy needs, it was determined that 5,400 MWh/year (the equivalent of 1.5 tons per work day) of diesel

fuel is required to run the waste sector, and the rest of the waste systems (robotic belts, treatment facilities, etc.) would need 81,200 MWH/year electrical energy to function at capacity and account for the 5% emissions.

- 86,598 MWh/year energy required
    - Electrical energy: 81,198 MWh/year
    - Diesel: 5,400 MWh/year
- 58,361 total tons CO2 emissions (5% of total CO2 emissions)

Industrial Process and Product Use - estimated at 26% of total CO2 emissions (Metroverse)

By analysing the city's economic profile from Metroverse, it was determined that IPPU accounts for 26% of the total city's emissions. Electrical energy was set at 70% and natural gas at 30% as needed to power this sector, and so the overall fuel requirements were determined by taking these percentages out of the total emissions and converting them into MWh/year using the IPPC emissions conversion factors. Regarding the types of industry working in the city, the most relevant information comes from the structure of economically active local establishments in the Cluj-Napoca Metropolitan Area, by main economic activities (2019 data). The city and its metropolitan area are dominated by economic actors whose main activities comprise: trade (20,4%), professional, scientific and technical activities (15,37%), construction (10,86%), transport and storage (10,33%), manufacturing (8,48%), IT&C (8,47%), administrative and support services (4,40%), plus real estate transactions (4,33%) and hotels and restaurants (4,24%). To these are added, in smaller proportions, economic operators responsible for: healthcare (3,50%), other service activities (3,10%), cultural, entertainment and leisure activities (2,25%), education (1,40%), financial intermediation (1,31%), utilities (0,50%), agriculture, forestry and fishing (0,91%) plus mining and quarrying (0,16%).

- 753,755 MWh/year energy required
    - Electrical energy: 303,045 MWh/year
    - Natural gas: 450,710 MWh/year
- 303,478 total tons CO2 emissions/year (26% of total CO2 emissions)

Agriculture, Forestry and Land Use - estimated at 1% of total CO2 emissions (Metroverse)

AFOLU was estimated at 1% of the total city's emissions. This percentage is also supported by data obtained from the Statistical Office of Romania. Diesel fuel accounts for 70% and electrical energy for 30% out of the sector's energy requirements. Cluj-Napoca has an insignificant agricultural sector, that is why operation and maintenance of public parks was included in this estimate:

- 35,596 MWh/year energy required
    - Electrical energy: 4,995 MWh/year
    - Diesel: 30,601 MWh/year
- 11,672 total tons CO2 emissions (1% of total CO2 emissions)

All in all, it can be noticed that 69.2% of the energy requirement for the city comes from natural gas, while electricity accounts for only 15.6 %. The building sector has the highest energy need, requiring an average of 2,372,076 MWh/year of natural gas and 231,941 MWh/year of electrical energy.

2030 - CHANGING THE CITY'S ENERGY PROFILE TO A CITY THAT RUNS MAINLY ON ELECTRIC ENERGY

SECAP offers an energy paradigm shift for 2030, that is why the estimates taken from SECAP correlated with the actions proposed in the following chapters will change the city's energy profile from a gas intensive one into an electrical energy one. Electrical energy will be the main source of energy, accounting for 57.2%, followed by natural gas 25.5% and green electric energy at 11%. In recent years, Romania has made insignificant progress in supplying green energy to the national grid and large national projects are currently under development, that is why SECAP recommends using a conversion factor of 0.1 (MWh/year electrical energy to tons CO2/year) when calculating emissions for 2030.

The target energy requirements and CO2 emission for 2030 are as follows:

Total target CO2 emissions for 2030: 221,929 tons CO2/year (80% decrease compared to 2021)

Total energy consumption estimates for 2030: 4,348,317 MWh/year (7% increase compared to 2021)

2030 Buildings sector - estimates sourced from SECAP 2021

Information related to the estimated 2030 energy requirements of public buildings, residential buildings and tertiary buildings is available in the SECAP 2021 document. CO2 emissions in tons/year were calculated by multiplying the 2030 conversion factors with the energy type expressed in MWh/year. According to SECAP 2021, the conversion factor for electrical energy from the grid was set at 0.1 while the conversion factor for green electrical energy was set at 0. Electric energy is general grid energy, while green electric energy is electric energy produced from renewables on site, within the city boundaries. The target CO2 emission for this sector is 101,592 tons CO2/year.

- 2,240,755 MWh/year energy required
    - Electrical energy: 871,172 MWh/year
    - Natural gas: 892,496 MWh/year
    - Green electric energy: 477,087 MWh/year
- 267,401 tons total CO2 emissions after energy conversion and before implementation of proposed actions
- 15,158 tons total CO2 emissions after implementation of actions. (actions account for a 252,243 tons CO2 reduction)

2030 Transport sector - estimates sourced from SECAP 2021

The transport energy requirements and CO2 emissions for 2030 were taken from the SECAP 2021 document and aggregate data about the Municipality's own transport, public transport as well as private and commercial transport. Compared to 2021, a large percentage of transport in Cluj-Napoca will be powered by electrical energy, thus decreasing the need for fossil fuels.

- 586,593 MWh/year energy required
    - Electrical energy: 329,453 MWh/year
    - GPL: 3,959 MWh/year
    - Diesel: 116,363 MWh/year
    - Gasoline: 111,232 MWh/year
    - Biofuel (carbon neutral): 25,586 MWh/year
- 92,635 tons total CO2 emissions after energy conversion and before implementation of proposed actions
- 44,183 tons total CO2 emissions after implementation of actions. (actions account for a 48,452 CO2 reduction)

2030 Waste sector - estimated at 5% from total CO2 emissions (Science Direct)

CO2 emissions for the waste sector in 2030 were estimated at 5% of the total target emissions in 2030. The amount of diesel fuel required to power this sector will not change compared to 2021, and so, the electrical energy needed to power the sector and account for those emissions was estimated. It can be noticed that this sector will require 3 times more electrical energy in 2030 compared to 2021.

- 259,662 MWh/year energy required
    - Electrical energy: 254,262 MWh/year
    - Diesel: 5,400 MWh/year
- 26,868 total tons CO2 emissions after energy conversion and before implementation of proposed actions
- 10,868 tons total CO2 emissions after implementation of actions. (actions account for a 16,000 CO2 reduction)

2030 Industrial Process and Product Use

For 2030, the IPPU sector was estimated to require half the quantity from natural gas, but 3 times more electrical energy compared to 2021. Although no hard actions were planned for 2030 for this sector, city wide soft interventions will lead to the adoption of a climate-neutral behaviour from the citizens, and ultimately force industrial entities to shift towards more environmentally friendly production processes which will ultimately increase their electrical energy needs.

- 1,231,102 MWh/year energy required
    - Electrical energy: 1,015,623 MWh/year
    - Natural gas: 215,479 MWh/year
- 145,089 total tons CO2 emissions/year after energy conversion

2030 Agriculture, Forestry and Land Use

Similar to the other sectors analysed, the AFOLU sector in 2030 will see a shift from a diesel intensive sector to an electrical energy intensive one.

- 35,206 MWh/year energy required
    - Electrical energy: 16,119 MWh/year
    - Diesel: 14,087 MWh/year
- 5,373 total tons CO2 emissions after energy conversion and before implementation of proposed actions
- 2,168 tons total CO2 emissions after implementation of actions. (actions account for a 3,205 CO2 reduction)

3.2 Module A-2 Current Policies and Strategies Assessment

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
Action Plan	Local	Sustainable Energy and Climate Action Plan 2022-2030 (SECAP)	The SECAP is the main strategic document targeting the reduction of GHG emissions, elaborated according to the methodology of the Covenant of Mayors on Climate and Energy, including a Climate Change Adaptation Action Plan which contains the planned interventions.	The SECAP identifies stationary energy and transport as the main sectors responsible for GHG emissions. Most significantly, the plan highlights that buildings account for approx. 81% of total emissions (particularly residential), while transport is responsible for approx. 16%. Therefore, the action plan addresses stationary energy with priority. The SECAP includes a target of reducing the emissions by 80% by 2030 (compared to 2011).	Considering the high emissions from residential buildings, measures to accelerate interventions for energy efficiency are required. To this end, a comprehensive climate-neutrality masterplan for dense multi-apartment neighborhoods and suburbs will be developed, to allow for scalability at the metropolitan level. Another key action regards the development of a new governance model for condominiums, in order to better integrate them as dialogue partners and actors of change in the journey towards climate neutrality.
Strategy	Local	Integrated Urban Development Strategy for Cluj-Napoca Metropolita	The IUDS was developed at the level of the metropolitan area and places a strong emphasis on the transition to	More exactly, Specific Objective no. 3 - Carbon neutral, green and resilient city aims to ensure an environmentally friendly development	While the IUDS offers the strategic guidelines for becoming a climate neutral metropolitan area, there is still a gap in terms of understanding,

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
		n Area 2021-2030	climate neutrality.	of the Municipality and its metropolitan area so that GHG emissions are reduced by 80% by 2030, through the following investment priorities: INVESTMENT PRIORITY 3.1: Increasing energy performance at the level of collective housing complexes; Investment priority; INVESTMENT PRIORITY 3.2: Increasing energy performance in public buildings and public lighting systems; Investment priority; INVESTMENT PRIORITY 3.3: Investments in the central heating system, renewable energy supply infrastructure and natural gas	awareness and motivation at the community-level. Gathering information on these topics would provide a solid baseline for developing targeted solutions.
Strategy	Local	Sustainable Urban Mobility Plan for Cluj Napoca Metropolita	The SUMP developed for the Cluj Metropolitan Area focuses on reducing carbon emissions, promoting green	The Action Plan of the SUMP includes major interventions on the street grid, public transport, freight transport, alternative mobility, traffic management,	As the transport sector is the second source of CO2 emissions in Cluj-Napoca, the Net Zero City Coalition will be mobilised to accelerate the

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
		n Area 2021-2030	means of transport and increasing quality of life.	areas with a high level of complexity (protected areas, logistic areas, intermodal areas etc) and institutional aspects required to be addressed. The current SUMP aims for 100% of public transport to be green by 2030 (around 50% of the total public transport fleet, including trams and trolleybuses, is currently electric). Moreover, the SUMP includes projects to reduce the emissions of freight transport and eliminating heavy traffic from the city, through regulatory and electro / micromobility hubs for sustainable last mile deliveries (including the use of cargo bikes), as well as major infrastructure projects such as the Metropolitan Belt and electrifying the rail transport on the main export route, towards the border with Hungary.	implementation of the SUMP and translating the development vision formulated for 2035 into practice, particularly achieving a 100% green public transport fleet. The Net Zero City Action Plan also includes interventions which strongly reduce the emissions from freight traffic, through major infrastructure projects planned at the metropolitan scale, and will create momentum for piloting electro / micro-mobility delivery options for last mile deliveries within the city.

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
Strategy	Local	District Heating Strategy Cluj-Napoca 2021-2031	The main objective of Strategy is to identify solutions for increasing the energy efficiency of the district heating system in Cluj-Napoca. The Strategy addresses the need to improve the energy efficiency in the context of a strong trend of disconnecting from the centralized system and aims to maintain its current number of clients and increasing it once the proposed investments are finalised.	The Strategy aims at reducing GHG emissions from the district heating sector with 55% by 2030 and increasing the share of renewable sources to at least 32% (currently the energy is produced using 100% natural gas), as well as reaching a minimum share of 50% for energy from renewable sources and co-generation combined.	The District Heating Strategy will be at the core of the intervention dedicated to creating a district heating system running primarily on green energy. This will include actions such as increasing the renewable energy share from solar power, heat pumps, cogeneration engines, as well as rehabilitation works of the infrastructure and a pilot positive energy neighborhood. The City administration is committed to strengthening the district heating system, within the boundaries of applicable legislation (users have the right to disconnect) and economic realities, which push many residents to choose individual heating solutions, that are more cost-efficient and offer them more autonomy. Considering that users have the right to decide whether to disconnect or remain customers, the focus of the Action Plan is

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
					twofold: a. increasing the efficiency of the system with effects on costs and quality of service has the potential to incentivize users to reconnect; b. reducing energy consumption through behavior change and energy efficiency measures.
Strategy	Local	Air Quality Improvement Plan for the Cluj-Napoca Agglomeration 2020-2024	The Plan identifies the emissions of NO2/NOx and PM10, as the most problematic in the city and includes measures to reduce the levels of pollutants below target values, while giving increased attention to vulnerable population groups.	Good air quality is a direct result of the actions to reduce carbon emissions. The Air Quality Improvement Plan identifies the urban expansion trend as a main contributor to atmospheric pollution (as well as noise pollution), combined leading to an increase in motorised traffic, green space reduction and lower density developments which result in a higher rate of personal car use.	The Net Zero City Coalition will include the local academic sector and ensure knowledge transfer across involved stakeholders to support the implementation of the Air Quality Improvement Plan. The TUCN and BBU will overlook the implementation of the air quality monitoring system and closely cooperate with relevant public and private actors.
Strategy	Local	Digital Transforma	The Strategy was elaborated to enable the	Digitalisation is a key dimension for achieving the net	The process of Digital Transformation of Cluj-Napoca needs to

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
		tion Strategy of Cluj-Napoca (2021)	digitalization efforts across a wide range of stakeholders. Its vision is to integrate technology in the life of the community with the objective to increase quality of life and prosperity in a sustainable manner. The strategy has a strong orientation towards partnership building, bringing together citizens, the public sector, academia, private companies, clusters, NGOs and innovation hubs.	zero targets, specifically in terms of mapping, monitoring, awareness and engagement activities. Cluj-Napoca has already implemented several initiatives which use digitalization to support sustainability (first smart street in Romania, self-driving electric buses etc.). In direct alignment with the objectives of the Digital Transformation Strategy, the Municipality plans to extend the online procedures available to citizens (already over 300), within a broader zero-paper policy.	further support the transition to climate neutrality. Several digital tools are planned to be developed to improve implementation and monitoring of actions, as well as awareness raising and engagement of all stakeholders. Moreover, Transilvania Digital Innovation Hub acts as the main facilitator of the local digital transition.
Regulation	Local	Energy Performance Standards for New Buildings and Fiscal Incentives for Certified Green	Cluj-Napoca has passed regulations which regard the energy performance standards of new buildings (private and public), aimed at both restricting new sources of	Considering that stationary energy is the main source of GHG emissions in Cluj-Napoca, regulations in this sector are strongly encouraged and will provide a sustainable basis for future developments.	To support the renovation of the old building stock (over 50% of the population of Cluj-Napoca and its MA lives in 30-60 years old flats built during the communist period, with a low energy efficiency level), further regulations are

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
		Buildings	carbon emissions from the built environment, as well as incentivizing residents and businesses to obtain the highest energy efficiency rating.	The regulations regard new buildings and fiscal incentives for achieving green certifications, for both commercial and residential buildings.	required, including the development of Terms of Reference for the renovation of private and public buildings in line with the nZEB principles. Moreover, changes in the use of the buildings prompt the inclusion of these modifications in the ToR, to ensure that they best serve their residents / users and are implemented at a high-quality standard.
Program	Local	Energy Efficiency Improvement Program (EEIP) 2017 - Cluj-Napoca Urban Agglomeration	The local public administration authorities in localities with a population greater than 5,000 inhabitants have the obligation to draw up EEIP (energy efficiency improvement program) which includes short-term measures and measures for a term of 3-6 years and to have an energy manager.	The EEIP contains technical assessments and evaluation of the necessary interventions for the public lighting system, buildings (public, residential and private) and the transport sector. The measures proposed include energy efficiency professional trainings, defining performance indicators, while mapping interventions for relevant stakeholders (departments within	The energy efficiency program will be complemented by the proposed regulatory and policy instruments promoted by the Net Zero City Coalition, with the fundamental contribution of the Department of Energy Efficiency and Public Lighting within the Cluj-Napoca Municipality and the Technical University of Cluj-Napoca.

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
				the Municipality, building managers, owner associations, school inspectorate, private actors, county-level authorities etc.)	
Policy	Local	Walkable City and Urban Renewal	A comprehensive policy which includes extended pedestrian and green areas, complemented by dedicated public transport lanes, cycling lanes, stands for electric taxis, charging stations, smart lighting and traffic management.	The Walkable City Policy is highly relevant for reaching climate neutrality by 2030 through the reduction of CO_2 emissions generated by motorised vehicles and can accelerate the transition by ensuring the transfer of best practices to the peri-urban localities in the Metropolitan Area. While the initial interventions have been implemented in the city center, the Municipality has moved its focus towards neighborhoods, with the objective to ensure access by foot to a full range of facilities and services (a 20-minute city). This policy is translated into a series of projects to	The focus on neighborhoods is a key policy shift and needs to be continued as part of the efforts to bring the Green Deal closer to citizens. Actions calibrated to the neighborhood level that also promote participation and can further inspire citizens to contribute to the climate neutral transformation of the city and its metropolitan area are a strong component the 2030 Climate Neutrality Action Plan.

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
				create pedestrian corridors at the neighborhood level.	
Policy	Local	Green City	The Green City Policy implies the creation of 200 ha of green public areas, planting 100.000 new trees and creating blue-green corridors along the water courses in the city and its metropolitan area.	Implementing the Green City Policy is directly linked with the Climate-Neutral and Smart Cities Mission Action Plan, through the creation of carbon sinks, as well as an extended air, soil and water quality monitoring system which can support progress evaluation.	The Green City Policy will be expanded in order to ensure access to a green or blue-green area within a 10 minute walk for 98% of the city's population, through developing blue-green corridors and introducing a program for green roofs and facades.
Policy	Local	Green Transport	Another policy which has been widely promoted at the community level is related to green transport. Currently, over 50% of the total public transport is electric (electric buses, trolleybuses and trams) and the Municipality is continually replacing older fleet with electric options.	A major flagship project emerged as a result of this policy is the new metro line connecting the metropolitan area. The Municipality also implements the Green Fridays project, which offers residents access to free public transport each Friday, as well as innovative solutions for promoting the use of public transport - such as the „Health ticket" (acquiring public transport tickets through physical exercise) .	The Green Transport Policy will be continued as a major contributor to the net zero objective. Further approaches to encourage the use of public transport, active travel and incentivizing the shift to electric cars will be explored within the Net Zero Coalition, including urban planning regulations that encourage the development of private charging stations.
Strategy	Regional	North-West Regional Developme	The Plan formulates the vision and	Strategic Priority no. 3. A region with environmentally	The interventions included in the Net Zero Action Plan are

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
		nt Plan 2021-2027	strategic priorities for the North-West region, identifying the main challenges, including the following: the regional and urban-rural disparities are significant, the energy efficiency of buildings is low (with a particular focus on urban areas), urban areas require measures to extend green infrastructure, develop sustainable urban mobility, while rural areas often lack access to public services and require integrated development.	friendly localities Strategic Priority 4: A region with sustainable multimodal urban mobility Strategic Priority 5: An accessible region	aligned with the priorities of the North-West Regional Development Plan. The 2021-2027 ROP 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 elaborated in accordance with the EU energy policy framework, detailing the main objectives	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	As one of the three urban authorities which have joined the 100 Cities Mission (along with District 2 of Bucharest and Suceava), Cluj-Napoca is aligned with the objectives of the NIPECC in terms of reducing GHG emissions and increasing the

A-2.1: LIST OF RELEVANT POLICIES, STRATEGIES & REGULATIONS					
TYPE	**LEVEL**	**NAME & TITLE**	**DESCRIPTION**	**RELEVANCE**	**NEED FOR ACTION**
			for 2030.	renewable sources compared to 2015), as well as by increasing the number of prosumers. In terms of emission reduction, the national targets assumed for the year 2030 are detailed under the A-2.2 section.	capacity of renewable energy generation, accelerating the process of achieving the national targets.
Policy	National	Romania Urban Policy	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 adaption and mitigation, reducing air pollution and improving sustainable urban mobility.	All interventions planned are aligned with the objectives and priorities of the Urban Policy, particularly focusing on the development of Cluj Metropolitan Area into a green and resilient urban area.

A-2.2: DESCRIPTION & ASSESSMENT OF POLICIES
LOCAL STRATEGIES At the moment, Cluj-Napoca is the only city in Romania to have all its general and sectoral planning documents recently updated (IUDS, SUMP, SECAP, Air Quality Improvement Plan, District Energy Strategy, Digital Transformation Strategy etc.) and the only major one with a General Urban Plan approved in the last 10 years. All these documents have a strong focus on climate change,

environmental protection, GHG emissions, sustainable mobility, energy efficiency.

Sustainable Energy and Climate Action Plan 2022-2030 (SECAP) - Cluj-Napoca

The Sustainable Energy and Climate Action Plan is a public policy document defining the policy of the local public administration in the fields related to energy and the environment, with the general objective of reducing CO2 emissions generated by final energy consumption in the administrative territory. The SECAP is the main strategic document targeting the reduction of GHG emissions, with an ambitious target of 80%. The plan was elaborated according to the methodology of the Covenant of Mayors on Climate and Energy, whose signatories have pledged to reduce emissions by at least 40% by 2030. To this purpose, signatory cities develop Sustainable Energy and Climate Action Plans (SECAP) and commit to report and monitor their implementation.

The Net Zero Action Plan is aligned with the SECAP and builds on the interventions proposed. The Sustainable Energy & Climate Action Plan (SECAP) covers the following sectors:

- Public Lightning;
- Public buildings, tertiary buildings, residential buildings;
- Public transport and private / commercial transport;
- Production of thermal energy at local level;
- Producing energy from renewable sources at the local level;
- Sanitation system and waste management;
- Green public procurement;
- Energy poverty and vulnerable consumers;
- Citizen awareness and mobilization for increasing energy efficiency.

The SECAP is informed by local strategic documents (Local District Heating Strategy 2031, SUMP 2027, 2020-2024 Air Quality Plan Improvement Plan), policies and programs (eg Walkable City, Green City, Green Transport, Cluj-Napoca Urban Agglom. Energy Efficiency Improv. Program), public regulations (e.g. restructuring contracts with private operators for brownfield redevelopment, fiscal incentives), including private measures (e.g. CSR campaigns financed by business actors, encouraging green mobility or waste recycling).

Integrated Urban Development Strategy for Cluj-Napoca Metropolitan Area 2021-2030

The key programmatic document for Cluj-Napoca & its Metropolitan Area (CMA) is the Integrated Urban Development Strategy (IUDS), outlining the investments planned for 2021-30-50. Recognizing the growing interdependencies & opportunities for cooperation between the core city and its surrounding localities, the IUDS was elaborated at the metropolitan level, in line with the recommendations of the New Leipzig Charter (transposed in Romania's first Urban Policy) and the PO5.A Europe closer to citizens.

The IUDS for 2021-2030 includes an extensive list of interventions at the metropolitan level, which account for a CO2 emission reduction of up to 80%. By joining the 100 Cities Mission, Cluj-Napoca will have the necessary momentum and resources to accelerate the achievement of the target assumed in the SECAP and has identified a comprehensive list of interventions included in the current Action Plan.

The Net Zero Action Plan 2030 is connected with primarily 3 of the 6 Specific Objectives identified in the IUDS & their corresponding investment priorities:

SO3. Carbon Neutral, Green & Resilient City and MA.

3.1: Increasing energy performance in collective housing complexes

3.2: Increasing energy performance in public buildings and public lighting system

3.3: Investments in the central heating system, electricity supply infrastructure and natural gas

3.6: Supporting the implementation at local and metropolitan level of the integrated waste management system and the circular economy

3.5: Conservation of natural heritage, and development of green-blue infrastructure

3.7: Reduction of air pollution and noise pollution

SO4. No one left behind.

4.3: Carrying out integrated socio-economic interventions at the level of marginalized communities and developing a diverse range of social and employment services for all people at risk of poverty and exclusion

4.4: Implementing an integrated housing policy at the level of the Municipality and the metropolitan area

As highlighted in the IUDS, over 50% of the population of Cluj-Napoca and its MA lives in 30-60 years old flats built during the communist period, with the technologies and materials available at the time. This situation directly impacts residents in terms of living costs (particularly energy bills, as a result of low energy efficiency of the building) and comfort. Moreover, awareness and empowering residents with knowledge on carbon neutrality and sustainability further support the objective of leaving no one behind and involving citizens across the CMA.

SO2. Made and Invented in Cluj.

Research-development-Innovation (RDI) is a cornerstone dimension for achieving climate neutrality by 2030. Therefore, the existing assets in terms of innovative potential will be valorised as much as possible, considering the city's vision to become a "European Lab City", where the solutions to challenges of the future are being tested. This vision is reflected in SO2 and its investment priorities, particularly:

2.1: Developing the research-development-innovation and technology transfer capacity, both in the public and private sectors, in order to strengthen the metropolitan innovation ecosystem.

The portfolio of priority projects outlined in the IUDS amounts to approx. €800 mill., corresponding to the financial capacity of the Municipality for capital investments between 2021-2030. Flagship projects linked to the net-zero objectives include:

- Thermal renovation - (projects for 100 blocks submitted under NRRP / prepared under ROP)
- Projects nested under the Walkable City Initiative (pedestrian corridors in each neighborhood, putting the 15-Minute City concept into practice)
- Projects nested under the Green Cluj Initiative (a network of carbon sinks with over 200 ha of new public green areas +100000 new trees planted in public areas, green-blue corridors for pedestrians and bicycles)
- New metro line and metropolitan train (fully operational by 2030 - option for green commutes)
- Metropolitan belt (to reduce CO2 emissions from transit, esp. in central area & main neighborhoods)

Sustainable Urban Mobility Plan for Cluj Napoca Metropolitan Area 2021-2030

The SUMP assumes a target of 100% of the public transport to be green by 2030 (from a current level of 50%). The Municipality is continually renewing its fleet (almost the entire fleet has been replaced with new, efficient and attractive vehicles). In terms of impact, the purchase of 41 new electric buses led to a reduction in CO2 emission by over 2,000 tons/year, lowered the level of outdoor air and noise pollution.

The 2035 vision for urban mobility in Cluj-Napoca and the metropolitan area is formulated on four levels: territorial, metropolitan, local and neighborhood level. The Strategy aims to ensure accessibility within 120 minutes to the main urban centers of region or, air transport, to the main European destinations, a maximum 30 minutes to reach Cluj-Napoca from each of the metropolitan localities by, public transport, e-bike, or private car, a 15-minute city, and 1 minute-neighborhoods.

The SUMP also addresses the need to reduce emissions from the freight traffic, including “last mile” sustainable delivery. An important project planned to reduce emissions from freight transport is creating a network of electro / micromobility hubs. Through this project, storage spaces for parcels will be placed within these hubs, in order to reduce the environmental impact of transporting small goods to the end destination. Based on international best practices, the hubs located in the historic center will be able to include facilities to enable the transfer of goods from cars to cargo bikes, aiming to reduce the impact of freight transport on the central area.

Moreover, the SUMP includes a proposal for a regulation on optimising the transport of goods within the city, which includes limiting or discouraging the timeframe for supplying commercial units within the day through increased taxing, encouraging deliveries with electric vehicles, cargo bikes and bikes and supporting the development of the network of small parcel deposits.

By implementing all projects proposed in the SUMP (maximum scenario), the environmental impact in terms of GHG emissions reduction is estimated at **240,488 tonnes CO2 equivalent,** i.e. a reduction of up to 20% relative to the reference scenario (1,184,056 tonnes CO2 equivalent for 2027).

District Heating Strategy Cluj-Napoca for 2021-2031 and a perspective for 2050

According to the Strategy, the objectives are to attain a 55% reduction in greenhouse gas emissions by 2030 and a share of energy from renewable sources of at least 32%. Moreover, the measures proposed are directed to meeting the criteria for an efficient centralized heating system, as defined by EC Directive 27/2012 (using at least 50% energy from renewable sources, using at least 50% energy from renewable heat, using at least 75% thermal energy through cogeneration, using at least 50% of a combination of energy and heat of the previously mentioned types).

Air Quality Improvement Plan for the Cluj-Napoca Agglomeration 2020-2024

The Air Quality Improvement Plan identifies the urban expansion trend as a main contributor to atmospheric pollution as well as noise pollution, leading to an increase in motorised traffic, green space reduction and lower density developments which result in a higher rate of personal car use. The main measures proposed focus on reducing emissions from motorized traffic (through improved public transport, intermodal terminals, major infrastructure projects, restricting access of vehicles over 3,5 tons during peak hours), reducing emissions resulted from heating in the residential sector through energy efficiency measures and increasing the surface of green areas.

Digital Transformation Strategy of Cluj-Napoca (2021)

The Strategy outlines interventions across six objectives: data-based decision-making, developing digital infrastructure, improving public services, protecting citizen data and ensuring cybersecurity, participation and transparency, and the transversal strategic objective of sustainability and resilience.

LOCAL REGULATIONS, POLICIES AND PROGRAMS

Energy Performance Standards for New Buildings and Fiscal Incentives for Certified Green Buildings

The Local Council has approved several regulations and fiscal improvement initiatives related to climate neutrality. Firstly, to receive a construction permit, all new private buildings in Cluj-Napoca with more than six apartments need to either connect to the district heating system or to install a low-carbon heating unit for the entire building (rather than individual units, by apartment). The decision to ban installing individual gas-based boilers in new-built apartment blocks has been implemented starting from 2022. Moreover, all public buildings built recently by the Municipality are in line with the nZEB standard. The Municipality also introduced a 50% reduction in property taxes for buildings (commercial or residential) earning a green certification (by LEED, BREEAM and DGNB) and achieving the top score on the energy efficiency rating.

Considering that Cluj-Napoca and its metropolitan area have undergone the most dynamic growth in new housing units in Romania over the past decades (with a 15% increase in housing surface compared to 2011 levels in Cluj-Napoca only), introducing regulations to support the transition towards green building practices is highly needed.

A major success factor for passing transformative regulations such as the cited ones above is the strong political leadership and support for the climate neutrality mission. However, the key barriers identified in using regulations as a lever for accelerating the transition are mostly identified at the level of fiscal regulations impacting citizens directly (particularly around the use of private cars). Overcoming this will require extensive participatory processes to drive proactive behaviour change. Moreover, limits in power were identified in terms of passing regulations to limit the disconnection from the district heating system (resulting in higher operation costs and lower efficiency). To address this, incentivizing options will be explored in the context of extensive investments in creating a green district heating system (Action 1.1.)

Energy Efficiency Improvement Program for Cluj-Napoca Urban Agglomeration - 2017

The EEIP is established priority projects, the financial means to implement the program and the performance indicators and monitoring the results of the implementation of measures to increase energy efficiency.

Walkable City and Urban Renewal, Green City, Green Transport

The modal shift to walking and cycling and ensuring a good air quality through urban greening are key policies at the level of the Cluj-Napoca Metropolitan Area, with concrete interventions already implemented in this direction. These include extended pedestrianisation, massive tree planting programs and dedicated public transport lanes.

The most recent one is a bolt and pioneer decision to ban installing individual gas-based boilers in new-built apartment blocks starting 2022. Also, Cluj-Napoca implemented in 2021 the ”Green Fridays” initiative. The campaign is called “Stop! Leave your car at home!” and it ensures free access to public transport each Friday. This is a continuation of the “health ticket” with its 20-squats-to-ride system which the city unveiled back in 2020.

REGIONAL PLANS

North-West Regional Development Plan 2021-2027

In the period 2021-2027, interventions aimed at improving the energy performance in multi-family residential buildings are considered. The measures aim at at least a moderate rehabilitation (minimum 40% reduction in primary energy consumption) as well as a decrease in annual energy consumption for heating by at least 50%, minimum conditions imposed on all projects.

The NW Region's strategic goal is to become one of Europe's most dynamic areas in terms of smart, sustainable economic growth. To achieve this goal, the region will use local variety and foster innovation while also reducing inequalities and raising living standards. The strategy activities are defined by sustainable development and resilience, fully in line with the environmental and climate objectives at the European level.

A selection of the strategic priorities for the NW Region and specific objectives relevant for the transition towards climate-neutrality of Cluj-Napoca and the metropolitan area is presented below:

Strategic Priority 3: A region with environmentally friendly localities

- Supporting energy efficiency in buildings (both housing sector & public buildings) and reducing GHG emissions
- Promotion of energy from renewable sources in accordance with the Directive on energy from renewable sources
- Intensification of actions to protect and preserve nature, biodiversity and green infrastructure, including in urban areas, as well as reducing all forms of pollution

Strategic Priority 4: A region with sustainable multimodal urban mobility

- Promoting sustainable multimodal urban mobility, as part of the transition to a zero-carbon economy

Strategic Priority 5: An accessible region

- Development and improvement of national and regional and local sustainable mobility, climate resilient, smart and intermodal, including improving access to TEN-T and cross-border mobility

NATIONAL PLANS AND POLICIES

The National Integrated Plan in the field of Energy and Climate Change (NIPECC) 2021 – 2030

To achieve the objectives regarding the achievement of targets regarding energy from renewable sources (RES), the Plan details policies and measures aimed at reducing energy consumption, but also to encourage the use of RES in the relevant sectors – heating and cooling, electricity and transport, thus maximizing the synergies between the various actions envisaged.

The NIPECC assumes a 43.9% reduction of emissions related to ETS sectors compared to the level of 2005, respectively by 2% of emissions related to non-ETS sectors compared to the same year. A share of energy of 30.7% in the gross final energy consumption will be accounted by renewable

sources. The Plan addresses the following areas: energy efficiency, reduction of GHG emissions, renewable energy sources, internal market, energy security, research, innovation and competitiveness and further informs the **National Energy Strategy** for the same period.

Romania Urban Policy (RUP) 2030

The Urban Policy represents Romania's sustainable, inclusive and resilient urban development vision. The adoption of the first such policy in 2021 has set the common agenda of central and local public authorities to improve the urban development framework, by providing a coherent set of measures and inter-sectoral coordination. Under its second priority objective (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 adaption and mitigation, reducing air pollution and improving sustainable urban mobility.

Assessing the existing local strategies and policies adopted, a major positive advancement lies in the fact that all strategic documents have been recently updated and are aligned in terms of ambition with the Net Zero Action Plan, with solid local policies contributing to the set objectives. Therefore, they do not require an update to support the 2030 climate neutrality ambition, but will act as key instruments to support this transition and provide the opportunity to focus on developing interventions to improve organisational and governance innovation. The two regional and national level policies outlined were selected as the most relevant to the Action Plan and are also fully aligned with the EU strategic directions and policies.

A-2.3: EMISSIONS GAP

	Baseline emissions (percentage)		****Residual emissions / offsetting**		**Baseline emissions reduction target[2]**		***Emissions reductions in existing strategies[3]**		**Emissions gap (to be addressed by action plan)[4]**	
	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)	(absolute)	(%)
Buildings	641,750	55 %	15,158	7%	626,592	66%	0 *	0 %	626,592	66%
Transport	151,962	13 %	44,183	20%	107,779	11%	0 *	0 %	107,779	11%
Waste	58,361	5%	10,868	5%	47,493	5%	0 *	0 %	47,493	5%
Industrial Process and Product	303,478	26 %	145,089	67%	158,389	17%	0 *	0 %	158,389	17%

Use (IPPU)										
Agricultural, Forestry and Land Use (AFOLU)	11,672	1%	2,168	1%	9,504	1%	0 *	0 %	9,504	1%
Total	**1,167,223**	**100 %**	**217,466**	**18.63 %**	**949,757**	**81.37%**	**0 ***	**0 %**	**949,757**	**81,37%**

[1] Residual emissions consist of those emissions which can't be reduced through climate action and are being offset. Residual emission may amount to a maximum of **20** % as stated by the Mission Info Kit.

[2] Baseline reduction target = Baseline emissions – residual emissions.

[3] Emission reductions planned for in existing action planning and strategies should be quantified per sector.

[4] Emissions gap = Baseline emission reduction target – Emissions reduction in existing strategies.

*** Although the above-mentioned strategies account for CO2 reductions, for the purpose of this estimate, those values could not be used to calculate the emissions gap. The reason for this is that the emissions were calculated using a different methodology, and the strategies do not take the year 2021 as a reference (used for calculating Action Plan baseline emissions).**

**** For the residual emissions / offsetting section, the values inputted in this section are those emissions that are not accounted for through the interventions proposed in the Action Plan. The reasoning behind this decision was that the Municipality cannot assume direct responsibility for interventions beyond those included. As explained in section B2-3, these emissions are expected to be tackled by the private sector and by other measures proposed in other local strategies. The interventions proposed in the Action Plan and subsequent target of 81,37% already include offsetting measures (carbon sinks).**

3.3 Module A-3 Systemic Barriers and Opportunities to 2030 Climate Neutrality

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
INFRASTRUCTURES	Cluj County Council	Public administration	The Cluj County Council plays a vital role in transferring the knowledge acquired by the local administrative staff to the county public staff, but it is, in fact, essential in every aspect and process related to the replication of Municipality's interventions at the level of the entire county. At the moment, the County Council is in charge of the urban planning of the metropolitan area, but also of implementing and monitoring the waste collection and recycling, water and waste water infrastructure for the whole area, including Cluj-Napoca. Thus, The Cluj County Council will be a strategic dialogue partner and will be invited to take active part in the proposed actions.	The main interest of Cluj City Council consists in replicating as many climate-neutrality interventions as possible throughout the county, in order to be able to scale the impact generated by the implementation of the Action Plan in all the municipalities within the county. The most relevant sectors for Cluj City Council are public staff know-how, urban planning, waste and water.

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
INFRASTRUCTURES	Cluj Metropolitan IDA	Metropolitan administration and governance	Cluj Metropolitan IDA is an essential lever for ensuring dissemination, outreach, awareness raising and effective communication about climate neutrality at metropolitan level, both for the public administrations and private companies, but also for the metropolitan population.	Cluj Metropolitan IDA's main interest consists of expanding the beneficial effects of the climate-neutrality interventions in the metropolitan area and replicating as many types of interventions as possible. All areas are of interest to Cluj Metropolitan IDA because the organization aims to achieve climate-neutrality in the metropolitan area, but special attention is paid to increasing the competences of metropolitan public actors (especially within Municipalitys) and citizens.
INFRASTRUCTURES	Romanian Green Building Council	Certification bodies	The Romanian Green Building Council is the most representative and powerful national organization that promotes environmental responsibility and energy efficiency within the life cycle of a building (design phase, construction, operation and deconstruction).	The organization's focus falls on the built sector, especially energy efficient buildings and progress towards carbon neutrality in cities, its interest being to increase the number of buildings certified as energy efficient.

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			Thus, they have a predominant influence on the climate-neutrality potential of buildings, being also responsible for the "Green Building Professional" Certification and Training Program.	Green schools are also of interest to the association, along with green homes.
INFRASTRUCTURES	Termoficare Napoca S.A. (Cluj-Napoca's Public Heating Company)	Public goods (utilities, services) / infrastructure	Being Cluj-Napoca's Public District Heating Company, Termoficare Napoca S.A. is the key pillar in the implementation of the District Heating Local Strategy, thus having a major impact heating both the private and the public buildings.	Termoficare Napoca S.A.'s primary interest consists of reaching the District Heating Local Strategy's objectives, namely the simultaneous achievement of the following targets: reduction of greenhouse gas emissions caused by district heating by 2030, increase in the share of energy from renewable sources, fulfilment by 2030 of the criteria that define an "efficient central heating system", according to the Directive CE 27/2012.
INFRASTRUCTURES	CTP Cluj-Napoca S.A. (Cluj-Napoca's Public	Public goods (utilities, services) /	Being Cluj-Napoca's Public Transport Company, it plays a central role in city's	The main interest of CTP Cluj-Napoca S.A. is to actively contribute to the fulfillment of

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
	Transport Company)	infrastructure	climate-neutral mobility, because it actively pursues the provision of qualitative, safe, comfortable and environmentally-friendly public transport services for citizens and visitors.	SUMP objectives related to sustainable, resilient and inclusive public transport. Thus, the efforts of CTP Cluj-Napoca S.A. focus in particular on having a 100% green public transport fleet (electric buses and trolleybuses).
INFRASTRUCTURES	Compania de Apa Somes S.A. . (Cluj-Napoca's Water Provider)	Public goods (utilities, services) / infrastructure	Given the specifics of the company, as a public utility provider for a key resource (water), it exerts a strong influence on investment projects related to the city's water supply, but also on aspects related to environmental protection and reduction of the public services' impact on nature and the climate. It is important to highlight the fact that the Someș Water Company is one of the largest operators of water and sewage networks in the country, serving almost one million inhabitants across eight municipalities and cities, and 305 rural localities in the	The company's main interest is to ensure efficient and sustainable water management, especially in the context of water scarcity / poverty (given the massive impact of climate changes on water resources and provision). The company focuses on ensuring a qualitative water supply process for the entire city, so that it actively contributes to citizen's quality of life and health but also to environmental protection.

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			counties of Cluj, Sălaj, and Mureș. Its infrastructure encompasses over 4,000 km of water intakes and networks and more than 2,000 km of collectors and sewage networks. The company embarked on its first climate neutrality initiative by constructing a micro-hydropower plant downstream of the Tarnița lake dam, capable of generating up to 10,000 MWh of renewable energy per annum, in anticipation of the ISPA program co-funded by the EU, executed between 2003 and 2010. Presently, under the OPBI program, the Someș Water Company is in the process of constructing another micro-hydropower plant at the Gilău Water Treatment Plant. For several years, the company has been generating green energy, both electrical and thermal, from the biogas derived from the sewage sludge in the large sewage	In a recent statement, the Someș Water Company has publicly declared its objective to become an energy-neutral company by 2035.

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			treatment plants in Cluj and Sălaj counties. The company has also extensively employed solar panels in remote rural locations and has recently applied for funding to construct photovoltaic parks at several of its operational sites.	
INFRASTRUCTURES	Supercom S.A. (Cluj-Napoca's Waste Operator)	Public goods (utilities, services) / infrastructure	Being responsible for efficient, sustainable and secure waste management, Supercom S.A. has a massive influence in the implementation of sustainable practices of selective collection and recycling of waste, being an essential actor in municipal circular economy practices.	The company's main interest consists of increasing the percentage of selective collection of municipal waste and its recycling/upcycling, so as to reduce polluting emissions caused by the quantities of waste generated in the city and their storage/processing.
CAPACITIES	Technical University of Cluj-Napoca (Faculties of Architecture, Transport, Energy)	RDI ecosystem	The Technical University of Cluj-Napoca, an advanced research and education university, is one of the higher education institutions with tradition, recognized (inter)nationally for its performance.	Through the perspective of the Faculties of Architecture, Transport, and Energy, TUCN pursues the transfer of technology and knowledge in climate neutrality matters towards the local businesses

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			TUCN has extensive research structures (collectives, groups, laboratories, centers and research platforms). Its performance anchored in the perspective of the socio-economic environment, its visibility and international cooperation, and scientific novelty and interdisciplinarity characterize the local research environment. The open research directions are oriented towards world priorities: information technology and communications, renewable energies and ecology, superconductivity, spintronics, nanomaterials, management, robotics, mechatronics, electrical engineering, autonomous vehicles, the home of the future, urbanism and society.	(capitalization of RDI results) and the implementation of RDI projects focused on climate-neutrality in the 3 areas that the previously listed faculties are specialized in.
CAPACITIES	”Babeș-Bolyai University	RDI ecosystem	Babeș-Bolyai University (Universitatea Babeș-	The areas of interest reside in the profile of the 3

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
	(Faculties of Geography – the Research Center of Sustainable Development, Environment, Sociology)		Bolyai / BBU) of Cluj-Napoca, Transylvania, Romania has the oldest academic / university tradition in Romania, and is the largest university in the country being ranked on the first position in country between 2016-2019, in the University Metaranking, initiated by the Romanian Ministry of Education and Research in 2016. BBU has 61 Research units accredited within the university , together with many other that are accredited at the level of the 21 BBU Faculties.	Faculties: Geography, Environment, Sociology. Numerous experts from the Faculties of Geography and Environment are specialized in climate-change and climate-neutrality research, while professionals from the Faculty of Sociology focus on anthropological analyses and behavioral changes. With regard to climate neutrality, it is noteworthy that BBU wants to be actively involved in the local ecosystem through a closer collaboration with private companies and through direct support for citizens. Advanced RDI projects are BBU's central intervention tool.
CAPACITIES	University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca	RDI ecosystem	UASVM Cluj-Napoca covers a wide spectrum of specializations in fields specific to agriculture, horticulture, animal husbandry,	The main interest of the university consists in RDI projects and technology and knowledge transfer in the environmental

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			biotechnologies, veterinary medicine, biology, environmental engineering, cadastre, forestry , food product engineering. It has 13 research centers, including in the fields of: Entrepreneurship and Technology Transfer and Data analysis and mining, mathematical modelling and GIS. UASVM also has 2 research and technological transfer centers and numerous projects with non-reimbursable, private and public funding.	engineering and cadastre sectors, with an emphasis on climate neutrality. Also, the university wants to contribute in reducing polluting emissions generated in agriculture, animal husbandry and public food.
CAPACITIES	University of Medicine and Pharmacy Cluj-Napoca	RDI ecosystem	The Iuliu Haţieganu University of Medicine and Pharmacy in Cluj-Napoca fits into the international context of competitiveness, meeting the requirements of the European Research and Knowledge Area. It represents a center of excellence in	The university is particularly interested in digital technologies that can improve the life quality of citizens residing in urban environments, that are extremely polluting and increasingly stressful for the inhabitants' physical and

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			education, training, research, medical and pharmaceutical assistance, a national leader in modern educational developments and an active and dynamic factor in the socio-cultural life of Cluj, being a reference brand of the city.	mental health.
PROCESSES	Citizens	Civil society	The citizens of Cluj-Napoca and the metropolitan area are not only the final beneficiaries of this Action plan, but also play the double role of stakeholders. They will be the ones who will set the tone of the Plan's implementation, being actively involved in the social innovation, civic imagination & co-design processes that are needed for the Municipality's transition towards climate-neutrality.	Their main interests consist of energy poverty and water scarcity, safe, comfortable and healthy living conditions, liveable and pleasant urban environment, climate changes' impact. They also need to adopt climate-neutral behaviors, in order to make a positive contribution to solving the climate problems that directly affect them, by achieving cheaper, healthier and above all more sustainable lifestyles.
PROCESSES	Associations of home owners: The Federation of	Civil society	The associations of home owners are the bodies responsible for the management of residential apartment	Their main interest is to ensure safe, comfortable and decent living conditions, with low

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
	Home Owners' Associations Cluj-Napoca		blocks. They represent the main link between the public administration and citizens, being a key element in the climate-neutrality process, because they have the capability to influence the residents and the potential to accelerate the interventions that will be applied to the residential apartment blocks. They will be constantly consulted, through direct contacts, for the proposed interventions.	climate impact (but also as resilient as possible to climate change) for citizens who live in residential apartment blocks.
PROCESSES	National Research and Development Institute for Isotopic and Molecular Technologies INCDTIM Cluj-Napoca	RDI ecosystem	INCDTIM is a national institute that offers a wide range of RDI services and products. Through its human capital and scientific infrastructure, INCDTIM occupies an important position among the most significant research institutes in Romania, also owning the Center for Research and Advanced Technologies for	In the context of this Action Plan, INCDTIM's objective is to create a bridge between INCDTIM's research and the local community of entrepreneurs, investors and industry organizations, such as to facilitate the entire local ecosystem's transition towards climate neutrality.

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			Alternative Energies.	The main areas of interest include the agro-food industry, health and pharma, environment and clean technologies and advanced materials.
PROCESSES	"Ernest Lupan" Institute for Circular Economy and Environmental Research	RDI ecosystem	IRCEM is an independent non-governmental organization, formed as a research think tank. It accelerates the transition to circularity in a bottom-up approach with actions focused on developing practical and scalable solutions, national campaigns, communicating messages related to circularity and sustainable development.	IRCEM's position in this project consists in accelerating the implementation of circular economy practices in Cluj-Napoca, of particular interest being the interventions in the sectors: education and training, entrepreneurship, and RDI for sustainable development and environmental protection.
PROCESSES	Servelect S.R.L.	Private sector	With over 16 years of experience, Servelect offers integrated services and solutions to optimize energy consumption and reduce operational costs, for: industry, buildings, public authorities, energy infrastructure operators or utilities.	Servelect's interest is to provide energy efficiency services and solutions to support industry and commercial buildings in Cluj-Napoca and, indirectly, the families of those working in them.

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			Servselect's influence emerges from its major involvement in SECAP 2030, and also through the 800 implemented projects and the 900,000 MWh / year identified as potential for energy savings.	For the interventions included in the Action Plan, Servelect can involve in tasks that involve complex energy audits, energy management, feasibility studies and technical design.
ALLIANCES	Urbannect, Cluj Youth Federation, Cluj Cultural Center - CCC	Local NGOs that are active in the field of citizens engagement, active citizenship, community initiatives	These include local NGOs that are actively involved in the local community's development. In addition to their constant consultation, they will also take part in all the proposed interventions / initiatives, because they can pass on, in a coherent manner, the common voice of the citizens.	The main interest of these NGOs is to represent the voice of the citizens, to engage and involve them as strongly as possible in the ongoing interventions and also to align the local community to unitary climate-neutral practices, behaviors and mentality.
ALLIANCES	AgroTransilvania Cluster	Local innovation ecosystem & Private sector	AgroTransilvania Cluster aims to become the main Romanian technological transfer center for research, development and innovation in the agro-industrial field. It represents an	AgroTransilvania Cluster's main goal is to reduce the impact that the agri-food industry has on the climate and the environment, especially the reduction of pollutant emissions generated by the agri-sector and the

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			active and viable RDI partner in the agro-industrial field for local economic actors and a model of good international collaboration practices, fact reflected in particular through the ZeroWaste project, an international project aiming to reduce food waste and thus to contribute to the reduction of CO2 emissions	promotion and expansion of circular economy practices (zero waste) on the agro-industrial and agri-food value chains.
ALLIANCES	Romanian New Materials Cluster	Local innovation ecosystem & Private sector	RNMC is a cluster focused on increasing the competitiveness of the Romanian business environment in the sector of new technologies and advanced materials.	The cluster's interest is that of aspiring its member entities to develop materials and technologies with minimum negative impact, respectively with maximum positive impact on the climate and the environment.
ALLIANCES	Transilvania IT Cluster – DIH	Local innovation ecosystem & Private sector	Transilvania IT Cluster is the main coordinator of Transilvania Digital HUB, the main organization responsible for Cluj-Napoca's digital transformation. TDIH is specialized in the digital transition and offers customized digitization solutions	The central interest of the cluster, through TDIH, is to create a Climate-Neutrality Digital Twin, which can collect, visualize, monitor and forecast social and natural behaviors and environments. In the first phase, the aim is to create

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			such as training, prototyping & testing, creation of new value chains, support for investments and innovation ecosystem & networking.	the Climate-Neutrality Digital Twin Proof Of Concept and then to achieve the most complex technology readiness level.
ALLIANCES	Transylvania Energy Cluster	Local innovation ecosystem & Private sector	TREC is a cluster that engages most companies specialized in energy from the North-West region. In addition to representing all local and regional actors specialized in green energy, the cluster implements non-reimbursable RDI projects (photovoltaic and wind park that will test the energy efficiency of photovoltaic panels and modern wind energy installations, research hub for hydrogen-based mobility, REFLOW, etc) with both national and international partners. Its main influence comes from the critical mass of companies in the field and the strong relationships it has	TREC's main interest consists of planning and carrying out services and activities aimed at promoting and developing mechanisms to support member entities in the energy field, to increase their competitiveness at local, regional, national and international levels. The main field of action revolves around green and sustainable energy, with special focus on innovative technologies, processes and methodologies, based on technological and know-how transfer in order to increase the adoption of emerging clean energy solutions.

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			developed between RDI representatives, the public administration (the Municipality is a cluster member) and the private sector in clean, innovative energy.	
FUNDS	Cluj IT Cluster	Local innovation ecosystem & Private sector	Cluj IT is a cluster based organization formed of active organizations in the information technology field: providers of software services and solutions, universities and research institutes, public bodies and other catalyst organizations.	The central interest of the cluster is to help the city accelarate climate-neutrality by including innovation in all the processes.
FUNDS	North-West Regional Development Agency	The national network of Regional Developmen t Agencies	The North-West Regional Development Agency was established as an NGO of public utility, acting in areas specific to regional development. North-West RDA is the executive body of the Council for Regional Development of the North-West Development Region and is the Managing Authority in charge of Regional Operational Program for the North-West (NW - ROP) development	ROP is currently the main source of financing local investments that target climate-neutrality (sustainable urban mobility, thermal rehabilitation of public and residential buildings, urban regeneration, green areas extension, etc.). Thus, the main interest of the North-West Regional Development Agency is to ensure

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			region of Romania. One of the priority axes of the 2021-2027 NW-ROP is to promote a region with environmentally friendly localities. Through the lens of the financing program that it manages, the entity is essential for the funding needed for implemented all the proposed actions. Its representatives will be invited to the discussions and events, in order for them to understand the interventions' relevance and the need to transform the city into a local catalyst of climate neutrality, process which must also be adopted by the North-West region, of which Cluj-Napoca is a part.	the total allocation of the available ROP funds, in the present case especially of those funds that financially support the transition of region's actors towards climate-neutrality.
FUNDS	Transylvania Commercial Bank (ro : Banca Transilvania)	Banking institutions	Transylvania Commercial Bank, headquartered in Cluj-Napoca, is the main, most reliable and renowned private banking institution in the country and an active promoter of sustainable development.	Transylvania Commercial Bank's interest is to finance as many climate-neutral investments as possible and to become the main private funding partner of the Municipality for such projects.

A-3.1: SYSTEMS & STAKEHOLDER MAPPING				
SYSTEM DESCRIPTION	**STAKEHOLDERS INVOLVED**	**NETWORK**	**INFLUENCE**	**INTEREST**
			The bank has recently provided an important investment loan to the Municipality of Cluj-Napoca, following a public procurement procedure. Given its character, Transylvania Commercial Bank is essential as a funding partner, because it can financially support local initiatives (be it promoted by citizens or companies) oriented towards the climate neutrality, for instance through various credits. Transylvania Commercial Bank will be invited to become a discussion partner and take part in various events, so that, through these actions, the Municipality establishes a stable financial contact, much needed in its ambition.	

A-3.2: DESCRIPTION OF SYSTEMIC BARRIERS – TEXTUAL ELEMENTS
Regarding the local specificities of climate policy development and implementation, Cluj-Napoca has just finished the elaboration of its Sustainable Energy & Climate Action Plan (SECAP) by 2030, officially aiming to: “Become a Net-Zero City by 2030 through reducing GHG emissions by at least 80%, and become a living lab for testing, maturing, implementing, and scaling-up solutions for the fight against climate change.” The Plan meets IUDS 2021-2027’s strategic vision (transition

from EGO-SYSTEM to ECO-SYSTEM in all areas related to Cluj Metropolitan Area's development) and builds on:

- Local strategic documents (Local Heating Strategy 2031, SUMP 2027, 2020-2024 Air Quality Plan Improvement Plan)
- Projects (pursued both by the Municipality and the local ecosystem), programs (e.g. Walkable City, Cluj-Napoca Urban Agglomeration's Energy Efficiency Improvement Program)
- Public measures (e.g., Restructuring contracts with private operators for brownfield redevelopment, fiscal incentives for residents that make their homes energy efficient)
- Private measures (e.g., CSR campaigns financed by business actors, encouraging, among others, green mobility/waste recycling).

The Integrated Urban Development Strategy (IUDS) is the key programmatic document for Cluj-Napoca & its Metropolitan Area (CMA) and outlines the investments planned for the 2021-2030-2050 period. Recognizing the growing interdependencies and opportunities for cooperation between the core city and its surrounding localities, the IUDS was elaborated at the metropolitan level, in line with the recommendations of the New Leipzig Charter (transposed in Romania's first Urban Policy) and the PO5. A Europe closer to citizens.

In this context, the city has taken significant steps towards climate-neutrality, which is already an assumed goal in the IUDS 2021-2030-2050 (approved by the City Council in January 2022), which includes a comprehensive package of priority projects to achieve this goal.

- **ENERGY PERFORMANCE STANDARDS FOR NEW BUILDINGS AND CONSOLIDATED NZEB SKILLS.** With respect to public buildings, significant steps have already been taken in improving energy performance (e.g., thermal rehabilitations, solar panels installed on 15 units) but efforts will be expanded to ensure that most public buildings will achieve nZEB standards by 2030. To receive a construction permit, all new private buildings in Cluj-Napoca with more than 6 apartments need to either connect to the district heating system or to install a low-carbon heating unit for the entire building (rather than individual units).
- **RENOVATION OF EXISTING BUILDINGS.** 78% of GHG emissions in Cluj-Napoca are generated by the built environment, with the residential sector accounting for over half of these emissions. In this regard, Cluj-Napoca has already taken important steps, with over 55% of the estimated 101.000 apartments thermally refurbished, mostly by household associations, from private funds. Also, the City of Cluj-Napoca co-finances thermal rehabilitation works undertaken with EU Funds (ROP and RRF). However, the plan is to move beyond thermal rehabilitation interventions and focus on integrated urban regeneration interventions that also include energy generation (e.g. solar roof panels, green facades and roofs), encouragement of sustainable transport use (e.g. dedicated public transport lanes, extended network of bike paths, larger and better quality pedestrian spaces, natural shade for pedestrians and cyclists), discouragement of private car use, and improving the quality of life in neighborhoods to reduce flight to suburbs and peri-urban areas. The IUDS 2021-2030-2050 includes urban regeneration proposals for apartment block neighborhoods in Cluj-Napoca, as well as the MA.
- **INTEGRATING RES GENERATION FACILITIES INTO BUILDINGS.** The Municipality has already installed solar panels on approx. 15 public buildings, including schools, sports facilities,

and food markets.

- **CLEAN BUSES AND NEW AND EFFICIENT TRAMS.** Transport is the sector with the highest increase in GHG emissions in recent years in Cluj-Napoca, mainly commuter traffic - a target of 80% of commutes by public & non-motorized transport by 2030 was set in the IUDS & SUMP. Several major investments are planned / in progress (metro system, metropolitan train, Someș Blue-Green Corridor, Southern belt, Metropolitan green belt). Moreover, to encourage a rapid uptake of electric cars in Cluj-Napoca, the existing network of electric charging stations has been continuously expanded, together with dedicated parking. Around 20% of the bus fleet in the Cluj MA is electric (around 50% of the total public transport fleet, including trams and trolleybuses, is currently electric), including charging stations, and the current SUMP proposes 100% of public transport to be green by 2030. In addition, almost the entire fleet has been replaced with new, efficient and attractive vehicles. The purchase of 41 buses led to a reduction in CO2 emission by over 2,000 tons/year , lowered the level of outdoor air and noise pollution and generated cost savings of more than €60,000/year.
- **MODAL SHIFT TO WALKING & CYCLING.** The on-going Walkable City Program has transformed many areas of the city into pedestrian-only / shared spaces. This program will be expanded, with a stronger focus on residential neighborhoods, to make it more attractive for people to walk, bike, or use public transport. Energy use in private buildings can be significantly reduced if people are encouraged to spend more time outdoors and less time indoors. A particular focus will be on transforming Cluj-Napoca into a city for kids, as a city that is safe and exciting for kids to explore, is also a city that will be friendlier to people with disabilities, seniors, tourists, immigrants, and parents. Thus, Cluj-Napoca's "Walkable City" Program is the most comprehensive initiative of this kind in Romania (including dedicated public transport, bike lanes, planting of new trees, charging stations, green taxi stands, smart lighting and traffic management). The Program resulted, so far, in new low emission zones within the city center (car access only for residents, employees, and suppliers), dedicated lanes for public transport and bicycles, electric charging stations, stands for electric taxis, extended pedestrian and planted areas.

The actions foreseen within this Action Plan are connected with primarily 3 of the 6 Specific Objectives identified in the IUDS & their corresponding investment priorities:

SO3. Carbon Neutral, Green & Resilient City and Metropolitan Area. The actions are directly aligned with the following investment priorities under this objective:

3.1: Increasing energy performance in collective housing complexes

3.2: Increasing energy performance in public buildings and public lighting system

3.3: Investments in the central heating system, electricity supply infrastructure and natural gas

3.6: Supporting the implementation at local and metropolitan level of the integrated waste management system and the circular economy

3.5: Conservation of natural heritage, and development of green-blue infrastructure

3.7: Reduction of air pollution and noise pollution

SO4. No one left behind. The actions complement & can further inform the implementation of the following investment priorities:

4.3: Carrying out integrated socio-economic interventions at the level of marginalized communities and developing a diverse range of social and employment services for all people at risk of poverty and exclusion

4.4: Implementing an integrated housing policy at the level of the Municipality and the metropolitan area

The transition to climate-neutrality directly impacts each of us, both in terms of its urgency & the actions required to achieve it. The proposed actions address the need to ensure an inclusive carbon transition and have a citizen / "user-first" focus – starting with a behavior analysis on individual adaptation and focusing on high-density neighbourhoods, which are increasingly exposed to energy poverty. As highlighted in the IUDS, over 50% of the population of Cluj-Napoca and its MA lives in 30-60 years old flats built during the communist period, with the technologies and materials available at the time. This situation directly impacts residents in terms of living costs (particularly energy bills, as a result of low energy efficiency of the building) and comfort. Moreover, awareness and empowering residents with knowledge on carbon neutrality and sustainability further support the objective of leaving no one behind and involving citizens across the CMA.

SO2. Made and Invented in Cluj. The city's vision to become a "European Lab City", where the solutions to challenges of the future are being tested is reflected in SO2 and its investment priorities, particularly:

2.1: Developing the research-development-innovation and technology transfer capacity, both in the public and private sectors, in order to strengthen the metropolitan innovation ecosystem.

Involving a broad spectrum of partners in the local Net Zero Coalition, bringing together the public sector, academia and RDI, energy and IT clusters, a digital innovation hub (DIH) & professional organizations of architects and urban planners, etc, the Action Plan is consistent with the investment priority to develop RDI and technology transfer capacity, which lies at the core of the city's development vision for 2030.

Thus, the portfolio of priority projects outlined in the IUDS amount to approx. €800 mill., corresponding to the financial capacity of the Municipality for capital investments between 2021-2030. Among these, flagship projects linked to the net-zero objectives and actions envisaged in this Plan can be summarized as follows:

- **Thermal renovation** (projects for 100 residential apartment blocks submitted under NRRP / prepared under ROP)
- **Projects nested under the Walkable City Initiative** (pedestrian corridors in each neighborhood, putting the 15-Minute City concept into practice)
- **Projects nested under the Green Cluj Initiative** (a network of carbon sinks with over 200 ha of new public green areas +100.000 new trees planted in public areas, green-blue corridors for pedestrians and bicycles)
- **New metro line and metropolitan train** (fully operational by 2030 - option for green commutes)

- **Metropolitan belt** (to reduce CO2 emissions from transit, especially in central area and main neighborhoods).

Strategies, policies and plans which are relevant for achieving climate-neutrality (particularly the IUDS, PACED and SUMP - summarized under Module A-2) have a series of strengths. Firstly, they provide an up-to-date analysis of needs and challenges regarding reducing carbon emissions, as they all have been recently updated. Secondly, they are well-aligned in terms of objectives and priorities, and act as practical instruments for guiding the transition, by identifying a clear list of priority projects, possible financing sources and timelines.

All key strategic documents have benefit from effective stakeholder engagement, including citizens, experts, private sector and academia. For example, the IUDS (approved in January 2022) has benefitted from intensive participatory processes even in the pandemic context, through online live consultations which have allowed for a wide outreach and engagement of the community and have been led by the Mayor of Cluj-Napoca. In addition, several sociological research initiatives have informed the planning. The participatory process piloted through the Center for Civic Innovation and Imagination has become a landmark for the city's approach to strategic planning and decision-making, which will be scaled up for the implementation of the Net Zero City Action Plan. Moreover, all strategic documents are geared towards ensuring sustainable development at the metropolitan scale, recognizing the strong interdependencies which also impact achieving the city's ambitious climate goals and potential positive spill-overs. The strategies have a common outlook (2030, with an outlook to 2050 - in the case of the IUDS) and clear impact indicators defined.

The updated IUDS builds strongly on the previous strategic document, assessing its implementation progress and maintaining the key directions around which the strategic vision of becoming a "European Lab City" is formulated: Innovation, University and Participation. The vision for 2050 is strongly focused on quality of life, enhanced by the development and testing of new technologies, processes and policies to meet the challenges of the future.

The barriers to implementation of the strategic documents are mainly derived from securing funding for the major infrastructure projects planned (referenced below under "Funds"), accelerating the energy efficiency renovation of the buildings stock (a solution in this regard is identifying a more performing homeowners' association model to leverage private funding) and resistance to behaviour changes required for the transition to a climate-neutral city (particularly to policies affecting diesel car owners). While there is a strong political will and decision-makers are committed this goal, capacity constraints may affect implementation of planned projects.

Although, at the moment, there are certain barriers that the Municipality faces on its way to achieving climate-neutrality strategic ambition, to which certain types of risks that can hinder this transition are added, nevertheless, at the same time, the Municipality has already created a solid foundation (as described above), on which it can build all the transition actions towards carbon neutrality, together with the local Net Zero Coalition.

In this context, we must mention that certain sectors and activities are outside of the Municipality's regulatory control. We are talking about certain areas where Cluj-Napoca Municipality needs to work with other governmental layers, namely the county-level and national-level governments, given on the one hand their significance and, on the other hand, their belonging to other governmental layers. More precisely, at the moment, Cluj County is implementing the 2020-2025 County Waste Management Plan, which covers municipal waste, special waste streams and waste resulting from the activities of health units and veterinary activities. This planning tool is used for ensuring efficient waste management at county (and implicitly local) level, with low impact on the environment and human health and with minimal consumption of resources and energy. Thus, in the Solid Waste Management sector, waste collection including (selective collection) falls under the responsibility of the local administration, while the disposal of waste (in the case of Cluj-Napoca we refer to the ecological landfill) is managed by the Cluj County Council. The water and wastewater sector are managed by the Someș Regional Water Company, where Cluj County Council is the majority shareholder. Moreover, several of Cluj-Napoca's major transport projects (that will have a big impact on reducing GHG emissions), such as the Southern Beltway, the Connection to the Transylvania Highway (A3 Highway) and the Metro will be financed by the National Government.

In terms of barriers, critical gaps and challenges that might hinder the transition to climate-neutrality, some major obstacles at local and even metropolitan level can be observed. The fast-growing car ownership rate, fueled by the import of cheap and polluting second-hand cars from other EU Member States, a relaxed policy of residential parking or the deep-routed culture of possessing and using the personal even for short distances, is currently the biggest vulnerability of the city. Another one is related to the energy efficiency of residential buildings, correlated with the increasing price for natural gas. Only 55% of the multi-apartment building units have been thermally rehabilitated, while most of them are using autonomous (apartment) heating systems based exclusively on natural gas. The price for this fuel has reached a historical level in 2022, exposing many households to potential energy poverty.

However, it is important to note that the city can benefit from the fact it is the second educational center in Romania, with over 120,000 pupils and students (one third of the total population) and hosts the biggest and the most prestigious university in Romania (BBU), together with other major public universities active in most areas of expertise, from agriculture and IT&C to health and energy. Additionally, it is estimated that almost 50% of the residents have graduated from university, most of them working in IT&C (15%), BPO, education, health services etc. The city is also the most entrepreneurial in Romania, with almost 70 active firms per 1,000 inhabitants.

MAIN GAPS, BARRIERS AND ASSISTANCE NEEDS

- **INFRASTRUCTURE:** While the energy consumption of municipal and tertiary buildings dropped in recent years, after massive private investment and EU funding for improving energy efficiency, the share of residential buildings in the total GHG emissions continued to grow from 49% to 53%. The GHG emission in the residential sector dropped by less than 15% in the last decade, despite the large share of blocks that went through private rehabilitation (50-55%). Here, it is worth mentioning the gap between the number of apartments blocks that have been thermally retrofitted and the reductions achieved in energy consumption: this difference is justified by the fact that Cluj-Napoca is the most dynamic real

estate market in Romania. The city, together with its metropolitan area, experienced, at the national level, the fastest growth in the delivery of new housing units - this situation applies both within the core city and the peri-urban areas. Within Cluj-Napoca, the housing surface grew from 7 mil. sqm to 8.1 mil. sqm (reaching a tremendous 15 % increase) from 2011 to 2021. In Floresti, the main suburb of Cluj-Napoca, the housing surface grew from 0.8 mil. sqm to 1.5 mil sqm between 2011 and 2021, registering an 83% increase. Moreover, despite the availability of EU/State Budget funding for thermal rehabilitation, many owners refuse / do not have the money to cover the co-financing for such interventions. Almost 80% have unplugged from the centralised heating system and installed individual heating systems using natural gas, one of the main sources of CO2 emissions at local level. Also, at the moment, there is room for improvement in the transport and waste sectors, due to current barriers such as insufficient charging facilities for electric vehicles, under-sized cycling infrastructure (both in terms of velo lanes kilometres and support facilities) and insufficient ecological islands for the selective collection of waste.

- **CAPACITIES:** One of the main challenges concerns the reduced capacity for action among individuals (both as persons and also as entities), due to the lack of a unified understanding and a common vision on climate-neutrality. For instance, various individual behaviours damage the local climate-neutrality pathway (e.g., a deep-rooted behaviour of possessing cars - even +1 / household, using personal cars for short distances). We aim to improve the Municipality's overall ability to channel local efforts towards climate-neutrality, in order to catalyse this transformation in a bottom-up and place-based manner, centred on the individual (person / legal entity). Moreover, although the climate-neutrality concept is known (at least heard of) by most residents and local organisations and there are many local climate-friendly initiatives, the concept is not deeply understood and even less assumed at a personal or collective level. At the moment, the Municipality does not have data on the average level of knowledge / competence of citizens & local ecosystem, in order to identify the know-how entry point to use in stimulating pro-climate-neutrality behaviours.
- **PROCESSES:** Although the Municipality has up-to-date urban planning documents, many of them do not place climate-neutrality as a central pillar of urban development (thus not including predominantly carbon-neutral interventions), which imposes the need for shifting the way urban planning is approached at local level. Other regulatory barriers include bureaucracy associated with expropriation measures for public infrastructure, poor regulation/standardisation at central level (e.g. unclear micro-mobility legislation), inefficient legislation on public procurement. The continuous and poorly regulated urban sprawl especially in the suburban LAUs also jeopardises this ambition. As in the case of planning instruments, local policies have not yet succeeded to become main instruments for encouraging climate-neutrality. Moreover, the policy tools are not sufficiently based on the scientific evidence developed within the academic/RDI institutions or regional clusters. Lastly, the community is weak at neighbourhood level (a collective mentality is lacking, joint efforts are not stimulated and promoted, therefore not assumed and understood), which hinders local common approaches.
- **RESOURCE FLOWS:** Urban renewal initiatives (e.g., Green Cluj / Walkable City) are most successful at local level, but still face implementation limitations: funding (high cost of major projects vs. limited EU funding, high inflation, reduced local budget), lack of public property for all envisaged interventions, public opposition to the renewal projects that involve limiting car transit in favour of green mobility. Resource flows are also disturbed by the availability and capacity of different private contractors to deliver in time and at the agreed quality level, in the context of high inflation, poor availability of labour force, unethical practices of some companies.

- **ALLIANCES:** Although the public administration in Cluj-Napoca is one of the most innovative, proactive and performing in Romania, it is not backed-up by a well-organised and structured community. To reduce this deficit, we need bodies, structures & processes that work at the community level, reducing the gap between the public administration and citizens and between the urban and peri-urban environment, so that dialogue between these actors and territorial levels can be improved. This barrier will be countered through the local Net Zero Coalition, whose role will be to bring together local champions from various sectors (public sector, academia and RDI, business, civil society, non-governmental sector), who can fuel the city's climate transition.

- **FUNDS:** The funding barriers associated with the climate-neutrality envisaged by the Municipality are very high. Firstly, the implementation costs for only a few of the major projects (subway, metropolitan train, metropolitan beltway etc.) is above 3 million Euro, an amount comparable with the total budget of an 2014-2020 Operational Programme for Romania. Secondly, the high inflation reported recently brings the need to update these investment costs periodically to make them attractive for contractors. The local budget can cover only a small percentage of these expenses; thus, the focus of this Municipality will continue to be on external sources. These barriers affect all the emission domains, because financing is the one that inevitably dictates their implementation. However, the main emission sectors that can be impacted by funding obstacles include transportation (given the large sums involved and the long implementation periods, especially in the case of the metro) and energy (since the rehabilitation of the district heating system involves both massive energy efficiency investment and stimulus for the reconnection of households that withdrew from the system in the last 2 decades). To be more precise, there are several specific funding barriers that we have previously faced against achieving climate neutrality. We will continue to encounter some of these during the implementation of this Action Plan. Some of the most significant barriers are described below. Overall, addressing these funding barriers will be critical for us to achieve climate neutrality and progress towards a 0-emission future. However, we acknowledge the fact that we still have plenty of work to do in this regard.

    - **Lack of dedicated funding:** We have to admit that the process of securing dedicated funding for climate action can be a challenge, particularly for long-term projects. Our local budget is limited, and sometimes, resources may need to be allocated to other priorities, making it difficult for us to invest in low-carbon projects.

    - **High upfront costs:** The climate neutrality interventions, such as building retrofits or public transportation infrastructure, require significant upfront investments that involve massive financial resources.

    - **Uncertainty around revenue streams:** Many of the proposed climate actions can be subject to market fluctuations and other uncertainties that will increase the difficulty to project future revenue streams, especially in the current geopolitical context.

    - **Competing priorities:** Climate action is not seen as a top priority in the eyes of all our citizens, particularly when we refer to the communities that are prone to poverty and have a reduced ability of understanding such matters. Thus, we expect that some residents will oppose to the massive financial investments needed in order to achieve the proposed climate neutrality interventions.

    - We must also mention **the difficulty of motivating private investors to implement climate neutrality projects in the local industry**. We have observed some barriers that cause a certain reluctance of private investors, in relation to the private projects that could contribute to the local economy’s climate neutrality:

- **Lack of profitability:** Many climate neutrality projects may not generate significant profits or returns on investment, which reduce their attractiveness for private investors, especially is such uncertain financial times.
- **Uncertainty:** Climate neutrality projects often involve new and innovative technologies or approaches, which can be untested or uncertain. This uncertainty makes the local private investors hesitant to invest, as they may perceive these projects as too risky.
- **Regulatory barriers:** The national regulatory environment is not always a favourable one, because national regulations can often be unclear, inconsistent or not provide sufficient incentives for private investment.
- **Lack of knowledge and awareness:** Private investors do not have a full understanding of climate neutrality, the benefits that such projects can provide, and neither the opportunities for investment. This lack of knowledge and awareness can lead to a lack of interest in investing in such projects.

- For us, another challenge is also **the use of PPPs in the implementation of climate neutrality projects**. Some of the reasons that constitute barriers in this respect include:
  - **Lack of control:** In PPP projects, private partners typically have a significant degree of control over the project, which can make it difficult for us to ensure that the project meets all the established needs and goals.
  - **Financial risk:** PPP projects could involve significant a financial risk, as we may be required to provide significant upfront funding or be held liable for cost overruns or other financial issues.
  - **Public opposition:** PPP projects sometimes face opposition from the citizens, who may be concerned about the way in which private companies manage the public infrastructure.
  - **Regulatory hurdles:** PPP projects are subject to central regulatory hurdles, which could delay their implementation.

- **ASSISTANCE NEEDS:** Resulting from the previously mentioned barriers and the Municipality's goal to decrease their extent and impact, Cluj-Napoca's main assistance needs consist, on the one hand, in support for establishing the knowledge and practices/behaviors necessary to accelerate the transition to climate-neutrality and, on the other hand, in assistance for the optimization of the processes encompassed in the ambition to reach the local climate-neutrality objectives.

During the workshop organized by the Net Zero City Advisors, our local Net Zero Coalition adopted a systems-thinking approach to scrutinize the draft NZC Action Plan with key stakeholders. Through this exercise, the Coalition identified specific barriers and opportunities in various emission domains, including energy systems, mobility and transport, waste & circular economy and green infrastructure & nature-based solutions. Although the workshop did not focus on the built environment, the Coalition subsequently held a working session to examine barriers and opportunities in this emission domain.

EMISSION DOMAINS	MAIN BARRIERS IDENTIFIED BY THE LOCAL STAKEHOLDERS	MAIN OPPORTUNITIES IDENTIFIED BY THE LOCAL STAKEHOLDERS
ENERGY SYSTEMS	• The high use of fossil fuels to ensure energy security • The small quantity of waste converted into energy, due to poor regulations • The lack of storage capabilities • The high energy losses from the district heating system • The low involvement of citizens in energy production • The technical problems of the district heating infrastructure • The reduced number of citizens that are connected to the local district heating system • The obstacles imposed by regulations related to energy systems • The low level of awareness among consumers and insufficient training regarding climate neutrality solutions that can be activated at individual level • The lack of data on waste, that could be used to generate waste-to-energy scenarios • The barriers in applying the concept of circular economy in energy systems	• The improvements in local and national policies: producer-driven and consumer-driven policies • The use of RES generation facilities • The implementation of local energy markets • The involvement of the private sector and other stakeholders in the process of achieving 0 carbon emissions in the energy systems • The potential of providing training sessions for smart energy consumption • The increasing capabilities of hydrogen production and storage • The local regulations that are favourable to expanding district heating • The availability of new, innovative technologies • The favourable market conditions • The European non-reimbursable funding opportunities • The idea of introducing a new legal framework for hydrogen in the transport sector • The plan of building a modular hydrogen production facility for further upscaling • The advantage of acting as a pioneer city in the field of technology validation and implementation for hydrogen
MOBILITY & TRANSPORT	• The relaxed residential parking policy • The deep-rooted culture of personal car ownership and use, especially given that the rate of car ownership is growing fast • The public resistance regarding carbon neutral means of transportation (biking or walking) compared to using the own vehicle • The lack of experts specialized in the 0-emission mobility/transport fields • The Romanian tradition of importing cheap and polluting	• The chance of collaborating with other European cities, that are experienced in 0-emission mobility, through knowledge exchanges, best practice transfer and replication activities • The further increase in transport efficiency via Mobility on Demand CAVs • The large-scale adoption of green public transport, through an extensive intermodal system, connected to the local Airport • The generous amounts of national and European funds dedicated to green mobility and

	second-hand cars from other EU Member States • The lack of electric charging infrastructure • The missing legal framework for metropolitan transport • The limited adoption of public transport as the main way of travelling throughout the city • The lack of a proper legal framework for autonomous public transport vehicles • The undersized cycling facilities (lanes and supporting infrastructure) • The middle-class challenge	transport • The potential that public policies hold regarding the promotion of green transportation means (especially public transport) • The attractiveness of the Walkable City initiative, due to the increased interest for the 15-minute city concept • The citizens' interest for using e-bikes in travelling across the city • The idea of organizing Civic Imagination and Innovation meetings for raising awareness and building engagement regarding clean and active mobility • The process of introducing a new legal framework for hydrogen use in transport • The sustainable development of EV infrastructure • The plan of building a modular hydrogen production facility for further upscaling
WASTE & CIRCULAR ECONOMY	• The fact that currently, the waste disposal bins are not equipped with security systems • The quantities of waste that is re-used are extremely reduced, e.g., for repurposing waste as compost or for transforming waste water into heat • The current lack of a common vision or understanding regarding both climate neutrality and circular economy • Currently, the process of collecting, synthesizing, monitoring and using waste data is insufficient • The lack of awareness in terms of waste meaning, effects upon individual and environmental health, recycling potential and reduction solutions • At the moment, public policies do not reward waste-reduction behaviour or innovative products • The lack of linking the quantity of generated waste to taxes (the concept of pay-as-you-throw is not implemented at the moment)	• The untapped potential of using waste to generate electricity for the EV infrastructure • The idea of adopting the local Foodwaste Platform (that has been developed through the ZeroWaste project) at municipal level and furtherly scaling it, such as to embed other types of waste • The tremendous amount of EU funds dedicated to circular economy, in the context of the Green Deal and the the EU's New Circular Action Plan

	• The overarching cost of new infrastructure is far beyond the local budgeting capacity • The need of implementing new economic circuits (e.g., glass recycling factory) • The resource flows are disturbed by the availability and capacity of different private contractors to deliver their services timely and at the agreed quality standards	
GREEN INFRASTRUCTURE & NATURE-BASED SOLUTIONS	• Inflation affects the local budget dedicated to projects and can hinder / slow down public procurement procedures • Prior to this large-scale initiative, there were no local alliances that actively supported climate neutrality • The insufficient data-driven insights at Municipality level on awareness / understanding within citizen groupings, in order to identify the right entry-points • The overarching cost of new infrastructure is far beyond the local budgeting capacity • The bureaucracy implied on spending on climate neutrality can be cumbersome • The interoperability of different databases is limited so the projects' implementation processes are slow and bureaucratic • The public opposition to projects which limit car use in favour of green mobility • The lack of available land for such interventions • The poor regulations and standards at central level for climate neutrality in key areas • The reluctance of building owners to implement nature-based solutions • The need to update the local public policies regarding NBS solutions • The community has a reduced capacity to understand the local strategies	• The large number of local NGOs that are active in environmental-related matters • The residents' increased interest to healthy and active habits • The advantage of collaborating with the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca • The already-existing living labs in the Municipality, such as the one developed by the University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca • The potential of scaling-up green infrastructure projects due to the sound metropolitan cooperation • The high interest that citizens and entrepreneurs show when presented with various innovative solutions for carbon neutral projects

BUILT ENVIRONMENT	• The majority of the built environment consists of buildings that were constructed before energy efficiency regulations came into force. These buildings are energy-inefficient and are difficult to retrofit to meet current energy efficiency standards, resulting in high energy consumption and carbon emissions. • The upfront cost of implementing energy-efficient technologies and building systems can be prohibitive for building owners and developers. This cost can deter investment in energy-efficient technologies, despite the long-term cost savings. • Many people are not aware of the benefits of energy-efficient buildings, and the potential cost savings that can be achieved through energy-efficient practices. This lack of awareness can limit demand for energy-efficient buildings and products. • There are no uniform mechanisms for monitoring the energy efficiency of buildings, making it difficult for policymakers, investors, and consumers to evaluate the energy performance of buildings accurately. • The local regulations and incentives are not stringent enough to encourage energy-efficient practices. • The behaviour of building occupants is also a barrier to achieving climate neutrality. For example, many citizens do not bother to turn off lights and appliances when not in use and use heating and cooling systems inefficiently. • The current Associations of Residential Buildings' Owners have scarce resources (e.g., competencies, knowledge, funds) to initiate and support climate neutrality interventions.	• The huge amounts of non-reimbursable funds available for building retrofitting through the 2021-2027 ROP. • The plethora of options in terms of innovative energy-efficient building materials, efficient heating systems, cooling and lighting systems. • The potential of implementing energy-efficient practices. • Incorporating green building design principles, such as passive solar design, natural ventilation, and green roofs, could reduce the energy consumption of buildings and improve their indoor environmental quality. • Conducting, with the help of local universities, ROAT and the energy manager, life cycle assessments (LCAs) of buildings could help in identifying opportunities to reduce their carbon footprint. • The policies and regulations that could incentivize energy efficiency, renewable energy, and sustainable building practices. • The improved collaboration between stakeholders, including building owners, developers, architects, engineers, policymakers, and financiers, which could be mediated by the representatives of the Net Zero City Coalition. • The recent approval of the Guide for Energy Performance Interventions applicable to new buildings, in line with the nZEB requirements.

Another identified barrier was **the lack of data and scenario planning capacity**, which is a transversal issue across existing climate-relevant strategies, policies and plans. Cluj-Napoca Municipality faces the lack of data that would allow a fully-evidence-based modus operandi. Thus, a comprehensive process for improving emissions baseline is required in order for the Net Zero City Local Coalition to be able to properly assess the impact of the interventions applied through this Action Plan. The Municipality aims **to address this barrier in the coming years by strengthening its evidence-based governance and implementation capacity, both within the Municipality and the Coalition**, to achieve the goal of climate neutrality. Net Zero City Advisors' support during the Action Plan's actual implementation period is anticipated in overcoming these challenges. Moreover, we will consider platforms such as ClimateView, Futureproofed and ClimateWatch, to be able to provide adequate data for our decision-making processes, but also for educating and implicitly supporting, our citizens.

In order to be able to encourage the systemic transformation of local neighbourhoods, it is necessary to address these barriers simultaneously and in a coordinated manner, through levers dedicated to each focal point**. Overcoming these barriers will make Cluj-Napoca's pathway to climate-neutrality a textbook example for other similar cities**, this Action Plan aiming to push urban climate-neutrality even higher on the local agenda.

MAIN RISKS THAT COULD IMPACT THE ACHIEVEMENT OF THE CITY'S CLIMATE-NEUTRALITY TARGET BY 2030

- **LEADERSHIP, STRATEGIC PLANNING, AND POLITICAL RISK SOURCES.** The frequent changes of leadership, budget allocation for the local level and investment priorities at governmental level (3 different Prime Ministers in 2 years). This instability is challenging, the speed of the central authorities in implementing major transport infrastructure is very low and the focus on metropolitan /urban functional areas is almost non-existent. In this unpredictable context, the Municipality is taking responsibility for the preparation of major projects (subway, metropolitan train, beltway) - normally the attribute of the central administration - and for reducing the level of emissions, by using local regulations and innovative tools.
- **REGULATORY RISK SOURCES.** These risks include the resources and bureaucracy associated with different expropriations measures for public use, poor regulation / standardization at central level, inefficient legislation on public procurement that can delay the implementation calendar of many projects (a high risk especially for those that are financed from the Recovery and Resilience Plan and must be concluded by the end of 2026). To prevent these risks, the Municipality started the preparation of these projects a few years ago, leaving enough space for the entire bureaucratic process of securing the assets, getting all the legal approvals and permits to obtain interoperability and shared standards.
- **ORGANIZATIONAL RISK SOURCES.** The main organizational risk is related to the capacity of the limited number of public staff to deliver many interventions, some

unprecedented in size and complexity. Although the impact of this risk is considered moderate, due to the fact that the city proved the capacity to absorb the most EU funds among all growth poles in Romania, the Municipality is considering to fill the gap of personnel and competences with external expertise, volunteers, but also by reallocating and training its own staff in the context of strong digitalization of most tasks – hundreds of public services and procedures are already in place, as well as a virtual public servant, the first in Romania).

- **PARTNERSHIPS / STAKEHOLDER (WORKING TOGETHER) RISK SOURCES.** In terms of partnerships and stakeholder engagement, no major risks are foreseen. The Municipality intends to intensify its previous efforts to efficiently engage more stakeholders and citizens in the decision making and co-delivery processes, through the Net Zero Coalition. The Center for Civic Imagination and Innovation (one of the most innovative tools of decision making, considered to be a good practice in Romania), participatory budgeting and international design competition will remain the main tools to ensure that the Municipality manages to capture as many ideas as possible, proposals, opinions, and support from the community. All these initiatives will be coordinated under the umbrella of the Net Zero Coalition, which will manage, through the involvement of all relevant stakeholder categories, the proposed local climate-neutrality actions.
- **SOCIAL RISK SOURCES.** Energy and transport poverty are the main social risks at the local level. The vision of the Municipality is that no one should be left behind in the process of smart, green, and digital transformation of the city. In this context, the Municipality has implemented financial support initiatives for the residents with low income that can't afford to pay the thermal energy bill, subsidizing more than half of the prices for those still using the centralized heating system. For public transport, the city has adopted the Green Friday Initiative when everybody can use public transport for free. Another measure is that the Municipality provides free school transport for children, both pupils and students.
- **ENVIRONMENTAL RISK SOURCES.** Air pollution is the main risk at local level, already acknowledged as having a large impact and tackled by the Air Quality Improvement Plan for 2020-2024. The emissions of NO2/NOx and PM10, that are most problematic in the city, can affect the health and wellbeing of many citizens, especially children and elderly. From this perspective, the priorities of the Municipality will remain to implement the "Green Cluj" and "Walkable City" that will create new carbon sinks and reduce the appetite for personal car use for short distances (15 minutes walking to general use facilities).
- **SAFETY AND SECURITY RISK SOURCES.** Cluj-Napoca is acknowledged to be one of the safest cities in Romania, a fact that was confirmed by the 2020 edition of the Report on the quality of life in European cities. For cybersecurity measures the city works closely with a Consultative Committee for Entrepreneurship and Innovation in IT, that reunites the 2 local IT clusters with hundreds of members and has recently elaborated a Digital Transformation Strategy that tackles this topic. The Municipality/County Council has invested in fixing some vulnerable perimeters (landslides) with tree planting, in the framework of the "Green Cluj" Initiative.

OPPORTUNITIES THAT THE MUNICIPALITY WILL CAPITALIZE ON

- **INFRASTRUCTURE:** All the infrastructure projects carried out so far at the local and metropolitan level represent the basis for developing and implementing this Action Plan. In this sense, the previous initiatives and efforts will be capitalised through scaling and upgrading, especially in the context of the non-refundable funds available for interventions in the transport, energy and housing infrastructure.
- **CAPACITIES:** Shortly after Cluj-Napoca was selected among the 100 cities in the EU to become climate neutral and smart by 2030, the Municipality has organized the InnoWave Summit. The other two cities selected from Romania (Suceava and Bucharest) had the chance to meet for the first time and discuss the future of climate neutrality in Romania with the coordinator of the Horizon European Mission Cities, the President of European Committee of the Regions, the European Commissioner for Innovation, Research, Culture, Education and Youth, members of the European Parliament, the representatives of the Romanian Ministry for Research, Innovation and Digitalisation etc. Thus, the local ecosystem and the Municipality have assumed a clear responsibility at national and EU-level that Cluj-Napoca is highly politically committed to act as an European Lab City for climate neutrality, in line with its strategic development vision for 2030.
- **PROCESSES:** Up until now, the Local Council has approved, generally unanimously, any local strategy, plan, regulation or initiative related to climate neutrality. The most recent one is a bold pioneer decision to ban installing individual gas-based boilers in new-built apartment blocks starting 2022. Also, Cluj-Napoca implemented in 2021 the ”Green Fridays” initiative. The campaign is called “Stop! Leave your car at home!” and it ensures free access to public transport each Friday. This is a continuation of the “health ticket” with its 20-squats-to-ride system which the city unveiled back in 2020. At the moment, Cluj-Napoca is the only city in Romania to have all its general and sectoral planning documents recently updated (IUDS, SUMP, SACEP, Air Quality Improvement Plan, District Energy Strategy, Digital Transformation Strategy etc.) and the only major one with a General Urban Plan approved in the last 10 years. All these documents have a strong focus on climate change, environmental protection, GHG emissions, sustainable mobility, energy efficiency.
- **RESOURCE FLOWS:** Since the supplier market has started to recover after the impact of the global pandemic and manages to remain constant even in the current fragile geopolitical context, the Municipality considers that the resource flows necessary for the proposed actions will be able to be optimally managed, without affecting the steps taken within this local climate-neutrality ambition.
- **ALLIANCES:** Mayor Emil Boc, who is also the president of the Romanian Association of Municipalities, president of the European Committee of the Regions’ commission for Territorial Cohesion Policy and EU Budget (COTER), the designated Country Ambassador at the European Covenant of Mayors for Climate and Energy and former Prime Minister of Romania, is one the strongest supporters of climate neutrality at national and EU level. At his initiative, Cluj-Napoca was the first Municipality in Romania to sign the Green City Accord and also the first city nationwide to lead the sustainable urban mobility group within the City Science Initiative Network.
- **FUNDS:** Cluj-Napoca can be considered a magnet for attracting European funds allocated through the National and Regional Operational Programs, respectively through the NRRP. The Municipality has a department dedicated for the preparation and implementation of projects with non-reimbursable financing, which prepares financing applications for accessing these types of funds. Moreover, the Municipality has identified a series of international funding opportunities, for which the dedicated project department will prepare applications in the coming years, as new open funding calls will be launched. Thus, of priority interest for Cluj -Napoca are the

projects that can be prepared within the European Urban Initiative and URBACT (especially for urban regeneration), New European Bauhaus (due to the public aim of creating a more sustainable, inclusive and beautiful future for Cluj-Napoca's citizens), LIFE programme (especially for clean energy and circular economy) and Horizon Europe (for strengthening the local RDI potential in climate, energy and mobility matters, respectively smart city solutions), Connecting Europe Facility (especially in terms of sustainable urban mobility and renewable energy), Interreg Europe (because the city's aim to become smarter, greener, more connected and social, closer to citizens and better governed), DUT and DEAR.

OPPORTUNITIES FOR COORDINATED ACTION AND KNOWLEDGE TRANSFER AT NATIONAL LEVEL

As previously-stated, the dialogue with the other two Romanian cities (Bucharest and Suceava) that are part of The Mission on Climate-Neutral and Smart Cities (Cities Mission) has already been initiated through the InnoWave Summit. Furtherly, we are willing to strengthen the collaboration with the local administrations of these two cities, but also with their local ecosystems (universities, RDI organizations and private actors that can generate impact). We aim to transform our paths towards climate neutrality into practical best practice models for the cities throughout the country, by organizing not only events similar to InnoWave, but also hands-on activities, such as joint discussions and one-to-one work meetings.

The Executive Unit for Financing Higher Education, Research, Development and Innovation (EUFHERDI - a public institution that is subordinated to the Ministry of National Education) has formally assumed the role of National Coordinator of the climate transition of Romanian cities, in accordance with the principles Cities Mission. Hence, EUFHERDI will work closely both with Cluj-Napoca, Bucharest and Suceava and with other Romanian follower cities, in order to ensure the scale-up of climate-neutrality efforts at national level and also to gather national support for measures with impact at local level. Besides the fact that we are totally dedicated to this ambition and will be actively involved in the partnership with EUFHERDI and the other Mission Cities, we also aim to obtain dedicated support from the Ministry of Energy and the Ministry of the Environment, in order to accelerate the climate neutrality journeys of Romanian cities.

A number of Romanian follower cities are already preparing their own Action Plans for transitioning to climate neutrality (Timisoara, Iași, Arad, Reșița, Lugoj) and several others have expressed their intention to do the same (Brașov, Piatra Neamț, Sibiu). In this regard, Cluj-Napoca's Net Zero City Coalition will work closely not only with the 2 Mission Cities, but also with the other above-mentioned local administrations, in order to provide assistance, share knowledge and transfer best practices related to climate neutrality matters.

Furthermore, representatives of relevant national ministries will also be invited to the events organized by the Net Zero Coalition, in the Coalition's attempt to strengthen dialogue with national public authorities and bring them closer to local climate-neutrality efforts, given that the country's climate-neutrality starts with local steps. Moreover, any relevant material developed within the proposed actions (e.g., if various guides, analyses, studies or relevant reports will be prepared) will be disseminated to the public staff in the ministries, in the spirit of bottom-up transfer of site-specific

knowledge.

In order to overcome the identified systemic barriers and to exploit related opportunities, several measures will be undertaken at local and metropolitan scale, based on the following levers:

- **GOVERNANCE LEVERS:**
  - Enhancing the capacity of the ecosystem to implement and monitor climate neutral policies, through the Net Zero local Coalition and the dedicated NZC Champs Campaign;
  - Skills upgrading package for the community, the ecosystem representatives and building administrators; study visits & exchange of good practices;
  - Digital platform (interactive website managed by the local climate neutrality ecosystem);
  - Climate Neutrality Digital Twin (virtual tool for collecting, visualising, monitoring and forecasting social and natural behaviours and environments relevant for the climate transition of the city).

- **POLICY & REGULATION LEVERS:**
  - Comprehensive climate-neutrality masterplan for dense multi-apartment neighbourhoods;
  - Detailed proposals for transforming different areas in neighbourhoods/suburbs into climate neutral demo districts;
  - Update the General Spatial Planning of Cluj-Napoca, to incorporate strategies for reducing CO2 emissions in all targeted areas;
  - Zonal Urban Plans for climate-neutral neighborhoods;
  - International contests for solutions for the major urban renewal interventions outlined in the Action Plan;
  - Terms of reference for the renovation of private and public buildings in line with the nZEB principles, but also with other local priorities (e.g. extending the average living area of the apartments or the capacity of schools);
  - Defining a set of urban planning principles for climate neutral interventions in high density multi-apartment neighbourhoods;
  - New governance models for condominiums and their integration into the local climate neutrality ecosystem.

- **SOCIAL INNOVATION & ECOSYSTEM INTEGRATION:**
  - Knowledge & competence audit of the local climate neutrality ecosystem;
  - Civic imagination & innovation modelling for climate neutrality at neighbourhood level;

- **DEMOCRACY/PARTICIPATION:**
  - Behavioural, perception and modelling analysis on the individual adaptation of residents and businesses to climate neutrality enhancing the contribution an adaptation of residents to climate neutrality;
  - NetZero Caravan in neighbourhoods and suburbs.

Overall, Cluj-Napoca Municipality will implement, within the Coalition, a flexible model of adaptive management: through the proposed iteration sessions, the current situation for each action will be assessed annually. Depending on the assessment results/outcomes, the way in which the barriers were overcome and the opportunities were capitalized will be monitored. Furtherly, the alternatives

for reaching the proposed targets will be established by consulting the Net Zero City Coalition's members. Moreover, the Precautionary Principle will guide all targeted actions, so that no harm is caused to the people, the organizations and the environment.

UNCERTAINTY ANALYSIS AND ADAPTIVE MANAGEMENT

Cluj-Napoca's journey towards climate neutrality until 2030 is an ambitious one, given the number and size of the projects required to reach our target. In order to be able to reduce the risks caused by the complexity of the actions included in this Plan, the progress of its implementation will be monitored annually, by the internal team of the Cluj-Napoca Municipality. Monitoring will take into account an uncertainty framework, through which course will be adjusted if key barriers are not addressed in time, or if opportunities and expectations are not met.

In order to implement the uncertainty framework, we followed the model proposed for the Strategic Environmental Assessment, which was developed by M. Bodde, K. Van der Wel, P. Driessen and A. Wardekker in the article *Strategies for Dealing with Uncertainties in Strategic Environmental Assessment: An Analytical Framework Illustrated with Case Studies from The Netherlands*[1]. According to this article, the typology of uncertainties relevant for strategic environmental assessments (SEAs) comprises inherent, scientific, social and legal uncertainties, which influence the decision-making process and dictate the future courses of action. We applied this model intended for environmental assessment to the specifics of our document and adapted it to our climate neutrality case, which resulted in the following:

- **INHERENT UNCERTAINTIES**: These are given by the inherent unpredictability of the systems. For example, the cause-effect relationship in climate change is complex and difficult to establish, especially when we take into account its cumulative effects and their scale. Such uncertainties will be managed along the way by the experts from the internal team of the Municipality, who will also consult the experts from the Coalition, because we are talking about uncertainties that can manifest themselves regardless of the measures adopted by the Municipality.
- **SCIENTIFIC UNCERTAINTIES:** These refer to issues in terms of relevant data, based on the difficulty of collecting it due to limited access to the necessary information. Moreover, the existing data may not be fully accurate and may become invalid over time, even due to incorrect measurement and prediction. These uncertainties will be addressed through knowledge generation, and the main responsibles will be the universities involved - TUCN and BBU. Through the technologies and know-how they possess, the universities will generate various knowledge that will help us to better substantiate our actions, especially since the faculties that the 2 universities include cover complex fields (energy, transport, architecture, environmental protection, sociology, etc.) and allow the combination of several disciplines in the pursued research. Thus, new quantitative and qualitative data will be generated, which will complete and substantiate the amount of available evidence.
- **SOCIAL UNCERTAINTIES:** These are connected to the actors involved in the pathways towards climate neutrality, being caused by the different values, interpretations, needs, interests and expectations of the people involved, also based on the category of stakeholders they represent. To all this is added the political climate, which can influence

[1] Sustainability | Free Full-Text | Strategies for Dealing with Uncertainties in Strategic Environmental Assessment: An Analytical Framework Illustrated with Case Studies from The Netherlands (mdpi.com)

the way climate issues are addressed. In this case, the role of the Coalition, the Champions and the Caravan is to strengthen stakeholder engagement and to increase their support for the implementation of the Action Plan. The approaches and levels of stakeholder participation will be adapted to the category of stakeholders through the proposed consultative activities.

- **LEGAL UNCERTAINTIES:** These refer to the ambiguity and variability of the legal framework, including the emergence of new laws or various specific regulatory procedures. In this case, support will be requested, if necessary, from the Ministry of Energy, the Ministry of the Environment and the Executive Unit for Financing Higher Education, Research, Development and Innovation (the national coordinator of the Cities Mission).

By comparing the barriers, risks and opportunities with the Municipality's strategic goals in terms of climate-neutrality, the current Action Plan and its related interventions come as a strategic, directly targeted and tangible response to the main objectives established in 2030 SECAP and IUDS. The narrative starts from the intervention areas for which SECAP and IUDS propose concrete actions to reduce emissions until 2030: Buildings, Private and institutional environment, Transport, Mobility, Lighting, Local production of renewable energy, Public procurement, Urban planning and Collaboration with citizens.

Our approach starts by understanding and changing individual behaviors and subsequently, consolidating functional local systems (supplemented by establishing climate neutrality engines where they are absent) with the ultimate objective of fostering a collective mentality that fights for the common goal of reaching climate neutrality within the city. Cultivating this institutional and residential collective mentality will be reinforced through policy and planning mechanisms that will provide the necessary development framework, in addition to integrated, multi-sector infrastructure interventions, facilitated by the Net Zero City Coalition and local climate-neutrality champions. Our pathway will advance under the guidance of existing strategic documents, within our **unified ambition to reach climate-neutrality, whereby the efforts of all stakeholders contribute to decreasing the urban CO2 footprint on the climate and to enhancing citizen's safety, health, and quality of life**.

A-3.3: DESCRIPTION OR VISUALISATION OF PARTICIPATORY MODEL FOR THE CITY CLIMATE NEUTRALITY – TEXTUAL AND VISUAL ELEMENTS

LOCAL CONTEXT AND EXPERIENCE WITH COLLABORATIVE APPROACHES

In the last 10 years, especially since the emergence of clusters in the city's development landscape, the local ecosystem has strongly consolidated its collaboration, through various joint projects. Thus, this Action Plan is **based on the hundreds of initiatives previously carried out at local level**, both in terms of infrastructure projects and also as soft interventions. The background on which this document was created lies on the strategic documents already developed and implemented at the Municipality's level and its metropolitan area. Moreover, the Action Plan's foundation consists of the previous and current projects developed within the local ecosystem by the Municipality, local universities, clusters, private companies, NGOs and even citizens (through the previously organized participatory budgeting processes). At the moment, there **are dozens of projects that are or have been implemented in partnership between local actors**, which were carried out mainly by attracting non-reimbursable funds, including within the framework of numerous international

initiatives that were pursued under the umbrella of a large number of European funding programs, from Horizon Programme to COSME and from Interreg to Urban Innovative Action, etc. The **principles that dictated the partnership projects during these 10 years included**, in the first phase, the consolidation of collaboration between local factors, in the second phase, the sustainable development of the created partnerships and, currently, as the third phase, the acceleration of sustainable innovation within the local ecosystem. These principles represent, in fact, **the interests on which the ambitions of local actors have focused during this decade**. Starting with the accession of Cluj-Napoca to the mission of the 100 climate-neutral and smart cities in 2022, the Municipality managed to direct the local cooperative efforts towards the climate neutrality transition, not only in terms of the city's journey, but of all the pillars that, in fact, support the city: clusters, companies, universities and local NGOs.

SUMMARY OF INDIVIDUAL AND INSTITUTIONAL LEVEL MEASURES

- **Individual adaptation** will be fostered through levers dedicated to behavioural changes. The aforementioned elements constitute a cohesive and sequential procedure: firstly, comprehending the existing collective perception regarding climate-neutral behaviors (via behavioral and perception analysis, modeling, and correlation with other pertinent research), followed by a transition towards a unified climate-neutral mentality based on scientific evidence. This process will be facilitated by the coordinated implementation of digital technology (Climate Neutrality Digital Twin), social innovation (civic imagination and innovation events), democratic participation (NZC participatory budgeting), urban-metropolitan transfer of good practices (caravan for metropolitan residents), local incentives, and education. To further reinforce interactions among citizens and between citizens and the public, NZC Champs will foster community engagement and steer it towards the common pathway to climate neutrality**.**

- **The adaptation of the local public administration** will focus on those levers that will improve its ability to act and react in line with climate neutrality, hand in hand with the local community and ecosystem and at the same pace as its EU counterparts. In this regard, the initial step involves an analysis - an audit of climate neutrality expertise and capabilities (which will also be extended to other public and private entities within the ecosystem). The outcomes of this lever will form the foundation for the subsequent ones, including alternative governance (NZC Champs and new governance models for condominiums, supplementing and supporting public governance from a residential standpoint), the NZC local coalition for change (which will rely on collaboration within a well-coordinated framework with the local ecosystem), engagement with the local financial market (to provide financial backing for climate-neutral local plans and initiatives), knowledge transfer (a collaborative endeavor to adopt best practices from other European cities), and RD capitalization (integration of research findings into urban policy and planning principles/tools).

NET ZERO COALITION PARTICIPATORY MODEL

The entire Action Plan will be implemented through a local Net Zero Coalition, having as members representatives from the climate stakeholder ecosystem, namely representatives of each identified stakeholder. The Net Zero Coalition will act as a strategic local task force, comprising key ecosystems actors and will function as an action group dedicated to co-designing,

co-producing and co-monitoring local climate-neutrality solutions. It will use a collaborative-leadership governance model, where all the partners within the Net Zero Coalition will participate in the decision-making and implementation of the actions and all named/yet unnamed stakeholders will be consulted, according to their particular value-added and expertise.

The Net Zero Coalition will be coordinated under the umbrella of CIIC – Civic Imagination and Innovation Center, the main participatory governance tool of Cluj Municipality.

The Net Zero Coalition will act within the framework of an official declaration/pact between the local and metropolitan public institutions, private sector, NGOs, professional association representatives and NZC Champs, with the goal of cooperating in order to accelerate and facilitate the deployment of the proposed climate-neutrality actions. Thus, the Net Zero Coalition's diversity of participants will be ensured through a quadruple helix framework, which activates 4 sub-systems to enhance knowledge production and innovation: governments, higher education, civil society, economy. Given that the climate transition will cut across various sectors (residential built sector, transport, health, education, urban planning, energy, economy, green spaces, etc) the Net Zero Coalition includes partners with extensive experience in social sciences, climate action, architecture, renewable energy, transport, citizen engagement, business, metropolitan development, capacity building, digital innovation. Engaging the efforts of all these categories of stakeholders in a common vision (and, in particular, in a common commitment to implementation and monitoring) is crucial for ensuring the cross-sectoral approach, which is a priority for the Net Zero Coalition. The pact will include the governing methodology and the monitoring framework needed in order to evaluate the Coalition's activities.

The Net Zero Coalition's governance model will build on multi-system horizontal collaboration, as well as vertical coordination with regional and national governance structures (e.g., RDA, Ministry of Investments and European Projects), through efficient and multi-sectoral cooperation, under the coordination of the public administration. The cross-organizational coalition's internal functioning will be directed by the principles of accountability (each person involved will be responsible for their own actions by directly acquiring their role), transparency (all the necessary information and tools will be available to all partners on a common platform), and diversity of participants (as seen from the stakeholder list).

TARGETED INTERVENTIONS TO ENHANCE CITIZEN PARTICIPATION IN THE TRANSITION TO CLIMATE NEUTRALITY

The shift towards climate neutrality directly involves citizens, both in terms of its impact and individual actions. Citizen engagement in our measures is crucial, especially when considering that individual behaviors were identified as one of the principal obstacles in our climate neutrality pathway. As a result, residents are the city's starting point for systemic change and the focal point of our Action Plan. The proposed measures will start with understanding their behaviors and perceptions through research on individual adaptation. Based on the outcomes, civic imagination and innovation modeling will be established (where citizens, particularly homeowners' associations, will express their viewpoint), tools for enhancing individual adaptation capacity will be developed (e.g., free-of-charge resident training), and the profile of NZC Champs will be created to serve as trusted partners for citizens. The principal targeted interventions for boosting citizen participation in

behavior change and decision-making are enumerated below.

Civic imagination and Innovation Center - CIIC modelling for climate-neutrality will be organized at neighbourhood level, in the aim of bringing the NZC local coalition as close as possible to citizens and their real needs, through a user-centric and place-based approach. Civic imagination and Innovation modelling events will build on the successful experience of Cluj-Napoca to become the first Municipality in Romania to implement the participatory budgeting and to establish a Civic Imagination and Innovation Center (CIIC), both managed directly by the staff of the Municipality, which is currently very limited. Specifically, the CIIC concept will be upgraded by taking into account the Net Zero Coalition model, with the support of external expertise contracted by the Municipality, such as to focus more on climate-neutrality. The events will be designed to bring together international and local experts that have the opportunity to interact directly with citizens, businesses an NGOs from a certain neighborhood on given climate neutral-related topics. Also, specific civic imagination and innovation event concepts will be prepared and tested for new target groups, such as children, students and elderly.

Regarding **participatory budgeting**, which is currently only applied at the city level on a few specific subjects, a new concept for participatory budgeting at the neighborhood level on climate neutrality related topics will be created and piloted, with external expertise subcontracted by the Municipality, in an attempt to achieve more place-based interventions. Since we plan to develop and test participatory budgeting at the neighborhood level on climate neutrality related topics, we are interested in gaining knowledge from more experienced European cities on how to enhance ownership and democracy in this regard. We would appreciate the NZC expert team's assistance in connecting Cluj-Napoca with such cities, for instance Vienna, to learn from them. Therefore, the Cluj-Napoca Municipality specifically expresses its intention to adopt western models of best practices for creating the participatory budgeting process and is receptive to any form of assistance in this matter.

A central element in connecting all the systems is represented by the **Climate Neutrality Digital Twin**: besides technological functions, this virtual tool will also have social modules: it will facilitate the integration of social aspects/data in the developed solutions, it will allow citizens to see simulations of the proposed infrastructure/policy actions (in order to ensure residents' understanding of repercussions and benefits before facing them), it will facilitate awareness and education and will allow monitoring of solutions (so that citizens can see the real and accurate impact of the pursued actions).

The **Model for improving condominium governance** will streamline the way in which residential blocks are managed (currently a deficient, problematic management) and the new local public policy tools will accelerate the individual adoption of climate neutral practices. Within the improved condominium governance model, homeowners associations will play a stronger role and proactive citizens investing in thermal rehabilitation will benefit from reduced costs and faster implementation of energy renovation works. This measure will build on the existing investments of individual owners into energy efficiency of their building, identifying bottlenecks, engaging citizens in the reform process and promoting improved quality in the delivery.

Citizens, particularly those residing in high-density multi-apartment neighbourhoods, will also benefit from **the urban planning toolkit and local public policy tools**, which will provide numerous advantages in terms of energy costs and quality of life, including improvements in physical health and mental well-being.

Moreover, **in order to enhance the contribution and adaptation of residents to climate-neutrality, the Municipality will focus on creating communities that** are willing to get involved and assume their participation in the construction, implementation and monitoring of participatory public policies related to climate neutrality. In order to achieve this, the community must find a comfortable and friendly environment that generates confidence in the fact that its voice is listened to and the debate is the vehicle through which it can convey the needs to the local administration. In this broader context, this action will be pursued by organizing meetings in informal neighbourhood spaces with a temporary character located on the public domain (parks, markets etc.), with a minimal setup and equipping, under the concept of Net Zero City Caravan.

The **NZC Caravans** will ensure that every citizen is included in the journey towards climate neutrality, while participatory budgeting will strengthen democracy, decision-making, and active citizen participation in shaping the city's future. To act as citizens' trusted partners, the **NZC Champs** will be selected through an online neutrality champion competition, using competitive tools to identify entities such as private companies, NGOs, and institutions that will implement climate-neutrality actions at the neighbourhood level, producing measurable and potentially replicable outcomes. As a result, citizen involvement will be widespread, transparent, and accessible, with a focus on social inclusion and equal opportunities.

Once residents are involved in the NZC Caravan, they will have the opportunity to volunteer for teaching and educational workshops on various topics related to climate neutrality, such as energy savings, food waste prevention, waste recycling, and becoming a prosumer. The Caravans will use temporary Ground Level Actions as tools to facilitate the transfer of knowledge and engagement through Placemaking. **The Caravan will serve as a vehicle to connect all neighbourhood centres into a single network, translate good practices, and unify messages**. It will also serve as a place for community formation and spending free time. Through social facilitation actions, the community will be invited to form debate centres around the climate neutrality theme. Educational activities consisting of two levels, educational workshops and community debates, will be held at these community contact points for all ages. The Caravan will eventually become a Memory Place. The goal is to empower citizens and the supporting ecosystem to become active facilitators of the city's climate neutrality.

In addition, **the community building process will directly inform and accelerate the process of establishing energy communities** (currently, there is only one energy cooperative active in Romania and the EY Solar Energy Strategy has the target of setting up at least one renewables-based energy community in every Municipality with a population over 10,000 by 2025). Considering that awareness on the process and benefits of establishing energy communities, as well as the technical and regulatory context are one of the main reasons for the small number of such arrangements in the EU, the community events organised as part of the NZC Caravan will provide

the opportunity to directly engage citizens in establishing community-owned energy generation facilities and identify the required course of action.

PARTNERSHIPS AS A LEVER FOR MOBILISING PRIVATE FUNDING AND KNOWLEDGE TRANSFER

The partnerships within the local climate-neutrality ecosystem will be also consolidated by involving potential entities that could finance part of the actions (North-West Regional Development Agency - manages the NW ROP, the Ministry of Investments and European Projects, private companies that can finance pilot actions through CSR/PPPs, citizens that can organise crowd-funding, commercial banks that can offer loans for green projects, even representatives from EBRD, EIB & VC/BA funds), capacity building actions for financial sustainability. Key measures for meeting the funding gap and mobilizing private resources include:

- **Encourage and promote access to ROP funding**. The involvement of the private sector is essential for achieving climate neutrality, and leveraging the close relationship between Cluj-Napoca Municipality and the NW Regional Development Agency is key to encouraging private companies to access as many funds as possible from the Regional Operational Program. The Regional Operational Program managed by the Regional Development Agency provides a significant opportunity for private companies to invest in energy efficiency, circular economy, renewable energy, and other sustainability initiatives. By encouraging dialogue with private companies and promoting the availability of these funds, we can create new opportunities for private companies to invest in sustainability and help us achieve our climate neutrality goals.
- **Promote sustainability measures via clusters**. Another way we can engage the private sector is by leveraging our close relationship with clusters in the Municipality, particularly the IT and Energy Clusters. These clusters represent some of the most innovative and forward-thinking companies in our region, and we believe they can play a key role in promoting energy efficiency measures and innovative practices in sustainability to their members. By working with these clusters, we can help ensure that private companies have access to the latest information and best practices related to sustainability.
- **Empower homeowners' associations**. The increased role that homeowners' associations will play in the new condominium governance structure will encourage the mobilization of private funding from individual owners. Energy renovation projects will also be implemented more quickly and at lower cost, while promoting greater quality and CO2 reductions.
- **Scale-up CSR program of adopting green spaces**. Another important area where private companies can be more involved is in the extension and maintenance of green spaces, by adopting certain areas as part of their corporate social responsibility actions. We would like to promote the green space adoption program at a larger scale, based on the successful experience so far (with smaller surfaces such as squares and roundabouts). By supporting the development of green spaces, private companies can help reduce carbon emissions and also contribute financially to the pathway to climate neutrality.
- **Promote incentive schemes and application of nZEB concept**. We are committed to developing existing initiatives in the real estate construction sector (such as the regulation on heating facilities) and promote building owners to apply for incentive schemes, such as the 50% tax reduction for buildings with green certificates. Real estate development companies can play a crucial role in this effort by adopting sustainable practices and technologies in their buildings,

in line with the nZEB principles.

- **Extend partnerships and build capacity.** Build on existing partnership with the Transylvania Commercial Bank (an existing loan was already contracted) and explore further possibilities for financing the green transition, as well as the development of public-private partnerships by addressing current barriers identified above.

The partnerships that Cluj-Napoca already has in place, at the national, EU, and global level, along with additional connections that will be established in the coming years, will ensure a wider impact of the undertaken actions, through scalability and replicability efforts. The core tool envisaged for mass transferability will be a **dedicated digital platform** – an interactive website managed by the local climate neutrality ecosystem, which will encompass all the actions' progress together with lessons learned, and knowledge exchange activities with other similar urban areas. Overall, the transferability and/or replication of the proposed actions across other EU cities and functional urban areas will be based on: (1) existing partnerships, such as those with the Romanian Ministry of Research, Development and Digitalization, DG Regio, and the World Bank, (2) EU-funded exchanges (through TAIEX, Net Zero City's City Learning Programme, Interreg, etc), (3) the development of a strong knowledge transfer mechanism within the coalition's members and (4) the coalition partners' dissemination channels and transfer mechanisms (Social Media, networks, events, etc.). All these opportunities will be fully used to disseminate the results and help entities that are interested with all the tools and ideas emerged from implementing the Action Plan.

INNOVATION, LEARNING AND CAPACITY BUILDING

Cluj-Napoca uses **collaborative local development as an innovation driver**, based on all the local flagship projects resulting from co-participatory processes and pursued by the local innovation ecosystem. Our stakeholders will not be spare parts of change, but the engine of change and this is why the NZC local coalition is structured to embrace the cooperative efforts within the quadruple helix, as a key enabler for systemic, innovative transformation. During the Action Plan's implementation period, local stakeholders (mainly those identified in the stakeholder list, plus other proactive and interested local actors and new local actors who are not yet constituted at the moment - their engagement will be promoted publicly, intensively and transparently) will be directly involved in the civic imagination & innovation sessions through the NZC local coalition, because they are the ones who catalyse the proposed change, bringing real, place-based inputs to the climate neutrality table. Moreover, through co-participatory approaches, the stakeholders will be involved in sense-making and cross-fertilization sessions during each stage of development of the proposed actions: co-design, co-implementation and co-monitoring.

The enhancement of the local ecosystem's capacity to implement and monitor climate neutral actions will be achieved through specific actions focused on the Net Zero Coalition (ecosystem representatives and building administrators) as follows:

- Selecting local and/or nearby ecosystem good practice examples and promoting them as successful climate neutrality stories;
- Know-how and skills upgrading package for ecosystem representatives, Municipality and private sector stakeholders and staff to facilitate day by day and medium to long term climate

neutrality measures implementation;

- Interactive interface / framework to enhance building administrators' knowledge about the measures / actions that could facilitate achieving climate neutrality;
- Training, knowledge dissemination and good practice promoting events held for targeted groups of ecosystem representative and building administrators;
- Identifying local NZC Champs, as trusted partners that could act as liaison between Municipality, ecosystem representatives and residents. Persons willing to encourage, promote and monitor carbon neutrality achievement within the neighbourhood;
- Study Visits and Experience exchange sessions for NZC Coalition and Champs;
- Guidance for the NZC Coalition members and NZC Champs, in monitoring the impact of applied and implemented actions;

The core element of implementing the proposed actions involves the **application of a "learning by doing" approach**. Firstly, the proposed actions are based on the experiences gained through previous efforts to reduce the city's carbon footprint, including research conducted by local universities, international projects involving clusters and NGOs, and interventions by the Municipality, such as infrastructural investments and integrated programs like Walkable City. Learning by doing will also be used in implementing the proposed actions in this plan by considering two perspectives. Firstly, the proposed solutions will be co-designed, co-tested, and co-redesigned in conjunction with the local ecosystem to ensure the results obtained are most suitable for the local context. Secondly, the entire system will undergo a designing, testing, and redesigning process over the next eight years to adapt Cluj-Napoca's climate-neutrality journey to the constant changes that any city faces, including both internal dynamics and external factors. As a result, the course of the proposed actions will occur experimentally and iteratively, with all stakeholders and potential catalysts participating. Through interactive and participatory approaches, citizens and the ecosystem will understand the actions' benefits on their overall welfare and well-being.

Moreover, **the coalition's governance model is designed to enhance feedback and iterative learning learning processes, by using a bi-dimensional approach**:

- INTERNAL DIMENSION – within the Net Zero Coalition. The implementation of the Action Plan will advance by collecting, organizing and sharing information, to achieve a common understanding and ensure ongoing cross-fertilization across the coalition. This pursuit will be performed as part of the sensemaking process, following an iterative model. The development and implementation of the proposed actions will undergo the three phases of iterative learning processes (plan, test, iterate) to generate the most suitable approaches.
- EXTERNAL DIMENSION – among the stakeholders. The Net Zero Coalition will pursue a permanent learning process by auditing the local ecosystem's behaviour, perceptions, capacities and capabilities and will further build appropriate learning tools), starting from real, place-and-research-based evidence, by tackling 4 main phases: analysing & modelling citizen's and ecosystem actors' behavior, perceptions, knowledge -> starting the learning process -> implementing the learning process -> learning capitalization know-how transfer.

Overall, the learning mechanism will consider the following aspects:

- Working in an experimental, interactive way: plan, test, iterate;
- Accelerating learning by extracting rapid learnings to inform the actions;
- Engagement of all actors within the proposed actions, and by creating the suitable frameworks for the Net Zero Coalition and the NZC Champs;
- Capitalizing on previous experience in developing feedback and iterative learning processes (the previous initiatives of the Municipality – e.g., the Center for Innovation and Civic Imagination and the previous projects of the partners - e.g., REFLOW).

The Net Zero coalition aims to deepen and systematize the understanding of the factors affecting the emergence and effectiveness of climate neutral practices in the local ecosystem and aspires to provide a more concrete conception of what a collective climate-neutral mentality should look like, as well as how this can be effectively achieved. **The coalition's work will build upon a KNOW – DO - UNDERSTAND** model and will seek to create competencies (Attitudes, Skills, Knowledge) among involved stakeholders. Thus, we will include awareness-raising and data-driven trainings and workshops, applied tasks to model the reduction of emissions through implementing the proposed actions, and finally we will assess the attitude and value change towards a climate-neutral future. This "applied research approach" will provide a clear, measurable definition of a climate-neutral urban ecosystem, as well as the levers required to achieve it. Lessons learned and good practices from each intervention will be shared with all stakeholders via the Net Zero Coalition's channels.

REFLEXIVE GOVERNANCE AND SYSTEMS THINKING AT THE LEVEL OF THE NET ZERO COALITION

To accelerate the shift towards climate neutrality in Cluj-Napoca and its metropolitan area, a reflexive governance approach will be implemented. This approach acknowledges that climate neutrality challenges are multifaceted and long-term, and as such, the Net Zero Coalition will consider the interconnectedness, complexity, and scale of a variety of climate-related concerns to determine the best course of action. The adoption of this approach recognizes that reducing greenhouse gas emissions requires a collaborative effort from all sectors of society, and that it is no longer sufficient for city administrations to analyze, plan, and implement a ready-made solution to achieve Net Zero Coalition targets. In this Action Plan, the primary goal of adopting reflexive governance is to coordinate collective efforts to identify integrated solutions that can be implemented through the Net Zero Coalition.

To monitor the system, the City Energy Manager will adhere to the methodologies outlined in the Action Plan Guide and utilize its own evaluation and calculation technologies, including air quality sensors. Additional equipment will be utilized to closely monitor emissions in the area alongside a complex data acquisition process to better understand the impact of proposed actions. The Energy Manager will receive ongoing support from the environmental departments of Babes-Bolyai University and Technical University of Cluj-Napoca, which possess various digital monitoring tools and solutions, as well as a vast array of relevant studies in the field, which will be continued and

updated throughout the Action Plan's implementation. Furthermore, once the Climate Neutrality Digital Twin is established, more complex data analyses will be conducted in accordance with methodologies proposed by international entities managing the Covenant of Mayors, ICLEI, and NZC.

The entire approach of the Action Plan focuses on the systems thinking theory, such as to ensure the holistic interrelation of all the systems and of all their constituent parts, in the ultimate goal of achieving climate neutrality by 2030 through a systemic change that is based on the proper integration of the impact pathways, and not on unrelated independent interventions. Thus, the Plan's development started from the identification of the city systems that will be intervened upon. Then, the emissions generated by them were evaluated and the reduction targets were proposed, the barriers and opportunities were structured, and, finally, the necessary solutions and innovations were identified, together with the stakeholders who can contribute to their deployment. Therefore, Cluj-Napoca Municipality did not plan single-lever interventions, but combined them across systems and chose key ecosystem actors that can become delivery partners.

The Cluj-Napoca Municipality has aimed to tackle all urban systems that can contribute to climate-neutrality, which can be seen in both the proposed actions and the involved stakeholders. Our goal requires a concerted effort to implement the interventions across multiple city systems. The implementation and monitoring of the Action Plan will be guided by systems thinking, which served as the underlying philosophy behind our impact pathways. The actions proposed will operate within the systems and the relationships established between them, leading to the accomplishment of the set target through an ongoing and continuous process.

An essential component in this process will be the feedback, which will help us, on the one hand, to reinforce certain measures if we need to accelerate / expand them to reach our target and, on the other hand, to balance the implementation of certain interventions depending on external and internal conditions. The feedback will allow us to drive several aspects of improvement simultaneously, in order to tackle the gaps that we might discover that hinder the implementation of the Action Plan, during the annual CCC iteration phases.

The Climate City Contract will go through an annual review and update process, based on iteration sessions organized by the Net Zero City Coalition. Thus, based on the learning gained through the daily implementation of the Action Plan, the Municipality and its ecosystem will intervene with improvements in the content of the CCC-related documents. As we stated, we will use a model of reflexive governance, in which participation and deliberation across the Net Zero City Coalition will help us implement an intervention system based on common commitment, by taking into account the perspectives of all the actors involved. During the annual iteration sessions for CCC review, all the knowledge systems provided by the Net Zero City Coalition members will be activated, and the results of the consultations with them will be recorded in the updated version of the documentation. Citizens' involvement will play an important role in this regard. In this sense, through the CII events, the Caravan and the Champions, the residents' observations regarding Cluj-Napoca's Climate Neutrality journey will be collected (through interactive activities, supplemented by survey-type instruments), and the gathered information will be clustered and included in the updated version of the CCC. The whole process described above represents an innovative way of governance for the Municipality and its ecosystem, because, although until now various joint projects have been

implemented in partnership, previously we did not manage to implement the reflexive governance model as a full-time process, but rather as an intervention-based one. Thus, both the elaboration of the Action Plan and its implementation, respectively its update, will allow us to implement an innovative governance model, which will be reflected in the future iterations for the CCC review CCC.

In more detail, the steps we will follow in terms of reflexive governance are the following:

1. Set ambitious but achievable goals: Through this Action Plan, we have set a clear and ambitious goal for achieving climate neutrality, but we tried to make sure that our target is achievable, given the local ecosystem's current knowledge, resources, and political will. Our aim is aligned with the broader local policy objectives and and, during the implementation phase, we will focus on transferring it also to the local community's aspiration.

2. Foster collaboration and engagement: Through our Coalition, we aim to foster collaboration and engagement among stakeholders, including the community. We have pursued the Coalition approach in order to ensure that diverse perspectives and knowledge are incorporated into the decision-making process.

3. Use evidence-based decision-making: During the implementation phase, we will strive to improve the use of evidence-based decision-making to guide our policy and practice. For this, we need to improve our process of collecting and analysing data on greenhouse gas emissions, energy use, and other key emission domains, in order to be able to properly evaluate the effectiveness of the implemented actions.

4. Monitor and evaluate progress: As already stated, we will regularly monitor and evaluate our progress towards achieving climate neutrality. In this regard, we will work better with our universities and with the Energy Manager, in order to be able to use indicators that are scientifically rigorous and aligned with our goals. The monitoring and evaluation results will be used to adapt our course of action as needed and to ensure accountability across the entire Coalition.

5. Adopt a flexible and adaptive approach: Since starting the elaboration of the current Action Plan, we have adopted a flexible and adaptive approach to decision-making and and we will maintain this approach during the implementation phase as well, recognizing that our climate journey is a complex and evolving challenge. We are open to learning from our own experiences and to making adjustments to our interventions, as new learning will emerge.

6. Build capacity and knowledge: We need to strengthen the capacity and knowledge among stakeholders, in order to be able to support this reflexive governance processes. This is why we want to invest in training and education actions for all the stakeholder categories. At the same time, being one of the largest university centres in Romania, we are permanently supporting research and innovation in climate-neutral technologies and practices.

7. Use innovative financing mechanisms: We will study innovative financing mechanisms, such as green bonds, carbon pricing, and public-private partnerships, because we understand the need to mobilize additional resources for climate neutrality. However, regardless of the funding mechanisms that we will unlock in order to achieve climate neutrality, we will ensure that the used financing mechanisms are not only aligned with our objectives, but that they are also transparent and accountable.

As mentioned above, the reflexive governance sessions will take place annually, in the first half of each calendar year, as re-iteration stages of the CCC. Overall, implementing this reflexive governance approach in our climate neutrality journey requires the Coalition's commitment to collaboration, evidence-based decision-making, and adaptive management – **we are aware of the fact that we still have to work on all these aspects to improve them, but we are open to making substantial efforts in this regard,** both as the Municipality and as the coordinator of the Net Zero City Coalition.

4 Part B – Pathways towards Climate Neutrality by 2030

4.1 Module B-1 Climate Neutrality Scenarios and Impact Pathways

B-1.1: 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	Efficiency of the District Heating System improved by introducing new technologies such as thermal solar systems, air-water and water-water heat pumps, cogeneration engines and boilers using natural gas, potentially combined with green hydrogen	A District Heating System running primarily on green energy	Reduce CO2 emissions by 45,243 tons over 2021	Improved air quality and quality of life Lower energy costs for households
		RES generation facilities (solar panels and/or heat pumps) for all public buildings, for 2,000 apartment block buildings, and for 5,000 individual homes	A higher share of heat, hot water, and cooling generated from green electricity.	Reduce CO2 emissions by 37,000 tons over 2021	Improved air quality and quality of life Lower energy costs for households Potentially generate additional sources of revenue from energy generation
		Around 80% of the public lighting network equipped with LED lamps, remote management, and dimming systems	State of the art and energy efficient public lighting system	Reduce CO2 emissions by 3,000 tons over 2021	Increased safety of public spaces Savings for local budget
Mobility & transport	Technology/ Infrastructure	Extend by at least 200 the network of public electric charging stations	Key public areas made more attractive for electric cars.	Reduce CO2 emissions by 24,377 tons over 2021	Reduced air pollution More affordable transport by car
	Governance & Policy	Enforce urban planning regulations to include electric charging stations	Extension of network of electric charging stations		

B-1.1: 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)**
		for large development, and increase network by at least 300 new stations.	in neighbourhoods		
	Finance & Funding	Benefits for residents that purchase electric vehicles (lower local taxes, subsidies (both national and local), parking discounts, and dedicated parking spots and city areas), with at least 50,000 beneficiaries anticipated by 2030	50,000 new electric vehicles in local car fleet		Improvement of quality of life
	Technology/ Infrastructure	Start shift to predominantly green commuting in the wider metropolitan area	Most long commutes in the metropolitan area are done by green transport modes (metro, metropolitan train, electric buses, tramways, trolleybuses)	Reduce CO2 emissions by 15,975 tons over 2021	Improved air quality and reduced congestion Improved wellness and quality of life of residents
	Technology/ Infrastructure	Continue investments in the "Walkable City Program", to make the center city and neighborhoods more easily accessible by foot, bike and other green micro-mobility options	Most short commutes in the city are done by foot, bike or other green micro-mobility options.	Reduce CO2 emissions by 7,100 tons over 2021	Improve quality of life for residents Make public spaces safer for children, elderly, and people with disabilities Reduce air pollution and congestion Reduce monthly transport costs for households Reduce flight to suburbs by improving quality of living spaces in existing
		Continue investments in the "City Bike Program", to make commuting by bike easy, safe, and comfortable	Increase share of people that use bikes for short and medium-length commutes, and for recreational use		
	Social Innovation	Continue and expand Social Innovation programs, such as "Squats for Bus Tickets"	At least 3 creative programs in place that encourage people to use green transport modes		

B-1.1: 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)**
					neighborhoods
Waste & circular economy	Technology/ Infrastructure	Continue investments in the "Circular City" Program, with a focus on developing at least 270 digitised eco-islands for selective collection, building at least 2 collection centers for voluminous and hazardous waste, and installing at least 100 new smart street waste bins	Over 60% of municipal waste will be reused or recycled	Reduce CO2 emissions by 16,000 tons over 2021	Improved quality of life Potential for new business opportunities and partnerships through circular schemes (e.g. used coffee grinds used as fertilizer for urban farms) Increased productivity of the private sector
	Social Innovation	Continue social innovations programs such as "Recyclables for Bus Tickets"			
	Learning & Capabilities	Continue to inform people on the benefits of recycling and on how to properly recycle			
	Governance & Policy	Continue and expand punitive measures for people that don't recycle, and incentives for those that do			
	Finance & Funding	Higher SWM taxes for people that don't recycle and lower taxes for those that do			
Green infrastructure & nature based solutions	Technology/ Infrastructure	Extension of "Green City" Program, through rehabilitation and/or extension of existing parks, development of new parks, planting at least 100,000 new trees.	98% of the city population within a 10 minute walk to a green or blue-green area	Abate 380 tons of CO2 emissions over 2021	Improve quality of life Reduce flight to suburbs by making existing neighborhoods more attractive Encourage more trips by foot and green transport

B-1.1: 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)**
					modes
	Technology/ Infrastructure	Continue and expand the development of blue-green corridors	The Someș River Blue-Green Corridor (with at least 75 km of bike and pedestrian paths) and other blue-green corridors developed	Reduce CO2 emissions by 2,650 tons over 2021	Improve quality of life Make commuting by bike and green micro-mobility options more attractive Reduce air pollution and congestion
	Technology/ Infrastructure	Introduce program for green roofs and facades for public and private buildings	At least 50 buildings with green roofs and facades	Reduce CO2 emissions by 175 tons over 2021	Improved quality of life Improved urban aesthetics
Built environment	Technology/ Infrastructure	Introduction of rehabilitation program for multi-apartment block neighborhoods, where 77% of people in the city live	Improved energy efficiency for at least 40,000 apartments, and public areas around apartment blocks rehabilitated to reduce car usage and make transport by foot, bike and public transport more attractive.	Reduce CO2 emissions by 70,000 tons over 2021	Improve quality of life Reduce energy bills Potentially generate additional sources of revenue from energy generation
	Governance & Policy	Continue and expand policies (e.g. urban planning regulations) that promote NZEB standards in new and existing residential buildings	Most new buildings built to NZEB standards, and at least 75% of housing units with improved energy performance	Reduce CO2 emissions by 53,000 tons over 2021	Strengthen community cohesion and collaboration
	Finance & Funding	Introduce incentives program (e.g. lower taxes, subsidies) for household associations that improve energy performance of their			Reduce flight to suburbs, by improving quality of life in existing

B-1.1: 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)**
		apartment blocks			
	Social Innovation	Facilitate social innovation initiatives that enable people to save energy costs and also reduce energy consumption	At least 2 social innovation initiatives that are adopted by the wider population		
	Learning & Capabilities	Introduce program for transfer of best-practices and innovative ways to save energy and energy costs, and expand communication and dissemination efforts on the climate neutrality agenda	At least two best-practices or innovations adopted by wider population, and at least 75% of the population aware of climate neutrality goals and actively engaged in climate neutrality efforts		neighborhoods
	Democracy/ Participation	Establishment of the Local NetZero Coalition	At least 5 civic imagination and innovation modelling initiatives started at the neighbourhood level, enhancing the capacity of communities to implement and monitor climate neutral policies at the neighbourhood level		Abate congestion and pollution from metropolitan commuting
	Technology/ Infrastructure	Continue and expand Energy Renovation of Public Buildings Program	At least 50 public buildings (e.g. nurseries, kindergartens, schools, administrative buildings) rehabilitated	Reduce CO2 emissions by 5,000 tons over 2021	Improve performance of public sector employees and quality of public services Reduce local budget energy costs
	Governance & Policy	Continue and expand policies (e.g. urban planning regulations) that promote NZEB standards in new and existing	At least 95% of the commercial building stock with improved energy performance, and	Reduce CO2 emissions by 39,000 tons over 2021	Increased productivity of private sector due to better quality of

B-1.1: 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)**
		commercial buildings, and the redevelopment of brownfields rather than green-field development	at least 3 major brownfield redevelopment projects undertaken in the city		working spaces
	Finance & Funding	Introduce incentives (e.g. lower taxes, easier permitting) for commercial buildings with improved energy performance and for brownfields redevelopment, and punitive measures for commercial buildings with poor energy performance and for green-field developments			
Organisational and Governance Innovation	Learning & Capabilities	The local ecosystem actors that can have a potential contribution to achieving climate neutrality mapped and audited in terms of relevant competencies. - knowledge and competence audits for at least 15 stakeholders -	The entire local ecosystem has been mapped and is capable of implementing and monitoring climate neutral policies	Reduce CO2 emissions by 3,400 tons over 2021	Improved effectiveness and efficiency of multi-level governance for climate neutrality Unlocked favourable systemic conditions for climate neutrality Capacitated local ecosystem Improved learning process and related outcomes Institutionalised systems for implementation and monitoring of climate neutral policies
Social and	Democracy /	Consumer survey applied	Innovative		Evidence-based

B-1.1: 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)**
Other Innovation	participation	among city residents to understand their perspectives and individual actions on climate neutrality - target of minimum 1,000 responses for the the surveys and minimum 20 interviews with condominium administrators and local business owners -	solutions for climate neutrality co-created and co-implemented by the local community - minimum 3 solutions co-developed-		substantiation of climate neutrality interventions Faster reduction of behavioral barriers that can hinder the climate neutrality journey
		Group for experimentation and simulation of local climate neutrality policies established within the local community - 1 experimentation and simulation group established -			Enhanced civic engagement and social innovation for climate neutrality Stronger local commitment and ownership of the the overall objectives at neighbourhood level Improved communication between stakeholders Strengthened community cohesion and collaboration
	Democracy / participation	NetZero Caravan organized in the local neighborhooods and suburbs	NetZero Caravan transformed into an environment that fosters debates and learning on topics		Enhanced contribution and adaptation of residents to climate neutrality

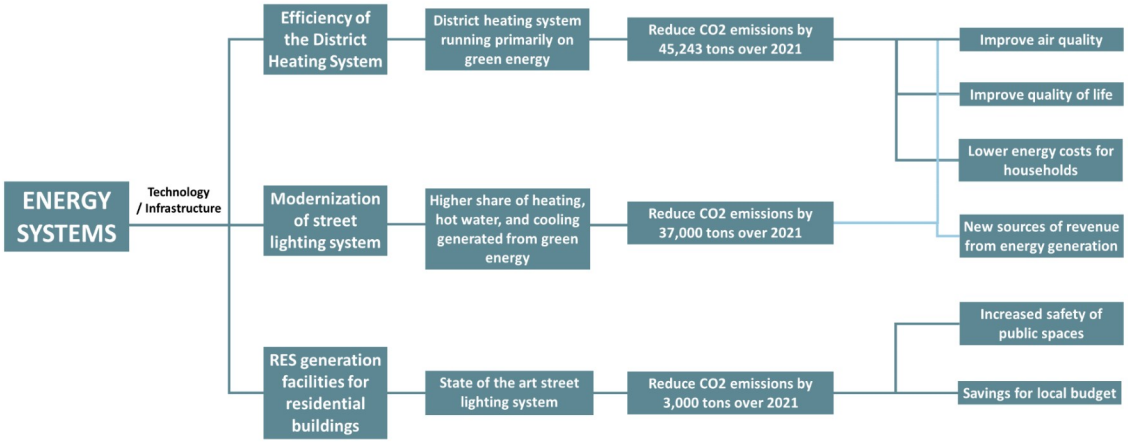
B-1.1: IMPACT PATHWAYS					
FIELDS OF ACTION	**SYSTEMIC LEVERS**	**EARLY CHANGES (1-2 YEARS)**	**LATE OUTCOMES (3-4 YEARS)**	**DIRECT IMPACTS (EMISSION REDUCTIONS)**	**INDIRECT IMPACTS (CO-BENEFITS)**
		- 4 meetings in neighbourhoods + 4 meetings in suburbs -	of climate neutrality, for all ages		Collective mindset directed towards achieving climate neutrality Integrated and coordinated efforts
	Governance & policy	Pilot set of comprehensive urban planning tools (1 urban regeneration masterplan, 1 zonal urban plan, 1 feasibility plan, 1 ToR model for nZEB building rehabilitation, 8 contests for international solutions for urban renewal interventions) for climate-neutral urban regeneration co-designed	Multi-apartment neighborhoods that have gone through extensive climate neutrality urban regeneration processes, based on the tools developed, together with new tools implemented (1 General Spatial Plan, 1 Zonal Urban Plan for climate-neutral districts) and incentives for their implementation	Reduce CO2 emissions by 63,000 tons over 2021	Planning framework for accelerating the transition to climate neutrality Reduced urban sprawl Improved quality of life and urban aesthetics Reduced air pollution and congestion Rehabilitated existing housing stock Energy cost reduction for households
Organisational and Governance Innovation	Governance & policy	Alternative governance models identified for condominiums in dense apartment-block neighborhoods	Proposal for update of local legislation on condominium management companies		Rehabilitation of existing stock is completed much faster

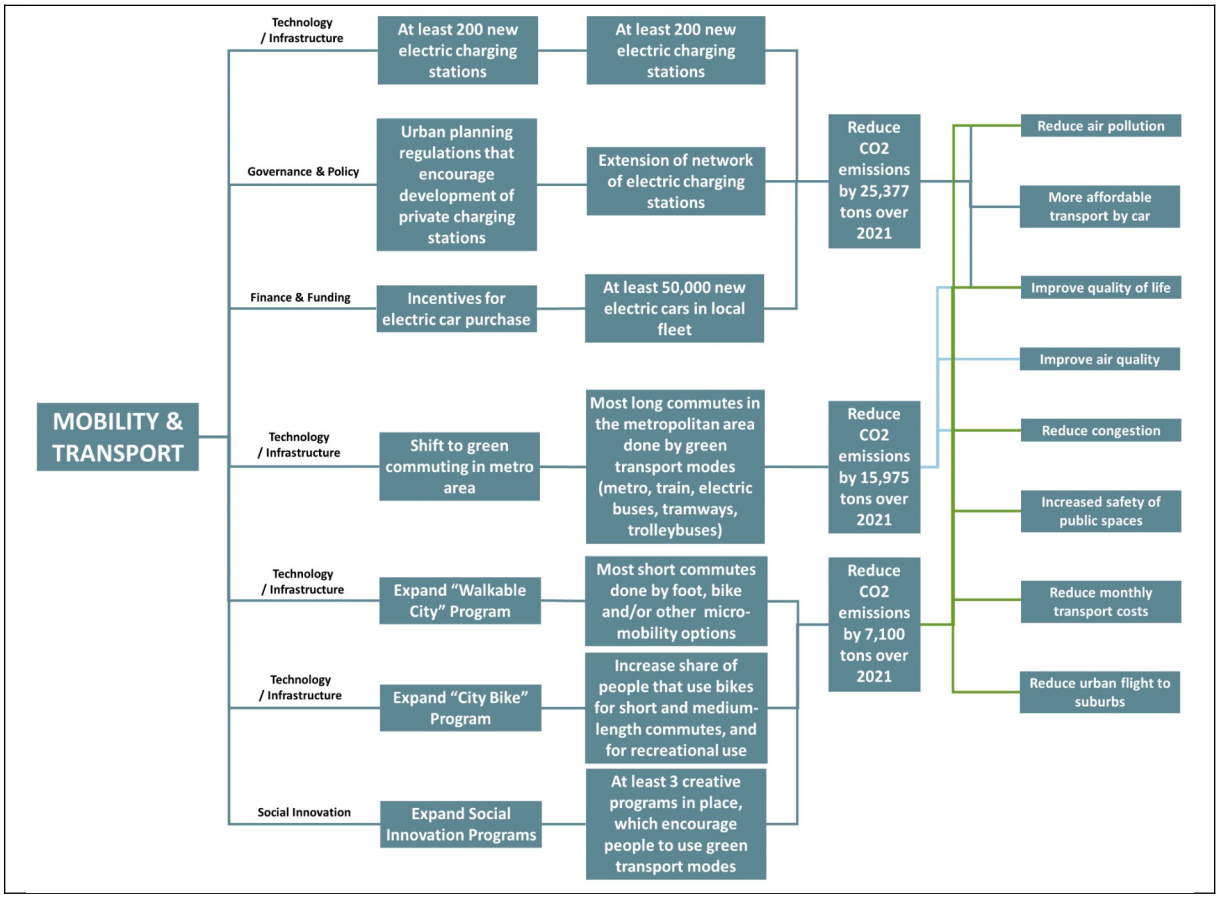
B-1.1: IMPACT PATHWAYS					
FIELDS OF ACTION	**SYSTEMIC LEVERS**	**EARLY CHANGES (1-2 YEARS)**	**LATE OUTCOMES (3-4 YEARS)**	**DIRECT IMPACTS (EMISSION REDUCTIONS)**	**INDIRECT IMPACTS (CO-BENEFITS)**
		- 1 comprehensive model for alternative governance in condominiums -	developed		Cost of interventions is significantly reduced Creative financing options are tapped Reduction of energy bills and CO2 emissions Condominiums earn a central role in implementing any climate-neutrality policies at neighborhood level
Social and Other Innovation Social and Other Innovation	Democracy / participation	Online and offline communication channels and tools dedicated to climate neutrality, set and implemented -informative materials disseminated monthly through the Coalition's members' online and offline communication channels -	Local and metropolitan community informed and educated about local aspects of climate neutrality, through informative materials, educational sources, awareness and promotion spots and activities	Reduce CO2 emissions by 13,600 tons over 2021	Stronger local commitment Ownership of the the overall objectives Improved visibility Increased civic awareness and involvement Better informed citizens Facilitated transfer of international

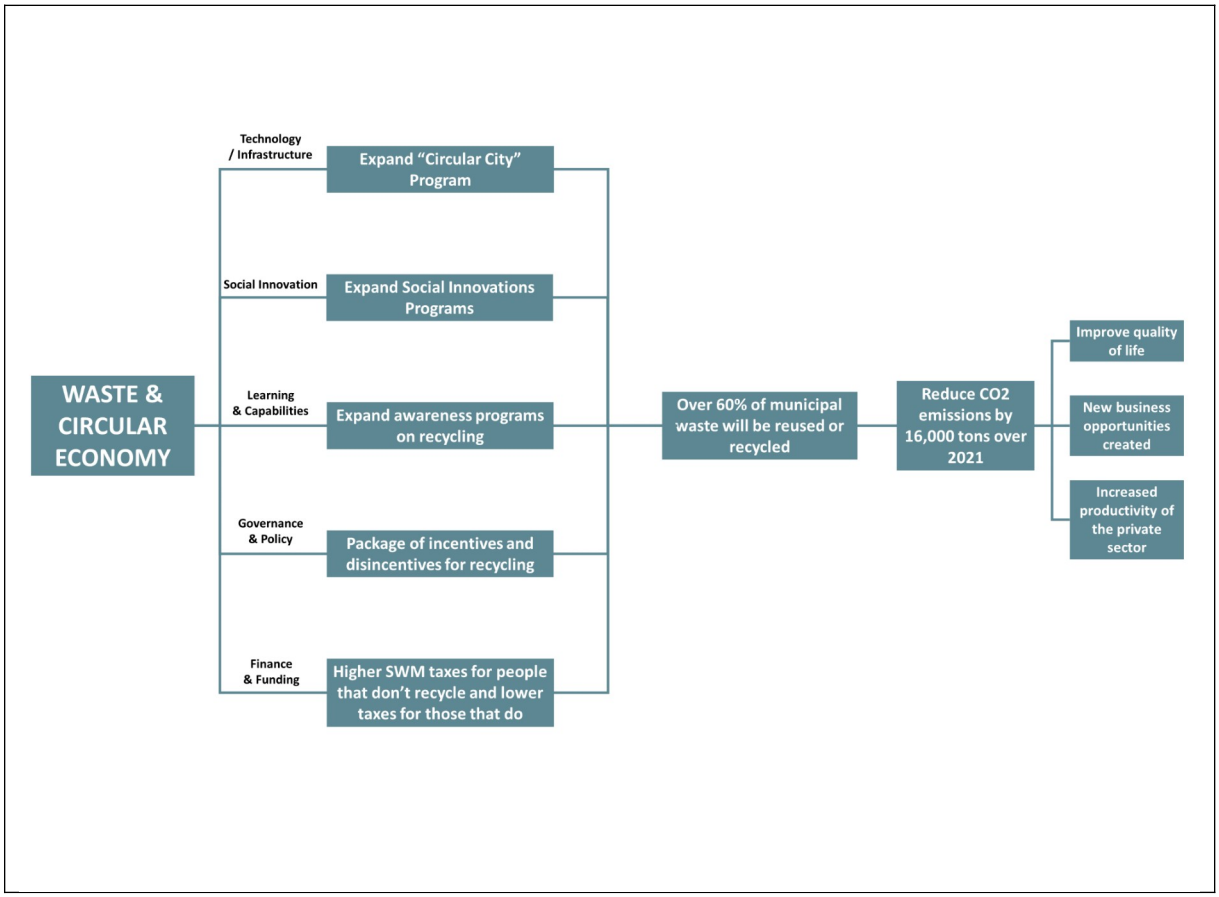
B-1.1: IMPACT PATHWAYS					
FIELDS OF ACTION	**SYSTEMIC LEVERS**	**EARLY CHANGES (1-2 YEARS)**	**LATE OUTCOMES (3-4 YEARS)**	**DIRECT IMPACTS (EMISSION REDUCTIONS)**	**INDIRECT IMPACTS (CO-BENEFITS)**
					know-how, experiences, lessons learned Stronger political, private and individual commitment
	Governance & policy	Digital twinning technical solution designed for climate neutrality - Climate Neutrality Digital Twin Proof of Concept (TRL3) -	Digital twinning technical solution for climate neutrality TRL 7 (to reach TRL 9 by 2030)		Real time adjustments to the proposals made, based on changing circumstances Increased innovation and technological progress Innovative, data-based decision-making process
Organisational and Governance Innovation	Democracy / participation	A new digital platform, in the form an interactive website is developed for communicating about the city's journey towards climate-neutrality	The website becomes the main communication platform for climate-neutrality matters and is managed by the local climate neutrality ecosystem		Behavioural change fostered through transparent and accessible communication Stronger local commitment and ownership of the climate neutrality objectives

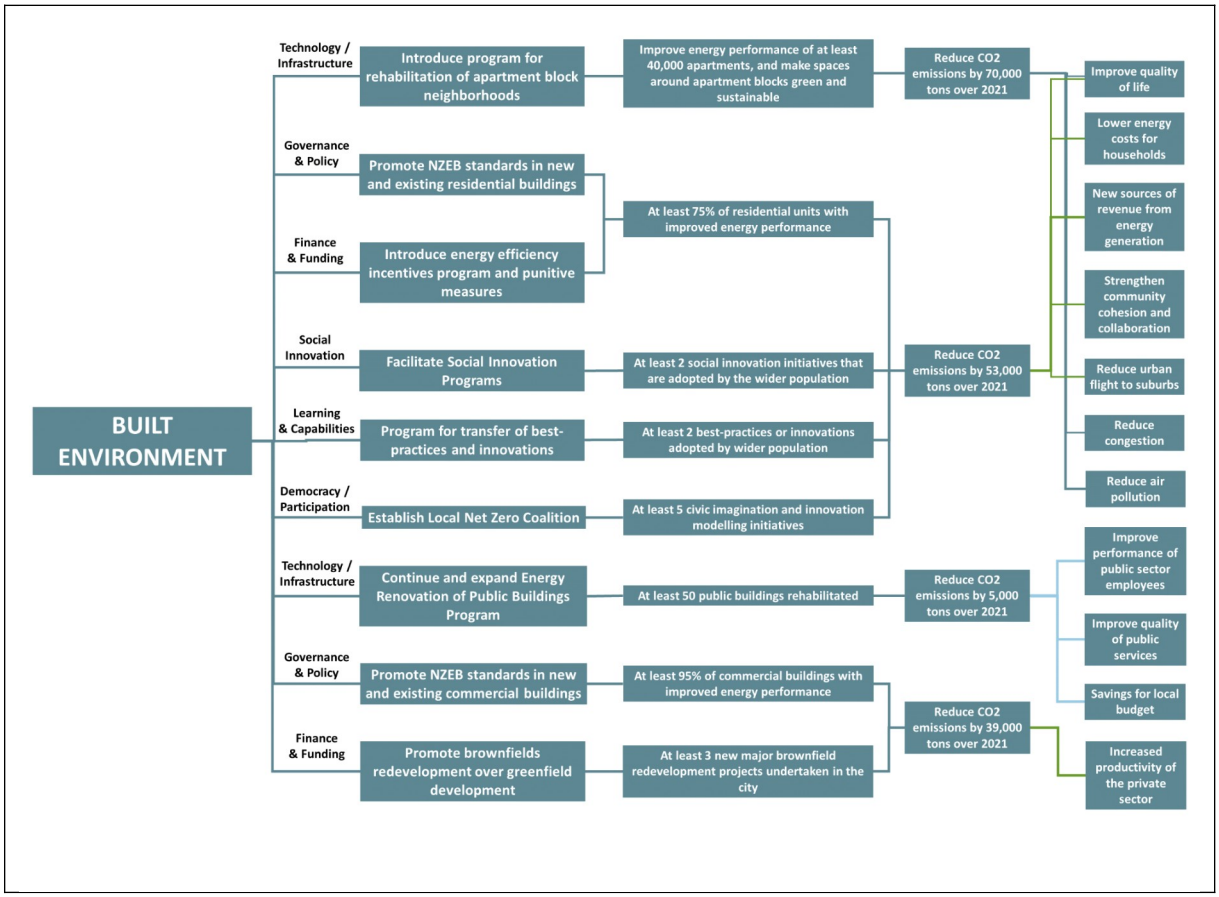
B-1.2: DESCRIPTION OF IMPACT PATHWAYS– TEXTUAL AND VISUAL ELEMENTS

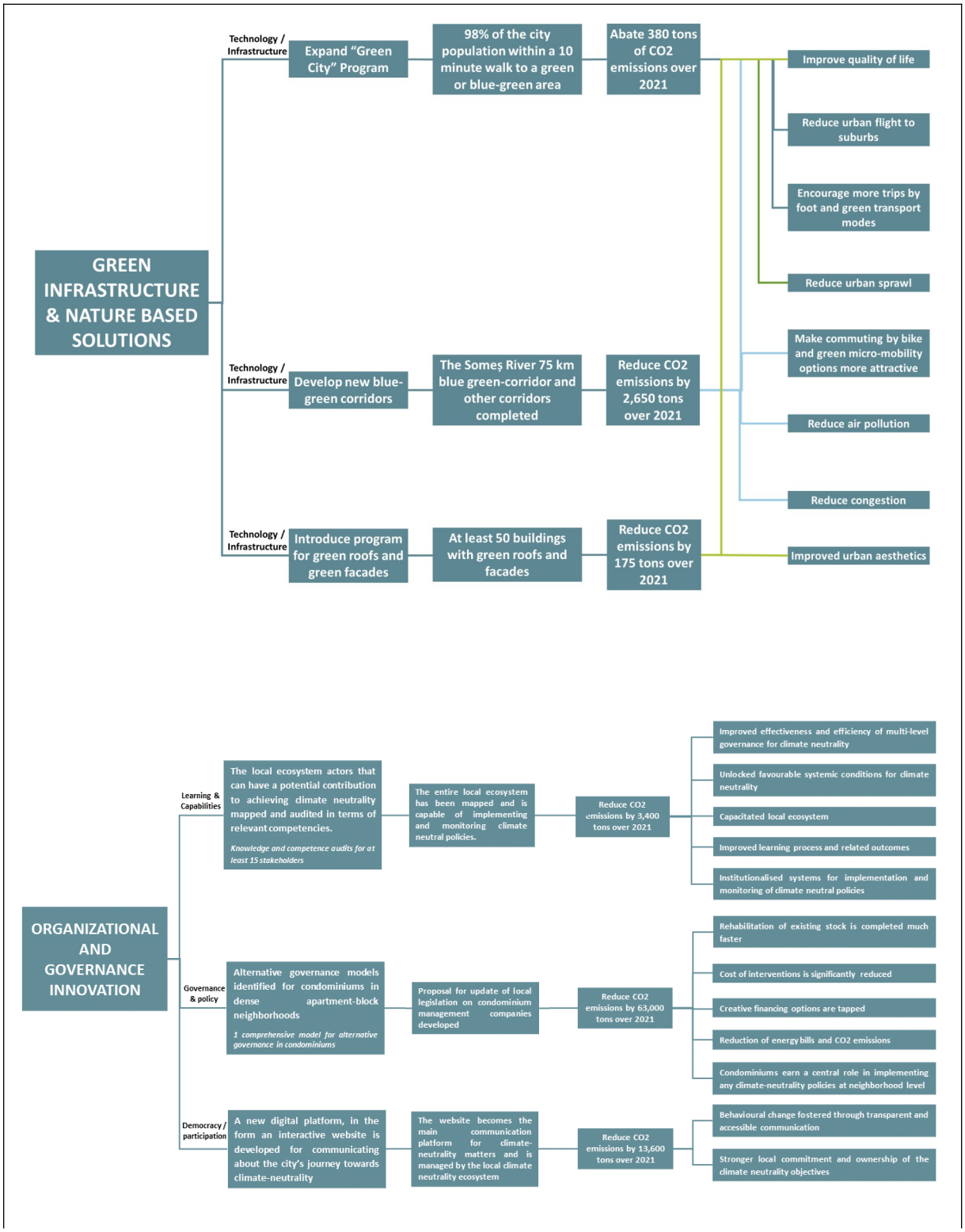
Figure 11 IMPACT PATHWAYS

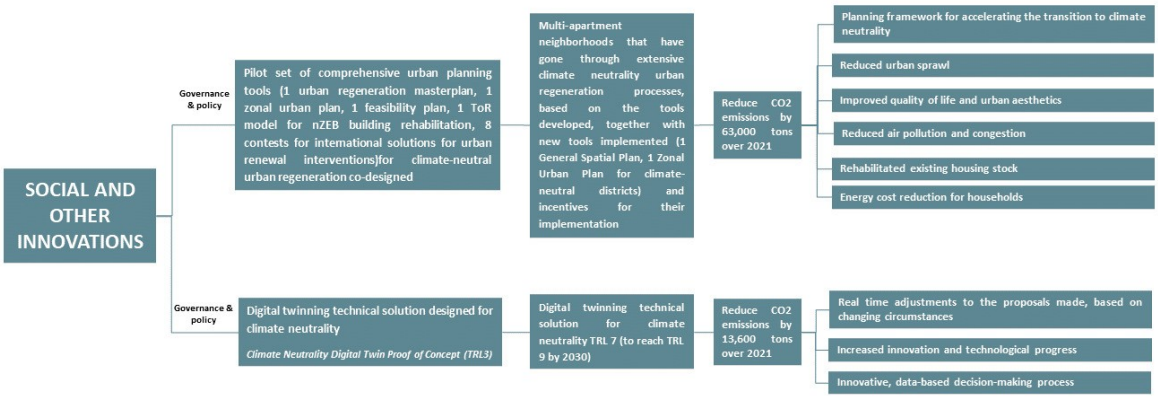



MOBILITY & TRANSPORT
Technology / Infrastructure
At least 200 new electric charging stations
At least 200 new electric charging stations
Governance & Policy
Urban planning regulations that encourage development of private charging stations
Extension of network of electric charging stations
Finance & Funding
Incentives for electric car purchase
At least 50,000 new electric cars in local fleet
Technology / Infrastructure
Shift to green commuting in metro area
Most long commutes in the metropolitan area done by green transport modes (metro, train, electric buses, tramways, trolleybuses)
Technology / Infrastructure
Expand "Walkable City" Program
Most short commutes done by foot, bike and/or other micro-mobility options
Technology / Infrastructure
Expand "City Bike" Program
Increase share of people that use bikes for short and medium-length commutes, and for recreational use
Social Innovation
Expand Social Innovation Programs
At least 3 creative programs in place, which encourage people to use green transport modes
Reduce CO2 emissions by 25,377 tons over 2021
Reduce CO2 emissions by 15,975 tons over 2021
Reduce CO2 emissions by 7,100 tons over 2021
Reduce air pollution
More affordable transport by car
Improve quality of life
Improve air quality
Reduce congestion
Increased safety of public spaces
Reduce monthly transport costs
Reduce urban flight to suburbs


WASTE & CIRCULAR ECONOMY
Technology / Infrastructure
Expand "Circular City" Program
Social Innovation
Expand Social Innovations Programs
Learning & Capabilities
Expand awareness programs on recycling
Governance & Policy
Package of incentives and disincentives for recycling
Finance & Funding
Higher SWM taxes for people that don't recycle and lower taxes for those that do
Over 60% of municipal waste will be reused or recycled
Reduce CO2 emissions by 16,000 tons over 2021
Improve quality of life
New business opportunities created
Increased productivity of the private sector


BUILT ENVIRONMENT
Technology / Infrastructure
Introduce program for rehabilitation of apartment block neighborhoods
Improve energy performance of at least 40,000 apartments, and make spaces around apartment blocks green and sustainable
Reduce CO2 emissions by 70,000 tons over 2021
Improve quality of life
Lower energy costs for households
Governance & Policy
Promote NZEB standards in new and existing residential buildings
Finance & Funding
Introduce energy efficiency incentives program and punitive measures
At least 75% of residential units with improved energy performance
New sources of revenue from energy generation
Strengthen community cohesion and collaboration
Social Innovation
Facilitate Social Innovation Programs
At least 2 social innovation initiatives that are adopted by the wider population
Reduce CO2 emissions by 53,000 tons over 2021
Reduce urban flight to suburbs
Learning & Capabilities
Program for transfer of best-practices and innovations
At least 2 best-practices or innovations adopted by wider population
Reduce congestion
Democracy / Participation
Establish Local Net Zero Coalition
At least 5 civic imagination and innovation modelling initiatives
Reduce air pollution
Technology / Infrastructure
Continue and expand Energy Renovation of Public Buildings Program
At least 50 public buildings rehabilitated
Reduce CO2 emissions by 5,000 tons over 2021
Improve performance of public sector employees
Improve quality of public services
Governance & Policy
Promote NZEB standards in new and existing commercial buildings
At least 95% of commercial buildings with improved energy performance
Savings for local budget
Finance & Funding
Promote brownfields redevelopment over greenfield development
At least 3 new major brownfield redevelopment projects undertaken in the city
Reduce CO2 emissions by 39,000 tons over 2021
Increased productivity of the private sector


GREEN INFRASTRUCTURE & NATURE BASED SOLUTIONS
Technology / Infrastructure
Expand "Green City" Program
98% of the city population within a 10 minute walk to a green or blue-green area
Abate 380 tons of CO2 emissions over 2021
Technology / Infrastructure
Develop new blue-green corridors
The Someș River 75 km blue green-corridor and other corridors completed
Reduce CO2 emissions by 2,650 tons over 2021
Technology / Infrastructure
Introduce program for green roofs and green facades
At least 50 buildings with green roofs and facades
Reduce CO2 emissions by 175 tons over 2021
Improve quality of life
Reduce urban flight to suburbs
Encourage more trips by foot and green transport modes
Reduce urban sprawl
Make commuting by bike and green micro-mobility options more attractive
Reduce air pollution
Reduce congestion
Improved urban aesthetics
ORGANIZATIONAL AND GOVERNANCE INNOVATION
Learning & Capabilities
The local ecosystem actors that can have a potential contribution to achieving climate neutrality mapped and audited in terms of relevant competencies.
Knowledge and competence audits for at least 15 stakeholders
The entire local ecosystem has been mapped and is capable of implementing and monitoring climate neutral policies.
Reduce CO2 emissions by 3,400 tons over 2021
Improved effectiveness and efficiency of multi-level governance for climate neutrality
Unlocked favourable systemic conditions for climate neutrality
Capacitated local ecosystem
Improved learning process and related outcomes
Institutionalised systems for implementation and monitoring of climate neutral policies
Governance & policy
Alternative governance models identified for condominiums in dense apartment-block neighborhoods
1 comprehensive model for alternative governance in condominiums
Proposal for update of local legislation on condominium management companies developed
Reduce CO2 emissions by 63,000 tons over 2021
Rehabilitation of existing stock is completed much faster
Cost of interventions is significantly reduced
Creative financing options are tapped
Reduction of energy bills and CO2 emissions
Condominiums earn a central role in implementing any climate-neutrality policies at neighborhood level
Democracy / participation
A new digital platform, in the form an interactive website is developed for communicating about the city's journey towards climate-neutrality
The website becomes the main communication platform for climate-neutrality matters and is managed by the local climate neutrality ecosystem
Reduce CO2 emissions by 13,600 tons over 2021
Behavioural change fostered through transparent and accessible communication
Stronger local commitment and ownership of the climate neutrality objectives



The **quantified effects of the impact pathways emerge from the indicators proposed for their measurement and evaluation**, which allow a clearer understanding of the generated systemic changes. Thus, the target values proposed in *Module B-3 Indicators for Monitoring, Evaluation and Learning*, together with their related metadata sheets, will allow us to properly evaluate the progress of the implemented actions and to study the status of our journey towards climate neutrality. In this way, we will be able to keep track of the created impact and to succeed in holding the entire Net

Zero City Coalition accountable for co-implementing and co-monitoring the sets of interventions related to each urban system. This approach does not limit to the local level but spans over the entire metropolitan area, as it can be seen from the sections of this Action Plan.

We cannot provide numerical estimates for all the co-benefits included in Impact Pathways due to their typology, but **below we present the quantification of the main co-benefits included in several Impact Pathways**. Until 2030, the following quantitative indicators of the co-benefits generated by the implementation of this Action Plan are estimated:

- Improved air quality: General Air Quality Index 20 (AQI)
- Improved quality of life: 75% of the population
- Lower energy costs for households: 75 euro per household per year saved, over 2022 baseline
- Increased safety of public spaces: 22% decrease in the crime rate
- Reduced local budget energy costs: 48 mil. euro
- Reduced congestion: 50 h time reduction in rush hour per year (TomTom)
- Reduced monthly transportation costs for households: 50 euro per household
- Reduced flight to suburbs: 18% per year
- Strengthen community cohesion and collaboration: 50 members in the Net Zero City Coalition
- Better informed citizens: 40% of the population aware of climate neutrality

The Module B-3 table, *Indicators for Monitoring, Evaluation and Learning,* provides a comprehensive breakdown of all the relevant actions for this plan. It describes the indicators and desired targets for each individual project.

This plan's actions are derived from the inventory of projects associated with the 2022-2030 Integrated Urban Development Strategy of the Cluj Metropolitan Area (IUDS CMA). These actions comprise both concrete and soft interventions specific to this plan. Also, the C-3.1 section, *Summary of interventions with cost implication from this document and the investment plan*, provides budgetary details for implementing these actions, while a summary of project timelines is available below:

ACTIONS TIMELINE		
FIELDS OF ACTION	**LIST OF ACTIONS**	**TIMELINE**
Energy systems	Efficient district heating and cooling in Cluj-Napoca	2023-2026
	Local (off-site) renewable energy generation and integrating RES into private and public buildings	2023-2030
	Energy-efficient public lighting	2023-2030
Mobility & transport	Major green public transport infrastructure and reduction of congestion in the city	2023-2026
	Promotion of large-scale use of Electric Vehicles	2023-2030
	Extension of Walkable City Program	2023-2026
	Extension of Cluj Bike Program	2023-2030
Waste & circular economy	Cluj Circular City	2023-2030

Green infrastructure & nature-based solutions	Extension of ”Green Cluj” Program	2023-2030
	Green-blue corridors	2023-2030
	Green roofs and facades for public and private buildings	2023-2030
Built environment	Integrated renovation of dense multi-apartment residential areas and their transition to climate neutral district	2023-2030
	Energy Renovation of Public Buildings	2023-2030
	Energy Efficiency of Commercial Buildings and brownfields redevelopment	2023-2030
Soft interventions	Cluj NetZero Coalition	2023-2030
	Improved local urban regulations and policies for achieving climate neutrality	2023-2030
	Communication, dissemination and scalability	2023-2030

4.2 Module B-2 Climate Neutrality Portfolio Design

B-2.1: DESCRIPTION OF ACTION PORTFOLIOS - TEXTUAL OR VISUAL		
FIELDS OF ACTION	**PORTFOLIO DESCRIPTION**	
	LIST OF ACTIONS	**DESCRIPTIONS**
Energy systems	1.1 Efficient district heating and cooling in Cluj-Napoca	Efficient district heating and cooling in Cluj-Napoca action refers to a cluster of actions, namely: improving the energy efficiency of existing plants by using the solar thermal system, air-to-water and water-to-water heat pumps, cogeneration engines and gas boilers natural, potentially combined with green hydrogen in the future, in about 19 power plants in the districts of Plopilor, Gheorgheni, Mănăștur, Zorilor, Grigorescu and in a central area.
	1.2 Local (off-site) renewable energy generation and integrating RES into private and public buildings	The action also refers to the rehabilitation of the transport and distribution networks of thermal energy in the city, as well as the establishment of 13 energy islands in the neighbourhoods of Gheorgheni, Mănăștur and Zorilor.
	1.3 Energy-efficient public lighting	The transformation of 3 thermal points into thermal plants and the reconfiguration of an area plant in the Mărăști neighborhood and the implementation of a pilot project in Timișului-Blajul neighborhood with positive energy, will also contribute to the

B-2.1: DESCRIPTION OF ACTION PORTFOLIOS - TEXTUAL OR VISUAL		
FIELDS OF ACTION	**PORTFOLIO DESCRIPTION**	
	LIST OF ACTIONS	**DESCRIPTIONS**
		efficiency of the heating and cooling system in Cluj-Napoca. All public buildings, 2,000 blocks of flats and 5,000 individual homes will be fitted with RES generation installations (solar panels and/or heat pumps). Equipping approx. 80% of the public (street, parks, food markets and other public facilities) lighting network with LED lamps, remote management and dimming systems.
Mobility & transport	2.1 Major green public transport infrastructure and reduction of congestion in the city 2.2 Promotion of large-scale use of Electric Vehicles 2.3 Extension of Walkable City Program 2.4 Extension of Cluj Bike Program	Phase 1 of the Cluj Metro Network: new metro line with 9 stations and a capacity of 15,000-20,000 passengers/hour/one way, that connects the eastern and western parts of the city with the central area; Cluj Metropolitan Train: 43 km of metropolitan railway with 23 stations, both in Cluj-Napoca and in the 5 suburbs with almost 50,000 residents; Phase I of the Cluj Metropolitan City Belt (Feleac T35 Road): includes 24 km of new city belt, 20 km of connecting roads and a large bikeway along the belt. The new roads will allow the deviation of transit outside the congested residential areas of the city 100% green public transportation fleet: the purchase of 200 electric / hybrid public transport vehicles (buses and trolleybuses); Smart public transport stations: the modernization of almost 90 stations equipped with green roofs, easy access for low mobility passengers, e-ticketing, LCD displays etc. Public transport dedicated lanes: at least 5 km of new dedicated lanes for buses and trolleybuses along congested streets. Extend by at least 200 the network of public electric charging

B-2.1: DESCRIPTION OF ACTION PORTFOLIOS - TEXTUAL OR VISUAL		
FIELDS OF ACTION	**PORTFOLIO DESCRIPTION**	
	LIST OF ACTIONS	**DESCRIPTIONS**
		stations. Extension of the network of private electric charging stations, by enforcing urban planning regulations: at least 300 new charging stations. Benefits for the residents purchasing electric vehicles (local taxes, subsidies (both national and local); parking discount and dedicated lots etc.) – at least 50,000 beneficiaries by 2030". Urban renewal of public spaces in both central area and neighborhoods to promote walking, cycling, sports, play, interactions between citizens, recreational and cultural activities – by transforming regular streets into residential low-speed ones: 14 Iulie (Grigorescu Neighborhood – 35,000 sqm); Karl Liebknecht (Iris Neighborhood - 23,000 sqm); Nicolae Bălcescu (Central Area – 30,000 sqm); Expo Transilvania (Mărăști Neighborhood – 70,000 sqm); Piața Mărăști (Mărăști Neighborhood - 40,000 sqm); Mănăștur, Morilor Channel (Mărăști Neighborhood), Piața 1 Mai. The expansion of the Cluj bicycle program includes a series of actions, namely: the expansion of the municipal bicycle tracks by at least 50 km until 2030 and the updating of the existing tracks with a low level of service, then the expansion of the public bike sharing system (minimum 20 new stations), including the purchase of new regular and electric bicycles (minimum 1,000) as well as expanding bicycle parking spaces (safe and energy-independent storage containers), especially in dense residential areas (minimum 100 containers).
Waste & circular economy	3.1 Cluj Circular City	Cluj Circular City involves the construction of at least 270 digitized eco-islands for the selective collection of household waste and packaging, which can be monitored by the town hall remotely, the construction of at least 2 centers for the collection of bulky and hazardous waste, including packaging for construction, as well as The installation of at least 100 new solar-powered smart street waste bins.

B-2.1: DESCRIPTION OF ACTION PORTFOLIOS - TEXTUAL OR VISUAL		
FIELDS OF ACTION	**PORTFOLIO DESCRIPTION**	
	LIST OF ACTIONS	**DESCRIPTIONS**
Green infrastructure & nature based solutions	4.1 Extension of "Green Cluj" Program	"Rehabilitation and/or extension of existing parks: Feroviarilor (5.3 ha); Armătura (3.2. ha); Lunca Someșului Mic (14.7 ha); Cetățuia (14.1 ha); Primăverii (1.9 ha); Canalul Morii – Plopilor (3.6 ha); Caragiale (0.5 ha), 14 Iulie (0.5 ha); Colina (10 ha); Aurel Vlaicu (10 ha). Creation of new parks: Parcul Est (54 ha); Borhanci (54.1 ha); Zorilor (1.2 ha); Bună Ziua (10.7 ha).
	4.2 Green-blue corridors	Tree planting: 100,000 new trees in public areas (streets, squares, courtyards of public institutions, parks etc.).
	4.3 Green roofs and facades for public and private buildings	The actions related to the Green-Blue corridors involve the development of 2 corridors, namely: the Someș Green-Blue Corridor involves 75 km of cycle paths along the Someș River Valley that connects Cluj-Napoca with three major suburbs (Gilău, Florești, Apahida) with over 80,000 inhabitants and the Canalul Morii Green-Blue Corridor. Green roofs and facades for public buildings: at least 20 by 2030. Support for green roofs and facades for private buildings: at least 50 by 2030.
Built environment	5.1 Integrated renovation of dense multi-apartment residential areas and their transition to climate neutral district 5.2 Energy Renovation of Public Buildings	The action involves the energy renovation of over 40,000 apartments in communal housing carried out with public and private funding, using a mix of coercive and supportive measures. It also involves integrated intervention for the public areas around the buildings with several renovated apartments: pilot masterplan for the Mănăștur District (80,000 inhabitants, 90% live in buildings with low energy efficiency built during the communist period) including interventions to reduce car consumption, promote walking and cycling, sports, separate collection and recycling of waste, increasing green spaces, interventions to reduce UHI, redevelopment of abandoned and underutilized public and private spaces, implementation of Smart City solutions, etc. – around the concept of City for Children.

B-2.1: DESCRIPTION OF ACTION PORTFOLIOS - TEXTUAL OR VISUAL		
FIELDS OF ACTION	**PORTFOLIO DESCRIPTION**	
	LIST OF ACTIONS	**DESCRIPTIONS**
	5.3 Energy Efficiency of Commercial Buildings and brownfields redevelopment	Energy renovation of 50 public buildings, especially nurseries, kindergartens, schools and high schools, but also administrative ones, especially by making use of the EU funding opportunities. Support for the redevelopment of at least 100 ha of brownfields that overlap UHIs into climate-friendly mixed-use areas, by using taxation and urban planning tools. Property tax reduction for at least 50 new commercial green buildings earning a green certification.

B-2.2: INDIVIDUAL ACTION OUTLINES		
INTERVENTIONS		
Action outline	Action name	**Efficient district heating and cooling in Cluj-Napoca**
	Action type	Technical interventions
	Action description	Efficient district heating and cooling in Cluj-Napoca action refers to a cluster of actions, namely: improving the energy efficiency of existing plants by using the solar thermal system, air-to-water and water-to-water heat pumps, cogeneration engines and gas boilers natural, potentially combined with green hydrogen in the future, in about 19 power plants in the districts of Plopilor, Gheorgheni, Mănăștur, Zorilor, Grigorescu and in a central area. The action also refers to the rehabilitation of the transport and distribution networks of thermal energy in the city, as well as the establishment of 13 energy islands in the neighbourhoods of Gheorgheni, Mănăștur and Zorilor. The transformation of 3 thermal points into thermal plants and the reconfiguration of an area plant in the Mărăști neighborhood and the implementation of a pilot project in Timișului-

		Blajul neighborhood with positive energy, will also contribute to the efficiency of the heating and cooling system in Cluj-Napoca.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	A District Heating System running primarily on green energy
Implementation	Responsible bodies/person for implementation	Municipality, Public Heating Service Operator, Energy Manager
	Action scale & addressed entities	Districts (the ones supplied with public central heating)
	Involved stakeholders	Municipality Cluj Napoca, Cluj-Napoca's Public Heating Company, Associations of home owners: The Federation of Home Owners' Associations Cluj-Napoca, North-West Regional Development Agency, Romanian Green Building Council, Servelect
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 316,701 MWh/year Natural gas: 67,193 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	45,243 tons CO2/year from Buildings
	Total costs and costs by CO2e unit	€ 352,000,000.00- total cost € 7,784/tone CO2

Action outline	Action name	**Local (off-site) renewable energy generation and integrating RES into private and public buildings**
	Action type	Technical intervention
	Action description	All public buildings, 2,000 blocks of flats and 5,000 individual homes will be fitted with RES generation installations (solar panels and/or heat pumps)
Reference to	Field of action	Energy systems
	Systemic lever	Technology/Infrastructure

impact pathway		
	Outcome (according to module B-1.1)	A higher share of heat, hot water, and cooling generated from green electricity.
Implementation	Responsible bodies/person for implementation	Municipality, Public Entities headquartered in targeted public buildings, Associations of house owners and citizens in targeted private buildings, Energy Manager, TREC
	Action scale & addressed entities	Buildings (both public - used for providing public services and private - residential ones)
	Involved stakeholders	Cluj Napoca Municipality, Cluj-Napoca's Public Heating Company, Associations of home owners: The Federation of Home Owners' Associations Cluj-Napoca, North-West Regional Development Agency, Romanian Green Building Council, Transylvania Energy Cluster, Servelect
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	477,087 MWh/year of green electrical energy
	Removed/substituted energy, volume or fuel type	Electrical energy: 259,000 MWh/year Natural gas: 54,950 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	37,000 tons CO2/year from Buildings
	Total costs and costs by CO2e unit	€ 144,000,000.00- total cost € 3,953/tone CO2

Action outline	Action name	**Energy-efficient public lighting**
	Action type	Technical intervention
	Action description	Equipping approx. 80% of the public (street, parks, food markets and other public facilities) lighting network with LED lamps, remote management and dimming systems.
Reference to impact pathway	Field of action	Energy systems
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	State of the art and energy efficient public lighting system
Implementation	Responsible bodies/person	Municipality and Public Lighting Service

	for implementation	Operator
	Action scale & addressed entities	Buildings (both public - used for providing public services and private - residential ones)
	Involved stakeholders	Cluj Napoca Municipality, Cluj-Napoca's Public Lighting Service Company, North-West Regional Development Agency, Servelect
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 30,000 MWh/year Natural gas: 4,455 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	3,000 tons CO2/year from Buildings
	Total costs and costs by CO2e unit	€ 13,000,000.00 - total cost € 4,366/tone CO2

Action outline	Action name	**Major green public transport infrastructure and reduction of congestion in the city**
	Action type	Technical intervention
	Action description	Phase 1 of the Cluj Metro Network: new metro line with 9 stations and a capacity of 15,000-20,000 passengers/hour/one way, that connects the eastern and western parts of the city with the central area; Cluj Metropolitan Train: 43 km of metropolitan railway with 23 stations, both in Cluj-Napoca and in the 5 suburbs with almost 50,000 residents; Phase I of the Cluj Metropolitan City Belt (Feleac T35 Road): includes 24 km of new city belt, 20 km of connecting roads and a large bikeway along the belt. The new roads will allow the deviation of transit outside the congested residential areas of the city 100% green public transportation fleet: the purchase of 200 electric / hybrid public transport vehicles (buses and trolleybuses); Smart public transport stations: the

		modernization of almost 90 stations equipped with green roofs, easy access for low mobility passengers, e-ticketing, LCD displays etc. Public transport dedicated lanes: at least 5 km of new dedicated lanes for buses and trolleybuses along congested streets.
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	Most long commutes in the metropolitan area are done by green transport modes (metro, metropolitan train, electric buses, tramways, trolleybuses).
Implementation	Responsible bodies/person for implementation	Municipality, Ministry of Transport, Public Transport Operator, Individual Citizens, Cluj County Council, National Railway Company
	Action scale & addressed entities	Metropolitan area
	Involved stakeholders	Cluj Napoca Municipality, Cluj County Council, Cluj Metropolitan IDA, Cluj-Napoca's Public Transport Company, Managing authority from Ministry of Transport, National Railway Company
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 86,607 MWh/Year GPL: 1,041 MWh/Year Diesel: 30,590 MWh/Year Gasoline: 29,241 MWh/Year Bio-fuel: 6,726 MWh/Year
	GHG emissions reduction estimate (total) per emission source sector	25,377 tons CO2/year from Transport
	Total costs and costs by CO2e unit	€ 4,351,000,000.00- total cost € 96,591/tone CO2

Action outline	Action name	**Promotion of large-scale use of Electric**

		Vehicles
	Action type	Technical intervention
	Action description	Extend by at least 200 the network of public electric charging stations. Extension of the network of private electric charging stations, by enforcing urban planning regulations: at least 300 new charging stations Benefits for the residents purchasing electric vehicles (local taxes, subsidies (both national and local); parking discount and dedicated lots etc.) – at least 50,000 beneficiaries by 2030
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	Key public areas made more attractive for electric cars. Extension of network of electric charging stations in neighbourhoods 50,000 new electric vehicles in local car fleet
Implementation	Responsible bodies/person for implementation	Municipality
	Action scale & addressed entities	City wide streets and districts (both commercial and residential ones)
	Involved stakeholders	Cluj Napoca Municipality, Cluj Metropolitan IDA, Cluj-Napoca's Public Transport Company, Local innovation ecosystem & Private sector, Romanian New Materials Cluster, Local NGOs that are active in the field of citizens engagement (eg. Sustainable Cluj NGO)
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 53,347 MWh/year GPL: 7,269 MWh/year Diesel: 25,843 MWh/year Gasoline: 25,301 MWh/year

		Bio-fuel: 1,500 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	15,000 tons CO2/year from Transport
	Total costs and costs by CO2e unit	€ 324,000,000.00- total cost € 270/tone CO2

Action outline	Action name	**Extension of Walkable City Program**
	Action type	Physical / spatial intervention
	Action description	Urban renewal of public spaces in both central area and neighborhoods to promote walking, cycling, sports, play, interactions between citizens, recreational and cultural activities – by transforming regular streets into residential low-speed ones: 14 Iulie (Grigorescu Neighborhood – 35,000 sqm); Karl Liebknecht (Iris Neighborhood - 23,000 sqm); Nicolae Bălcescu (Central Area – 30,000 sqm); Expo Transilvania (Mărăști Neighborhood – 70,000 sqm); Piața Mărăști (Mărăști Neighborhood - 40,000 sqm); Mănăștur, Morilor Channel (Mărăști Neighborhood), Piața 1 Mai
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	Most short commutes in the city are done by foot, bike or other green micro-mobility options.
Implementation	Responsible bodies/person for implementation	Municipality, Local NGOs that are active in the field of citizens engagement, active citizenship, community initiatives
	Action scale & addressed entities	Streets in both central area and city neighborhoods (especially Grigorescu, Iris, Mărăști and Mănăștur neighborhoods)
	Involved stakeholders	Cluj Napoca Municipality, Cluj-Napoca's Public Transport Company, Local innovation ecosystem & Private sector, TUCN, BBU, Local NGOs that are active in the field of citizens engagement
	Comments on implementation	N/A

Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 7,113 MWh/year GPL: 85 MWh/year Diesel: 2,512 MWh/year Gasoline: 2,402 MWh/year Bio-fuel: 552 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	2,000 tons CO2/year from Transport
	Total costs and costs by CO2e unit	€ 219,000,000.00 - total cost € 22,500/tone CO2

Action outline	Action name	**Extension of Cluj Bike Program**
	Action type	Physical / spatial intervention
	Action description	The expansion of the Cluj bicycle program includes a series of actions, namely: the expansion of the municipal bicycle tracks by at least 50 km until 2030 and the updating of the existing tracks with a low level of service, then the expansion of the public bike sharing system (minimum 20 new stations), including the purchase of new regular and electric bicycles (minimum 1,000) as well as expanding bicycle parking spaces (safe and energy-independent storage containers), especially in dense residential areas (minimum 100 containers).
Reference to impact pathway	Field of action	Mobility & transport
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	Increase share of people that use bikes for short and medium-length commutes, and for recreational use
Implementation	Responsible bodies/person for implementation	Municipality
	Action scale & addressed entities	City wide streets, especially in dense residential areas
	Involved stakeholders	Cluj Napoca Municipality, Cluj-Napoca's Public Transport Company, Local innovation

		ecosystem & Private sector, Local NGOs that are active in the field of citizens engagement
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 25,251 MWh/year GPL: 303 MWh/year Diesel: 8,919 MWh/year Gasoline: 8,525 MWh/year Bio-fuel: 1,961 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	7,100 tons CO2/year from Transport
	Total costs and costs by CO2e unit	€ 15,000,000.00 € 2,112/tone CO2

Action outline	Action name	**Cluj Circular City**
	Action type	Technical intervention
	Action description	Cluj Circular City involves the construction of at least 270 digitized eco-islands for the selective collection of household waste and packaging, which can be monitored by the town hall remotely, the construction of at least 2 centers for the collection of bulky and hazardous waste, including packaging for construction, as well as the installation of at least 100 new solar-powered smart street waste bins.
Reference to impact pathway	Field of action	Waste & circular economy
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	Over 60% of municipal waste will be reused or recycled
Implementation	Responsible bodies/person for implementation	Municipality
	Action scale & addressed entities	Residential districts and areas

	Involved stakeholders	Cluj Napoca Municipality, Cluj-Napoca's Waste Operator, 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, Transylvania IT Cluster
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 151,414 MWh/year Diesel 3,216
	GHG emissions reduction estimate (total) per emission source sector	16,000 tons CO2/year from Waste
	Total costs and costs by CO2e unit	€ 16,000,000.00 € 412/tone CO2

Action outline	Action name	**Extension of "Green Cluj" Program**
	Action type	Nature-based solution
	Action description	"Green Cluj" Program involves the rehabilitation and/or expansion of the existing parks: Feroviarilor (5.3 ha); Armătura (3.2. ha); Lunca Someșului Mic (14.7 ha); Cetățuia (14.1 ha); Primăverii (1.9 ha); Canalul Morii – Plopilor (3.6 ha); Caragiale (0.5 ha), 14 Iulie (0.5 ha); Colina (10 ha); Aurel Vlaicu (10 ha). Creation of new parks: Parcul Est (54 ha); Borhanci (54.1 ha); Zorilor (1.2 ha); Bună Ziua (10.7 ha), tree planting: 100,000 new trees in public areas (streets, squares, courtyards of public institutions, parks, etc.) Metropolitan Green Belt new metropolitan forest in the Cluj-Napoca Metropolitan Area is part of the "Green Cluj" Program
Reference to impact pathway	Field of action	Green infrastructure & nature based solutions
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	98% of the city population within a 10 minute

		walk to a green or blue-green area; At least 12,500 hectares of new green areas in the wider metropolitan zone
Implementation	Responsible bodies/person for implementation	Municipality, The Order of Romanian Architects (especially Transilvania branch) and their (inter)national partners, National Environmental Agency, UASVM, Association for Intercommunity Development CMA, Cluj County Council
	Action scale & addressed entities	All citizens within the metropolitan area
	Involved stakeholders	Cluj Napoca Municipality, Cluj County Council, Technical University of Cluj-Napoca (Faculties of Architecture, Transport, Energy), The Order of Romanian Architects (especially Transilvania branch) and their (inter)national partners, National Environmental Agency, University of Agronomic Sciences and Veterinary Medicine, Association for Intercommunity Development CMA, 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, Local innovation ecosystem & Private sector, Transylvania Energy Cluster, North-West Regional Development Agency.
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 1,140 MWh/year Diesel: 996 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	380 tons CO2/year from Agricultural, Forestry and Land Use
	Total costs and costs by CO2e unit	€ 195,000,000.00 € 511,843/tone CO2

Action outline	Action name	**Green-blue corridors**
	Action type	Nature-based solution

	Action description	The actions related to the Green-Blue corridors involve the development of 2 corridors, namely: the Someș Green-Blue Corridor involves 75 km of cycle paths along the Someș River Valley that connects Cluj-Napoca with three major suburbs (Gilău, Florești, Apahida) with over 80,000 inhabitants and the Canalul Morii Green-Blue Corrido.
Reference to impact pathway	Field of action	Green infrastructure & nature based solutions
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	The Someș River Blue-Green Corridor (with at least 75 km of bike and pedestrian paths) and other blue-green corridors developed
Implementation	Responsible bodies/person for implementation	Municipality, Association for Intercommunity Development CMA, Cluj County Council, suburbs' Public Administrations
	Action scale & addressed entities	Metropolitan area
	Involved stakeholders	Cluj Napoca Municipality, Cluj County Council, Technical University of Cluj-Napoca (Faculties of Architecture, Transport, Energy), The Order of Romanian Architects (especially Transilvania branch) and their (inter)national partners, National Environmental Agency, University of Agronomic Sciences and Veterinary Medicine, Association for Intercommunity Development CMA, 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, Local innovation ecosystem & Private sector, North-West Regional Development Agency
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 7,950 MWh/year Diesel: 6,948 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	2,650 tons CO2/year from Agricultural, Forestry and Land Use
	Total costs and costs by	€ 87,000,000.00 - total cost

	CO2e unit	€ 32,641/tone CO2

Action outline	Action name	**Green roofs and facades for public and private buildings**
	Action type	Nature-based solution
	Action description	Green roofs and facades for public buildings: at least 20 by 2030 Support for green roofs and facades for private buildings: at least 50 by 2030
Reference to impact pathway	Field of action	Green infrastructure & nature based solutions
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	At least 50 buildings with green roofs and facades
Implementation	Responsible bodies/person for implementation	Municipality, Public Entities headquartered in targeted public buildings, Associations of house owners and citizens in targeted private buildings
	Action scale & addressed entities	Buildings (both public - used for providing public services and private - residential ones)
	Involved stakeholders	Cluj Napoca Municipality, Cluj County Council, Associations of home owners: The Federation of Home Owners' Associations Cluj-Napoca, Technical University of Cluj-Napoca (Faculties of Architecture, Transport, Energy), The Order of Romanian Architects (especially Transilvania branch) and their (inter)national partners, National Environmental Agency, University of Agronomic Sciences and Veterinary Medicine, Association for Intercommunity Development CMA, 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, Local innovation ecosystem & Private sector, Transylvania Energy Cluster, North-West Regional Development Agency
	Comments on implementation	N/A
Impact & cost	Generated renewable energy	N/A

	(if applicable)	
	Removed/substituted energy, volume or fuel type	Electrical energy: 525 MWh/year Diesel: 459 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	175 tons CO2/year from Agricultural, Forestry and Land Use
	Total costs and costs by CO2e unit	€ 10,000,000.00 - total cost € 6,912,285/tone CO2

Action outline	Action name	**Integrated renovation of dense multi-apartment residential areas and their transition to climate-neutral district**
	Action type	Technical intervention
	Action description	The action involves the energy renovation of over 40,000 apartments in communal housing carried out with public and private funding, using a mix of coercive and supportive measures. It also involves integrated intervention for the public areas around the buildings with several renovated apartments: pilot masterplan for the Mănăștur District (80,000 inhabitants, 90% live in buildings with low energy efficiency built during the communist period) including interventions to reduce car consumption, promote walking and cycling, sports, separate collection and recycling of waste, increasing green spaces, interventions to reduce UHI, redevelopment of abandoned and underutilized public and private spaces, implementation of Smart City solutions, etc. – around the concept of City for Children.
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	Improved energy efficiency for at least 40,000 apartments, and public areas around apartment blocks rehabilitated to reduce car usage and make transport by foot, bike and public transport more attractive.
Implementation	Responsible bodies/person for implementation	Municipality, The Order of Romanian Architects (especially Transilvania branch) and their (inter)national partners, Associations of house owners and citizens in targeted private

		buildings, TUCN, BBU, TREC, TITC
	Action scale & addressed entities	Housing, blocks, public area in the Mănăștur Quarter
	Involved stakeholders	Cluj Napoca Municipality , Cluj-Napoca's Public Heating Company, Associations of home owners: The Federation of Home Owners' Associations Cluj-Napoca, North-West Regional Development Agency, Romanian Green Building Council, Servelect, Transylvania Energy Cluster, North-West Regional Development Agency
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 228,054 MWh/year Natural gas: 233,636 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	70,000 tons CO2/year from Buildings
	Total costs and costs by CO2e unit	€ 180,000,000.00 - total cost € 428/tone CO2

Action outline	Action name	**Energy Renovation of Public Buildings**
	Action type	Technical intervention
	Action description	Energy renovation of 50 public buildings, especially nurseries, kindergartens, schools and high schools, but also administrative ones, especially by making use of the EU funding opportunities.
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	At least 50 public buildings (e.g. nurseries, kindergartens, schools, administrative buildings) rehabilitated
Implementation	Responsible bodies/person for implementation	Municipality, Public Entities headquartered in targeted public buildings, Energy Manager
	Action scale & addressed entities	Public buildings

	Involved stakeholders	Cluj Napoca Municipality , Cluj-Napoca's Public Heating Company, Public Entities headquartered in targeted public buildings, North-West Regional Development Agency, Romanian Green Building Council, Transylvania Energy Cluster, North-West Regional Development Agency, Technical University of Cluj-Napoca (Faculties of Architecture, Transport, Energy), The Order of Romanian Architects (especially Transilvania branch) and their (inter)national partners, National Environmental Agency, Association for Intercommunity Development CMA
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 16,290 MWh/year Natural gas: 16,688 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	5,000 tons CO2/year from Buildings
	Total costs and costs by CO2e unit	€ 90,00,000.00 - total cost € 52,260/tone CO2

Action outline	Action name	**Energy Efficiency of Commercial Buildings and brownfields redevelopment**
	Action type	Technical intervention
	Action description	Support for the redevelopment of at least 100 ha of brownfields that overlap UHIs into climate-friendly mixed-use areas, by using taxation and urban planning tools Property tax reduction for at least 50 new commercial green buildings earning a green certification.
Reference to impact pathway	Field of action	Built environment
	Systemic lever	Technology/Infrastructure
	Outcome (according to module B-1.1)	At least 95% of the commercial building stock with improved energy performance, and at least 3 major brownfield redevelopment projects undertaken in the city

Implementation	Responsible bodies/person for implementation	Municipality
	Action scale & addressed entities	Brownfield areas
	Involved stakeholders	Cluj Napoca Municipality , Cluj-Napoca's Public Heating Company, Public Entities headquartered in targeted public buildings, Associations of home owners: The Federation of Home Owners' Associations Cluj-Napoca, North-West Regional Development Agency, Romanian Green Building Council, Romanian New Materials Cluster, Transylvania Energy Cluster, North-West Regional Development Agency, Technical University of Cluj-Napoca (Faculties of Architecture, Transport, Energy), National Environmental Agency, University of Agronomic Sciences and Veterinary Medicine, Association for Intercommunity Development CMA, 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, Local innovation ecosystem & Private sector
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 39,095 MWh/year Natural gas: 40,052 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	12,000 tons CO2/year from Buildings
	Total costs and costs by CO2e unit	€ 81,000,000.00- total cost € 41/tone CO2

Action outline	Action name	**Cluj NetZeroCoalition**
	Action type	Other interventions
	Action description	Behavioral, perception and modelling analysis on the individual adaptation of residents & businesses to climate neutrality Knowledge & Competence audit of the local

		climate neutrality ecosystem Civic imagination & Innovation modelling for climate neutrality at neighborhood level Enhancing the capacity of the ecosystem to implement and monitor climate neutral policies at neighborhood level: NZC Champs Campaign; skills upgrading package for ecosystem representatives, building administrators; study visits & exchange of good practices Enhancing the contribution an adaptation of residents to climate neutrality; NetZeroCaravan in neighbourhoods and suburbs (3)
Reference to impact pathway	Field of action	Soft interventions
	Systemic lever	Democracy/Participation
	Outcome (according to module B-1.1)	At least 5 civic imagination and innovation modelling initiatives started at the neighborhood level, enhancing the capacity of communities to implement and monitor climate neutral policies at the neighborhood level.
Implementation	Responsible bodies/person for implementation	All stakeholders foreseen for the NZC Action Plan implementation
	Action scale & addressed entities	City wide
	Involved stakeholders	All the stakeholders involved in implementing the NZC Action Plan
	Comments on implementation	N/A
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 11,077 MWh/year Natural gas: 11,348 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	3,400 tons CO2/year from Buildings
	Total costs and costs by CO2e unit	€ 1.000,000.00 - total cost € 73/tone CO2

Action outline	Action name	**Improved local urban regulations and**

		policies for achieving climate neutrality
	Action type	Other interventions
	Action description	Comprehensive climate-neutrality masterplan for each dense multi-apartment neighborhood and suburbs Detailed proposals for transforming different areas in each neighborhood/suburb into climate neutral demo district Terms of Reference for the renovation of private and public buildings in line with the nZEB principles, but also with other local priorities (eg. extending the average living area of the apartaments or the capacity of schools) Defining a set of urban planning principles for climate neutral interventions in high density multi-apartment neighbourhoods Defining a set of urban planning principles for climate neutral interventions in high density multi-apartment neighbourhoods Update of the local urban planning regulations to foster climate neutrality transition New governance models for condominiums and their integration into the local climate neutrality ecosystem.
Reference to impact pathway	Field of action	Soft interventions
	Systemic lever	Governance & Policy
	Outcome (according to module B-1.1)	At least 95% of the commercial building stock with improved energy performance, and at least 3 major brownfield redevelopment projects undertaken in the city
Implementation	Responsible bodies/person for implementation	All stakeholders foreseen for the NZC Action Plan implementation
	Action scale & addressed entities	City-wide multi-apartment neighborhoods & suburbs and buildings
	Involved stakeholders	All the stakeholders involved in implementing the NZC Action Plan.
	Comments on implementation	N/A

Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy, volume or fuel type	Electrical energy: 205,249 MWh/year Natural gas: 210,273 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	63,000 tons CO2/year from Buildings
	Total costs and costs by CO2e unit	€ 10,000,000.00 - total cost € 72/tone CO2

Action outline	Action name	**Communication, dissemination and scalability**
	Action type	Other interventions
	Action description	Digital platform – an interactive website managed by the local climate neutrality ecosystem Social & Mass Media coverage International Climate Neutrality Summit in 2025 Climate Neutrality Digital Twin - to collect, visualise, monitor and forecast social and natural behaviours and environments relevant for the climate transition of the city.(1)
Reference to impact pathway	Field of action	Soft interventions
	Systemic lever	Democracy/Participation
	Outcome (according to module B-1.1)	At least two best-practices or innovations adopted by wider population, and at least 75% of the population aware of climate neutrality goals and actively engaged in climate neutrality efforts.
Implementation	Responsible bodies/person for implementation	All stakeholders foreseen for the NZC Action Plan implementation
	Action scale & addressed entities	City-wide multi-apartment neighborhoods & suburbs and buildings
	Involved stakeholders	All the stakeholders involved in implementing the NZC Action Plan.
Impact & cost	Generated renewable energy (if applicable)	N/A
	Removed/substituted energy,	Electrical energy: 44,308 MWh/year

	volume or fuel type	Natural gas: 45,392 MWh/year
	GHG emissions reduction estimate (total) per emission source sector	200 tons CO2/year from Buildings
	Total costs and costs by CO2e unit	€ 2,000,000.00 - total cost € 8/tone CO2

B-2.3: SUMMARY STRATEGY FOR RESIDUAL EMISSIONS

Total emissions that are not accounted for in this Action Plan: 217,466 tons CO2/year (18.63%)

The proposed interventions included in the Action Plan reflect the city's priority actions to achieving climate neutrality. In drafting the Action Plan, we decided to take a pragmatic approach in evaluating the implementation capacity of the Municipality, particularly for the interventions for which it is directly accountable. At the same time, we will strive to go beyond the proposed interventions in order to reduce the emissions that are not accounted for in this Action Plan by encouraging the involvement of the private sector and exploring the possibility to implement additional interventions included in other local plans or strategies.

The Net-Zero City Action Plan brings together all major interventions planned by the Municipality to achieve climate neutrality by 2030. The activities and proposals described in this plan include priority projects from local strategies and were estimated to reduce CO2 emissions to a target of 81,37%. **Offsetting measures are already included in the current Action Plan, as the proposed interventions include major carbon sink projects** (rehabilitation and/or expansion of the existing parks, planting of 100,000 trees, metropolitan green belt), with an offsetting effect that was accounted for in the 81,37% target.

Considering that achieving climate-neutrality is a whole-society effort, private companies will be a close partner on the path to climate neutrality, both as sources of technological innovations, but also as agents of change - through implementing ESG and carbon neutrality strategies and encouraging the transition to a sustainable lifestyle for their clients and employees. The mobilisation of private resources is required for financing the interventions included in the Action Plan towards the 81,37% target, and the Net Zero Coalition will use this momentum to engage the private sector in completely neutralising GHG emissions, with **a contribution of up to 15% of the emissions that are not accounted for in this Action Plan.**

In this sense, it is worth noting that the Municipality has a close partnership with clusters in the city and is also a member of the Transylvania Energy Cluster (TREC), together with over 20 companies from the energy sector. For example, the cluster is implementing an innovative project to test the energy efficiency of photovoltaic panels and modern wind energy installations and is involved in preparing the development of the first research hub for hydrogen-based mobility in Romania,

together with a major local private company.

At the same time, other activities and proposals that are not included in this plan, but are proposed in the different strategies analysed may further contribute to the reduction in CO2 emissions. The total estimated CO2 reduction of these projects exceeds the **217,466 tons CO2/year residual emission value.** Therefore, actions described in this Plan will be prioritised, and further proposals included in existing plans and strategies are expected to contribute towards the reduction of emissions that are not accounted for in this Action Plan **estimated at 18,63%**, **by up to 5%**. These possible additional measures are detailed below.

Buildings - remaining emissions after implementation of proposed actions: 15,158 tons CO2/year

The Integrated Plan for Air Quality 2020-2024 recommends measures to improve energy efficiency of existing and upcoming public and private buildings, with regards to technology, construction materials, and municipal regulations, all with the intention of reducing emissions from the Buildings sector. The District Heating Strategy 2021-2030 takes further steps to decrease CO2 emissions from this sector. The solutions proposed in this strategy are geared towards increasing the energy efficiency of buildings, modernising existing heating infrastructure, and promoting the adoption of the nZEB principle in all new buildings. Other ideas put forth in the strategy centre around a greater utilisation of renewable energy sources, biomass, heat storage technology, heat pumps, cogeneration infrastructures, carbon capture and storage technologies, and energy islands. Moreover, the plan pays special attention to the soft interventions necessary for achieving behaviour change among citizens. Additional similar interventions are detailed in the Integrated Urban Development Strategy. The activities described in section A-1.3 for this sector are integrated into the plans mentioned above. Meanwhile, the other interventions that are not a part of this plan will reduce the emissions related to this sector that are not accounted for in this plan.

Transport - remaining emissions after implementation of proposed actions: 44,183 tons CO2/year

The projects proposed for the "Do Minimum" Scenario of the Urban Mobility Plan for Cluj-Napoca 2021-2030 aim to promote velo mobility by developing new urban mobility corridors, modernise and decarbonize public transport, and promote the use of electric vehicles of varying sizes for private and commercial transportation. Moreover, initiatives in the same scenario attempt to reduce traffic inside the city limits by constructing new transportation infrastructure and by implementing new local public policies that encourage inhabitants to embrace a more climate-neutral lifestyle. Even though many of the actions outlined in this plan are already included in the Urban Mobility Plan, the remaining suggested projects for the "Do Minimum" scenario are more than sufficient to reduce the remaining emissions.

In addition to this, the Integrated Plan for Air Quality 2020-2024 and the Integrated Urban Development Strategy propose additional measures to improve the quality of public transport and encourage the use of public transport, to better manage private and commercial traffic, to develop large infrastructure projects, to impose traffic restrictions in certain areas, and to develop new velo infrastructure, which will ultimately contribute to an even greater reduction of CO2 emissions associated with transportation.

Waste - remaining emissions after implementation of proposed actions: 10,868 tons CO2/year

The Integrated Urban Development Strategy for Cluj-Napoca proposes targeted measures to decrease CO2 emissions from the waste sector that will directly impact the local community. Projects such as the completion of the region's integrated waste management system, increased selective waste collection capability, and improved understanding of the waste hierarchy among citizens are all essential components of this plan. Furthermore, the Digital Transformation Strategy sets out strategies to grant citizens easier access to real-time information about public services, including waste management, and technologies that will enhance waste collection, personal accountability, and overall waste management efficiency. These measures are likely to further reduce emissions stemming from this sector.

IPPU - remaining emissions after estimated 2030 energy requirements conversion: 145,089 tons CO2/year

Interventions regarding the IPPU sector were not included in this plan. However, measures to promote a climate neutral behaviour and early access to education and technology, will boost the local innovation capacity, which, in turn, will have a positive influence on the culture, heritage, creative, and manufacturing industries. This will lead to decreased CO2 emissions associated with the industrial processes and product use sector. The Integrated Urban Development Strategy of Cluj-Napoca proposes concrete solutions and interventions for sustainable economic growth that are expected to contribute to CO2 reduction in this sector.

AFOLU - remaining emissions after implementation of proposed actions: 2,168 tons CO2/year

The Integrated Urban Development Strategy sets forth measures to promote economic efficiency of local markets and sustainable production of local goods, enhance land use, and emphasise sustainable development and conservation of green spaces. Similar measures can be found in the Integrated Plan for Air Quality 2020-2024 and the Urban Mobility Plan for Cluj-Napoca 2021-2030, which if implemented will likely decrease remaining emissions even more.

4.3 Module B-3 Indicators for Monitoring, Evaluation and Learning

B-3.1: IMPACT PATHWAYS							
OUTCOMES / IMPACTS ADDRESSED	**ACTION/ PROJECT**	**INDICATOR NO. (UNIQUE IDENTIFIED)**	**INDICATOR NAME**		**TARGET VALUES**		
					2025	2027	2030
Reduction of CO2 emissions from 2022 baseline	All actions in the Action Plan	CJ-NZC-I1	CO2 Emissions		20%	50%	81.4%
Percent of daily trips done by public transport and/or non-motorized means	2.1 Major green public transport infrastructure and reduction of congestion in the city 2.2 Promotion of large-scale use of Electric Vehicles 2.3 Extension of Walkable City Program 2.4 Extension of Cluj Bike Program 4.2 Green-blue corridors	CJ-NZC-I2	Modal Share		62%	65%	70%
Hectares of green spaces	2.3 Extension of Walkable City Program 3.1 Cluj Circular City 4.1 Extension of ”Green Cluj” Program 4.2 Green-blue corridors 4.3 Green roofs and	CJ-NZC-I3	Green Spaces		850 ha	900 ha	1014 ha

B-3.1: IMPACT PATHWAYS							
OUTCOMES / IMPACTS ADDRESSED	**ACTION/ PROJECT**	**INDICATOR NO. (UNIQUE IDENTIFIED)**	**INDICATOR NAME**		**TARGET VALUES**		
	facades for public and private buildings						
General Air Quality Index	All actions included in the Action Plan	CJ-NZC-I4	Air Quality		30 (AQI)	26 (AQI)	20 (AQI)
Percent of people fully satisfied to be living in the city	All actions included in the Action Plan	CJ-NZC-I5	Quality of Life		60%	65%	75%
Euro per household per year saved over 2022 baseline	1.1 Efficient district heating and cooling in Cluj-Napoca 1.2 Local (off-site) renewable energy generation and integrating RES into private and public buildings 2.1 Major green public transport infrastructure and reduction of congestion in the city 2.3 Extension of Walkable City Program 2.4 Extension of Cluj Bike Program 3.1 Cluj Circular City 5.1 Integrated renovation of dense multi-apartment residential areas and their transition to climate neutral district	CJ-NZC-I6	Household Savings		165 Euro	125 Euro	75 Euro

B-3.1: IMPACT PATHWAYS							
OUTCOMES / IMPACTS ADDRESSED	**ACTION/ PROJECT**	**INDICATOR NO. (UNIQUE IDENTIFIED)**	**INDICATOR NAME**		**TARGET VALUES**		
Euro spent by Municipality for Energy and Fuel	1.1 Efficient district heating and cooling in Cluj-Napoca 1.2 Local (off-site) renewable energy generation and integrating RES into private and public buildings 1.3 Energy-efficient public lighting 2.1 Major green public transport infrastructure and reduction of congestion in the city 2.2 Promotion of large-scale use of Electric Vehicles 3.1 Cluj Circular City 4.3 Green roofs and facades for public and private buildings 5.2 Energy Renovation of Public Buildings	CJ-NZC-I7	Public Sector Savings		EUR 9.5 mil.	EUR 8 mil.	EUR 5 mil.

B-3.2: INDICATOR METADATA	
(for each indicator selected – take from Comprehensive Indicator Sets)	
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
Indicator Context	
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)?	no
If yes, which co-benefit does it measure?	N/A
Can the indicator be used for monitoring impact pathways?	yes
If yes, which NZC impact pathway is it relevant for?	CJ-NZC-I1
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	Comprehensive monitoring reports.
Expected availability	Data will be difficult to collect, but a clear baseline is already in place.
Suggested collection interval	Bi-annually
References	
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

B-3.2: INDICATOR METADATA	
(for each indicator selected – take from Comprehensive Indicator Sets)	
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	Detailed traffic study.
Indicator Context	
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?	Reduction in CO2 emissions; Improvement in Air Quality; Improvement in Quality of Life; Lower Energy Costs for Households.
Can the indicator be used for monitoring impact pathways?	yes
If yes, which NZC impact pathway is it relevant for?	CJ-NZC-I2
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	Comprehensive traffic study.
Expected availability	Data will be difficult to collect, but a clear baseline is already in place.
Suggested collection interval	Every 5 years
References	
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

B-3.2: INDICATOR METADATA	
(for each indicator selected – take from Comprehensive Indicator Sets)	
Indicator Name	Surface of green spaces
Indicator Unit	Hectares

Definition	Increase in area covered with green spaces
Calculation	Data extracted from online and freely available land use databases (e.g. CORINE Land Cover)
Indicator Context	
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?	Reduction in CO2 emissions; Improvement in Air Quality; Improvement in Quality of Life.
Can the indicator be used for monitoring impact pathways?	yes
If yes, which NZC impact pathway is it relevant for?	CJ-NZC-I3
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	CORINE Land Cover, or other available open-source land use data base.
Expected availability	Data easily available and updated regularly.
Suggested collection interval	Bi-annually
References	
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

B-3.2: INDICATOR METADATA	
(for each indicator selected – take from Comprehensive Indicator Sets)	
Indicator Name	Air Quality
Indicator Unit	Hectares
Definition	General Air Quality Index

Calculation	Composite index prepared by the Romanian National Air Quality Monitoring Network (calitateaer.ro)
Indicator Context	
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?	Improvement in Quality of Life
Can the indicator be used for monitoring impact pathways?	yes
If yes, which NZC impact pathway is it relevant for?	CJ-NZC-I4
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	Web platform calitateaer.ro
Expected availability	Daily
Suggested collection interval	Annually
References	
Deliverables describing the indicator	Composite air quality index
Other indicator systems using this indicator	Romania Urban Policy Indicators

B-3.2: INDICATOR METADATA	
(for each indicator selected – take from Comprehensive Indicator Sets)	
Indicator Name	Quality of Life
Indicator Unit	Percent
Definition	Share of people fully satisfied to be living in the city
Calculation	Urban Barometer

Indicator Context	
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?	Reduction in CO2 emissions; Improvement in Air Quality; Lower Energy Costs for Households.
Can the indicator be used for monitoring impact pathways?	yes
If yes, which NZC impact pathway is it relevant for?	CJ-NZC-I5
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	Urban Barometer – undertaken regularly by EuroStat and by the Romanian Ministry of Development, Public Works, and Administration
Expected availability	Every 3-4 years
Suggested collection interval	Every 5 years
References	
Deliverables describing the indicator	Comprehensive survey to assess people's satisfaction with living in the city
Other indicator systems using this indicator	Eurobarometer, Romania Urban Policy Indicators

B-3.2: INDICATOR METADATA	
(for each indicator selected – take from Comprehensive Indicator Sets)	
Indicator Name	Household Savings
Indicator Unit	Euro
Definition	Average energy cost savings per household
Calculation	Comprehensive Household Survey

Indicator Context	
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?	Reduction in CO2 emissions; Improvement in Air Quality; Improvement in Quality of Life
Can the indicator be used for monitoring impact pathways?	yes
If yes, which NZC impact pathway is it relevant for?	CJ-NZC-I6
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	EU-SILC; Surveys undertaken by National Institute for statistics
Expected availability	Every 3-4 years
Suggested collection interval	Every 5 years
References	
Deliverables describing the indicator	Comprehensive household surveys
Other indicator systems using this indicator	EU-SILC

B-3.2: INDICATOR METADATA	
(for each indicator selected – take from Comprehensive Indicator Sets)	
Indicator Name	Public Sector Savings
Indicator Unit	Euro
Definition	Average energy cost savings of public institutions
Calculation	Detailed budget executions of public administrations
Indicator Context	
Does the indicator measure direct impacts	yes

(i.e. reduction in greenhouse gas emissions?)	
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?	Reduction in CO2 emissions; Improvement in Air Quality
Can the indicator be used for monitoring impact pathways?	yes
If yes, which NZC impact pathway is it relevant for?	CJ-NZC-I7
Is the indicator captured by the existing CDP/ SCIS/ Covenant of Mayors platforms?	yes
Data requirements	
Expected data source	Ministry of Finance; Consolidated budget executions of public institutions.
Expected availability	Annually
Suggested collection interval	Annually
References	
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

5 Part C – Enabling Climate Neutrality by 2030

5.1 Module C-1 Organisational and Governance Innovation Interventions

C.1.1: ENABLING ORGANISATIONAL AND GOVERNANCE INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIBLE ENTITY / DEPT./ PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
Knowledge & Competence audit of the local climate neutrality ecosystem	The intervention maps the local climate neutrality ecosystem and audits its competences (technical and social) relevant for the climate neutrality ambitions of the city.	TREC	All the stakeholders mapped for the implementation of the NZC Action Plan are involved. Stakeholders (public institutions, public companies, universities, research institutions, NGOs, professional associations etc.) will be audited to evaluate relevant aspects such as mission, vision, objectives; background; areas of expertise; existing human, financial, technical and informational resources; processes; technologies; knowledge nature,	The assessment of the local ecosystem's capabilities will establish its capacity to plan, implement and monitor climate neutrality policies at neighbourhood level. In turn will enable (1) the identification of potentially relevant stakeholders to be added to the initial list and (2) will facilitate the design of a more efficient learning process for the different actors of the ecosystem. It will improve the ecosystem to enable climate neutrality.	Enables climate neutrality by improving the effectiveness and efficiency of multi-level governance for climate neutrality. Hence, this intervention offers the necessary structure to achieve the listed outcomes, because it creates favourable systemic conditions.

C.1.1: ENABLING ORGANISATIONAL AND GOVERNANCE INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIBLE ENTITY / DEPT./ PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
			dissemination; learning needs; cooperation with other members of the ecosystem etc.		
Enhancing the capacity of the ecosystem to implement and monitor climate neutral policies at neighbourhood level	Specific actions focused on the ecosystem representatives and building administrators will be developed to increase their capacity, namely promoting good practice, delivering know-how and skills upgrading package, trainings, organize study visits and experience exchange sessions, and offer guidance in	TUCN, BBU, SERVELECT, CNM	All the stakeholders mapped for the implementation of the NZC Action Plan are involved.	Elaboration of monitoring framework and systems. Institutionalised systems for implementation and monitoring of climate neutral policies.	Enables climate neutrality by improving the effectiveness and efficiency of multi-level governance for climate neutrality. Hence, this intervention offers the necessary structure to achieve the listed outcomes, because it creates favourable systemic conditions.

C.1.1: ENABLING ORGANISATIONAL AND GOVERNANCE INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIBLE ENTITY / DEPT./ PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
	monitoring the impact of applied and implemented actions.				
Defining a set of urban planning principles and documents for climate neutral interventions, plus incentives for their implementation	Developing urban planning principles in accordance with climate-neutrality standards Updating the General Spatial Planning of Cluj-Napoca Developing Zonal Urban Plans for climate-neutral neighborhoods Organizing international contests of solutions	CNM	TUCN, BBU, SERVELECT, ROAT	The systemic change, from the urban planning point of view, of the city's entire way of functioning, in accordance with the climate neutrality ambition. The intervention will create the regulatory framework necessary to accelerate the climate neutrality transition at the local level, providing the public guiding principles that are necessary to fulfil the objective of the Action Plan.	Reduced urban sprawl by limiting land available for development in the metropolitan area Improved quality of life Reduced air pollution and congestion Improved urban aesthetics Improved quality of life Improved aspects of buildings Rehabilitated existing housing stock

C.1.1: ENABLING ORGANISATIONAL AND GOVERNANCE INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIBLE ENTITY / DEPT./ PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
	for urban renewal interventions Offering incentives to encourage climate-friendly individual behaviors				
New governance models for condominiums and their integration into the local climate neutrality ecosystem - enabling environ	Identifying alternative governance models for condominiums existing in dense apartment-block neighborhoods. This activity will involve public consultations with condominium administrators, the Municipality and other stakehold	ROAT	Associations of home owners	Proposal for update of local legislation on condominium management companies submitted for extensive public consultation. Rehabilitation of existing stock is completed much faster. Cost of interventions is significantly reduced. Creative financing options are tapped.	Reduction of energy bills and CO2 emissions. Condominiums will play a central role in implementing any climate-neutrality policies at neighborhood level by acting as liaisons between the local ecosystem, especially the local administration, and the residents.

C.1.1: ENABLING ORGANISATIONAL AND GOVERNANCE INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIBLE ENTITY / DEPT./ PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
	ers.				
Digital platform – an interactive website managed by the local climate neutrality ecosystem	The main communication platform for climate-neutrality matters will be an interactive website where all the relevant information will be published. (e.g. general information regarding the project, events, pilot activities etc.). Due to its content, the website can be used during different activities to present relevant	CNM, TITC	All the stakeholders mapped for the implementation of the NZC Action Plan are involved.	Transparency, communication, support behavioural change.	Stronger local commitment and behaviour change, ownership of the overall objectives

C.1.1: ENABLING ORGANISATIONAL AND GOVERNANCE INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIBLE ENTITY / DEPT./ PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
	information or tools (e.g., during the final conference the website can be used to showcase the project's findings).				

C-1.2: DESCRIPTION OF ORGANISATION AND GOVERNANCE INTERVENTIONS – TEXTUAL AND VISUAL ELEMENTS

The proposed interventions focus on **exploring opportunities and solutions that build innovative organisational and governance methods for the local ecosystem and capitalise on local opportunities**. They were constructed based on the assessment of local systemic barriers, current policies, and strategic documents, and aimed at supporting the listed pathways towards climate neutrality by 2030. Overall, this part of the plan helps create favourable systemic conditions and provides a layer of understanding of the necessary financing.

Regarding **the local specificities of climate policy development and implementation**, Cluj-Napoca has taken significant steps towards climate-neutrality, naming (1) the Sustainable Energy & Climate Action Plan (SECAP) by 2030 was elaborated, (2) the Integrated Urban Development Strategy 2021-2027 has multiple objectives correlated with the climate agenda, (3) the Local Heating Strategy 2031, SUMP 2027, and 2020-2024 Air Quality Plan Improvement Plan are documents designed to answer to multiple challenges, and also (4) implementing projects (pursued both by the Municipality and the local ecosystem), programs (eg Walkable City, Cluj-Napoca Urban Agglomerations Energy Efficiency Improvement Program), and public measures (e.g., restructuring contracts with private operators for brownfield redevelopment, fiscal incentives for residents that make their homes energy efficient) and private ones (e.g. CSR campaigns financed by business actors, encouraging, among others, green mobility/waste recycling) in line with climate neutrality objectives.

Organisational and Governance Innovation Interventions comprise interventions that are part of the following list of actions designed to enable the climate action portfolios and to achieve co-

benefits outlined in the impact pathway: **Cluj NetZero Coalition** (the mechanism enabling co-creation to improve framework conditions), **Improved local urban regulations and policies for achieving climate neutrality** (the interventions aimed at continuing and expanding policies that promote NZEB standards), and **Communication, dissemination, and scalability** (designed to make people take ownership of the overall objectives and change behaviours to tackle climate change). More specifically, for the organisational and governance part, the following interventions were established and validated with the local ecosystem:

1. **Knowledge & Competence audit of the local climate neutrality ecosystem.** The intervention maps the local climate neutrality ecosystem and audits its competences (technical and social) relevant for the climate neutrality ambitions of the city.

2. **Enhancing the capacity of the ecosystem to implement and monitor climate neutral policies at neighbourhood level.** Specific actions focused on the ecosystem representatives and building administrators will be developed to increase their capacity, naming, promoting good practice, delivering know-how and skills upgrading packages, training, organising study visits and experience exchange sessions, and offering guidance in monitoring the impact of applied and implemented actions.

3. **Defining a set of urban planning principles and documents for climate neutral interventions, plus incentives for their implementation.** These include various interventions such as developing urban planning principles, updating the General Spatial Planning of Cluj-Napoca according to the climate-neutrality vision, creating Zonal Urban Plans for climate-neutral neighborhoods, organizing international contests of solutions for urban renewal interventions, and offering incentives to encourage climate-friendly individual behaviors. The interventions aim to integrate energy-saving and energy-generating methods, nature-based solutions, sustainable mobility, smart city initiatives, and UHI mitigation to improve citizens' quality of life and prevent urban migration to suburban and peri-urban areas.

4. **New governance models for condominiums and their integration into the local climate neutrality ecosystem - enabling environment.** The model for improving condominium governance will streamline the way in which residential blocks are managed (currently a deficient, problematic management) and the new local public policy tools will accelerate the individual adoption of climate neutral practices. Another important part is identifying alternative governance models for condominiums existing in dense apartment-block neighbourhoods.

5. **Digital platform – an interactive website managed by the local climate neutrality ecosystem.** The involvement of citizens will be public, massive, transparent & accessible & will take into account social inclusion & equal opportunities. The main communication platform will be an interactive website where all the relevant information will be published. (e.g., general information regarding the project, events, pilot activities etc.). Due to its content, the website can be used during different activities to present relevant information or tools. It also helps build inclusiveness, trust, and legitimacy to the necessary actions.

All of them aim at improving the horizontal governance of climate neutrality, the effectiveness and efficiency of multi-level governance for climate neutrality, and create ownership and strong commitment inside the community.

INVOLVED STAKEHOLDERS

Multi-level governance is one of the main pillars of our Action Plan, which focuses on a co-participative approach within a quadruple helix framework. Consequently, the stakeholders were identified and engaged in the process of formulating all the interventions. Although all stakeholders are accountable for implementing these interventions, external professionals may be contracted for particular services if deemed necessary. The current list of stakeholders has been established based on the assessment conducted in the section dedicated to systemic barriers and opportunities:

- **Public sector:** Cluj Metropolitan IDA, Romanian Green Building Council, Termoficare Napoca S.A. (Cluj-Napoca's Public Heating Company), CTP Cluj-Napoca S.A. (Cluj-Napoca's Public Transport Company), Compania de Apa Somes S.A. . (Cluj-Napoca's Water Provider), Supercom S.A. (Cluj-Napoca's Waste Operator), North-West Regional Development Agency
- **Academia and research:** Technical University of Cluj-Napoca (Faculties of Architecture, Transport, Energy), "Babeș-Bolyai University (Faculties of Geography – the Research Center of Sustainable Development, Environment, Sociology), University of Agricultural Sciences and Veterinary Medicine Cluj-Napoca, University of Art and Design, National Research and Development Institute for Isotopic and Molecular Technologies INCDTIM Cluj-Napoca, "Ernest Lupan" Institute for Circular Economy and Environmental Research
- **Non-governmental sector**: Urbannect, Cluj Youth Federation (ro : Federatia Tinerilor din Cluj-Napoca), CCC- Cluj Cultural Center Botnar Foundation, Transilvania IT Cluster – DIH, Transylvania Energy Cluster.
- **Private sector (business):** Servelect S.R.LAgroTransilvania Cluster, Romanian New Materials Cluster, Transylvania Commercial Bank (ro : Banca Transilvania).

IMPROVED ORGANISATIONAL SETTINGS AND GOVERNANCE MODELS

The local public administration, together with the local community and ecosystem, focuses on acting and reacting in line with climate neutrality principles. In order to achieve this, the project focuses on the broader governance framework, encompassing multi-level governance through the Net Zero local Coalition. The coalition comprises various representatives from the climate stakeholder ecosystem, including those from the quadruple helix framework such as representatives from numerous NGOs, universities, and clusters representing hundreds of local and regional companies. An essential role will be played by the **Ministry of Investments and European Projects (MIEP)** with which efforts will be made to consolidate an active and permanent dialogue to secure the necessary funds to implement the actions proposed in the plan. In this sense, representatives of MIEP will be constantly invited to coalition meetings. In addition, **the local climate-neutrality ecosystem will establish partnerships with potential entities that can provide funding for our actions**, such as the North-West Regional Development Agency, private companies interested in financing pilot actions through CSR/PPPs, citizens who can organize crowdfunding, commercial banks that can offer loans for green projects, and even representatives from EBRD, EIB, and VC/BA funds if they accept the invitations to events. Capacity building actions will also be undertaken to ensure financial sustainability. The NZ Coalition will also prioritize (1) enhancing dialogue with national public authorities and engaging them in local climate-neutrality efforts, and (2) disseminating materials such as guides, analyses, studies, and relevant reports to public staff in

ministries to replicate successful practices and outcomes at the national level.

The NZ Coalition acts as a strategic local task force to implement the action plan, with all actors participating in co-designing, co-producing, and co-monitoring local climate-neutrality solutions. To ensure effective collaboration, partners will be involved in decision-making and implementation, and stakeholders consulted based on their expertise. The proposed measures to empower governance include forming the NZ Coalition, assessing and improving local capacity, adding alternative structures, approaching the financial market, transferring knowledge, capitalizing on research, and providing learning tools for funding.

Thus, the entity with primary responsibilities for climate mitigation policies and cross-sectoral coordination of the climate agenda and the working modality is the NZC Coalition, which is coordinated by the local authority. The main person responsible from the local administration is Dalila Ciuclan as coordinator together with the internal team from various departments (Strategy, Local, Development and Project Management Department, Public Procurement Service, Urban Strategies Office, Investment Department, Urban Energy Manager, and Energy Efficiency Office). The most important department within the Municipality, with a central role in the implementation and monitoring of the action plan, is the Office for Energy Efficiency and Public Lighting. Its role is to monitor the energy consumption for public buildings, to formulate strategies for energy savings and the promotion of RES generation, to improve the energy efficiency, quality and coverage of the public lighting system, to ensure its maintenance, to ensure the local framework for the implementation of the nZEB standard, to integrate the sustainable development targets in public procurement. Moreover, an important role is played by the Energy Manager who is outsourced to Servelect SRL, a company with over 16 years of experience, that offers integrated services and solutions to optimize energy consumption and reduce operational costs. The Energy Manager is responsible for coordinating all aspects of energy management, from reducing carbon dioxide emissions to waste management and sustainable development. Among its main attributions are:

- Development, coordination and implementation of strategies and policies to reduce local energy consumption
- Encouraging the use of sustainable energy resources within organisations and the community, along with improving the local energy conservation profile
- Developing solutions for carbon management
- Providing technical assistance and organising training sessions on energy efficiency
- Energy auditing and energy monitoring, including on-site inspections and energy studies
- Aligning local efforts with international best practices

Foreseen co-benefits by implementing these four interventions

As observed, these interventions are part of a larger scheme and perfectly fit into the impact pathways towards climate neutrality to support capitalization of opportunities and enable the following direct impacts:

- Improved quality of life

- Reduced air pollution and congestion
- Reduced energy bills
- CO2 reduction
- Stronger local commitment
- Ownership of the the overall objectives
- Integrated and coordinated efforts, which could enable higher GHG reduction
- Improved communication between all stakeholders
- Strengthen community cohesion and collaboration
- Increased chances of innovation and improvements

SUMMARY OF EXISTING CLIMATE ACTION GOVERNANCE AND THE GAPS THAT NEED TO BE FULFILLED

Cluj-Napoca adopts co-participatory processes for local development to drive innovation and systemic transformation, recognizing that stakeholders play a crucial role in initiating change. However, despite our reputation as one of the best-performing public administrations in Romania, there remains a gap between the public administration and citizens, as well as between the urban and peri-urban environment, resulting in a lack of effective communication among these actors and territorial levels. To address these challenges, we need to collect data on the average level of knowledge and competence of citizens and the local ecosystem regarding the concept of climate neutrality. Regulatory barriers, such as poor regulation and standardization at the central level and unclear micro-mobility legislation, also impede our efforts to encourage climate neutrality through planning instruments and local policies.

5.2 Module C-2 Social and Other Innovation Interventions

C.2.1: ENABLING SOCIAL INNOVATION INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIB. ENTITY / DEPT. / PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
Behavioral, perception and modelling, analysis on the individual adaptation of residents & businesses to climate neutrality	Designing and applying a: - consumer survey that targets city residents (owners and tenants) to determine the current understanding of different related concepts, the various typologies of individual climate neutral-related behaviors, with special focus on energy demand, the availability to learn more about climate neutrality and to become part of a Net Zero Coalition, the perception on potential barriers to individual adoption of neutrality behaviors etc. Another goal is to establish a group of individuals needed to experiment with various types of local policies to stimulate climate neutral communities and also for monitoring purposes. - set of focused interviews condominium administrators and local business owners to determine the current understanding of different related concepts, the various typologies of organizational climate neutral-related behaviors, with special focus on energy demand, the availability to learn more about climate neutrality and to become part of a Net Zero Coalition, to experiment various innovative	BBU	Citizens and business owners	The intervention will allow the evidence-based substantiation of all other interventions and will contribute to the faster reduction of the identified behavioral barriers	Improved local understanding Stronger local commitment Improved quality of life

C.2.1: ENABLING SOCIAL INNOVATION INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIB. ENTITY / DEPT. / PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
	solutions to become more „green", the perception on potential barriers to the adoption of neutrality practices etc.				
Civic imagination & Innovation Center - CIIC modelling for climate neutrality at neighborhood level	This activity will build on the successful experience of Cluj-Napoca to become the first Municipality in Romania to implement the participatory budgeting and to establish a CIIC – Civic Imagination and Innovation Center. CIIC concept will be updated, with the support of external expertise contracted by the Municipality, to focus more on climate neutrality and on related specific local needs. CIIC events will be designed to bring together international and local experts that have the opportunity to interact directly with citizens, businesses an NGOs from a certain neighborhood on given climate neutral-related topics. Also, specific CII event concepts will be prepared and tested for new target groups, such as children, students and elderly. A new concept for participatory budgeting at neighborhood level on climate neutrality related topics, will be developed and tested.	CNM	All stakeholders foreseen for the NZC Action Plan implementation	The intervention will stimulate civic engagement and innovation, as acceleration engines for all the foreseen initiatives to achieve climate neutrality	Stronger local commitment Improved quality of life Ownership of the the overall objectives Integrated and coordinated efforts, which could enable higher GHG reduction Improved communication between all stakeholders Strengthened community cohesion and collaboration Increased chances of innovation Improved local understanding

C.2.1: ENABLING SOCIAL INNOVATION INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIB. ENTITY / DEPT. / PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
NetZeroCaravan in neighborhoooods and suburbs	The Caravan is the vehicle that ensures the connection of all neighborhood centers and suburbs in a single network through the system of translating good practices, and at the same time the unification of all messages into one. It will be at the same time a place for the formation of the community core and for spending free time. Here contacts will be made and friends will be made around Ground Level Action activities. The community will be invited through social facilitation actions to form debate centers around the climate neutrality theme. Thirdly, within these community contact points, educational activities will be held that consist of two levels addressed to all ages: educational workshops and community debates. The caravan is set up at the point that it will turn into a Memory Place.	URBANECT	Citizens	The intervention will enhance the contribution and adaptation of residents to climate neutrality and will contribute to the consolidation of the collective mindset directed towards the Action plan's objective	Stronger local commitment Improved quality of life Ownership of the overall objectives Integrated and coordinated efforts, which could enable higher GHG reduction Strengthened community cohesion and collaboration Increased chances of innovation and improvements Improved local understanding
Comprehensive climate-neutrality masterplan for each dense multi-apartment neighborhood and suburbs	A comprehensive urban regeneration masterplan will be prepared a dense multi-apartment neighborhood and suburb. The focus will be on promoting sustainable mobility, developing blue-green corridors and	TUCN, RAO	All stakeholders foreseen for the NZC Action Plan implementation	Masterplans will create the needed planning framework for accelerating the transition to climate neutrality and outline the	Reduced urban sprawl by limiting land available for development in the metropolitan area Energy cost

C.2.1: ENABLING SOCIAL INNOVATION INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIB. ENTITY / DEPT. / PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
	expansion of green spaces, reducing energy use in public spaces (e.g. street lighting, sprinkler systems), ensuring easy access by foot to amenities, reducing UHI footprint, implementing and integrating Smart City solutions, increasing accessibility for vulnerable groups and improving the quality of life (to prevent urban flight to the suburbs and peri-urban areas). The masterplan will take into consideration existent local policies, but will also propose the introduction of new policies if research findings will call for this. The masterplan will also take into consideration similar urban regeneration work in the city and in other, but will focus on interventions that will enable the transition to climate neutrality. The draft versions of the masterplan will be subject to public consultation within the framework of CIIC innovation modelling events.			intervention sectors from an urban planning perspective	reduction for households Reduced air pollution and congestion Improved urban aesthetics Reduced energy bills Potential additional sources of revenue from energy generation Improved quality of life Additional private investments and jobs Improved aspects of buildings Rehabilitated existing housing stock Reduced local budget energy costs
Detailed	For areas to be identified by the Cluj-Napoca Municipality based	TUCN,	All	The detailed	Reduced urban sprawl

C.2.1: ENABLING SOCIAL INNOVATION INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIB. ENTITY / DEPT. / PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
proposals for transforming different areas in each neighborhood/ suburb into climate neutral demo district	on the feedback received from citizens and stakeholders, Zonal Urban Plans and Feasibility Plans will be elaborated, and proposed interventions will be financed from available funds (e.g. Regional Operational Programme 2021-2027, local funds, the National Environment Fund, OP Sustainable Development 2021-2027).	RAO	stakeholders foreseen for the NZC Action Plan implementation	proposals will offer place-based urban acupuncture solutions to accelerate the transition towards climate-neutrality in a bottom-up approach	by limiting land available for development in the metropolitan area Improved quality of life Reduced air pollution and congestion Improved urban aesthetics Improved quality of life Improved aspects of buildings Rehabilitated existing housing stock
Terms of Reference for the renovation of private and public buildings in line with the nZEB principles, but also with other local priorities (e.g., extending the average living area of	The proposed Terms of Reference will be modular, to allow easy incorporation of relevant elements in individual building renovation proposals adapted to different local contexts. In addition, the ToR will include the option for enlarging the living space (e.g. through the construction of an outer shell) with a focus on: growing the surface of liveable space,	TUCN, RAO	Citizens	The ToR will facilitate the reduction of the the built sector's carbon footprint, by modelling building renovations on climate-neutral principles	Energy cost reduction for households Improved quality of life Improved urban aesthetics Improved quality of life Improved

C.2.1: ENABLING SOCIAL INNOVATION INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIB. ENTITY / DEPT. / PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
the apartments or the capacity of schools)	improving the comfort level of apartments, and creating commercial/recreational spaces that could generate revenue for residents or encourage community activities. The ToR Model will incorporate various modules for energy renovation, such as (minimal list): Measures to reduce the waste of heat, Measures to reduce the use of energy in common spaces (e.g. elevators, stairway lightbulbs), Measures to generate heat and cooling in a greener, and ideally, lower cost way (e.g. installation of heat pumps, electric boilers), Measures to reduce the cost of generating hot water (e.g. solar hot water panels), Measures to reduce electricity use in apartments (e.g. installation of automatic shut-off systems). Additionally, the TOR will include options for enlarging the net living surface of the apartments, with the purpose of promoting social inclusion and increasing the quality of life.				aspects of buildings Rehabilitated existing housing stock Enhanced social inclusion
Social & Mass Media coverage	Social and mass media campaigns for awareness, information, education and civic involvement, on all the channels of the representatives of the Net Zero Coalition.	All the Net Zero Coalition Members	All stakeholders foreseen for the NZC Action Plan implementation	The media campaigns will stimulate the local community, especially in the context where the citizens are consumers of media products	Stronger local commitment Ownership of the the overall objectives Improved visibility Increased civic

C.2.1: ENABLING SOCIAL INNOVATION INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIB. ENTITY / DEPT. / PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
				and these channels are the most suitable for them to absorb information about the city's climate neutrality objectives	awareness and involvement Better informed citizens
International Climate Neutrality Summits	The International Carbon Neutrality Summits will be dedicated to all the intense efforts that European cities make, thanks to their citizens and the local ecosystems, in reaching the European and international objectives of reducing the urban fabric's impact on the climate. Local, national and international stakeholders (from local and national professionals to international experts and national and European governing institutions) will be invited to join this pursuit of increasing the visibility of the actions that urban actors take in order to contribute to the stringent need of achieving climate neutrality. Representatives of civil society and citizens will also be invited to attend the International Carbon Neutrality Summits not only as participants, but also as key speakers, because they are the ones who catalyse the proposed change, bringing real, place-based inputs to the	CNM	All stakeholders foreseen for the NZC Action Plan implementation	The summits will formalize and promote all the undertaken efforts, putting under the spotlight the ambitions that Cluj-Napoca and European cities have in terms of climate neutrality. This intervention will formalize, through the dedication of an international event, the urban commitment to reduce the negative impact on the climate and will stimulate other actors to engage in such practices.	Increased international visibility Facilitated transfer of international know-how, experiences, lessons learned Stronger political, private and individual commitment

C.2.1: ENABLING SOCIAL INNOVATION INTERVENTIONS					
INTERVENTION NAME	**DESCRIPTION**	**RESPONSIB. ENTITY / DEPT. / PERSON**	**INVOLVED STAKEHOLDER**	**ENABLING IMPACT**	**CO-BENEFITS**
	climate neutrality table.				
Climate Neutrality Digital Twin	The Climate Neutrality Digital Twin will be developed as an innovative technical solution and will act as a transversal, scalable solution that will be able to: a) collect and analyse data, b) make predictions relevant for achieving climate-neutrality. Using the state-of-the art technologies and local expertise, the Digital Twin technology will collect, visualise, monitor and forecast social and natural behaviours and environments and will capture the different pathways that lead to climate-neutrality. It will be calibrated at neighborhood or 'architectural piece.'	TITC	Citizens	The digital twin represents the technological tool for facilitating climate neutrality in the city, allowing an innovative, data-based process.	Real time adjustments to the proposals made, based on changing circumstances Increased innovation and technological progress

C-2.2: DESCRIPTION OF SOCIAL INNOVATION INTERVENTIONS – TEXTUAL AND VISUAL ELEMENTS

Cluj-Napoca enjoys a **culture of collaborative partnership, where the public administration consults its citizens regarding the major local interventions and gives them the opportunity to choose which projects to be implemented locally** (both through the participatory budgeting processes and through voting, surveys and meetings), such as to give them the power to be the enablers of the city's sustainable development. Given the positive background that these practices created, the Municipality's collaboration with its community has developed harmoniously in recent years, being defined by participation and inclusiveness, so that citizens put their trust in the public authority, which, in turn, is in permanent and close contact to the residents whose interests it represents. All these principles will be taken into account while implementing the Action Plan for climate neutrality, both by consulting the citizens regarding the major investments and proposed programs, and especially by strengthening the role they play as facilitators / proactive actors who contribute positively in the city's net zero journey.

In Cluj-Napoca, various initiatives focused on social and ecological innovation have already been successfully carried out. With the introduction of climate neutrality targets and components in the current Action Plan, we expect the local efforts to become even more ambitious. While there has been no explicit political endorsement of climate neutrality in recent years, the local ecosystem has recognized that sustainable development needs inclusive and fair partnerships, as well as considering the impact on the community, environment, and climate.

PAST PROJECTS

- **ENTREPRENEURIAL:** The projects implemented by the local clusters through National Operational Programs, such as OP Competitiveness, OP Administrative Capacity and OP Human Capital (e.g., Learn2Do, Smart Romania)
- **SOCIAL ECONOMY:** The ASIST project - Social Entrepreneurship and Social Enterprises in Transylvania. As a result of the project, 21 social enterprises were established by granting subsidies in the amount of up to 55,000 EUR.
- **SOCIAL AWARENESS AND MOBILIZATION:** Annually, local NGOs run dozens of community campaigns on various topics, with a focus on the awareness-education-mobilization cycle, such as the extensive Somes Delivery metropolitan campaign, dedicated to the valorisation of the Somes river green-blue corridor.
- **SOCIAL COHESION AND SOLIDARITY:** Most such projects were implemented under the umbrella of the Intercommunity Development Association of the Cluj Metropolitan Area, their focus being on information, education, integration and social inclusion of disadvantaged communities.

PRESENT PROJECTS

- **ENTREPRENEURIAL:** Among the flagship projects, Cluj Future of Work, FIX - Innovation and

eXperiment Fund and Transilvania Digital Innovation Hub stand out.

- **SOCIAL ECONOMY:** BBU, the best performing national university, has a master's program for Social Work and Social Economy, where students are trained in all aspects related to social enterprises.
- **SOCIAL AWARENESS AND MOBILIZATION:** The Cluj Cultural Center, as well as the Innovation and Civic Imagination Center and the Cluj Youth Federation (together with dozens of other local NGOs) are active supporters of the community's involvement in urban development, which is why they run numerous social awareness and mobilization initiatives.
- **SOCIAL COHESION AND SOLIDARITY:** The Intercommunity Development Association of the Cluj Metropolitan Area currently has 4 such projects under implementation: Pata 2.0, Cluj Future of Work, Eudigit, Stardust, to which are added other such initiatives of the other NGO sector actors.

The future projects will be more clearly and more specifically directed towards climate-neutrality, because, on the one hand, they will have as a clear strategic development framework the IUDS, SECAP and this Action Plan, and, on the other hand, numerous non-reimbursable funds will be allocated for this priority. Thus, future social and ecosystemic projects will furtherly build on the foundation already consolidated in the previously implemented projects, also through scaling and upgrading the results obtained within past and present actions.

The Plan foresees a series of actions in which all stakeholders are both catalysts of the proposed change and direct beneficiaries of it, not only mere receptacles of top-down actions. To them is added the entire urban and metropolitan community, where the entire population will be at least an indirect beneficiary (although the positive climate impact generated by all the proposed actions brings direct effects and co-benefits for all residents, we consider as indirect beneficiaries those residents who will enjoy the overall obtained benefits, but who will not take active part in the actions detailed below). The following areas will be considered when collaborating with citizens, in order not to isolate the climate-neutrality pathways from their well-being and welfare, and to meaningfully engage them in the climate-neutrality journey.

- **EMPOWERMENT AND INCLUSION:** The Action Plan is designed around citizens as major influencing factors on the city's journey to climate neutrality, not just as beneficiaries of the positive effects obtained through the completion of this journey. Since the ambitions must be appropriated and owned by all the stakeholders involved and the citizens are a major part of these stakeholders, the Plan includes Actions that directly aim their active involvement in the entire proposed course of action, not only at the level of awareness and engagement, but especially centred around enhancing their sense of belonging to these common efforts.
    - Civic imagination & Innovation modelling for climate neutrality at neighborhood level
    - NetZero Caravan in neighborhoods and suburbs
- **REGULATION AND SUPPORT:** In order to further involve citizens through community-led projects, we, as public administration, aim to leverage our leading position and implement a series of policy and regulation actions to support the achievement of climate-neutrality objectives. The proposed actions seek to foster additional climate neutrality projects that may

arise within the community and ecosystem through social innovation, in addition to those already outlined in our Action Plan.

  - Comprehensive climate-neutrality masterplan for each dense multi-apartment neighborhood and suburbs
  - Detailed proposals for transforming different areas in each neighborhood/suburb into climate neutral demo district
  - Terms of Reference for the renovation of private and public buildings in line with the nZEB principles, but also with other local priorities (e.g. extending the average living area of the apartments or the capacity of schools)
  - Defining a set of urban planning principles and documents for climate neutral interventions, plus incentives for their implementation
  - New governance models for condominiums and their integration into the local climate neutrality ecosystem

- **BOTTOM-UP INITIATIVES/PROJECTS:** In order to better support bottom-up initiatives (in addition to the top-down ones already included in the Action Plan) that will release the locals' creativity in solving climate-neutrality issues, the identification and assignation of NZC Champs will be tested. Champs will be responsible to create the local conditions for stimulating community initiatives, including the ones arising at neighborhood level. Moreover, the digital platform will have functionalities and modules through which citizens can actively involve in achieving the desired climate neutrality goals.
  - NZC Champs Campaign
  - Digital platform – an interactive website managed by the local climate neutrality ecosystem
- **SKILLS AND CAPACITY BUILDING:** The Action Plan bases its success especially on the direct involvement of citizens and ecosystem actors in its implementation. However, given that stakeholders need solid knowledge bases in order to be able to intervene correctly and pragmatically, there is a need to strengthen their capacity. After assessing their skills and knowledge, numerous skills and capacity building interventions will be organized, on multiple levels, through formal and informal training sessions for both the citizens and the other local actors, which will allow them to better co-design and co-implement, respectively co-monitor the Plan's actions, respectively to co-create and co-deliver new solutions (in addition to the ones already proposed).
  - Knowledge & Competence audit of the local climate neutrality ecosystem
  - Skills upgrading package for ecosystem representatives, building administrators
- **CHANGE IN SOCIAL BEHAVIOUR:** Individual and collective behaviors have been identified as one of the main barriers to achieving the local objective of climate neutrality, which is why many efforts will be allocated to solving this obstacle. Thus, all the actions proposed for citizens and the ecosystem will start from behavioral and capacity analyses (in order to propose measures based on how individuals actually behave in their daily life), and the actions will be outlined according to the results of these analyses/audits. A useful tool in this sense, as technological support, will be the Climate Neutrality Digital Twin. The proposed measures will allow the Net Zero Coalition to better define the individual problems, to diagnose the actionable bottlenecks

and to implement suitable interventions.

- Behavioral, perception and modelling analysis on the individual adaptation of residents & businesses to climate neutrality
- Climate Neutrality Digital Twin - to collect, visualise, monitor and forecast social and natural behaviours and environments relevant for the climate transition of the city.

*** Although some of the above-mentioned interventions (Knowledge & Competence audit of the local climate neutrality ecosystem, NZC Champs Campaign, Skills upgrading package for ecosystem representatives, building administrators, New governance models for condominiums and their integration into the local climate neutrality ecosystem, Digital platform) are considered Governance interventions, they deserved to be mentioned in this section as well, because, although they create an optimum governance framework that enables climate-neutrality, at the same time they also contribute to catalysing social innovation, by creating the appropriate environment for community-based projects / initiatives.

The core idea of **the action plan centers around a co-participatory approach that fosters collective change by directing individual behaviors towards the shared goal of achieving climate-neutrality** for the city. In order to achieve this goal, a wide range of events and collaborative activities will be organized within the local ecosystem and community, utilizing a multi-actor approach that leverages an integrated place-based methodology to achieve more efficient results. Through this approach, well-informed solutions will emerge, based on deliberative and engaging processes such as the caravans, civic innovation and modeling events. Urban planning will also take into account the opinions of citizens, involving them in the design of proposed regulations through public consultations, surveys, and other means of engagement. The public administration will be responsive to citizen proposals, and provide follow-up through both online and offline channels, including easy-to-understand summary reports that inform citizens of the outcomes of their feedback.

In order to successfully complete the actions, the resources that will be used include:

- The necessary funds (covered through a mix of funds from the local budget, supplemented by non-reimbursable funds from the National Operational Programs, NRRP, European funds and contributions from the partners involved in the project)
- The personnel involved (the complementarity of the expertise provided for the implementation of the actions by the stakeholders' representatives)
- Individual time for collective efforts (this includes the hours allocated for the actions' preparation and implementation, especially under the umbrella of the Net Zero Coalition)
- Civic ambition, motivation and interest (considered as resources because they are an essential regarding the citizens who will be involved in social and ecosystem innovation interventions)
- Workspaces and material resources (all the spaces where various interventions will be organized, such as the Net Zero Caravan, along with the equipment, materials and consumables needed in the activities such as Civic imagination & Innovation modelling events).

The implementation of all the proposed social and other innovation interventions will contribute to the aim of creating a collective mindset focused on climate neutrality**. This mindset will positively influence the individual behaviors of citizens and economic/public agents, leading, through**

individual practices, to the overall reduction of Cluj-Napoca's carbon footprint on the climate and, implicitly, to the improvement of health standards and quality of life in the city. Also, the public administration wants to use these forms of civic participation, in order to improve the individuals' adaptive capacity over the systemic changes that will inevitably occur during the climate-neutrality journey, along with increasing their acceptance of the transition initiatives.

This category of **innovation interventions will generate learning not only through the proposed training sessions, but especially through the actual work carried out for co-designing, co-implementing and co-monitoring the foreseen actions**. In addition to substantiating and subsequently understanding the notions of climate neutrality, teamwork skills will be strengthened, newer, more efficient and more inclusive community and ecosystem engagement techniques will be discovered, a local collective ability of combining the social dimension with the economic and technical ones will be achieved and most importantly, all the stakeholders will develop feelings of belonging and trust, within this powerful coalition, which joins individual efforts for achieving a collective intelligence and creates value through collaboration.

In the city of Cluj-Napoca and its metropolitan area, **marginalized communities receive special attention, so that they are properly included in the society.** The most remarkable efforts are undertaken by the Cluj Metropolitan Area Intercommunity Development Association, which over time developed more projects aimed at improving the life quality of communities living in marginalized areas. Moreover, at the level of the Cluj-Napoca's Metropolitan Area, there is a detailed mapping of marginalized communities, which includes information about how they are affected by urban heat islands. Special measures have been developed to increase their resilience (for example, the resilience of marginalized communities living in flood zones and of those living in areas affected by UHIs) in the face of climate change and to address the needs they face in these regards. There is also a detailed proposal for the transition to climate neutrality of the main social housing district in Cluj-Napoca. The climate neutrality digital twin tool will also embed a component dedicated to virtually transposing the locations of marginalized communities and the solutions developed for them.

In order for climate neutrality actions to reach the population of marginalized communities, measures will be taken to actively engage them in the activities and events organized for the community through the Center for Civic Imagination and Innovation. The discussions will be prepared to be easily understood by the participants, regardless of their education or professional status and will be accessible both from the point of view of participation and content, such as to allow their involvement in the climate neutrality talks. An important role in this regard will be held by the Net Zero City Champions, who will be responsible for attracting and engaging disadvantaged people in community interventions. The Champions will also have the duty to explain to people the concepts and information that have a high degree of technicality/specificity, so that they can understand such content. Since a significant share of the marginalized communities come from the metropolitan area's LAUs, the Caravan will include dedicated sessions for them: if we will see that people from the marginalized communities do not want / are unable to participate in the Caravan's sessions, dedicated events will be organized especially for them, so as to ensure their inclusion in the climate neutrality efforts. The same principle, of preparing dedicated sessions for talks and work, will also apply to the events under the umbrella of the Center for Civic Imagination and Innovation.

Cluj-Napoca Municipality will be primarily responsible for engaging marginalized communities in local climate neutrality efforts and the Cluj Metropolitan Area Intercommunity Development Association will deal with the disadvantaged population in the metropolitan area. Thus, the 2 entities will ensure that the voice of these communities' representatives will be heard when climate neutrality is discussed. In this sense, we will capitalize both on the human component - through the Champions - but also on the technical one - with the help of the digital twinning tool.

In order for all interventions having a social component to be equitable, inclusive and accessible to marginalized communities, we will apply a series of strategies to attract and engage them in the proposed community actions:

- **Outreach and advertising:** Cluj-Napoca Municipality's communication department, together with the ZMC IDA's experts will apply targeted advertising and outreach strategies to reach marginalized communities (both from the urban and the peri-urban areas) and properly inform them about the events. We will apply advertising in local strategic places, we will partner with the communities' leaders and use social media to spread the word.
- **Location:** We will choose event locations that are accessible and convenient for marginalized communities, especially public spaces that are easily accessible by public transportation.
- **Accommodations:** We will ensure that the events will accommodate people with disabilities, including providing wheelchair accessibility, sign language interpretation, and audio descriptions where necessary.
- **Inclusivity:** Our teams have the permanent duty to ensure that everyone feels welcome, regardless of their background or identity. Every material will be accessible and easy to understand and we will avoid using technical concepts and specialized information.
- **Engage with the community:** When possible, we will discuss with members of marginalized communities in order to involve them in the planning and execution phases of community interventions. This will not only help us increase their participation, but will also ensure that our actions are tailored to their needs and interests.

The **Net Zero Coalition, together with the NZC Champs will be responsible for sustaining this framework of power-sharing-and-allocation** within which the community initiatives will operate, by providing, with massive support from the public administration, the needed assistance instruments to fit the community's needs. To ensure that the Net Zero Caravan and NZC Champs are effective in engaging all members of the community, it will be important to consider and address the specific needs of marginalised groups and communities. **Energy poverty is an important issue that must be addressed, but it is also important to consider other barriers to engagement, such as language barriers, cultural differences, and lack of access to information or resources.** To address these challenges, the Caravan and Champs will need to be adapted to the needs of different communities. This may involve different outreach strategies, communication methods, and approaches to community engagement. For example, in some communities, it may be more effective to partner with community organisations or leaders who have existing trust and relationships with marginalised groups. Additionally, educational activities and workshops will be designed to be accessible and inclusive to all ages and abilities. **This may involve adapting activities and materials to different learning styles.** Overall, the success of the Net Zero Caravan and NZC Champs will depend on their ability to engage and include all members of the community. By taking into account the unique needs and perspectives of marginalised groups, we can create a more equitable and sustainable future for all.

To ensure success in engaging the target audience and promoting climate neutrality**, a strategic and data-driven approach will be taken towards the digital engagement strategy.** We will develop specific campaigns and initiatives, as well as identify of key performance indicators (KPIs) to measure success. The digital engagement strategy will be continuously monitored and evaluated to ensure that it is meeting the goals and making optimal use of the allocated resources. Feedback will be gathered from the target audience through regular surveys or focus groups, and adjustments will be made as necessary based on the tracked KPIs.

The resources allocated to the digital engagement strategy include financial resources for personnel cost and other incurred costs, staff from the Municipality and the Coalition's members who will each name a responsible, and approximately 10 hours per month for the entire project duration until 2030. The necessary technology such as laptops, internet, smartphones, and cameras for photos will also be provided. The sufficiency of the resources will be assessed, and additional resources will be identified if necessary. Furthermore, complementary to the dedicated channels (especially the digital platform), all partners will use their communication channels to promote the climate neutrality actions. By collaborating and utilising the resources effectively, the digital engagement goals can be achieved, and climate neutrality can be promoted.

The table below delineates interventions for Organizational and Governance Innovation, as well as Social and Other Innovation, which are founded on the Blueprint for Net-Zero Apartment-block Neighborhoods project. This project has recently received funding through the NetZeroCities Pilot Cities Programme. The interventions will be implemented during a pilot phase, which spans over 2 years, and will subsequently be extended through scaling and replication. A re-iterative cycle will govern the development and expansion of these interventions based on prior achievements.

The implementation of interventions listed in the table necessitates a range of resources, including time, human, material, and financial resources. The Municipality's internal teams of experts will provide human resources, while members of the Coalition will contribute with their expertise/experience, as required. Material resources, such as IT equipment, consumables, event spaces, and logistic equipment, have been taken into account in the estimated budget, reflected in the second column of the table. The Coalition will review and update the costs during the reiteration phases of the CCC, based on co-working sessions. The allocated time for each intervention differs based on its complexity.

INTERVENTION	ESTIMATED BUDGET	FURTHER EXPLANATIONS
Behavioral, perception and modelling analysis on the individual adaptation of residents & businesses to climate neutrality	160.000 eur	The proposed budget outlines the development of a consumer survey to assess residents' comprehension of climate neutrality concepts, individual behaviors linked to climate neutrality (with a particular emphasis on energy demand), willingness to acquire knowledge about climate neutrality and participate in a climate-neutral community, and potential barriers to adopting climate-neutral behaviors. Furthermore, the survey seeks to identify groups of individuals who can test local policies promoting climate neutrality at the neighborhood level and serve as a monitoring team. The budget also includes a series of focused interviews with representatives from the local ecosystem to evaluate their understanding of climate neutrality concepts, organizational behaviors associated with climate neutrality (with a focus on energy demand), willingness to learn more about climate neutrality, experiment with innovative solutions to become more environmentally friendly, and any perceived obstacles to adopting climate-neutral practices. The analysis

		will involve various categories of stakeholders, and each instrument will be tailored to the characteristics of the specific targeted categories of stakeholders.
Knowledge & Competence audit of the local climate neutrality ecosystem	122.500 eur	The Coalition has allocated funds for the purpose of mapping and auditing the local climate neutrality ecosystem. The audit will assess the technical and social competences relevant to the city's climate neutrality goals in order to gain a better understanding of the local ecosystem's ability to plan, implement, and monitor climate neutrality policies at the neighborhood level. Additionally, the audit aims to identify potential stakeholders and facilitate a more efficient learning process for ecosystem actors. To accomplish this, individual knowledge and competence audits will be conducted for various local stakeholders, including public institutions, public companies, universities, research institutions, NGOs, and professional associations. These audits will evaluate important aspects necessary for the transition to climate neutrality, such as mission, vision, objectives, background, areas of expertise, available resources, processes, technologies, knowledge dissemination, learning needs, cooperation with other members of the ecosystem, and more.
Civic Imagination & Innovation Center - CIIC modelling for climate neutrality at neighborhood level	235.500 eur	This initiative aims to update and refine the ideas and approaches within **Civic Imagination & Innovation Center - CIIC**, which has been successfully implemented in Cluj-Napoca, by focusing more intensively on climate neutrality. The CIIC will be managed by Municipality, and external experts will be contracted to provide support. The initiative will host CIIC events that bring together international and local experts to interact with citizens, businesses, and NGOs on climate-neutral related topics. Additionally, new concepts for civic imagination and innovation events will be developed and tested for target groups such as children, students, and the elderly. The initiative will also test new participatory budgeting concepts at the neighborhood level for climate neutrality-related topics, in addition to organizing various forms of participatory budgeting processes and civic imagination and innovation events.
Net Zero Caravan in urban neighbourhoods	88.000 eur	The estimated budget will be allocated towards establishing communities at the neighborhood level that are willing to actively engage in the development, implementation, and supervision of participatory public policies pertaining to climate neutrality. This effort will involve conducting meetings in informal neighborhood spaces through the Net Zero Caravan initiative. After residents become involved with the NZ Caravans, they will be able to participate in specialized training and educational workshops focused on different aspects of climate neutrality and community-led initiatives. These workshops may include topics such as saving energy in their own homes, preventing food waste, recycling waste, and becoming a prosumer.
Net Zero Caravan in the metropolitan area of Cluj-Napoca	94.000 eur	The focus of the intervention is on the suburban areas in Cluj-Napoca's metropolitan area, with the goal of transferring the knowledge gained in the city center to the peri-urban communities. The Metropolitan Carbon Neutrality Caravan aims to promote the zero-carbon mindset of Cluj-Napoca to its suburbs, disseminate educational materials to various stakeholders in the Cluj Metropolitan Area, and encourage behavioral changes among the peri-urban residents, businesses, and public administrations to adopt the urban climate-neutral mentality that is specific to the metropolitan demographics. To accomplish these objectives, the caravan will organize workshops, training events, and community-building initiatives that target local administrations, residents, and other stakeholders in each neighborhood. In-depth training sessions will be conducted, to increase awareness of climate-neutrality-related topics, assist with the adoption of the proposed tools, and identify potential NZ Champions who can exchange best practices and experiences with those from urban neighborhoods. The training sessions will be available to public servants, residents, NGOs, business owners, and other interested parties.

Enhancing the capacity of the ecoystem to implement and monitor climate neutral policies at neighborhood level	300.000 eur	The budget allocated for this intervention comprises several elements. Firstly, the NZChamp Campaign will be conducted to select climate neutrality managers/champions in neighborhoods. The competition will aim to identify private companies, NGOs, and institutions that are implementing measurable and replicable climate neutrality measures at the neighborhood level. Secondly, packages of training materials and good practice examples will be provided for various categories of stakeholders such as pupils, students, home owners, business owners, teachers, and researchers, etc. The materials will offer guidance on actions that can be taken in day-to-day activities and medium to long-term projects to accelerate neighborhood climate neutrality achievement. Thirdly, an interactive framework will be developed to enhance building administrators' knowledge of climate neutrality. The framework aims to assist building administrators in implementing measures and actions that can facilitate achieving climate neutrality at the condominium level. The budget will cover training and dissemination events organized for condominium administrators on topics such as energy saving, on-site renewable energy generation, and smart buildings. Finally, experience exchanges, networking, and learning activities will be organized for representatives of the local ecosystem on climate neutrality themes.
Defining a set of urban planning principles and documents for climate neutral interventions, plus incentives for their implementation	9.700.000 eur	The proposed budget encompasses the following sub-interventions: developing urban planning principles that integrate energy-saving and energy-generating methods, nature-based solutions, sustainable mobility, smart city initiatives, and UHI mitigation to improve citizens' quality of life and prevent urban migration to suburban and peri-urban areas. These principles will be based not only on technical expertise from Coalition partners but also on input from citizens and stakeholders. Additionally, the General Spatial Planning of Cluj-Napoca will be updated to incorporate strategies for reducing CO2 emissions in all targeted areas. Furthermore, at least 2 Zonal Urban Plans will be created for climate-neutral neighborhoods and around 8 international contests will be held for solutions to the major urban renewal interventions outlined in the Action Plan. The budget also includes costs associated with several incentives designed to encourage climate-friendly individual behaviors, such as tax reductions for green commercial buildings and the local implementation of the national RABLA program, which will offer financial support (in the form of discounts from the total price of the new purchased e-vehicle) to residents who purchase electric cars in exchange for giving up their old, polluting vehicles.
Developing a comprehensive masterplan model for transforming 1 high density apartment block neighborhood into a climate neutral district	95.000 eur	The allocated budget will cover the development of a masterplan for comprehensive urban renewal, which will focus on a single neighborhood. The plan will prioritize various initiatives such as sustainable mobility, the expansion of green spaces and blue-green corridors, reducing energy consumption in public spaces like street lighting and sprinkler systems, ensuring pedestrian-friendly access to amenities, decreasing the urban heat island (UHI) effect, implementing Smart City solutions, increasing accessibility for vulnerable groups, and enhancing the overall quality of life in the area to discourage urban migration to suburban and peri-urban regions. The existing local policies will be taken into account, but the plan will propose new policies if new discoveries demonstrate their necessity.
Elaborating a detailed proposal for transforming one pilot area of the 1 neighbourhood into a climate neutral demo district	117.000 eur	The budget estimate encompasses a particular region of the neighborhood selected by the Cluj-Napoca Municipality that will be subject to the detailed proposal for transforming it into a climate neutral space, with input from citizens and stakeholders. A financially viable and detailed proposal will be devised for the chosen area, using a comprehensive plan for the creation of a climate-neutral neighborhood. This plan will integrate all the emission domains in the final solution.
Developing a ToR model for the renovation of block of flats situated in high density multi-apartment neighborhoods in order to	58.000 eur	The proposed Terms of Reference (ToR) will be structured in a modular manner, facilitating the integration of relevant components into building renovation proposals tailored to meet the specific requirements of densely populated apartment-block neighborhoods. The ToR will also include an option to expand living space by constructing an outer shell,

accommodate both nZEB targets and the need to expand the living area		with the primary aim of increasing the livable area, enhancing apartment comfort, and creating commercial/recreational spaces that could generate income for residents or encourage community activities. The proposal has several objectives. Firstly, improving the quality of life, both inside and outside the building, including its appearance, can significantly reduce the number of people who move to suburban or peri-urban areas in search of better living conditions. Secondly, the possibility of constructing additional commercial spaces or housing units can attract private developers who can recover their costs through renting or selling these new spaces. Moreover, having more commercial areas in proximity to residents can decrease the need for travel by car to fulfill personal needs. Lastly, the ToR model will be applied to a building that can function as a pilot project.
Elaborating a model for improving the governance of condominiums and their integration in the local climate neutrality ecosystem	30.000 eur	The Model for improving condominium governance will streamline the way in which residential blocks are managed (currently a deficient, problematic management) and the new local public policy tools will accelerate the individual adoption of climate neutral practices. Within the improved condominium governance model, homeowners associations will play a stronger role and proactive citizens investing in thermal rehabilitation will benefit from reduced costs and faster implementation of energy renovation works. This measure will build on the existing investments of individual owners into energy efficiency of their building, identifying bottlenecks, engaging citizens in the reform process and promoting improved quality in the delivery.
Public promotion, communication and awareness	920.000 eur	The estimated budget encompasses the communication and promotional activities that the Municipality will carry out over the next 8 years to raise awareness and educate citizens, stakeholders, and partners about climate neutrality. This initiative aims to target both online platforms such as social media pages, virtual platforms, interactive community activities, gamification sessions, etc. and offline methods such as organizing the annual International Carbon Neutrality Summit, local events in neighborhoods and metropolitan areas, physical communication and promotional campaigns about measures that can be taken by citizens and the ecosystem to mitigate the negative impact on the climate, thematic conferences, etc.
Collaborative, innovative, integrative and tech-intensive development of the Climate Neutrality Digital Twin	1.000.000 eur	This intervention represents a ground-breaking effort in the European green and digital transition movement: the development of Digital Twin technology that can collect, monitor, and forecast social and environmental behaviors. The goal is to integrate the findings and models from previous interventions, and with the input of stakeholders, co-design and develop a full-scale solution to capture the various pathways towards climate.
Reflexive governance and CCC annual iterations	80.000 eur	The budget includes funding for running the reflexive governance process within the Net Zero City Coalition. This will involve coordinating and working within the Coalition to implement, monitor, and update the Action Plan as well as all deliverables and related documents. Additionally, it includes iterations of the CCC, within broader sessions of sensemaking and strategic learning.

5.3 Module C-3 Financing of Action Portfolio

C-3.1: SUMMARY OF INTERVENTIONS WITH COST IMPLICATION (TO BE UNPACKED IN INVESTMENT PLAN)					
ACTION / INTERVENTION NAME	**RESPONSIB. ENTITY AND PERSON**	**START/ END DATE**	**FIELD OF ACTION**	**IMPACT**	**TOTAL COST ESTIMATED**
Efficient district heating and cooling in Cluj-Napoca	Municipality, Public Heating Service Operator, Energy Manager	2023 - 2026	Energy systems	45,243 CO2 tons/ year CO2 reduction Increasing the technological level of the district heating system Reducing electricity costs and implicitly reducing the risk of energy poverty Increasing the Municipality's innovation potential	€ 352,000,000.00
Local (off-site) renewable energy generation and integrating RES into private and public buildings	Municipality, Public Entities headquartered in targeted public buildings, Associations of house owners and citizens in targeted private buildings, Energy Manager, TREC	2023 - 2030	Energy systems	37000 tons CO2 reduction Promoting and encouraging the concept of passive buildings Stimulation of clean electricity supply practices Reducing the burden of electricity costs Encouraging green investments	€ 144,000,000.00
Energy-efficient public lighting	Municipality and Public Lighting Service Operator	2023 -- 2030	Energy systems	3000 tons CO2 reduction Improved safety city-wide Improved quality of life	€ 13,000,000.00

C-3.1: SUMMARY OF INTERVENTIONS WITH COST IMPLICATION (TO BE UNPACKED IN INVESTMENT PLAN)					
ACTION / INTERVENTION NAME	**RESPONSIB. ENTITY AND PERSON**	**START/ END DATE**	**FIELD OF ACTION**	**IMPACT**	**TOTAL COST ESTIMATED**
Major green public transport infrastructure and reduction of congestion in the city	Municipality, Ministry of Transport, Public Transport Operator, Individual Citizens, Cluj County Council, National Railway Company	2023 - 2026	Mobility & Transport	25,377 tons CO2 reduction Reduced traffic congestion Decrease in number of traffic accidents Improved quality of life and safety	€ 4,351,020,000.00
Promotion of large-scale use of Electric Vehicles	Municipality	2023 - 2030	Mobility & Transport	15,000 tons CO2 reduction More climate-neutral behaviours among citizens Improved health by reducing pollution caused by vehicles - increased air quality Higher percentage of green mobility Fewer road deaths Less noise	€ 324,000,000.00
Extension of Walkable City Program	Municipality, Local NGOs that are active in the field of citizens engagement, active	2023 - 2026	Mobility & Transport	2000 tons CO2 reduction Less road congestion Healthier, active neighbourhood activities	€ 219,000,000.00

C-3.1: SUMMARY OF INTERVENTIONS WITH COST IMPLICATION (TO BE UNPACKED IN INVESTMENT PLAN)					
ACTION / INTERVENTION NAME	**RESPONSIB. ENTITY AND PERSON**	**START/ END DATE**	**FIELD OF ACTION**	**IMPACT**	**TOTAL COST ESTIMATED**
	citizenship, community initiatives			Fewer road deaths, less noise A cleaner, more beautiful and a more valuable urban environment A city friendlier to children and the elderly	
Extension of Cluj Bike Program	Municipality	2023 - 2030	Mobility & Transport	7100 tons CO2 reduction More climate-neutral behaviours among citizens Improved health by reducing pollution caused by vehicles - increased air quality Higher percentage of green and active mobility – health and environmental benefits Less noise Fewer road accidents and deaths	€ 15,000,000.00
Cluj Circular City	Municipality	2023 - 2030	Waste & circular economy	16.000 tons CO2 reduction More climate-neutral behaviours among citizens and more intensive circular economy practices Improved health by reducing pollution caused by waste - increased air quality	€ 16,000,000.00

C-3.1: SUMMARY OF INTERVENTIONS WITH COST IMPLICATION (TO BE UNPACKED IN INVESTMENT PLAN)					
ACTION / INTERVENTION NAME	**RESPONSIB. ENTITY AND PERSON**	**START/ END DATE**	**FIELD OF ACTION**	**IMPACT**	**TOTAL COST ESTIMATED**
				Cleaner, more beautiful and more valuable urban environment – improved quality of life	
Extension of "Green Cluj" Program	Municipality, The Order of Romanian Architects (especially Transilvania branch) and their (inter)national partners, National Environmental Agency, UASVM, Association for Intercommunity Development CMA, Cluj County Council	2023 - 2030	Green infrastructure & nature based solutions	380 tons CO2 reduction Improved citizens' well being - healthier lifestyle (reduced pollution, improved air quality, reduced sedentarism), increased quality of life More beautiful and pleasant landscape Reduced effects of UHI More climate-neutral behaviours among citizens (parks attract people to spend there their free = less time spent at home = less energy consumed)	€ 195,000,000.00
Green-blue corridors	Municipality, Association for Intercommunity Development CMA, Cluj County Council, suburbs' Public Administrations	2023 - 2030	Green infrastructure & nature based solutions	2650 tons CO2 reduction Protection and increase of natural riverbanks Improved water quality and biodiversity Improved quality of life, health and well-being: recreational places Increased natural	€ 87,000,000.00

C-3.1: SUMMARY OF INTERVENTIONS WITH COST IMPLICATION (TO BE UNPACKED IN INVESTMENT PLAN)					
ACTION / INTERVENTION NAME	**RESPONSIB. ENTITY AND PERSON**	**START/ END DATE**	**FIELD OF ACTION**	**IMPACT**	**TOTAL COST ESTIMATED**
				movement of wildlife Open space to absorb and filter rainwater using nature-based solutions Reduced risks of climatic calamities (floods) Active and green mobility - more climate-neutral behaviours among citizens	
Green roofs and facades for public and private buildings	Municipality, Public Entities headquartered in targeted public buildings, Associations of house owners and citizens in targeted private buildings	2023 - 2030	Green infrastructure & nature based solutions	175 tons CO2 reduction More climate-neutral behaviours among citizens and entities Improved quality of life - more beautiful and pleasant urban landscape Reduced effects of UHI Improved health - increased air quality Mitigation of stormwater runoff. Welcome boost to biodiversity Support for biodiversity net gain targets Improvements in the life span of roofing	€ 10,000,000.00
Integrated renovation of	Municipality, The Order of	2023 -	Built environme	70000 tons CO2	€

C-3.1: SUMMARY OF INTERVENTIONS WITH COST IMPLICATION (TO BE UNPACKED IN INVESTMENT PLAN)					
ACTION / INTERVENTION NAME	**RESPONSIB. ENTITY AND PERSON**	**START/ END DATE**	**FIELD OF ACTION**	**IMPACT**	**TOTAL COST ESTIMATED**
dense multi-apartment residential areas and their transition to climate neutral district	Romanian Architects (especially Transilvania branch) and their (inter)national partners, Associations of house owners and citizens in targeted private buildings, TUCN, BBU, TREC, TITC	2030	nt	reduction Lower individual utility bills – reduced risk of energy poverty Stabilisation of electricity prices and volatility More climate-neutral behaviours among citizens and entities Improved quality of life - more beautiful and pleasant urban landscape Reduced effects of UHI Improved health - increased air quality Greener and more active mobility Reduced sedentary behaviours More intensive circular economy practices Less traffic congestion - fewer accidents and reduced risk of death Increased safety and social inclusion	180,000,000.00
Energy Renovation of Public Buildings	Municipality, Public Entities headquartered in targeted public buildings,	2023 - 2030	Built environment	5000 tons CO2 reduction Increased quality conditions of public buildings	€ 90,000,000.00

C-3.1: SUMMARY OF INTERVENTIONS WITH COST IMPLICATION (TO BE UNPACKED IN INVESTMENT PLAN)					
ACTION / INTERVENTION NAME	**RESPONSIB. ENTITY AND PERSON**	**START/ END DATE**	**FIELD OF ACTION**	**IMPACT**	**TOTAL COST ESTIMATED**
	Energy Manager			Improved public services Reduced management costs of public buildings due to lower electricity costs	
Energy Efficiency of Commercial Buildings and brownfields redevelopment	Municipality	2023 - 2030	Built environment.	12000 tons CO2 reduction Improved urban landscape Improved quality of life Reduced effect of UHI Community gains Increased attractiveness for investors	€ 81,000,000.00
Cluj NetZero Coalition	All stakeholders foreseen for the NZC Action Plan implementation	2023 - 2030	Soft interventions	3400 tons CO2 reduction Stronger local commitment Improved quality of life Ownership of the the overall objectives Integrated and coordinated efforts, which could enable higher GHG reduction Improved communication between all stakeholders Strengthen community cohesion and collaboration	€ 1.000,000.00

C-3.1: SUMMARY OF INTERVENTIONS WITH COST IMPLICATION (TO BE UNPACKED IN INVESTMENT PLAN)					
ACTION / INTERVENTION NAME	**RESPONSIB. ENTITY AND PERSON**	**START/ END DATE**	**FIELD OF ACTION**	**IMPACT**	**TOTAL COST ESTIMATED**
				Increased chances of innovation and improvements Improved local understanding	
Improved local urban regulations and policies for achieving climate neutrality	All stakeholders foreseen for the NZC Action Plan implementation	2023 - 2030	Soft interventions	63000 tons CO2 reduction Stronger local commitment Improved quality of life Ownership of the the overall objectives Improved performance of public sector employees and quality of public service Behavioural changes Real time adjustments to the proposals made, based on changing circumstances	€ 10,000,000.00
Communication, dissemination and scalability	All stakeholders foreseen for the NZC Action Plan implementation	2023 - 2030	Soft interventions	13600 tons CO2 reduction Stronger local commitment Improved quality of life Ownership of the the overall objectives Improved performance of public sector employees and quality of public service Behavioural changes	€ 2,000,000.00

C-3.1: SUMMARY OF INTERVENTIONS WITH COST IMPLICATION (TO BE UNPACKED IN INVESTMENT PLAN)					
ACTION / INTERVENTION NAME	**RESPONSIB. ENTITY AND PERSON**	**START/ END DATE**	**FIELD OF ACTION**	**IMPACT**	**TOTAL COST ESTIMATED**
				Real time adjustments to the proposals made, based on changing circumstances.	

The overall budget for the actions incorporated in this plan amounts to € 6,090,000,000.00 The following table displays the percentage that each action represents in the total budget.

PERCENTAGE OF THE TOTAL BUDGET	
ACTIONS	**% OF THE TOTAL BUDGET**
Efficient district heating and cooling in Cluj-Napoca	5.78 %
Local (off-site) renewable energy generation and integrating RES into private and public buildings	2.36 %
Energy-efficient public lighting	0.21 %
Major green public transport infrastructure and reduction of congestion in the city	71.44 %
Promotion of large-scale use of Electric Vehicles	5.32 %
Extension of Walkable City Program	3.6 %
Extension of Cluj Bike Program	0.25 %
Cluj Circular City	0.26%
Extension of ”Green Cluj” Program	3.20 %
Green-blue corridors	1.43 %
Green roofs and facades for public and private buildings	0.16 %
Integrared renovation of dense multi-apartment residential areas and their transition to climate neutral district	2.96 %
Energy Renovation of Public Buildings	1.48%
Energy Effiency of Commercial Buildings and brownfields revedelopment	1.33 %
Cluj NetZeroCoalition	0.0002 %
Improved local urban regulations and policies for achieving climate neutrality	0.002 %
Communication, dissemination and scalability	0.003 %

The investment plan provides a thorough account of the costs, both in relation to the Municipality's current spending and holistically.

6 Outlook and next steps

PLANS FOR NEXT CCC AND ACTION PLAN ITERATION

During the preparation phase of the Climate Contract documents, **some methodological (and not only) issues occurred, that also have a potential impact on the implementation of the Action Plan**. First and the most important one is the GHG emissions monitoring and reporting procedures and practices at national and city level. Up to now, only two detailed inventories of CO2 emission have been conducted at local level, one during the elaboration of the first SEAP in 2011 and one associated with the preparation of the SECAP in 2021. The Municipality was one of the first in Romania to hire a Energy Manager, namely a private operator that provides consultancy and technical assistance for planning, implementation and monitoring of energy-related interventions. This company was also in charge of preparing the SECAP for 2030. The resources currently allocated by the Municipality and the mandate of this Energy Manager are, however, limited and do not cover all sources of emissions and types of gases needed for an exhaustive and periodically updated climate neutrality dashboard to accompany the implementation of the Action Plan. Thus, the consolidation of the monitoring system is the main challenge for 2030. Secondly, the period of time available for the preparation of the Action Plan was enough to actively involve the entire ecosystem but insufficient to carry out a climate neutrality-related survey among citizens, especially in the new global context of rising risks for energy poverty. This analysis was however included as a starting point in the project proposal submitted under NetZeroCities - Horizon 2020. Thirdly, the preparation of the Investment Plan was hampered by the high inflation rates in Romania (over 15% year-to-year) and the EU and by the high risk of any investment, operational and maintenance cost projection for 2030. The costs of various imported building materials (including those coming from ex-Soviet countries), to give just an example, tripled in the last two years. The high energy prices can also impact the individual behaviours, considering that preliminary data on household consumption indicates a 8% drop in the first three quarters of 2022 against the same period of 2021. To conclude, we are expecting that during the implementation phase of the Investment Plan updates of the financial indicators will be needed.

In what concerns the per se implementation of the Action Plan **we envisage both some critical milestones and iterations**, as follows:

- The Municipality will begin the implementation of many climate neutrality-related investment projects under NRRP (over 50 projects for energy renovation of public and residential buildings, smart city, green public transport, circular economy etc. have been submitted and selected for financing) and will submit other projects for financing under the 2021-2027 ROP (urban renewal, new parks, blue-green corridors, electric and hydrogen buses and trolleybuses, cycling infrastructure, energy renovation of public and private buildings etc.). Last but not least, in 2023 the most important metropolitan sustainable mobility investment project (first subway line), should enter the implementation phase. Overall, 2023 will bring much clarity on the maturity of measures included in the Action Plan. This might also require an update of the Action Plan and Investment Plan at the end of 2023/beginning of 2024.

  For 2023, another milestone will be the result of the evaluation phase for one major project proposals with high impact on the Action Plan: the project that was be submitted in January 2023 under the EUI - Innovative Actions (New European Bauhaus) call and it is in strong synergy with the project submitted under the NetZeroCities - Horizon 2020 Pilot Cities Call and fortunately Cluj-Napoca became one of the 53 selected cities.This 2 projects are strongly interconnected and target the climate neutrality of the largest and most dense residential area in the city, with ¼ of the total number of residents, with a large impact on the implementation of the

overall Climate Neutrality Action Plan.

- For 2024-2027, we expect the focus to be on the implementation of the NRRP projects (which have to be completed by the end of 2026), 2021-2027 ROP investments and all three major mobility projects financed from various sources (subway, metropolitan train and metropolitan belt). The ”soft interventions” (such as urban planning or behaviour changes) will also be tested in the pilot neighbourhood of Mănăștur (in the framework of the NetZeroCities and EUI projects). By the end of 2024, we expect the Climate Neutrality Coalition to be fully operational and to support the update, implementation and monitoring of the Action Plan. Overall, this interval of time will bring the largest investment in the history of the city, all of them focused on reducing the GHG emissions. It is also important to mention that 2027 will also be extremely important for the configuration of the post-2027 programming period at national and regional level, requiring a strong lobby of the local ecosystem for more resources allocated to climate neutrality. Considering that Cluj-Napoca has one of the most stable governance structures in Romania (same Mayor and a strong majority in the Local Council since 2005), we are not expecting the local elections in 2024 to bring significant changes of vision.
- For 2028-2030 the focus will be on scaling the pilot ”soft interventions” tested in Mănăștur neighbourhood at city and even metropolitan level, to finalise all the invest projects financed under 2021-2030 ROP and the three major sustainable mobility projects, with large impact on reducing the GHG emissions in the building and transport sector. Also, for the beginning of 2028 we are predicting that all strategic documents (IUDS, SUMP, SACEP etc.) for the post 2027 programming cycle will be updated, together with the Action Plan, emphasising once more the need to continue and even expand the interventions related to climate-neutrality.

Concluding, **the present Action Plan delineates our envisioned path towards decarbonization, which is informed by our obligation as a holder of the Mission Label to generate systemic innovations and transformative actions in all emission domains, capitalizing on all our available systems**. To accomplish this objective, we seek the support of both entities and citizens, whom we intend to keep engaged throughout the implementation of the Action Plan via our Cluj Net Zero City Local Coalition. We acknowledge that **our pursuit entails a great deal of work**, but we are convinced that, by adopting a collaborative strategic approach, we can rally citizens, companies, organizations, and institutions around our common ambition to create an unprecedented urban transition towards climate neutrality.

We recognize that **this pursuit requires not only horizontal and vertical coordination but also transversal interventions**, that will involve a mix of local actors. Hence, we pledge to coordinate all such endeavours to facilitate Cluj-Napoca's transition to climate neutrality, positioning our city as a hub for the deployment and demonstration of low-carbon investments in infrastructure, people, and the environment. **Together with Bucharest and Suceava, Cluj-Napoca is poised to assume the role of a climate neutrality ambassador for Romanian cities.**